COURSE STRUCTURE

AND

DETAILED SYLLABUS

DEPARTMENT OF INFORMATION TECHNOLOGY

(Applicable for batches admitted from 2020-2021)

VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY
(Autonomous)

Approved by AICTE, Permanently Affiliated to JNTUK,

NAAC Accredited with 'A' Grade, ISO 9001:2015 Certified

Nambur (V), Pedakakani (M), Guntur (Dt.), Andhra Pradesh – 522 508

COURSE STRUCTURE

Definition of Credit (C)

1 Hour Lecture (L) per week	1 Credit
1 Hour Tutorial (T) per week	1 Credit
1 Hour Practical (P) per week	0.5 Credit

Structure of B. Tech program Regulation R20

S.No.	Category	Code	Suggested Breakup of Credits by AICTE	Suggested Breakup of Credits by APSCHE	Breakup of Credits
1	Humanities and Social Sciences including Management courses	HS	12	10.5	10.5
2	Basic Science courses	BS	25	21	21
3	Engineering Science courses including workshop, drawing, basics of electrical/ mechanical/ computer etc	ES	24	24	22.5
4	Professional core courses	PC	48	51	52.5
5	Professional Elective courses relevant to chosen specialization/ branch	PE	18	15	15
6	Open subjects – Electives from other technical and /or emerging subjects	OE	18	12	12
7	Project work, seminar and internship in industry or elsewhere	PR	15	16.5	16.5
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	NC	Non-Credit	Non-Credit	Non-Credit
9	Skill Oriented Courses	SC	--	10	10
Total			**160**	**160**	**160**

SEMESTER-WISE STRUCTURE OF CURRICULUM

Course structure for eight semesters during four years of study is as follows

I Year I Semester (Semester-1)

S.No.	Course Code	Course Name	L	T	P	C
1	BS1101	Mathematics-I	2	1	0	3
2	BS1102	Applied Chemistry	3	0	0	3
3	ES1101	Basic Electrical and Electronics Engineering	2	1	0	3
4	ES1102	Computer Engineering Workshop	1	0	4	3
5	ES1103	Problem Solving Using C	2	1	0	3
6	BS1101L	Applied Chemistry Lab	0	0	3	1.5
7	ES1101L	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
8	ES1102L	Problem Solving Using C	0	0	3	1.5
					Total Credits	**19.5**

Category		Credits
BS	Basic Science Courses	3+3+1.5=7.5
ES	Engineering Science Courses	3+3+3+1.5+1.5=12
HS	Humanities and Social Sciences including Management courses	0
	Total Credits	**19.5**

I Year II Semester (Semester-2)

S.No.	Course Code	Course Name	L	T	P	C
1	BS1201	Mathematics - II	2	1	0	3
2	BS1202	Applied Physics	2	1	0	3
3	HS1201	Communicative English	3	0	0	3
4	ES1201	Problem solving using Python	3	0	0	3
5	ES1202	Digital Logic Design	2	1	0	3
6	BS1201L	Applied Physics Lab &Virtual Lab	0	0	3	1.5
7	HS1201L	Communicative English Lab	0	0	3	1.5
8	ES1201L	Problem solving using Python Lab	0	0	3	1.5
9	MC1201	Environmental Science	2	0	0	0
					Total	**19.5**

Category		Credits
BS	Basic Science Courses	3+3+1.5=7.5
ES	Engineering Science Courses	3+3+1.5=7.5
HS	Humanities and Social Sciences	3+1.5=4.5
	Total Credits	**19.5**

II Year I Semester (Semester-3)

S.No.	Course Code	Course Name	L	T	P	C
1	BS2101	Mathematics – III	2	1	0	3
2	PC2101	Mathematical Foundations of Computer Science	2	1	0	3
3	PC2102	Data Structures	3	0	0	3
4	PC2103	Java Programming	3	0	0	3
5	PC2104	Software Engineering	3	0	0	3
6	PC2101L	Data Structures Lab	0	0	3	1.5
7	PC2102L	Java Programming Lab	0	0	3	1.5
8	PC2103L	UML Lab	0	0	3	1.5
9	SOC2101	Skill Oriented Course-1 (Advanced Python Programming)	0	0	4	2
10	MC2101	Essence of Indian Tradition and Knowledge	2	0	0	0
					Total	**21.5**

Category		Credits
BS	Basic Science Courses	3
PC	Professional core courses	3+3+3+3+1.5+1.5+1.5=16.5
SOC	Skill Oriented Course	2
	Total Credits	**21.5**

II Year II Semester (Semester-4)

S.No.	Course Code	Course Name	L	T	P	C
1	BS2201	Probability and Statistics	2	1	0	3
2	ES2201	Computer Organization	3	0	0	3
3	PC2201	Operating Systems	3	0	0	3
4	PC2202	Database Management Systems	3	0	0	3
5	PC2203	Advanced Java Programming	3	0	0	3
6	PC2201L	R Programming Lab	0	0	3	1.5
7	PC2202L	Database Management Systems Lab	0	0	3	1.5
8	PC2203L	Advanced Java Programming Lab	0	0	3	1.5
9	SOC2201	Skill Oriented Course-2 (Mobile App Development)	0	0	4	2
					Total	**21.5**
		Internship/Community Service Project 2 Months (Mandatory) during summer vacation				
	Minor	Data Structures/Data Base Management Systems	3	1	0	4
	Honors	Any Course from the Pool as per the Opted Track	4	0	0	4

Category		Credits
BS	Basic Science Courses	3
ES	Engineering Science Courses	3
PC	Professional core courses	3+3+3++1.5+1.5+1.5=13.5
SOC	Skill Oriented Course	2
	Total Credits	**21.5**

S.No.	Course Code	Course Name	L	T	P	C
1	Professional Elective 1	**Can be contemporary Online Certification Courses which are conducted under standard technical bodies or higher learning institutions such as SWAYAM/ NPTEL with 12 weeks duration	0	0	0	3

****** A candidate shall complete at least one MOOC course as Professional Elective course 2 of 12 weeks duration.

Enrollment of MOOC course will be initiated from the date of commencement of class work for the second year second semester.

MOOC Course completion certificate must be submitted on or before the completion of fourth year first semester to consider it for regular evaluation, otherwise it will be considered as supplementary.

Student has to pursue and acquire a certificate for a MOOC course only from SWAYAM/NPTEL through online with the approval of Head of the Department concerned in order to earn the 3 credits. List of courses will be announced by the respective board of studies at the time of commencement of classwork for second year second semester.

III Year I Semester (Semester-5)

S.No.	Course Code	Course Name	L	T	P	C
1	PC3101	Computer Networks	3	0	0	3
2	PC3102	Artificial Intelligence	3	0	0	3
3	PC3103	Automata Theory and Compiler Design	3	0	0	3
4	PE3101	Professional Elective-II A. Data Warehousing and Data Mining B. Software Project Management C. Computer Graphics D. E-Commerce	3	0	0	3
5	OE3101	Open Elective-I /Job Oriented Course I Open Electives offered by other departments/Job Oriented Course : Front End Development	3	0	3	3
6	PC3102L	Unix and Network Programming Lab	0	0	3	1.5
7	PC3103L	Front End Development Lab	0	0	3	1.5
8	SAC3101	Skill Advanced Course: .Net Eco Systems	0	0	4	2
9	MC3101	Indian Constitution	2	0	0	0
10	PR	Summer Internship / Community Service Project 2 Months (Mandatory) after second year (to be evaluated during V semester)	0	0	0	1.5
					Total	**21.5**
	Minor	Operating Systems/ Java Programming	3	1	0	4
	Honors	Any Course from the Pool as per the Opted Track	4	0	0	4

Category	Credits

HS	Humanities and Social Science Courses	0
PC	Professional Core Courses	3+3+3+1.5+1.5=12
PE	Professional Elective Courses	3
OE	Open Elective Courses/Job Oriented Elective Courses	3
SAC	Skill Advanced Course/Soft Skills Course	2
PR	Summer Internship	1.5
MC	Mandatory course (AICTE)	0
	Total Credits	**21.5**

III Year II Semester (Semester-6)

S.No.	Course Code	Course Name	L	T	P	C
1	HS3201	Engineering Economics and Management	3	0	0	3
2	PC3202	Design and Analysis of Algorithms	3	0	0	3
3	PC3203	Cryptography and Network Security	3	0	0	3
5	OE3201	Open Elective-II /Job Oriented Course II Open Electives offered by other departments/Job Oriented Course: Machine Learning	3	0	0	3
6	PC3201L	Design and Analysis of Algorithms Lab	0	0	3	1.5
7	PC3202L	Artificial Intelligence & Machine Learning Lab	0	0	3	1.5
8	PC3203L	Cryptography Lab	0	0	3	1.5
9	SAC3201	Skill Advanced Course-2 (Soft Skills)	0	0	4	2
	Mc	Entrepreneurial Skill Development	2	0	0	0
					Total	**18.5**
		Industrial/Research Internship 2 Months (Mandatory) during summer vacation				
	Minor	Computer Networks/ Data Base Management Systems	3	0	2	4
	Honors	Any Course from the Pool as per the Opted Track	4	0	0	4

Category		Credits
HS	Humanities and Social Science Courses	3
PC	Professional Core Courses	3+3+1.5+1.5+1.5=10.5
OE	Open Elective Courses/Job Oriented Elective Courses	3
SAC	Skill Advanced Course/Soft Skills Course	2
	Total Credits	**18.5**

IV Year I Semester (Semester-7)

S.No.	Course Code	Course Name	L	T	P	C
1	HSE4101	Universal Human Values-2: Understanding Harmony	3	0	0	3
2	PE4101	Professional Elective-III A. Big Data Analytics B. Software Testing Methodologies C. Image Processing D. Devops	3	0	0	3
3	PE4102	Professional Elective-IV A. Mobile Computing B. Deep Learning C. Multimedia and Animation D. Cyber Security and Forensics	3	0	0	3
4	PE4103	Professional Elective-V A. Ui/Ux Design B. No SQL Databases C. Human Computer Interaction D. Network Programming	3	0	0	3
5	OE4101	Open Elective-III /Job Oriented Course III Open Electives offered by other departments/Job Oriented Course: Data Science	3	0	0	3
6	OE4102	Open Elective-1V /Job Oriented Course IV Open Electives offered by other departments/Job Oriented Course : Blockchain Applications using Solidity	3	0	0	3
7	SAC4101	Selenium/Salesforce Automation /PowerBI	0	0	4	2
8	PR	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)	0	0	6	3
					Total	**23**
	Minor	Software Engineering / Object Oriented Software Engineering	3	0	2	4
	Honors	Any Course from the Pool as per the Opted Track	4	0	0	4

Category		Credits
PC	Humanities and Social Sciences	3
PE	Professional Elective Courses	3+3+3=9
OE	Open Elective Courses/Job Oriented Elective Courses	3+3=6
SAC	Skill Advanced Course/Soft Skills Course	2
PR	Summer Internship	3
	Total Credits	**23**

IV Year II Semester (Semester-8)

S. No	Subject code	Course Name	L	T	P	C
1	PROJ4201	Major Project Project work, seminar, and Internship in industry	0	0	0	12
		Internship (6 months)				
					Total Credits	**12**

Open Elective Courses/Job Oriented Courses

Open Elective I (3-1)	Open Elective2 (3-2)	Open Elective3 (4-1)	Open Elective4(4-1)
Internet of Things	Machine Learning (Job Oriented Course)	Data Science (Job Oriented Course)	Blockchain Technologies (Job Oriented Course)
E-Waste Management	Environment Pollution and Control	Supply Chain Management	Optimization Techniques
Green Buildings	Robotics	Disaster Management	Wireless Sensor Networks
Full stack (Job Oriented Course)	Mobile Adhoc Networks	Cyber Security	Enterprise Resource Planning

Professional Elective Courses

Professional Elective- I (3-1)	Professional Elective- II(3-2)	Professional Elective- III(4-1)	Professional Elective- IV(4-1)	Professional Elective- V(4-1)
Software Project Management	MOOCS/ NPTEL/ SWAYAM	Software Testing Methodologies	Agile Technologies	Ui/Ux Design
Data warehousing and Data Mining		Big Data Analytics	Deep Learning	No SQL Databases
Computer Graphics		Image Processing	Multimedia & Application Development	Human Computer Interaction
E-Commerce		Devops	Mobile Computing	.Net Frameworks

Courses for Honors degree

Pool 1 (Software Design)	Pool 2 (Software Development)	Pool 3 (Artificial Intelligence & Machine Learning Pool)	Pool4 (Edge Computing)	Pool 5 (Networks & Cyber Security)
Object Oriented Analysis and Design	J2EE and J2ME	Natural Language Processing	High Performance Computing	Advanced Database Management Systmes
Software Architecture & Design Patterns	SAS (Statistical Analysis System)	Sentiment Analysis	Distributed Computing	TCP/IP Protocol Suite
Software Design and System	Fog Computing	Semantic Web	Multi Agent Systems	Bitcoin and Cryptocurrency Technologies

Integration				
Software Quality Assurance	Advanced Data Mining Tools (Industry specific)	Information Retrieval Systems	Quantum Computing	Cyber Laws
Data Modelling and Visualization	Testing Tools	Bio Imaging	Grid and Cluster Computing	Ethical Hacking
MOOC-1*(NPTEL/SWAYAM) Duration: 12 Weeks minimum				
MOOC-2*(NPTEL/SWAYAM) Duration: 12 Weeks minimum				

*Course/subject title can't be repeated

Note:

1. **Students has to acquire 16 credits with minimum one subject from each pool**
2. **Compulsory MOOC/NPTEL course for 4 credits (2 course, each 2 credited)**

Minor Courses Offered By IT Department:

1. Java Programming
2. Advanced Java Programming
3. Operating Systems
4. Database Management Systems
5. Computer Networks
6. Web Technologies
7. Free Open Source Software
8. .Net Framework
9. Full stack Development
10. Data Mining

VVIT Life skill courses

The following courses are admitted to be the **courses beyond curriculum** to improve individual life skills. These courses and will be demonstrated in the class room and will be having an internal assessment for satisfactory.

S. No	Year and Semester	Course Name
1	I Year I Semester (Semester-1)	Quantitative Aptitude
2	I Year II Semester (Semester-2)	Verbal Ability
3	II Year I Semester (Semester-3)	Understanding Self for Effectiveness
4	II Year II Semester (Semester-4)	Design Thinking
5	III Year I Semester (Semester-5)	Stress and Coping Strategies
6	III Years II Semester (Semester-6)	Research Skills

I- Year I - Semester	Name of the Course	L	T	P	C
BS1101	Mathematics -I	2	1	0	3

Course Objectives

1. This course will illuminate the students in the concepts of calculus.
2. To enlighten the learners in the concept of differential equations and multivariable calculus.
3. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit-1

Differential equations of first order and first degree

Linear differential equations-Bernoulli's equations - Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories – Electrical circuits.

Unit-2

Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x^n , $e^{ax}V(x)$ and $x^nV(x)$ - Method of Variation of Parameters.

Applications: LCR circuit – Simple harmonic motion

Unit-3

Mean value theorems

Mean value theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

Unit-4

Partial differentiation

Introduction – Homogeneous function – Euler's theorem - Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

Unit-5

Multiple integrals

Double integrals (Cartesian and Polar) – Change of order of integration – Change of variables (Cartesian to Polar) –Triple integrals.

Applications: Areas by double integrals and Volumes by triple integrals.

TEXT BOOKS

1. **B.S. Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **B.V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS

1. **H. K. Das,** Advanced Engineering Mathematics, 22nd Edition, S. Chand & Company Ltd.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

Course Outcomes: At the end of the course, the student will be able to

CO1. Solve the differential equations related to various engineering fields.
CO2. Utilize mean value theorems to real life problems.
CO3. Familiarize with functions of several variables which is useful in optimization.
CO4. Apply double integration techniques in evaluating areas bounded by region.
CO5. Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional and 3 – dimensional coordinate systems.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

Micro-Syllabus of MATHEMATICS – I (Calculus)

Unit-1: Differential equations of first order and first degree:
Linear differential equations-Bernoulli's equations - Exact equations and equations reducible to exact form.
Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories – Electrical circuits.

Unit	Module	Micro content
1a. & 2a. Differential equations of first order and first degree	Linear differential equations	Solution of Linear differential equations in $'y'$
		Solution of Linear differential equations in $'x'$
		Initial value problem
	Non-Linear differential equations	Bernoulli's equations
		Equations reducible to Linear differential equations
	Exact differential equations	Solution of Exact differential equations
	Non-Exact differential equations	Equations reducible to Exact equations
		Integrating factor found by inspection
		Integrating factor of a Homogeneous equation
		Integrating factor for an equation of the type $f_1(xy)ydx + f_2(xy)xdy = 0$
		Integrating factor, if $\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}$ be a function of $'x'$
		Integrating factor, if $\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}$ be a function of 'y'
1b. & 2b. Applications	Application of differential equations of first order and first	Newton's Law of cooling
		Law of natural growth and decay
		Orthogonal trajectories

	degree	Electrical circuits

Unit-2: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x^n , $e^{ax}V(x)$ and $x^n V(x)$ - Method of Variation of Parameters.

Applications: LCR circuit – Simple harmonic motion

Unit	Module	Micro content
3a. & 4a. Linear differential equations of higher order	Homogeneous equations of higher order with constant coefficients	Finding the Complementary function
	Non-homogeneous equations of higher order with constant coefficients	Particular integral of the type 'e^{ax}'
		Particular integral of the type 'sinax' (or) '$\cos ax$'
		Particular integral of the type x^n
		Particular integral of the type 'e^{ax} V(x)'
		Particular integral of the type 'x^{n}v(x)'
3b. & 4b. Applications	Applications of Non-homogeneous equations of higher order with constant coefficients	Method of variation of parameters
		LCR circuit
		Basic problems on simple harmonic motion

Unit-3: Mean value theorems:

Mean value theorems (without proofs): Rolle's theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

Unit	Module	Micro content
5a. & 6a. Mean value theorems	Mean value theorems	Rolle's theorem
		Lagrange's mean value theorem
5b. & 6b. Mean value theorems	Mean value theorems	Cauchy's mean value theorem
		Taylor's expansions of $f(x)$
		Maclaurin's expansions of $f(x)$

Unit-4: Partial differentiation:

Introduction – Homogeneous function – Euler's theorem **-** Total derivative – Chain rule – Jacobians – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

Unit	Module	Micro content
7a. & 8a. Partial differentiation	**Partial Differentiation**	Euler's theorem
		Total derivative
		Chain rule
		Jacobians
7b. & 8b. Applications	**Applications of Partial Differentiation**	Taylor's and Mc Laurent's series expansion of functions of two variables
		Maxima and Minima of functions of two variables
		Lagrange's method of undetermined multipliers

Unit-5: Multiple integrals:

Double integrals (Cartesian and Polar) – Change of order of integration – Change of variables (Cartesian to Polar) –Triple integrals.

Applications: Areas by double integrals and Volumes by triple integrals.

Unit	**Module**	**Micro content**
9a. & 10a. Multiple integrals	Evaluation of Double Integrals	Double integrals
		Change of order of integration
		Double integrals in Polar co-ordinates
		Change of variables
9b. & 10b. Applications	Evaluation of Triple Integrals	Triple integrals
	Applications of Multiple Integrals	Areas by double integrals
		Volumes by triple integrals

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I- Year I - Semester	Name of the Course	L	T	P	C
BS1102	Applied Chemistry	3	0	0	3

Pre-Requisites:

Knowledge of basic concepts of chemistry for Engineering students will help them as professional engineers later in design and material selection as well as utilizing the available resources.

Course Objectives

1. Significance of various types of plastic materials in household appliances and composites (FRP) in aerospace and automotive industries.
2. Understand the basic concepts of electrochemistry, which are useful to construct the electrochemical cells, batteries and fuel cells.
   Illustrate the theories and mechanism of corrosion and its prevention.
3. Importance of advanced materials and their engineering applications.
4. Make use of molecular machines in supramolecular chemistry and need of green chemistry.
5. Design and construction of advanced instrumental techniques and recall their importance.

Unit-1

POLYMER TECHNOLOGY

Polymerisation: Introduction-Methods of polymerisation-(emulsion and suspension)-Physical and mechanical properties.

Plastics: Compounding-Fabrication (compression, injection, blown film, extrusion)-Preparation, properties and applications of PVC, ploycarbonates and Bakelite-Mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers: Natural rubber-Drawbacks-Vulcanization-Preparation-Properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes)

Composite Materials: Fiber reinforced plastics-CFRP and GFRP

Conducting polymers: Polyacetylene, doped conducting polymers -p-type and n-type doping.

Bio degradable polymers: Biopolymers and biomedical polymers.

Unit-2

ELECTROCHEMICAL CELLS AND CORROSION

Single electrode potential-Electrochemical series and uses of series-Standard hydrogen electrode, calomel electrode, concentration cell, construction of glass electrode, Batteries: Dry cell, Ni-Cd cells, Ni-Metal hydride cells, Li-ion battery, Zinc air cells, Fuel cells-H_2 –O_2, CH_3OH-O_2, phosphoric acid, molten carbonate.

Corrosion: Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, water-line corrosion- passivity of metals-galvanic series-factors influencing rate of corrosion-corrosion control: (proper designing, cathodic protection)-protective coatings: cathodic and anodic coatings, electroplating, electroless plating (nickel), paints (constituents and its functions).

Unit-3

MATERIAL CHEMISTRY

Non-elemental semiconducting materails: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) – Semiconductor devices (p-n junction diode as rectifier, junction transistor)

Nano materials: Introduction, sol-gel method, characterization by BET, SEM and TEM methods, applications of graphene-carbon nanotubes and fullerenes: Types, preparation of carbon nanomaterials by carbon-arc, laser abalation methods.

Liquid crystals: Introduction-types-applications.

Superconductors: Meissner effect, type- I and type- II superconductors, characteristics and applications.

Unit-4

ADVANCED CONCEPTS AND GREEEN CHEMISTRY

Molecular switches and machines: Introduction to supramolecular chemistry, characteristics of molecular motors and machines. Rotaxanes and Catenanes as artificial molecular machines. Protypes linear motions in Rotaxanes, and acid-base controlled molecular shuttle, a molecular elevator, an autonomous light –powered molecular motors, natural molecular motors and machine.

Green chemistry: Principles of green chemistry, green synthesis – aqueous phase, microwave assisted chemical reactions and phase transfer catalysis (PTC).

Unit-5

SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES

Spectroscopic Techniques: Electromagneticspectrum-types of molecular spectra and their absorption criteria.

UV-visible spectroscopy (electronic spectroscopy), Frank-Condon principle, Beer-Lambert's law and its limitations, chromophores and auxochromes – *applications of UV visible spectroscopy.

IR spectroscopy – functional group and finger print region – molecular vibrations – stretching and bending vibrations – *applications of IR.

NMR (Nuclear magnetic resonance): Working principle and instrumentation of NMR – chemical shift(δ) – *applications of NMR.

(*only general applications – without any spectroscopic problems regarding quantitative and qualitative analysis.)

Non-conventional energy sources: Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, organic photo-voltaic, hydropower, geothermal power, tidal, ocean thermal energy conversion (OTEC) – open cycle OTEC, closed cycle OTEC and hybrid cycle OTEC.

REFERENCE BOOKS

1. A text book of Engineering Chemistry by S.S. Dara, S. S. Umare; S. Chand & Co., Ltd., Latest Edition.
2. Engineering Chemistry by Shashi Chawla; Dhanpat Rai Publicating Co., Latest Edition.

TEXT BOOKS

1. Engineering Chemistry by Jain & Jain; Dhanpat Rai Publicating Co., Latest Edition
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 Edition.
3. Engineering Chemistry by Prasanth Rath, B. Ramadevi, Ch. Venkata Ramana Reddy, Subendu Chakravarthy; Cengage Publications, 2019 Edition.

Course Outcomes: At the end of the course, the students will be able to

CO1. **explain** the preparation, properties and applications of thermoplastics, thermosettings, elastomers and conducting polymers.
CO2. **know** the importance of various materials and their uses in the construction of batteries and fuel cells.
CO3. **know** the applications of advanced materials in various industries.
CO4. **apply** the principles of supramolecular chemistry in the applications of molecular machines, need of green chemistry.
CO5. **explain** the principles of spectrometry such as UV, IR, and NMR.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2					3					
CO2	2	2					2					
CO3	2	2					2					
CO4	2	2					3					
CO5	2	2					3					

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Applied Chemistry

UNIT-I: POLYMER TECHNOLOGY **14 HRS**

Polymerisation:Introduction-Methods of polymerisation-(emulsion and suspension)-Physical and mechanical properties.

Plastics: Compounding-Fabrication (compression, injection, blown film, extrusion)-Preparation, properties and applications of PVC, ploycarbonates and Bakelite-Mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers: Natural rubber-Drawbacks-Vulcanization-Preparation-Properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes)

Composite Materials: Fiber reinforced plastics-CFRP and GFRP.

Conducting polymers: Polyacetylene, doped conducting polymers- p-type and n-type doping.

Bio degradable polymers: Biopolymers and biomedical polymers.

Unit	Module	Micro content
Polymerization	Introduction, Methods of Polymerization And Properties of Polymers	Introduction - Polymer, monomer, functionality and polymerization. Methods of polymerisation - Emulsion and suspension Physical and mechanical properties of polymers.
Plastics	Compounding of plastics, fabrication of polymer articles, preparation, properties and applications of some polymers,	Compounding of plastics Fabrication of polymer articles – compression, injection, blowing, extrusion Preparation, properties and applications of PVC, ploycarbonates and Bakelite Mention some examples of plastic materials used in

	e-plastic and disposal of e-plastic waste.	electronic gadgets, recycling of e-plastic waste.
Elastomers	Natural Rubber, vulcanization, synthetic rubbers	Natural rubber – Drawbacks – Vulcanization Preparation – Properties and applications of synthetic rubbers – Buna S, thiokol and polyurethane rubbers.
Composite materials	Fiber reinforced plastics	Fiber Reinforced Plastics (FRP) – CFRP and GFRP.
Conducting polymers	Polyacetylene polymer, p-type and n-type doping	Polyacetylene, doped conducting polymers- p-type and n-type doping.
Biodegradable polymers	Biopolymers and biomedical polymers	Biopolymers and biomedical polymers – polylactic acid polyglycolic acid polymers

<u>UNIT-II:</u> ELECTROCHEMICAL CELLS AND CORROSION

12 HRS

Single electrode potential - Electrochemical series and uses of series - Standard hydrogen electrode, calomel electrode, concentration cell, construction of glass electrode, Batteries: Dry cell, Ni-Cd cells, Ni-Metal hydride cells, Li-ion battery, Zinc air cells, Fuel cells-H_2 –O_2, CH_3OH-O_2, phosphoric acid, molten carbonate.

Corrosion: Definition - theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, water-line corrosion- passivity of metals-galvanic series-factors influencing rate of corrosion-corrosion control: (proper designing, cathodic protection)-protective coatings: cathodic and anodic coatings, electroplating, electroless plating (nickel), paints (constituents and its functions).

Unit	**Module**	**Micro content**
Introduction	Single electrode potential	Oxidation potential
		Reduction potential
Concentration cells	Electrode concentration cell and electrolyte concentration cell	Electrode concentration cell and electrolyte concentration cell
Electro chemical series	Electro chemical series	Definition – Electro chemical series
		Significances of Electro chemical series
		Differences between Electro chemical series and galvanic series
Reference electrodes	Standard Hydrogen Electrode	Working Principle and Construction of a – Standard Hydrogen Electrode – Calomel Electrode – Glass Electrode
	Calomel Electrode	
	Glass Electrode	
Corrosion	Introduction	Definition – Corrosion
	Theories of Corrosion	Chemical Theory of Corrosion / Dry Corrosion Electro Chemical Theory of Corrosion / Wet Corrosion
	Types of Corrosion	Galvanic corrosion, Differential aeration corrosion, Stress corrosion, Water-line corrosion
	Passivity of metals	Passivity, Examples for passive metals
Factors affecting	(a) Nature of metal	*(a) Nature of metal:* (i) Position of metal in the

rate of Corrosion		Galvanic series (ii) Purity of metal (iii) Relative surface area of anodic and cathodic metal (iv) Nature of oxide film (v) Physical state of metal (vi) Solubility and volatility of corrosion products
	(b) Nature of environment	*(b) Nature of environment:* (i) Temperature (ii) Humidity (iii) pH of the medium (iv) Establishment of oxygen concentration cell (v) Impurities of the atmosphere (vi) Polarization of electrodes
Corrosion control methods	Cathodic protection	Sacrificial anodic protection, impressed cathodic current
	|Cathodic and Anodic coatings	Galvanizing and Tinning
	Electroplating	Electroplating with example
	Electroless plating	Nickel Electroless plating
	Paints	Constituents of paints and its functions

<u>UNIT-III:</u> MATERIAL CHEMISTRY 12 HRS

Non-elemental semiconducting materails: Stoichiometric, controlled valency & chalcogen photo / semiconductors - Preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) – Semiconductor devices (p-n junction diode as rectifier, junction transistor)

Nano materials*:* Introduction, sol-gel method, characterization by BET, SEM and TEM methods, applications of graphene-carbon nanotubes and fullerenes: Types, preparation of carbon nanomaterials by carbon-arc, laser abalation methods.

Liquid crystals*:* Introduction – types-applications.

Superconductors: Meissner effect, type- I and type- II superconductors, characteristics and applications.

Unit	Module	Micro content
Non elemental semiconducting materials	Non elemental semiconductors	Stoichiometric, controlled valency & chalcogen photo / semiconductors
	Preparation, purification and fabrication of semiconductors	Preperation – Distillation, zone refining, Czochralski crystal pulling technique
	Applications of semiconducting devices	p-n junction diode as rectifier, junction transistor
Nano materials	Introduction, sol-gel method, characterization of nano materials	Introduction to Nano materials, Sol-gel method, characterization by BET, SEM and TEM methods,
	Applications of graphene	Carbon nanotubes and fullerenes. Types,
	Preparation of carbon nanomaterials	Carbon-arc, laser abalation methods.
Liquid crystals	Introduction, Types, Applications	Introduction,Thermotropic and Lyotropic liquid crystals, nematic and smectic liquid crystals, Applications of liquid crystals
Superconductors	Introduction, Characteristics and Applications	Introiduction, Meissner effect, type-I and type-II superconductors,characteristics and applications.

UNIT-IV: ADVANCED CONCEPTS AND GREEEN CHEMISTRY 10 HRS

Molecular motors/ machines: Introduction to supramolecular chemistry, characteristics of molecular motors. Rotaxanes and Catenanes as artificial molecular machines. molecular shuttle, a molecular elevator, an autonomous light –powered molecular motors.

Green chemistry: Principles of green chemistry, green synthesis – aqueous phase, microwave assisted chemical reactions and phase transfer catalysis (PTC).

Unit	Module	Micro content
Molecular motors/ machines	Introduction to supramolecular chemistry Moleculatr Motors.	Introduction to supramolecular chemistry, characteristics of molecular motors.
	Natural Molecular Motors and Artificial Molecular Motors	Natural Molecular Motors, Artificial Molecular Machines: Rotaxanes and Catenanes. Molecular shuttle, a molecular elevator, an autonomous light –powered molecular motors
Green chemistry	Principles of Green Chemistry Green Synthetic Methods	12 Principles of green chemistry, green synthesis – aqueous phase, microwave assisted chemical reactions and phase transfer catalysis (PTC).

UNIT-V: SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES 12 HRS

Spectroscopic Techniques:Electromagneticspectrum-types of molecular spectra and their absorption criteria.

UV-visible spectroscopy (electronic spectroscopy), Frank-Condon principle, Beer-Lambert's law and its limitations, chromophores and auxochromes – *applications of UV visible spectroscopy.

IR spectroscopy – functional group and finger print region – molecular vibrations – stretching and bending vibrations – *applications of IR.

NMR (Nuclear magnetic resonance): Working principle and instrumentation of NMR – chemical shift(δ) – *applications of NMR.

(*only general applications – without any spectroscopic problems regarding quantitative and qualitative analysis.)

Non-conventional energy sources: Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, organic photo-voltaic, hydropower, geothermal power, tidal, ocean thermal energy conversion (OTEC) – open cycle OTEC, closed cycle OTEC and hybrid cycle OTEC.

Unit	Module	Micro content
Spectroscopic Techniques	Introduction to Electromagneticspectrum	Electromagneticspectrum-types of molecular spectra and their absorption criteria.
UV	UV Visible Spectroscopy Applications	UV – Visible spectroscopy (electronic spectroscopy), Frank-Condon principle, Beer-Lambert's law and its limitations, chromophores and auxochromes – *applications of UV visible spectroscopy.
IR	IR Spectroscopy, Applications	***IR*** spectroscopy – functional group and finger print region – molecular vibrations – stretching and bending vibrations – *applications of IR.
NMR	NMR Spectroscopy,	***NMR*** (Nuclear magnetic resonance): Working

	Applications	principle and instrumentation of NMR – chemical shift(δ) – *applications of NMR. **(Note:** *only general applications – without any spectroscopic problems regarding quantitative and qualitative analysis.)
Non-conventional energy sources	Photovoltaic cells, Organic Photovoltaic cells, hydropower, geo thermal power, tidal and ocean thermal energy conversion	Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, organic photo-voltaic cell, hydropower, geothermal power, tidal, ocean thermal energy conversion (OTEC) – open cycle OTEC, closed cycle OTEC and hybrid cycle OTEC.

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I- Year I - Semester	Name of the Course	L	T	P	C
ES1101	Basic Electrical & Electronics Engineering	2	1	0	3

Course Objectives

- To introduce basics of electric circuits and to teach DC and AC electrical circuit analysis.
- To explain the working principles DC machines and speed control of various DC motors.
- To explain the working principles of transformers and AC machines and its applications.
- To introduce the basics of semiconductor physics and operation and applications of Diodes.
- To introduce the basics of transistors and explain the transistor configurations

Unit-1
DC & AC Circuits
DC Circuits: Electrical circuit elements (R - L and C) – Kirchhoff's laws -Voltage and Current division rules-series, parallel circuits and star-delta and delta-star transformations- [Elementary treatment only]
AC Circuits: Representation of sinusoidal waveforms - Peak and RMS values - phasor representation - real power - reactive power - apparent power - power factor. [Elementary treatment only]

Unit-2
DC Machines
DC Generator: Construction-Principle and operation of DC Generator - EMF equation -Types– Applications [Elementary treatment only]
DC Motor: Principle and operation of DC Motor – types-Torque equation - Speed control of DC Motor-Brake test- Swinburne's test-Applications. [Elementary treatment only]

Unit-3
AC Machines
Single Phase Transformer: Construction, Principle and operation of Single-Phase Transformer – EMF Equation-Losses-Efficiency. [Elementary treatment only]
Three Phase Induction Motor: Construction- Principle and operation of three phase Induction Motor-Types- Applications. [Elementary treatment only].

Unit-4
Semiconductor Devices
Semiconductor Physics, PN Junction Diode & Zener Diode-characteristics- Applications: Rectifiers (Half Wave Rectifier & Full Wave Rectifier) [Elementary treatment only], Clippers and Clampers.

Unit-5
Bipolar Junction Transistors
Construction and working of bipolar junction transistor, CB, CE and CC Configurations and characteristics. [Elementary treatment only], Transistors as amplifiers, op-amp basics.

Text Books

1. D. P. Kothari and I. J. Nagrath- "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

References

1. L. S. Bobrow- "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.

Course Outcomes: At the end of the course, the student will be able to

CO1. Apply concepts of KVL/KCL in solving DC circuits.(Apply, Find, Solve)
CO2. Choose correct machine for a specific application. (Understand, Apply)
CO3. Illustrate working principles of DC and AC Machines. (Understand, Apply)
CO4. Describe working principles of diodes and transistors. (Understand, Apply)
CO5. Understand the applications of diodes and transistors. (Understand, Analyze)

CO PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										1
CO2	3	2										1
CO3	3											1
CO4	3	2										1
CO5	3											1

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Basic Electrical & Electronics Engineering

UNIT-I: DC & AC Circuits:

DC Circuits:

Electrical circuit elements (R - L and C) – Kirchhoff's laws -Voltage and Current division rules-series, parallel circuits and star-delta and delta-star transformations- [Elementary treatment only]

AC Circuits:

Representation of sinusoidal waveforms - Peak and RMS values - phasor representation - real power - reactive power - apparent power - power factor.[Elementary treatment only]

Unit	**Module**	**Micro content**
1.a or 2.a DC Circuits	Definitions & circuit elements	Definitions of Voltage, Current, Power & Energy
		Types and Classification of circuit elements: R, L, C elements Active, Passive; unilateral, bilateral; linear, nonlinear; lumped, distributed elements
	Ohm's law, KCL, KVL, Voltage & Current Division rules	Ohm's Law. Active elements -Representation of Voltage and current sources in ideal and Practical cases and Passive elements –Voltage & Current relationship of R - L and C elements
		Kirchhoff's Voltage and current laws –series and parallel circuits of R, L & C elements, Voltage and Current division rules for resistive circuit only
	STAR-DELTA transformation	star-delta and delta-star transformations of resistive circuit only [Elementary treatment only]

1.b or 2.b **AC Circuits**	Phasor representation & AC fundamentals	Representation of sinusoidal waveforms –Phase difference and phasor representation of sinusoidal waveforms
		Peak, Average and RMS values for sinusoidal waveforms only
	AC circuits & Power	Definitions of reactance and Impedance, real power - reactive power - apparent power - power factor. [Elementary treatment only]

UNIT-II: DC Machines:

DC Generator:

Construction-Principle and operation of DC Generator - EMF equation -Types– Applications [Elementary treatment only]

DC Motor:

Principle and operation of DC Motor – types-Torque equation - Speed control of DC Motor-Brake test- Swinburne's test-Applications. [Elementary treatment only]

Unit	Module	Micro content
3.a or 4.a **DC generators**	DC generator principle of operation & applications	Construction details of dc generator-Field System, Armature
		Principle and operation of DC generator
		derivation of generated EMF-Simple problems on generated EMF
		Types of dc generators- Separately and Self excited (Shunt and series generators equivalent circuit [Elementary treatment only]) and applications.
3.b or 4.b **DC Motors**	DC Motor principle of operation & Back EMF	Principle operation of DC Motor
		Significance of Back EMF-Simple problems on Back EMF
		Derivation of Torque Equation-Simple problems on Torque Equation Torque equation of DC motor
	Types of DC motors & Applications	Types of DC Motors (Shunt and series motors equivalent circuit) and Applications
	DC motor Speed control techniques	speed control (armature and field control methods)
	Testing of DC machines	Brake test procedure-Swinburne's test procedure [Elementary treatment only]

UNIT-III: AC Machines:

Single Phase Transformer:

Construction, Principle and operation of Single-Phase Transformer –EMF Equation-Losses-Efficiency. [Elementary treatment only]

Three Phase Induction Motor: Construction- Principle and operation of three phase Induction Motor-Types- Applications. [Elementary treatment only].

Unit	Module	Micro content

5.a or 6.a Single Phase transformer	Basics of transformer	Construction, principle of operation of single-phase transformer, Types of single-phase transformer
	EMF equation & Phasor diagram	EMF Equation of a transformer and simple problems on EMF equation of single-phase transformer
		Ideal Transformer on NO load with phasor diagram
	Transformer performance	Losses, Efficiency. [Elementary treatment only]
5.b. or 6.b Three Phase Induction Motor	Basics of 3-phase induction motor	Construction and principles of 3-phase induction motor
	Types and applications	Types (Squirrel Cage and slip ring induction motor construction)- Applications
UNIT – IV: Semiconductor Devices Semiconductor Physics, PN Junction Diode & Zener Diode-characteristics- Applications: Rectifiers (Half Wave Rectifier & Full Wave Rectifier) [Elementary treatment only], Clippers and Clampers.		
Unit	**Module**	**Micro content**
7.a. or 8.a Semiconductor physics & Diodes	Semiconductor Physics	Classification of materials based on energy band diagram
		Current density in conductor, Intrinsic semiconductor & properties of silicon and germanium
		Extrinsic semiconductor: P-type and N-type, Conductivity of extrinsic semiconductor and law of mass action, Diffusion & Drift currents-N junction formation.
	PN Junction Diode & Zener Diode	Working principle of PN junction diode: forward bias, reverse bias
		Diode current equation (Expression only), Basic problems on usage of diode current equation.
		Diode circuit models: Ideal Diode Model, Ideal Diode Model with $V_{\gamma,}$. Reverse breakdown phenomena, Zener diode characteristics
7.b or 8.b Diode Applications	Voltage regulator	Zener Diode as Voltage Regulator
	Diode Rectifier Circuits	PN junction Diode Rectifiers (Working principle, Input and Output Waveforms and Expressions of output DC voltage for each) PN junction Diode Rectifiers (Working principle, Input and Output Waveforms and Expressions of output DC voltage for each)
	Clipper circuits	Bridge. Basics of Clippers: Series Positive, Series

		negative, Shunt Positive, Shunt negative, Dual clipping (without bias voltage).

UNIT V: Bipolar Junction Transistors

Construction and working of bipolar junction transistor, CB, CE and CC Configurations and characteristics. [Elementary treatment only], Transistors as amplifiers, op-amp basics.

Unit	**Module**	**Micro content**
9.a or 10.a BJT	BJT construction & working	Periodic functions Construction, Configuration and models
		Working of BJT, Definitions of α, β and γ
	BJT CB, CE characteristics	CB characteristics: Input, output characteristics, current relation, dynamic input and output resistances and base-width modulation
		CE characteristics: Input, output characteristics, current relation, dynamic input and output resistances
	BJT Amplifier	Transistor as an amplifier
9.b or 10.b OP-Amp basic	Basics of OP-amp & characteristics	Block diagram of OP-AMP (Qualitative treatment)
		Ideal characteristics of OP-AMP
	Basic OP-amp circuits	Inverting amplifier circuit
		Non-inverting amplifier circuit

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I- Year I - Semester	Name of the Course	L	T	P	C
ES1102	Computer Engineering Workshop	1	0	4	3

Course Objectives

1. To make the students aware of the basic hardware components of a computer and installation of operating system.
2. To introduce Raptor Tool for flowchart creation.
3. Each student will familiar with Productivity tool: LaTeX and Microsoft (MS) office
4. To get knowledge in awareness of cyber hygiene that is protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
5. To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

Unit-1

Simple Computer System: Central processing unit, the further need of secondary storage, Types of memory, Hardware, Software and people. Peripheral Devices: Input, Output and storage, Data Preparation, Factors affecting input, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices.

Unit-2

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, the one-zero game, some structured programming concepts, documents. Programming Languages: Machine Language and assembly language, high -level and low level languages, Assemblers, Compilers, and Interpreters

Unit-3

Operating systems: Introduction, Evolution of operating systems, Command Interpreter, Popular operating systems- Microsoft DOS, Microsoft Windows, UNIX and Linux.
Introduction to Unix Shell Commands, directory management commands, file operations, users commands, Time and Date commands.

Unit-4

Computer Networks: Introduction to computer Networks, Network topologies-Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology, Types of Networks: Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network, Network Devices- Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card, Basic Networking Commands.

Unit-5

Introduction to HTML : Basics in Web Design, Brief History of Internet ,World Wide Web Why create a web site ,Web Standards, HTML Documents ,Basic structure of an HTML document Creating an HTML document ,Mark up Tags ,Heading-Paragraphs ,Line Breaks ,HTML Tags.
Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

List of Tasks

TASK 1: PC Hardware: PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS

Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

TASK 2: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

TASK 3: **Drawing flowcharts (Raptor Tool)**

1. Create flowcharts for take-off landing of an Aeroplane.
2. Create a flowchart to validate an email id entered by user.
3. Create flowchart to print first 50 prime numbers.

TASK 4: Productivity tool: LaTeX and Microsoft (MS) office: Importance of MS office, Details of the three tasks and features that should be covered in each, MS word, Power Point, Excel.

TASK 5: Operating System Installation: Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

TASK 6: Basic Commands: Unix Shell Commands, directory management commands, file operations, users commands, Time and Date commands.

TASK 7: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

TASK 8: Networking Commands:

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget, route

TASK 9: Basic HTML tags

1. Head Section and Elements of Head Section, Paragraphs, Formatting Styles.
2. Colour tags, Creating Hyperlinks, Images, Tables, lists
3. HTML Forms, Form Attributes, Form Elements.

TASK 10: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured. Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

TASK 11: Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Text Books

1. Fundamentals of Computers –Reema Thareja-Oxford higher education
2. Computer Fundamentals, Anita Goel, Pearson Education, 2017
3. PC Hardware Trouble Shooting Made Easy, TMH
4. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.

Reference Books

1. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning, 2003.
2. An Introduction to Computer studies –Noel Kalicharan-Cambridge.

Course Outcomes: At the end of the course, the students will be able to:

CO1. Identify various hardware components of a system and apply their knowledge about computer peripherals to identify / rectify problems onboard.
CO2. Assemble the computer.
CO3. Use various Microsoft tools.
CO4. Integrate the PCs into local area network and re-install operating system and various application programs.
CO5. Manage data backup and restore operations on computer and update application software.

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2			
CO2	3		2		
CO3			3		3
CO4	2		2		
CO5				3	

(Strong – 3; Moderate – 2; Weak – 1)

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I- Year I - Semester	Name of the Course	L	T	P	C
ES1103	Problem Solving Using C	2	1	0	3

Course Objectives

1) To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
2) To gain knowledge of the operators, selection, control statements and repetition in C
3) To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
4) To assimilate about pointers, dynamic memory allocation and know the significance of Pre-processor.
5) To assimilate about File I/O and significance of functions

Unit-1

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

Unit-2

Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators.

Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

Unit-3

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

Unit-4

Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application **Processor Commands**: Processor Commands

Unit-5

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers to Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions **Binary Input / Output:** Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

TEXT BOOKS

1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE
2. The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson

REFERENCES

1. Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill
2. Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson
3. Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD

Course Outcomes: After completing this course, Students will be able to-

CO1. **Understand** algorithms and basic terminology of C
CO2. **Solve** problems using control structures and modular approach
CO3. **Demonstrate** 1D and 2D arrays along with strings for linear data handling
CO4. **Determine** the use of pointers and structures
CO5. **Implement** various operations on data files.

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	2	3	2	1	-	-	-	3	3	1	2	1	2
CO 2	2	3	3	2	-	-	-	-	1	1	2	2	2	2
CO 3	3	3	3	2	-	-	-	-	2	1	2	2	2	3
CO 4	2	2	2	2	-	-	-	-	2	1	2	2	2	2
CO 5	2	2	2	2	-	-	-	-	2	1	2	2	1	2

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Problem Solving in C

UNIT I

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

Unit	Module	Micro content
Introduction to Computers, C Language	Introduction to Computers	Creating and running Programs
		Computer Numbering System
		Storing Integers, Storing Real Numbers

	Introduction to C Language	C Tokens
		I/O Functions
		Scope and Storage classes
		Type Qualifiers
	Structure of a C Program	Expressions
		Side effects in evaluation of expressions
		Precedence and Associativity
		Command Line Arguments

UNIT - II

Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators.

Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples.

Unit	Module	Micro content
Control Statements	Bitwise Operators	Exact Size Integer Types
		Logical Bitwise Operators and Shift Operators
	Selection Statements	Two Way Selection
		Multi Way Selection
		More Standard Functions
	Iterative Statements	Counter Controlled Loops
		Logic Controlled Loops
		Other Statements related to looping
		Applications of looping and examples

UNIT III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

Unit	Module	Micro content
Derived and User Defined Data types	Arrays	One Dimensional Arrays: Theory and Practice Exercises
		Two Dimensional Arrays: Theory and Practice Exercises
		Introduction to Multi-Dimensional Arrays
		Some more Example Programs on Arrays
	Strings	Introduction to the concept of a String in C
		String I/O Functions
		Manipulation Functions on Strings
		String/Data Conversion
		Programming Example – Morse Code
	Structures, Unions	Introduction to the Concept of 'typedef'

	and Enumeration	Structures: Theory and Practice
		Unions: Theory and Practice
		Enumeration Data type
UNIT IV **Pointers:** Introduction, Pointers to pointers, Compatibility, L value and R value, **Pointer Applications:** Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application **Processor Commands**: Processor Commands		
Unit	**Module**	**Micro content**
Pointers and Processor Commands	Pointers	Introduction to Pointers
		Pointers to pointers
		Compatibility, L-value and R-value
	Applications of Pointers	Pointer Arithmetic
		Dynamic Memory Allocation
		Pointer to Arrays and Array of Pointers
	Processor Commands	Processor Commands
UNIT V **Functions:** Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers to Functions, Recursion, **Text Input / Output:** Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions **Binary Input / Output:** Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.		
Unit	**Module**	**Micro content**
Functions and Files	User Defined Functions	Designing, Structured Programs, Function in C
		Inter-Function Communication, Standard Functions
		Passing Array to Functions
		Passing Pointers to Functions
		Recursion
	Text Input / Output	Files, Streams
		Standard Library Input / Output Functions
		Formatting Input / Output Functions
		Character Input / Output Functions
	Binary Input/ Output	Text versus Binary Streams
		Standard Library
		Functions for files
		Converting File Type

I- Year I - Semester	Name of the Course	L	T	P	C
BS1101L	**Applied Chemistry Lab**	**0**	**0**	**3**	**1.5**

Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations quantitative analysis .

Course Objectives

1. To furnish the students with a solid foundation in Chemistry Laboratory required to solve the Engineering problems.
2. To expose the students in practical aspects of the theoritical concepts like pH, hardness of water etc.
3. To guide the students on how to handle the instruments like UV-visible spectrophotometer, potentiometer and conductometer.

List of Experiments

Students should do any 10 experiments listed below

1. Determination of HCl using standard Na_2CO_3 solution.
2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
3. Determination of Mn (II) using standard oxalic acid solution.
4. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.
5. Determination of Copper (II) using standard EDTA solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Iron (III) by colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metric method).
9. Determination of concentration of strong acid vs strong base (by conductometric method).
10. Determination of strong acid vs strong base (by potentiometric method).
11. Determination of Mg^{+2} present in an antacid.
12. Determination of $CaCO_3$ presence in an egg shell.
13. Estimation of vitamin- C.
14. Determination of phosphoric content in soft drinks.
15. Adsorption of acetic acid by charcoal.
16. Prepatation of nylon-6, 6 and Bakelite (demonstration only)

Reference Books:

A Text Book of Quantitative Analysis, Arthur J. Vogel.

Course Outcomes: At the end of the course, the students will be able

CO1. To estimate the amount of metal ions present in different solutions (L4 & L3)
CO2. To analyze the quality parameters of water (L4)
CO3. To determine the strength of different solutions by using different instrumentation techniques (L3)

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3							2			
CO2	2	2							2			
CO3	2	3							2			

(Strong – 3; Moderate – 2; Weak – 1)

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I- Year I - Semester	Name of the Course	L	T	P	C
ES1102L	Basic Electrical Engineering Lab	0	0	3	1.5

Course Objectives

- To Verify Kirchhoff's laws, Voltage and Current division rules.
- To learn speed control and testing of DC Shunt Motor.
- To learn and understand the operation of induction motor.
- To learn applications of diodes and transistors.

List of Experiments

Cycle-1

1. Verification of Kirchhoff laws.
2. Verification of Voltage division rule and current division rule.
3. Speed control of DC Shunt Motor.
4. Perform Brake test on DC Shunt Motor.
5. Conduct Swinburne's test on DC Shunt Motor.
6. Brake test on 3-phase Induction Motor.

Cycle-1I

1. V-I characteristics of P-N Junction Diode.
2. Understand Zener Diode Characteristics.
3. Understand Half wave rectifier and Full wave rectifier with and without filter.
4. Characteristics of BJT in Common Base Configuration.
5. Characteristics of BJT in Common Emitter Configuration.
6. Zener diode as voltage regulator.

Text Books

1. D. P. Kothari and I. J. Nagrath- "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

References

3. L. S. Bobrow- "Fundamentals of Electrical Engineering" – Oxford University Press – 2011.
4. E. Hughes – "Electrical and Electronics Technology" – Pearson – 2010.

Course Outcomes: Able to

CO1. Verify Kirchhoff's Laws and voltage and current division rules for DC supply.
CO2. Analyze the performance of AC and DC Machines by testing.
CO3. Perform speed control of DC shunt motor.
CO4. Perform the half wave and full wave rectifier.

CO PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										1
CO2	3	2										1
CO3	3											1
CO4	3	2										1

(Strong – 3; Moderate – 2; Weak – 1)

I- Year I - Semester	Name of the Course	L	T	P	C
ES1102L	Problem Solving Using C Lab	0	0	3	1.5

Course Objectives

1. Apply the principles of C language in problem solving.
2. To design flowcharts, algorithms and knowing how to debug programs.
3. To design & develop of C programs using arrays, strings pointers & functions.
4. To review the file operations, pre-processor commands.

Exercise 1

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.

2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

3. Write a C program to display multiple variables.

Exercise 2

1. Write a C program to calculate the distance between the two points.

2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3

1. Write a C program to convert a string to a long integer.

2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

3. Write a C program to calculate the factorial of a given number.

Exercise 4

1 .Write a program in C to display the n terms of even natural number and their sum.

2. Write a program in C to display the n terms of harmonic series and their sum.

1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.

3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5

1. Write a program in C to print all unique elements in an array.

2. Write a program in C to separate odd and even integers in separate arrays.

3. Write a program in C to sort elements of array in ascending order.

Exercise 6

1. Write a program in C for multiplication of two square Matrices.

2. Write a program in C to find transpose of a given matrix.

Exercise 7

1. Write a program in C to search an element in a row wise and column wise sorted matrix.

2. Write a program in C to print individual characters of string in reverse order.

Exercise 8

1. Write a program in C to compare two strings without using string library functions.

2. Write a program in C to copy one string to another string.

Exercise 9

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 14

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand & write the difference.
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

Course Outcomes: By the end of the Lab, the student able to

CO1. Comprehend the various concepts of a C language
CO2. Develop algorithms and flowcharts
CO3. Design and development of C problem solving skills.
CO4. Acquire modular programming skills.

CO-POS MAPPING

Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes (PO's & PSO's)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	3	2	1	-	-	-	3	3	1	2	1	2
CO2	2	3	3	2	-	-	-	-	1	1	2	2	2	2
CO3	3	3	3	2	-	-	-	-	2	1	2	2	2	3
CO4	2	2	2	2	-	-	-	-	2	1	2	2	2	2

(Strong – 3; Moderate – 2; Weak – 1)

I- Year II - Semester	**Name of the Course**	**L**	**T**	**P**	**C**
BS1201	**Mathematics-II**	**2**	**1**	**0**	**3**

Course Objectives

- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

Unit-1

Iterative methods

Introduction–Bisection method–Method of false position–Iteration method–Newton-Raphson method (one variable)–Jacobi and Gauss-Seidel methods for solving system of equations.

Unit-2

Interpolation

Introduction–Errors in polynomial interpolation–Finite differences–Forward differences–Backward differences–Central differences –Relations between operators–Newton's forward and backward formulae for interpolation–Gauss's forward and backward formulae for

Interpolation – Interpolation with unequal intervals–Lagrange's interpolation formula–Newton's divide difference formula.

Unit-3

Numerical integration and solution of ordinary difference equations

Trapezoidal rule–Simpson's $1/3^{rd}$ and $3/8^{th}$ rule–Solution of ordinary differential equations by Taylor's series–Picard's method of successive approximations–Euler's method–Modified Euler's method–Runge-Kutta method (second and fourth order).

Unit-4

Laplace Transforms

Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function – Dirac's delta function –Periodic function - Inverse Laplace transforms – Convolution theorem (without proof)

Applications: Evaluation of integrals using Laplace transforms - Solving ordinary differential equations (Initial value problems) using Laplace transforms.

Unit-5

Fourier series and Fourier Transforms

Fourier series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.

Fourier Transforms: Fourier integral theorem (without proof) - Fourier sine and cosine integrals – Sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

Text Books

1. **B.S. Grewal,** Higher Engineering Mathematics, 44^{th} Edition, Khanna Publishers.

Reference Books

1. **B.V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
2. **H.K.Das,** Advanced Engineering Mathematics, 22^{nd} Edition, S. Chand & Company Ltd.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10^{th} Edition, Wiley-India.

Course Outcomes: At the end of the course, the student will be able to

CO1. Evaluate approximate in the roots of polynomial and transcendental equations by different algorithms (EVALUATE)

CO2. Solve system of linear algebraic equations using Gauss Jacobi, Gauss Seidel and apply Newton's forward and backward interpolation and Lagrange's formulae for equal and unequal intervals (SOLVE , APPLY,FIND)

CO3. Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations and also by Laplace the transforms for solving differential equations (SOLVE , APPLY,FIND)

CO4. Find or compute the Fourier series of periodic signals (SOLVE ,APPLY, FIND, ANALYSE)

CO5. Know and be able to apply integral expressions for the forwards and inverse Fourier transform to range of non-periodic waveforms (SOLVE , APPLY, FIND)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of MATHEMATICS-II

UNIT-1: Iterative methods:

Introduction–Bisection method–Method of false position–Iteration method–Newton-Raphson method (one variable)–Jacobi and Gauss-Seidel methods for solving system of equations.

Unit	Module	Micro content
1a. & 2.a Solving given polynomial	Numerical solution of algebraic and transcendental polynomials	Bisection method
		Method of false position
		Iteration method
		Newton-Raphson's method
1b. & 2b. Solving linear system	Solving linear system	Jacobi's method
		Gauss-seidel method

UNIT-2 : Interpolation:

Introduction–Errors in polynomial interpolation–Finite differences–Forward differences–Backward differences–Central differences –Relations between operators–Newton's forward and backward formulae for interpolation–Gauss's forward and backward formulae for

Interpolation – Interpolation with unequal intervals–Lagrange's interpolation formula–Newton's divide difference formula.

Unit	Module	Micro content
3a. & 4a. Equal-Spaced difference tables	Finite difference tables	Forward, backward & central difference tables
		Errors in polynomials
	Finding functional values for given data	Newton's forward and backward difference interpolation formula
		Gauss forward and backward difference interpolation formula
3b. & 4b.	Unequal spaced data &	Lagrange's interpolation formula

Unequal spaced data & relation between various operators	relation between various operators	Relation between various operators(Shift, forward, backward, central, average & differential operators)

UNIT-3: Numerical integration and solution of ordinary difference equations:

Trapezoidal rule–Simpson's $1/3^{rd}$ and $3/8^{th}$ rule–Solution of ordinary differential equations by Taylor's series–Picard's method of successive approximations–Euler's method–Modified Euler's method–Runge-Kutta method (second and fourth order).

Unit	**Module**	**Micro content**
5a. & 6a. Numerical integration	Numerical Integration	Trapezoidal rule
		Simpson's $1/3^{rd}$ rule
		Simpson's $3/8^{th}$
5b. & 6b. Numerical solution of ordinary differential equations for single variable	Numerical solution of ordinary differential equations for single variable	Taylors series method
		Picard's method
		Euler's method
		Modified Euler's method

UNIT – 4: Laplace Transforms:

Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function – Dirac's delta function –Periodic function - Inverse Laplace transforms – Convolution theorem (without proof)

Applications: Evaluation of integrals using Laplace transforms - Solving ordinary differential equations (Initial value problems) using Laplace transforms.

Unit	**Module**	**Micro content**
7a. & 8a. Laplace Transforms	Laplace transforms and theorem	Shifting theorems
		Derivatives and integrals
		Multiplication and division
7b. & 8b. Inverse Laplace transforms and Applications	Periodic functions &Inverse Laplace Transforms	Periodic functions
		Dirac delta functions
		Evaluation integrals using Laplace Transforms
		Solving differential equations using Laplace transforms

UNIT 5: Fourier series and Fourier Transforms:

Fourier series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.

Fourier Transforms: Fourier integral theorem (without proof) - Fourier sine and cosine integrals – Sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

Unit	**Module**	**Micro content**
9a. & 10a. Fourier Series	Fourier Series	Periodic functions
		Dirichlet's conditions
		Even and odd function's
		Change of interval

		Half range sine and cosine series
9b. & 10b. Fourier Transforms	Fourier Transforms	Fourier Sine and Cosine integral
		Properties of Fourier Transforms
		Fourier and Inverse Fourier Transforms
		Fourier cosine and Inverse Fourier cosine Transforms
		Fourier sine and Inverse Fourier sine Transforms
		Finite Fourier Transforms
		Inverse Finite Fourier Transforms

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I- Year II - Semester	Name of the Course	L	T	P	C
BS1202	Applied Physics	2	1	0	3

Course Objectives

Applied Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by Vasireddy Venkatadri Institute of Technology, which serves as a transit to understand the branch specific advanced topics. The course is designed to:

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- Understand the physics of Semiconductors and their working mechanism for their utility in electronic devices.
- Impart the knowledge of materials with characteristic utility in appliances.

Unit-1 Wave Optics

Interference: Principle of Superposition-Interference of light – Conditions for sustained Interference-Interference in thin films (reflected geometry) - Newton's Rings (reflected geometry)

Diffraction: Fraunhofer Diffraction:- Diffraction due to single slit (quantitative), double slit(qualitative), N –slits(qualitative) and circular aperture (qualitative) – Intensity distribution curves - Diffraction grating – Grating spectrum – missing order– resolving power – Rayleigh's criterion – Resolving powers of Microscope(qualitative), Telescope(qualitative) and grating (qualitative).

Unit-2 LASERs and Holography

LASERs: Interaction of radiation with matter – Spontaneous and Stimulated emission of radiation – population inversion – Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium-Neon laser – Applications.

Holography: Introduction – principle – differences between photography and holography – construction and reconstruction of hologram – applications of holograms

Unit-3 Magnetism and Dielectrics

Magnetism: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr Magneton-Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

Dielectrics: Introduction- Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) - Lorentz Internal field- Claussius – Mossotti's equation- Frequency dependence of polarization - Applications of dielectrics.

Unit-4 Quantum Mechanics

Introduction– matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G. P. Thomson experiment – Heisenberg's Uncertainty Principle–Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).

Unit-5 Semiconductor Physics

Origin of energy bands (qualitative) –Classification of solids based on energy bands–Intrinsic semiconductors-density of charge carriers –Electrical conductivity-Fermi level – extrinsic semiconductors-P-type & N-type – Density of charge carriers- Dependence of Fermi energy on carrier concentration and temperature- Hall effect-Hall coefficient- Applications of Hall effect- Drift and Diffusion currents - Einstein's equation.

TEXT BOOKS

1. "Engineering Physics" by B. K. Pandey, S. Chaturvedi - Cengage Publications, 2012
2. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G.Kshirsagar - S.Chand, 2017.
3. "Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
4. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

REFERENCE BOOKS

1. "Engineering Physics" by M.R.Srinivasan, New Age international publishers (2009).
2. "Optics" by Ajoy Ghatak, 6th Edition McGraw Hill Education, 2017.
3. "Solid State Physics" by A.J.Dekker, Mc Millan Publishers (2011).

Course Outcomes: The students will be able to

CO1. Understand the principles such as interference and diffraction to design and enhance the resolving power of various optical instruments.
CO2. Learn the basic concepts of LASER light Sources and Apply them to holography
CO3. Study the magnetic and dielectric materials to enhance the utility aspects of materials.
CO4. Learn the fundamental concepts of Quantum behaviour of matter.
CO5. Identify the type of semiconductors using Hall Effect.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Applied Physics

Unit-I: Wave Optics

Interference: Principle of Superposition-Interference of light – Conditions for sustained Interference-Interference in thin films (reflected geometry) - Newton's Rings (reflected geometry)
Diffraction: Fraunhofer Diffraction:- Diffraction due to single slit (quantitative), double slit(qualitative), N –slits(qualitative) and circular aperture (qualitative) – Intensity distribution curves - Diffraction grating – Grating spectrum – missing order– resolving power – Rayleigh's criterion – Resolving powers of Microscope(qualitative), Telescope(qualitative) and grating (qualitative).

Unit	Module	Micro content
Ia. Interference	Principle of Superposition &	Introduction to interference
		Principle of superposition

	Interference of light	Coherence
		Conditions for sustained Interference
	Interference in thin films	Interference in thin films by reflection (cosine's law)
		Complementary nature
		Colours of thin film
	Newton's Rings	Newton's Rings(reflected geometry)
		Experimental arrangement & conditions for diameters
		Applications: determination of wavelength of monochromatic source and refractive index of the given transparent liquid.
Ib. Diffraction	Fraunhofer Diffraction - Diffraction due to single slit	Differences between Fresnel's and Fraunhofer's diffraction
		Differences between interference and diffraction
		Fraunhofer diffraction due to single slit(quantitative)
		Fraunhofer diffraction due to circular aperture (qualitative)
	double slit (qualitative) & N – slits(qualitative)	Fraunhofer diffraction due to double slit (qualitative)
		Fraunhofer diffraction due to grating (N- slits) (qualitative)
		Intensity distribution curves
	Diffraction grating& Resolving powers	Grating spectrum, missing orders and maximum number of orders possible with a grating
		Rayleigh's criterion for resolving power
		Resolving power of grating, Telescope and Microscope (qualitative)

Unit– II: LASERs and Holography

LASERs: Interaction of radiation with matter – Spontaneous and Stimulated emission of radiation – population inversion – Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium-Neon laser – Applications.

Holography: Introduction – principle – differences between photography and holography – construction and reconstruction of hologram – applications of holograms

Unit	**Module**	**Micro content**
IIa. LASERs	Interaction of radiation with matter	Introduction to LASERS
		Spontaneous emission
		Stimulated emission
	Einstein's coefficients	Einstein's coefficients
		Population inversion
		Pumping mechanisms
	LASERS construction and working	Ruby laser
		Helium-Neon laser
		Applications of Lasers
IIb. Holography	Principle of holography	Introduction and Principle of holography
		Differences between photography and holography
	construction and reconstruction of	Construction of hologram
		Reconstruction of hologram

	hologram	Applications of holography
Unit-III: Magnetism and Dielectrics **Magnetism**: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr magneton-Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material. **Dielectrics:** Introduction- Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) - Lorentz Internal field-Claussius –Mossotti's equation- Frequency dependence of polarization - Applications of dielectrics.		
Unit	**Module**	**Micro content**
IIIa. Magnetism	Introduction& Origin of permanent magnetic moment	Introduction to Magnetism, Definitions of Magnetic dipole moment, Magnetization, Magnetic susceptibility and Permeability
		Origin of magnetic moment
		Bohr magneton
	Classification of magnetic materials	Dia magnetic materials
		Para magnetic materials
		Ferro magnetic materials
	Domain concept of Ferromagnetism & Hysteresis	Domain concept of Ferromagnetism
		Hysteresis Curve (B-H Curve)
		Soft and hard magnetic materials classification based on Hysteresis Curve
		Applications of magnetic materials
IIIb.Dielectrics	Introduction& definitions	Introduction to dielectrics
		Dielectric polarization, Dielectric polarizability, susceptibility
		Dielectric constant
	Types of polarizations	Electronic polarization (Quantitative)
		Ionic polarization (Quantitative)
		Orientational polarizations (Qualitative)
	Internal field& Claussius –Mossotti's equation	Lorentz Internal fields in solids
		Clausius-Mossotti's equation
		Frequency dependence of polarization
		Applications of Dielectrics
Unit– IV: Quantum Mechanics Introduction– matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainty Principle–Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).		
Unit	**Module**	**Micro content**
IV. Quantum Mechanics	Introduction& de Broglie's hypothesis	Introduction to Matter waves
		de Broglie's hypothesis
		Properties of Matter waves
	Davisson-Germer	Davisson and Germer's experiment

	experiment & G.P.Thomson experiment	G. P. Thomson experiment
		Heisenberg's uncertainty principle
	Schrödinger wave function & equations	Schrödinger's wave function and it's physical significance
		Schrodinger Time Independent wave equation
		Schrodinger Time Dependent wave equation
		Application to particle in one dimensional box
Unit– V: Semiconductor Physics Origin of energy bands (qualitative) -Classification of solids based on energy bands –Intrinsic semiconductors – density of charge carriers – Electrical conductivity-Fermi level – extrinsic semiconductors - P-type & N-type – Density of charge carriers - DependenceofFermienergyoncarrierconcentrationandtemperature-Halleffect-Hallcoefficient-Applications of Hall effect- Drift and Diffusion currents - Einstein's equation.		
Unit	**Module**	**Micro content**
V. Semiconductor Physics	Origin of energy bands	Introduction to energy bands and Origin of energy bands in crystalline solids
		Classification of solids into conductors, semiconductors and insulators based on energy bands
	Intrinsic & extrinsic semiconductors	Intrinsic semiconductor and Carrier Concentration
		Equation for Conductivity
		Extrinsic Semiconductors (p-type and n-type)and Carrier Concentration
	Drift and Diffusion & Halleffect	Drift and Diffusion in semiconductors
		Einstein's Equation
		Hall Effect and it's applications

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I- Year II - Semester	Name of the Course	L	T	P	C
HS1201	Communicative English	3	0	0	3

Course Objectives

1. Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions.
2. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
3. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
4. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
5. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
6. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

Detailed Study: A Proposal to Girdle the Earth (Excerpt) by Nellie Bly

Theme: Exploration

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Non-Detailed Study:

1. "How to Fashion Your Own Brand of Success" by Howard Whitman

2. "How to Recognize Your Failure Symptoms" by Dorothea Brande

Unit 2

Detailed Study: An excerpt from The District School as It Was by One Who Went to It by Warren Burton

Theme: On Campus

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

Non-detailed Study:

3. "How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock

4. "How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz

Unit 3

Detailed Study: The Future of Work?

Theme: Working Together

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Non-Detailed Study:

5. "How to Make the Most of Your Abilities" by Kenneth Hildebrand

6. "How to Raise Your Self-Esteem and Develop Self-confidence" by James W Newman

Unit 4

Detailed Study: H.G Wells and the Uncertainties of Progress by Peter J. Bowler

Theme: Fabric of Change

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role-plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Non-Detailed Study

7. "How to Win Your War against Negative Feelings" by Dr Maxwell Maltz

8. "How to Find the Courage to Take Risks" by Drs. Tom Rusk and Randy Read

Unit 5

Detailed Study: Leaves from the Mental Portfolio of a Eurasian by Sui Sin Far

Theme: Tools for Life

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Non-Detailed Study

9. "How to Become a Self-Motivator" by Charles T Jones

10. "How to Eliminate Your Bad Habits" by OgMandino

Text Books

5. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019
6. University of Success by OgMandino, Jaico, 2015.

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

AICTE Recommended Books

1. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Oxford University Press, 2018.
2. Pushplata and Sanjay Kumar. Communication Skills, Oxford University Press, 2018.
3. Kulbushan Kumar. Effective Communication Skills. Khanna Publishing House, Delhi

Sample Web Resources

Grammar / Listening / Writing

1-language.com

http://www.5minuteenglish.com/

https://www.englishpractice.com/

Grammar/Vocabulary

English Language Learning Online

http://www.bbc.co.uk/learningenglish/

http://www.better-english.com/

http://www.nonstopenglish.com/

https://www.vocabulary.com/

BBC Vocabulary Games

Free Rice Vocabulary Game

Reading

https://www.usingenglish.com/comprehension/

https://www.englishclub.com/reading/short-stories.htm

https://www.english-online.at/

Listening

https://learningenglish.voanews.com/z/3613

http://www.englishmedialab.com/listening.html

Speaking

https://www.talkenglish.com/

BBC Learning English – Pronunciation tips

Merriam-Webster – Perfect pronunciation Exercises

All Skills

https://www.englishclub.com/

http://www.world-english.org/

http://learnenglish.britishcouncil.org/

Course Outcomes

At the end of the course, the learners will be able to

CO1. identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English and formulate sentences using proper grammatical structures and correct word forms **(Describe, relate, tell, find L-3)**

CO2. speak clearly on a specific topic using suitable discourse markers in informal discussions **(Discuss, outline, explain, predict – L3)**

CO3. write summaries based on global comprehension of reading/listening texts **(Use, categorize, complete, solve L-3)**

CO4. produce a coherent paragraph interpreting a figure/graph/chart/table **(Identify, compare, explain, illustrate- L4)**

CO5. take notes while listening to a talk/lecture to answer questions **(explain, relate, outline, complete -L3)**

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									2	3		1
CO2									2	3		1
CO3									2	3		1
CO4									2	3		1
CO5									2	3		1

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Communicative English

Unit 1

Detailed Study: A Proposal to Girdle the Earth (Excerpt) by Nellie Bly

Theme: Exploration

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Non-Detailed Study:

1. "How to Fashion Your Own Brand of Success" by Howard Whitman

2. "How to Recognize Your Failure Symptoms" by Dorothea Brande

Unit	Module	Micro content
1a.Detailed Study	**Listening**	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
	Speaking	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
	Reading	Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.
	Grammar and Vocabulary	Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
1b.Non-Detailed Study	**"How to Fashion Your Own Brand of Success" by Howard Whitman**	Introduction to Whitman Summary of the Essay
	How to Recognize Your Failure Symptoms" by Dorothea Brande	Introduction to Dorothea Brande Summary of the Essay

Unit 2

Detailed Study: The District School As It Was by One Who Went to It by Warren Burton

Theme: On Campus

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

Non-detailed Study:

3. "How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock

4. "How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz

Unit	Module	Micro content
2a. Detailed Study	**Listening**	Answering a series of questions about main idea and supporting ideas after listening to audio texts.

	Speaking	Discussion in pairs/ small groups on specific topics followed by short structured talks.
	Reading	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
	Writing	Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
	Grammar and Vocabulary	Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.
2b. Non-Detailed Study	**"How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock**	Introduction to Louis Binstock Summary of the Essay
	"How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz	Introduction to Maxwell Maltz Summary of the Essay

Unit 3
Detailed Study: The Future of Work
Theme: Working Together
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Non-Detailed Study:
5. "How to Make the Most of Your Abilities" by Kenneth Hildebrand
6. "How to Raise Your Self-Esteem and Develop Self-confidence" by James W Newman

Unit	**Module**	**Micro content**
3a. Detailed Study	**Listening**	Listening for global comprehension and summarizing what is listened to.
	Speaking	Discussing specific topics in pairs or small groups and reporting what is discussed
	Reading	Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
	Writing	Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

	Grammar and Vocabulary	Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
3b. Non-Detailed Study	**"How to Make the Most of Your Abilities" by Kenneth Hildebrand**	Introduction to Kenneth Hildebrand Summary of the Essay
	How to Raise Your Self-Esteem and Develop Self-confidence" by James W Newman	Introduction to James Newman Summary of the Essay

Unit 4

Detailed Study: H.G Wells and the Uncertainties of Progress by Peter J. Bowler

Theme: Fabric of Change

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role-plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Non-Detailed Study

7. "How to Win Your War Against Negative Feelings" by Dr Maxwell Maltz

8. "How to Find the Courage to Take Risks" by Drs. Tom Rust and Randy Read

Unit	Module	Micro content
4a. Detailed Study	**Listening**	Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
	Speaking	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions..
	Reading	Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
	Writing	Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.
	Grammar and Vocabulary	Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

4b. Non-Detailed Study	**"How to Win Your War Against Negative Feelings" by Dr Maxwell Maltz**	Introduction to Dr Maxwell Maltz Summary of the Essay
	"How to Find the Courage to Take Risks" by Drs Tom Rust and Randy Read	Introduction to Drs. Tom Rust and Randy Read Summary of the Essay

<u>Unit 5</u>

Detailed Study: Leaves from the Mental Portfolio of a Eurasian by Sui Sin Far

Theme: Tools for Life

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Non-Detailed Study

9. "How to Become a Self-Motivator" by Charles T Jones

10. "How to Eliminate Your Bad Habits" by OgMandino

Unit	Module	Micro content
5a. Detailed Study	**Listening**	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
	Speaking	Formal oral presentations on topics from academic contexts - without the use of PPT slides.
	Reading	Reading for comprehension.
	Writing	Writing structured essays on specific topics using suitable claims and evidences
	Grammar and Vocabulary	Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
5b. Non-Detailed Study	**"How to Become a Self-Motivator" by Charles T Jones**	Introduction to Charles T Jones Summary of the Essay
	"How to Eliminate Your Bad Habits" by OgMandino	Introduction to Og Mandino Summary of the Essay

***

I- Year II - Semester	Name of the Course	L	T	P	C
ES1201	Problem Solving using Python	3	0	0	3

Course Objectives

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

Unit-1

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit-2

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration, While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods Text Files.

Unit-3

List and Dictionaries: Lists, Defining Simple Functions, Dictionaries

Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

Unit-4

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism

Unit-5

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources.

Programming: Introduction to Programming Concepts with Scratch.

TEXT BOOKS:

3. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
4. Python Programming: A Modern Approach, VamsiKurama, Pearson.

REFERENCES:

4. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.
5. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Course Outcomes: After completing this course, Students will be able to-

CO1: Develop essential programming skills in computer programming concepts like data types, containers
CO2: Solve coding tasks related to conditions, loops and String processing
CO3: Experiment with various Data structures in interpreted Language and to build modules and packages for real software needs.
CO4: Implement Files and object-oriented principles in Python
CO5: Identify solutions using GUI in Python.

CO – PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	-	-	-	-	-	-	-	-
CO2	1	2	2	1	-	-	-	-	-	-	-	-
CO3	1	3	3	2	1	-	-	-	-	-	-	-
CO4	1	2	2	2	-	-	-	-	-	-	-	-
CO5	1	2	2	2	1	-	-	-	-	-	-	1

[1-Slight (low), 2-Moderate (Medium), 3-Substantial (High)]

Micro-Syllabus of Problem-Solving using Python

UNIT I

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit	Module	Micro content
Introduction to Python Language	Introduction Data Types and Expressions	Program Development Cycle, I/O Functions
		Comments, Variables, Operators
		Reading From Keyboard, Type Conversions
		Numeric Data types.
		Strings and Character set.
		String Functions
		Comments
	Decision Structures and Boolean Logic	Conditional Statements
		Nested Conditional Statements
		Looping Techniques
		Nested Loops

UNIT – II

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration, While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods Text Files.

Unit	Module	Micro content
Control Statements	Control Statements	For loop formatting text for output
		Selection if and if else statement
		Conditional iteration, While loop
	String and Text Files	Character and substring in strings
		Data Encryption
		Strings and Number Systems, String methods Text Files.

UNIT III

List and Dictionaries: Lists, Defining Simple Functions, Dictionaries

Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

Unit	Module	Micro content
Data Structures, Functions and	List and Dictionaries	Lists
		Functions of Lists

Modules		Dictionaries
		Functions of Dictionaries
	Design with Function Modules	Functions and there usage in python
		Recursive Functions
		Managing a Programs Namespace
		Gathering Info from a File System
		Higher Order Function
		Standard Modules
		Packages and their usage.

UNIT IV

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism

Unit	**Module**	**Micro content**
File Operations, Object Oriented Programming	File Operations	Reading and Writing Files in python using read and write functions
		File operations using seek and other operations
	Object Oriented Programming Design With Classes	Class, Object, constructor and destructor, OOP Principles.
		Objects and Classes, Data modeling Examples
		Adding and retrieving dynamic attributes of classes

UNIT V

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources.

Programming: Introduction to Programming Concepts with Scratch.

Unit	**Module**	**Micro content**
Errors and Exceptions, GUI and Programming	Errors and Exceptions	Syntax Errors, Exceptions, Handling Exceptions
		Raising Exceptions, User-defined Exceptions
		Defining Clean-up Actions
		Redefined Clean-up Actions
	GUI Programming	Terminal Based Programs and GUI – Based
		Simple GUI-Based Programs and other useful GUI Resources
		Introduction to Programming
		Scratch Programming

***

I- Year II - Semester	Name of the Course	L	T	P	C
ES1202	Digital Logic Design	2	1	0	3

Course Objectives

1. To understand common forms of number representation in digital circuits and Boolean algebra.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems and simplify logic expressions using basic theorems, K-map and Tabular methods.
3. To understand the concept of Combinational logic design and realize logic expressions using MUXand Decoder
4. Illustrate the concept of sequential logic design; analyze the operation of flip-flop and conversion from one flip-flop to another, and application of flip-flop.
5. To impart to student the concepts of sequential machines of digital system.

Unit-1

Number Systems and Boolean Algebra

Number systems: Introduction to different number system and their conversions, complement of number system and subtraction using complement method, Floating-Point Representation, Weighted and Non-weighted codes and its properties.

Boolean Algebra: Boolean algebra and logic gates, Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Universal Gates.

Unit-2

Minimization Methods of Boolean functions

Minimization of logic expressions by algebraic method, Sum of Products (SOP), Product of Sums (POS), K-Map Method, Don't Care Combinations, Multilevel NAND/NOR realizations, Prime and essential Prime Implicants, Tabular Method, Prime Implicants Chart, Simplification Rules.

Unit-3

Combinational Circuits

Design procedure, Half/full adders, Half / full substractors, Carry look ahead adder, BCD adder, Multiplexer/De-Multiplexer, Encoder/Decoder, Priority encoders, Implementation of Higher-Order Device Using Lower Order devices, Implementation of combinational logic using MUX/Decoder, Magnitude Comparator, Error detection and correction codes.

Unit-4

Sequential Circuits

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops,

Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers Left, Right and Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Unit-5

Sequential Machines

Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Paritybit Generator, Synchronous Modulo N –Counters, Finite state machinecapabilities and limitations, Mealy and Moore models.

***Note: Case Studies** / Small Projects ofDigital Circuits and Logic Design*

TEXT BOOKS

1. Digital Design by Mano, PHI

2. Modern Digital Electronics by RP Jain, TMH

3. Switching Theory and Logic Design by A. Anand Kumar, PHI.

REFERENCE

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition

2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers

Course Outcomes

CO1. Distinguish the analog and digital systems, apply positional notations, number systems, computer codes in digital systems. **(Remember, Understand, and Apply)**
CO2. To understand the Boolean Algebra theorems, simplify and design logic circuits. **(Understand, Apply, Analyze and valuate)**
CO3. Implemented combinational logic circuit design and modular combinational circuits using encoders, decoders, multiplexers and demultiplexers. (**Apply, Analyze, valuate, and create)**
CO4. To understand the basic elements of sequential logic circuits. **(Understand, Apply, Analyze)**
CO5. Able to design and analyze sequential circuits. **(Apply, Analyze and create)**

CO-PO MAPPING

Mapping	PO1	PO2	PO3	PO10
CO1	3	2	2	1
CO2	3	2	2	1
CO3	3	2	2	1
CO4	3	2	2	1
CO5	3	2	2	1

(Strong – 3; Moderate – 2; Weak – 1)

Micro-Syllabus of Digital Circuits and Logic Design

Unit-1: Number Systems and Boolean Algebra **10 Hours**

Number systems: Introduction to different number system and their conversions, complement of number system and subtraction using complement method, Floating-Point Representation, Weighted and Non-weighted codes and its Properties, Error detection and correction codes,

Boolean Algebra: Boolean algebra and logic gates, Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Universal Gates.

Unit	Module	Micro content	No of hrs
1a. Number systems	Introduction to different number system and their conversions	Introduction to number system	2
		Binary, Octal, Decimal, Hexadecimal.	
		Number base Conversions	
	Complement of number system and subtraction using complement method	1's, 2's Compliments	2
		r-1's Compliments	
		r's Compliments	
		signed Binary numbers	
		Compliment Arithmetic	
	Floating-Point Representation	IEEE 754 Standard 32-bit single precision, 64-bit double precision	1
	Weighted and Non-weighted codes and its Properties	BCD Code, 2421, Excess-3, 84-2-1, Gray Code, ASCII Character Code	1
	Error detection and correction codes,	Parity bit, Hamming Code	1
1b.Boolean Algebra	Introduction to Boolean algebra and Boolean theorems	Postulates of a mathematical system and Axiomatic Systems, Algebra Basic Theorems and Properties	2
		Boolean Functions of Canonical and Standard Forms	1
		logic gates, Universal Gates and justification of all logic gates	

Unit-2: Minimization Methods of Boolean functions **10 Hours**

Minimization of logic expressions by algebraic method, Sum of Products (SOP), Product of Sums (POS), K-Map Method, Don't Care Combinations, Multilevel NAND/NOR realizations, Prime and essential Prime Implicants, Tabular Method, Prime Implicants Chart, Simplification Rules.

Unit	Module	Micro content	No of hrs
1. Minimization Methods of Boolean functions	Minimization of logic expressions by algebraic method	Boolean function	2
		Minimization of Boolean expressions	
		Minterms, Maxterms, Sum of Products (SOP), Product of Sums (POS)	
		Canonical forms, Conversion between canonical forms	
	K-Map Method	Introduction to 2 – 5 variable K-Map with Implicants, prime Implicants, and Essential Prime Implicants	5
		POS minimization with K-Map	

		K-Maps with don't care terms	
		Multilevel NAND/NOR realizations of minimization functions	
	Tabular method	Introduction to Tabular (Q-M) method with examples	2
		Q-M method with don't care terms	
		Prime Implicants Chart, Simplification Rules	1

Unit-3: Combinational Circuits **10 Hours**

Design procedure, Half/full adders, Half / full subtractors, Carry look ahead adder, BCD adder, Multiplexer/De-Multiplexer, Encoder/Decoder, Priority encoders, Implementation of Higher-Order Device Using Lower Order devices, Implementation of combinational logic using MUX/Decoder, Magnitude Comparator, Programmable logic devices

Unit	**Module**	**Micro content**	**No of hrs**
3. Combinational Logic Design	Designing of Half/Full Adder /Subtractor and Carry look ahead adder, BCD adder	Introduction to Design Procedures of Combinational Circuits	1
		Designing of Half Adder and Subtractor	
		Full Adder and Subtractor	
		Full adder by HA	
		Realization of above circuits with NAND & NOR	
		Carry look ahead adder	1
		Designing of Magnitude comparator and BCD adder	1
	Multiplexers, Demultiplexers, Decoders, Encoders and Code Converters	Multiplexers, Demultiplexers	1
		Decoders, Encoders, Priority encodes	1
		Function realization using Multiplexers and Decoders	2
		Code Converters	1
	Implementation of Higher-Order Device Using Lower Order devices	Multiplexers, Demultiplexers, Decoders, Encoders	1
	Programmable logic devices	PROM,PAL,PLA	1

Unit-4: Sequential Circuits **10 Hours**

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers Left, Right and Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Unit	**Module**	**Micro content**	**No of hrs**
4a.	Analysis of Sequential Circuits	Basic Architectural Distinctions between	1

Sequential Circuits Fundamentals		Combinational and Sequential circuits	
		SR latch by NAND / NOR gates and introduction of flip flop	
	Storage elements: Flip Flops	Design various flip flops like SR, D, JK, JK Master Slave & T with truth tables, logic diagrams	2
		Excitation Table of all Flip Flops, Timing and Triggering Consideration	1
4b. Registers and Counters	Registers	Introduction of registers and Design of Shift Registers Left and Right	1
		Design of Bidirectional Shift Registers, Applications of Shift Registers	1
	Counters	Designing Asynchronous/Ripple counters	1
		Designing basic Synchronous Counters of UP/DOWN	1
		Other counters: modulo-n counters, Ring and twisted ring counters, Johnson Counter,	2

Unit-5: Sequential Machines **8 Hours**

Finite State Machines, Synthesis of Synchronous Sequential Circuits, Mealy and Moore models, Serial Binary Adder, Sequence Detector, Parity-bit Generator Synchronous Modulo N – Counters, Finite state machine capabilities and limitations.

Unit	**Module**	**Micro content**	**No of hrs**
5. Sequential Machines	**Analysis of Sequential Machines**	Finite-state machine (FSM), State Assignment, state table, excitation table	**1**
		Synthesis of Synchronous Sequential Circuits	**2**
		Mealy and Moore models by Serial Binary Adder	
		Problems on Sequence Detector	**2**
		Parity-bit Generator, Synchronous Modulo N – Counters	**2**
		Finite state machine capabilities and limitations,	**1**

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I- Year II – Semester	Name of the Course	L	T	P	C
BS1201L	**Applied Physics and Virtual Lab**	**0**	**0**	**3**	**1.5**

Course Objectives: The Applied Physics Lab is designed to

- **Understand** the concepts of interference and diffraction and their applications.
- **Apply** the concept of LASER in the determination of wavelength.
- **Recognize** the importance of energy gap in the study of conductivity and Hall Effect.

- **Illustrate** the magnetic and dielectric materials applications.
- **Apply** the principles of semiconductors in various electronic devices.

LIST OF EXPERIMENTS

(Any 10 of the following listed 15 experiments)

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano – Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Energy Band gap of a Semiconductor p – n junction.
6. Characteristics of Thermistor – Temperature Coefficients
7. Determination of dielectric constant by charging and discharging method
8. Variation of dielectric constant with temperature
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. LASER – Determination of wavelength by plane diffraction grating
11. Determination of resistivity of semiconductor by Four probe method.
12. Determine the radius of gyration using compound pendulum
13. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
14. Dispersive power of diffraction grating.
15. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall Effect.

Course Outcomes: The students will be able to:

CO1. Operate optical instruments like microscope and spectrometer
CO2. Determine thickness of a paper with the concept of interference
CO3. Estimate the wavelength of different colours using diffraction grating and resolving power
CO4. Plot the intensity of the magnetic field of circular coil carrying current with distance
CO5. Calculate the band gap of a given semiconductor

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

(Strong – 3; Moderate – 2; Weak – 1)

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I- Year II – Semester	Name of the Course	L	T	P	C
HS1201L	**Communicative English Lab**	**0**	**0**	**3**	**1.5**

Course Objectives

The main objective of the course is to adopt activity-based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions and appear confidently for competitive examinations for career development.

The specific objectives of the course are to

1. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native and non-native speakers
2. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials like newspapers, magazines, periodicals, journals, etc.
3. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Introduction to Sound system of English

Articulation – Airstream mechanism, Manners of Articulation, Places of Articulation, English phonetic symbols.

Accent – Syllabification, word stress and accent, stress rules and stress shift, exceptions to rules.

Intonation – Stress and accent in connected speech. Types and functions of Intonation in English.

I. **A. Speaking**: Introducing Yourself and Others
   1. **Listening:** Conversation between two and more people.

II. **A. Speaking:** Speak for a minute in response to a question about personal experience / wish.
   2. **Listening:** Identifying the main idea of a talk or a conversation

III. **A. Speaking: Group discussion** – 5 minutes followed by a summary –1 or 2 minutes: Topics-1. Features that make a place beautiful, 2. The most challenging job you can think of, 3. Some skills that everyone should learn, 4. The best criteria to measure success, 5. A recent news story that is interesting, 6. Impact of technology on the music industry, 7. An app that has helped society, 8. Pros and Cons of after school tutorials, 9. How to stay safe on Social Media, 10. The most common reasons why friendships fall apart, 11. Interactions with seniors on campus, 12. Coping with peer pressure, 13. Others' opinion vs your belief, 14. Feeling that plants would express if they could, 15. Growing up alone vs Growing up with siblings, 16. Uniforms stifle individuality, 17. In India summer is the best and worst of times, 18. A good sense of humour is a definite perk, 19. All fast food is not junk food and 20. Ideas to make your common room in college more inviting. Question Answer sessions – 1. Idea of a Tech Startup, 2. Training programme of T&P Cell, 3. Inter-college Cultural Fest, 4. 3-day Foreign University delegation visit to the campus, 5. Computer training programme by a reputed MNC, 6. Shifting your Dept or Classrooms to new location on campus, 7. How to manage attendance while attending additional courses (Minors/Honors), 8. How to choose placement offers? 9. Involvement in Student Affairs through SAC, 10. Planning an excursion.
   3. **Listening:**1. Comprehension Exercise on Teamwork, 2. Predicting what the speaker would say from the title of the talk, 3. Comprehension based on a narrative or a short video, TED Talks

IV. **A. Speaking:** Preparing speech using picture clues, asking Q&A using pictures.
   4. **Listening:** Listening Comprehension using short films, audio files, interviews of famous personalities

V. **A. Speaking:** Preparing 30-day planner, Using important phrasal expressions in speech, Oral Presentations on – 1. Setting goals is important2. Asking the right question is the skill you need to develop, 3. Do college students want their parents' attention4. Everyone needs to learn how to

cook5. Doing household chores is everyone's responsibility 6. Study groups facilitate peer-monitoring7. Is it OK for students to do things just because they want to fit in? 8. Students should compulsorily make time for physical activity, 9. Taking breaks to pursue other interests improves academic performance, 10. Strategies to avoid stress, 11. How best to use the media for educational activities, 12. Why volunteer for service activities? 13. International student exchange programme, 15. Work-life balance 16. Strategies to build on your strength and overcome weaknesses, 17. Strategies to build confidence and self-esteem18. Procrastination kills opportunities, 19. Setting a budget and sticking to it, 20. Grooming and etiquette 21. Pros and Cons of being Competitive, 22. Virtual classroom vs real classroom, 23. Freedom brings more responsibility 24. To-do lists help you become more productive 25. Having a diverse group of friends is an asset 26. One thing you wish you had learnt in High school 27. Why is it important to be non-judgmental towards others? 28. Humans need empathy, 29. Public speaking is a necessary skill 30. How to build and maintain good professional relationships.

5. **Listening:** Listening Comprehension, Speeches by Famous personalities

Pair work, Role-play, conversational practice and Individual speaking activities based on following essays from University of Success.

1. "How to Fashion Your Own Brand of Success" by Howard Whitman
2. "How to Recognize Your Failure Symptoms" by Dorothea Brande
3. "How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock
4. "How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz
5. "How to Make the Most of Your Abilities" by Kenneth Hildebrand
6. "How to Raise Your Self-Esteem and Develop Self-Confidence" by James W. Newman
7. "How to Win Your War against Negative Feelings" by Dr Maxwell Maltz
8. "How to Find the Courage to Take Risks" by Drs. Tom Rust and Randy Reed
9. "How to Become a Self-Motivator" by Charles T Jones
10. "How to Eliminate Your Bad Habits"by Og Mandino

Text Books

1. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019
2. University of Success by OgMandino, Jaico, 2015.

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

AICTE Recommended Books

1. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Oxford University Press, 2018.
2. Pushplata and Sanjay Kumar. Communication Skills, Oxford University Press, 2018.
3. Kulbushan Kumar. Effective Communication Skills. Khanna Publishing House, Delhi

Sample Web Resources

Grammar / Listening / Writing

1. 1-language.com
2. http://www.5minuteenglish.com/
3. https://www.englishpractice.com/

Grammar/Vocabulary

4. English Language Learning Online
5. http://www.bbc.co.uk/learningenglish/
6. http://www.better-english.com/
7. http://www.nonstopenglish.com/
8. https://www.vocabulary.com/
9. BBC Vocabulary Games
10. Free Rice Vocabulary Game

Reading

11. https://www.usingenglish.com/comprehension/
12. https://www.englishclub.com/reading/short-stories.htm
13. https://www.english-online.at/

Listening

14. https://learningenglish.voanews.com/z/3613
15. http://www.englishmedialab.com/listening.html

Speaking

16. https://www.talkenglish.com/
17. BBC Learning English – Pronunciation tips
18. Merriam-Webster – Perfect pronunciation Exercises

All Skills

19. https://www.englishclub.com/
20. http://www.world-english.org/
21. http://learnenglish.britishcouncil.org/

Course Outcomes: At the end of the course, the learners will be able to

CO1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English and speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)

CO2. Take notes while listening to a talk/lecture; to answer questions in English; formulate sentences using proper grammatical structures and correct word forms; and use language effectively in competitive examinations (L3)

CO3. Write summaries based on global comprehension of reading/listening texts; produce a coherent write-up interpreting a figure/graph/chart/table; and use English as a successful medium of communication. (L3)

CO PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									2	3		1
CO2									2	3		1
CO3									2	3		1

(Strong – 3; Moderate – 2; Weak – 1)

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I- Year II – Semester	Name of the Course	L	T	P	C
ES1201L	**Problem Solving using Python Lab**	**0**	**0**	**3**	**1.5**

Course Objectives

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphical user Interfaces in Python
- To develop the ability to write database applications in Python

List of Problems

1. Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3. Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86, 89.
4. Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5. Use a *for* loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

   *

   **

   ■■
6. Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7. Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and Not close otherwise.
8. Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
9. Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde* and *ABCDE* the program should print out *AaBbCcDdEe*.Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
10. In algebraic expressions, the symbol for multiplication is often left out, as in 3x+4y or 3(x+5). Computers prefer those expressions to include the multiplication symbol, like 3*x+4*y or 3*(x+5). Write a program that asks the user for an algebraic expression and then inserts multiplication symbols where appropriate.
11. Write a program that generates a list of 20 random numbers between 1 and 100.
    a) Print the list.
    b) Print the average of the elements in the list.
    c) Print the largest and smallest values in the list.
    d) Print the second largest and second smallest entries in the list
    e) Print how many even numbers are in the list.
12. Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.

13. Write a program that generates 100 random integers that are either 0 or 1. Then find the longest run of zeros, the largest number of zeros in a row. For instance, the longest run of zeros in [1,0,1,1,0,0,0,0,1,0,0] is 4.
14. Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
15. Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements,it is much shorter with lists and it is also easier to add new conversions if you use lists.
16. Write a function called *sum_digits* that is given an integer num and returns the sum of the digits of num.
17. Write a function called *first_diff* that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.
18. Write a function called *number_of_factors* that takes an integer and returns how many factors the number has.
19. Write a function called *is_sorted* that is given a list and returns True if the list is sorted and False otherwise
20. Write a function called root that is given a number x and an integer n and returns $x^{1/n}$. In the function definition, set the default value of n to 2.
21. Write a function called primes that is given a number n and returns a list of the first n primes. Let the default value of n be 100.
22. Write a function called merge that takes two already sorted lists of possibly different lengths, and merges them into a single sorted list.

a) Do this using the sort method. B) Do this without using the sort method.

23. Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in the user's word.
24. Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
25. Write a program that reads a list of temperatures from a file called *temps.txt*, converts those temperatures to Fahrenheit, and writes the results to a file called ftemps.txt.
26. Write a class called Product. The class should have fields called name, amount, and price, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method *get_price* that receives the number of items to be bought and returns a the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called *make_purchase* that receives the number of items to be bought and decreases amount by that much.
27. Write a class called Time whose only field is a time in seconds. It should have a method called *convert_to_minutes* that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called *convert_to_hours* that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
28. Write a class called Converter. The user will pass a length and a unit when declaring an object from the class—for example, c = Converter(9,'inches'). The possible units are inches, feet, yards, miles, kilometers, meters, centimeters, and millimeters. For each of these units there should be a method that returns the length converted into those units. For example, using the Converter object created above, the user could call c.feet() and should get 0.75 as the result.
29. Write a Python class to implement pow(x, n).
30. Write a Python class to reverse a string word by word.

31. Write a program that opens a file dialog that allows you to select a text file. The program then displays the contents of the file in a textbox.
32. Write a program to demonstrate Try/except/else.
33. Write a program to demonstrate try/finally and with/as.

Course Outcomes: After completing this course, Students will be able to-

CO1: Comprehend how software easily to build right out of the box.
CO2: Demonstrates the use of an interpreted language for problem solving through control statements including loops and conditionals.
CO3: Practice with data structures for quick programming solutions.
CO4: Demonstrates software building for real needs by breaking out code into reusable functions and modules.
CO5: Comprehend the software reliability through exception handling.

CO – PO MAPPING:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	3	2	2	-	-	-	2	-	-	-
CO2	2	2	2	2	2	-	-	-	2	-	-	-
CO3	2	2	2	2	3	-	-	-	2	-	-	-
CO4	2	1	2	2	2	-	-	-	3	2	-	-
CO5	-	3	3	2	3	-	-	-	3	2	-	-

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I- Year II – Semester	Name of the Course	L	T	P	C
MC1201	Environmental Science	2	0	0	0

Course Objectives

- To make the students to get awareness on environment,
- to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- to save earth from the inventions by the engineers.

Unit-1

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

Unit-2

ECOSYSTEMS, BIODIVERSITY, AND ITS CONSERVATION

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-3
ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT
Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution

c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Unit-4

SOCIAL ISSUES AND THE ENVIRONMENT

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Unit-5

HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

TEXT BOOKS

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela – Prentice hall of India Private limited.

Course Outcomes: At the end of the course, the student will be able to:

COURSE OUTCOMES

CO1 Able to U**nderstand** The concepts of the ecosystem
CO2 Able to U**nderstand** The natural resources and their importance
CO3 Able to learn The biodiversity of India and the threats to biodiversity, and **Apply** conservation practices
CO4 Able to learn Various attributes of the pollution and their impacts
CO5 Able to U**nderstand** Social issues both rural and urban environment
CO6 Able to U**nderstand** About environmental Impact assessment and **Evaluate** the stages involved in EIA

CO PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												1
CO2												1
CO3												1
CO4												1
CO5												1
CO6												1

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II- Year I – Semester	Name of the Course	L	T	P	C
BS2101	Mathematics – III	2	1	0	3

Pre-Requisites: Mathematics-I and Mathematics-II

Course Objectives:

1. To instruct the concept of Matrices in solving linear algebraic equations
2. To familiarize the techniques in partial differential equations
3. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications

UNIT-I: Solving system of linear equations, Eigen values and Eigen Vectors (10 hrs)

Rank of a matrix by Echelon form and normal form–solving system of homogeneous and non-homogeneous linear equations–Gauss elimination, Gauss Jordan for solving system of equations-Eigen values and Eigen vectors and their properties

UNIT-II: Cayley-Hamilton theorem and quadratic forms: (10 hrs)

Cayley-Hamilton theorem (without proof)–Finding inverse and power of a matrix by Cayley-Hamilton theorem–Reduction to Diagonal form–Quadratic forms and nature of the quadratic forms–Reduction of quadratic form to canonical forms by orthogonal transformation.

Application: Free vibration of two mass systems.

UNIT – III: Vector Differentiation: (8 hrs)

Scalar and Vector point functions-Vector Differential operator- Gradient – Directional derivatives–Divergence – Curl – Laplacian second order operator- Vector identities- Scalar Potential.

UNIT– IV: Vector Integration: (10 hrs)

Line integral – Work done – Circulation- Surface integral- Volume integral Vector integral theorems (without proof): Greens theorem in a plane- Stokes theorem- Gauss Divergence theorem.

UNIT– V: Solutions of Partial differential Equations (10 hrs)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

Second order PDE: Solutions of linear partial differential equations with constant coefficients RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

Text Books:

1.B.S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

Reference Books:

1.B.V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
2.H.K.Das, Advanced Engineering Mathematics, 22nd Edition, S. Chand & Company Ltd.
3.Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

Course Outcomes: At the end of the course, the student will be able to

CO1: develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)

CO2: solve system of linear algebraic equations using Gauss elimination, Gauss Jordan (L3)

CO3: to interpret the physical meaning of different operators such as gradient, curl and divergence (L5)

CO4: estimate the work done against a field, circulation and flux using vector calculus (L5)

CO5: identify the solution methods for partial differential equation that model physical processes (L3)

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

Micro Syllabus of MATHEMATICS – III

UNIT-I: Solving system of linear equations, Eigen values and Eigen Vectors Rank of a matrix by Echelon form and normal form–solving system of homogeneous and non-homogeneous linear equations–Gauss elimination, Gauss Jordan for solving system of equations-Eigen values and Eigen vectors and their properties		
Unit	**Module**	**Micro content**
1a. Solving system of linear equations	Rank of the given matrix	Find rank of the given matrix by reducing into Echelon form.
		Find rank of the given matrix by reducing into Normal form.(Canonical form)
	System of linear equations	Solve the system of homogeneous linear equations.
		Solve the system of Non- homogeneous linear equations.
		Solve the given system of linear equations using Gauss Elimination method.
		Solve the given system of linear equations using Gauss Jordan method.
1b.Applications	Eigen values and Eigen vectors	Find eigen values and Eigen vectors of given matrix.
	Properties of Eigen values and Eigen vectors	If λ is an eigen value of Matrix A then find Eigen values of A^m or A^{-1} or $B = A^2+k_1A+K_2I$ or ….
		The Eigen vectors corresponding to distinct Eigen values of real symmetric matrix are orthogonal.

UNIT-II: Cayley-Hamilton theorem and quadratic forms:
Cayley-Hamilton theorem (without proof)–Finding inverse and power of a matrix by Cayley-Hamilton theorem–Reduction to Diagonal form–Quadratic forms and nature of the quadratic forms–Reduction of quadratic form to canonical forms by orthogonal transformation.

Unit	Module	Micro content
II	Cayley-Hamilton theorem	Verify Cayley-Hamilton theorem for given matrix A and hence find A^{-1} or A^4.
II	Quadratic Forms	Reduce the given matrix into diagonal form.
		Reduce the quadratic form into canonical form using orthogonal transformation method.

UNIT – III: Vector Differentiation:
Scalar and Vector point functions-Vector Differential operator- Gradient – Directional derivatives Divergence – Curl – Laplacian second order operator- Vector identities- Scalar Potential.

Unit	Module	Micro content
3a. Vector Differential operator	Divergent, Curl and Gradient	Find Gradient of given scalar function.
		Find Unit normal vector at given point on given surface.
		Find divergent or Curl of given vector function.
3b. Vector identities	Vector identities	Find Scalar potential function.
		Problems on Laplacian second order operator.
		Prove the given vector identity.

UNIT– IV: Vector Integration:
Line integral – Work done – Circulation- Surface integral- Volume integral Vector integral theorems (without proof): Greens theorem in a plane- Stokes theorem- Gauss Divergence theorem.

Unit	Module	Micro content
4a. Vector integration	Line integration, surface integration & volume integration	Evaluate given line integration along the given curve.
		Find work done by force in moving a particle from A to B along curve C.
		Find surface integral of vector function.
		Find volume integral of vector function.
4b. Vector integration theorems	Green's theorem, Stoke's theorem and Gauss Divergence theorem.	Verify Green's theorem.
		Evaluate using stoke's theorem.
		Evaluate using Divergence theorem.

UNIT– V: Solutions of Partial differential Equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.
Second order PDE: Solutions of linear partial differential equations with constant coefficients – RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

Unit	Module	Micro content
5a. First order PDE	Formation of PDE	Form PDE by eliminating arbitrary constants.
		Form PDE by eliminating arbitrary functions.
	Solve First order	Solve first order linear PDE.

	PDE	Solve first order non-linear PDE.
5b. Higher order PDE	Solve Second order PDE.	Solve Second order linear PDE with constant coefficients with RHS terms $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

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II- Year I – Semester	Name of the Course	L	T	P	C
PC2101	Mathematical Foundations of Computer Science	2	1	0	3

Course Objectives:

- To introduce concepts of mathematical logic.
- To introduce concepts and perform operations with sets, relations and functions.
- To solve counting problems by applying elementary counting techniques.
- To introduce algebraic structures, generating functions and recurrence relations.
- To use graph theory for solving problems.

Unit-1: Mathematical Logic & Calculus 10 hrs

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, and Indirect Method of Proof.

Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

Unit-2: Set theory & Relations 10 hrs

***Set Theory*:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion.

Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

Unit-3: Algebraic Structures and Number Theory 10 hrs

Algebraic Structures: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism.

Number Theory: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, and Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

Unit-4: Combinatorics & Recurrence Relations 10 hrs

Combinatorics: Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, Pigeonhole Principle and its Application.

Recurrence Relations: Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving non homogeneous Recurrence Relations.

Unit-5: Graph Theory 8 hrs

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multi graphs, Planar Graphs, Euler's Formula, Graph Colouring, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P.Mohapatra, 3rdEdition, Tata McGraw Hill.

3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel,T.P. Baker, 2nd Edition, Prentice Hall of India.

2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon CutlerRoss, PHI.

3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2020

E-resources

1. https://nptel.ac.in/courses/106/103/106103205/
2. https://nptel.ac.in/courses/106/106/106106183/

Course Outcomes:

By the end the of the course, the student will be able to

CO-1: Apply mathematical logic to solve problems(L3)
CO-2: Understand sets, relations and discrete structures
CO-3: Apply number theory to perform modulo arithmetic and computer arithmetic. (L3)
CO-4: Solve problems on recurrence relations and counting principles (L3)
CO-5: Analyze and solve real world problems using graphs and trees. (L5)

CO-PO-PSO Mapping:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO 1	2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO 3	2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO 4	3	2	2	-	-	-	-	-	-	-	-	-	2	-
CO 5	3	2	2	-	-	-	-	-	-	-	-	-	2	-

Micro-Syllabus of Mathematical Foundations Of Computer Science

II B.Tech I Semester

Unit-1: 10 Hours

Mathematical Logic : Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof.

Predicate Calculus: Predicate Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus

Unit	Module	Micro content	No of hrs
1.Mathematical Logic & Predicate calculus	Introduction to Propositional logic	Def. of Proposition, Examples	2
		logical connectives	
		Truth tables	
	Truth tables for compound propositions	Well Formed Formulas	2
		Tautology,contradiction, contingency	
		Equivalence of Formulas	
		Duality Law	
	Normal forms	DNF,PDNF	2
		CNF,PCNF	
	Rules of inference	Formulae and problems on rules of inference	2
		Consistency of premises	
		Indirect method of proof	
	Predicate calculus	Predicate Logic-II	2

		Variables ,Quantifiers, Free and Bound Variables	
		Inference Theory for Predicate logic-II	

Unit-2: **10 Hours**

***Set Theory*:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion.

Relations:Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties

Unit	**Module**	**Micro content**	**No of hrs**
2. Set theory and Relations	Set theory	Introduction, Operations on Binary Sets	2
		Principle of Inclusion and Exclusion.	
	Relations	Properties of Binary Relations	4
		Relation Matrix and Digraph	
		Partition and Covering	
		Operations on Relations, Transitive Closure	
		Compatibility and Partial Ordering Relations	
		Hasse Diagrams	
	Functions	Bijective Functions, Composition of Functions, Inverse Functions.	2
		Permutation Functions, Recursive Functions	
		Lattice and its Properties	2

Unit-3: **10 Hours**

Algebraic Structures:Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism.

Number Theory:Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem

Unit	Module	Micro content	No of hrs
6. *Algebraic Structures & Number Theory*	Algebraic structures	Algebraic Systems, Examples, General Properties,	3
		Semi Groups and Monoids,	
		Group, Subgroup, Abelian Group	
		Homomorphism, Isomorphism	
		Division Theorem	1
		GCD&LCM	1
		Prime factorization, Testing of primes	2
	Number theory	The Fundamental Theorem of Arithmetic	3
		Fermat's Theorem and Euler's Theorem	

Unit –4: Combinatorics & Recurrence Relations (10 hrs)

Combinatorics:Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems,Pigeonhole Principle and its Application.

Recurrence Relations: Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving non homogeneous Recurrence Relations.

Unit	Module	Micro content	No of hrs
4a.Combinatorics	Binomial and Multinomial Theorems	Binomial and Multinomial Coefficients and problems	2
	Pigeonhole Principle and its Application	Pigeonhole Principle Statement and problems	2
4b. Recurrence Relations	Solution of First and second order RR	Substitution method	6
		Generating function method	
		Method of characteristic roots	
		Problems	
Unit	**Module**	**Micro content**	**No of hrs**
5.Graph Theory	Basic terminology of graph theory	Vertex,edge ,degree of vertex,Directed and un directed	**2**

		graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix	
		Paths and circuits	**2**
	Graph theory	Eulerian and Hamiltonian Graphs	
		Chromatic Number	**2**
		Spanning Trees,BFS and DFS	**2**

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II- Year I – Semester	Name of the Course	L	T	P	C
PC2102	Data Structures	3	0	0	3

Course Objectives:

1. To impart the usage of linear list to students.
2. To help students understand the difference between dynamic memory using linked list.
3. To demonstrate the students about the operations Trees.
4. To make the student to understand various algorithms in graphs.
5. To make the students to learn the importance of hashing and sorting algorithms.

Unit-1: **8 hrs**

Algorithms and Linear Lists : Algorithmic complexity, performance and Analysis, Linear lists (Arrays) , Applications of Linear List : Searching and Sorting

Unit-2: **10 hrs**

Stacks and Queues, Linked Lists: Single Linked List, Double Linked List, Circular Linked List, Stack and Queues using Linked list

Unit-3: **10 hrs**

Trees: Binary Trees Operations, Tree traversal, Threaded Binary Trees, Binary Search Trees, Binary Heap

Unit-4: **10 hrs**

Graphs- Elementary Graph Operations, Graph Traversals, Minimum cost spanning tree Algorithms , Shortest paths algorithms.

Unit-5: **10 hrs**

Hashing and Pattern Matching: Concept Hashing, Hash Functions, Collision Resolution Techniques, Pattern Matching algorithms

Text Books

1. Data structures, Algorithms and Applications in Java, S. Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in Java, Mark Allen Weiss, Pearson Education. Ltd, Second Edition

Reference Books

1. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
2. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press. 3rd Edition.
3. Classical Data Structures, 2nd Edition, DebasisSamanta, PHI

e- resources

7. Data Structures Visualizations : https://www.cs.usfca.edu/~galles/visualization/Algorithms.html
8. Code Archery Youtube Channel: https://www.youtube.com/playlist?list=PLrKBFf87Cy9CNZpzi3poq8BFWc0h4f0vL

Course Outcomes:

CO1: **understand** the implementation of linear lists**(Understand)**
CO2: **examine** static and dynamic data structures with suitable applications. **(Apply)**
CO3: **determine** trees applications. **(Apply)**
CO4: appreciate the importance and **significance** of graph algorithms in building and solving real world applications. **(Analyze)**
CO5: **understand** and implement algorithms for text processing.**(Understand)**

CO-PO mapping Table

Mapping	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
C01	2	2	1	-	-	-	-	-	-	-	-	-	2	2
C02	1	2	2	-	-	-	-	-	-	-	-	-	2	2
C03	1	-	2	2	-	-	-	-	-	-	-	-	2	2
C04	2	-	2	1	-	-	-	-	-	-	-	-	2	2
C05	1	2	1	2	-	-	-	-	-	-	-	-	2	2

Micro Syllabus of Data Structures and Algorithms

UNIT-I **8 Hours**

Algorithms and Linear Lists : Algorithmic complexity, performance and Analysis, Linear lists (Arrays) , Applications of Linear List : Searching and Sorting

Unit	Module	Micro content	# hrs
Algorithms	Algorithmic Complexity, performance and analysis	Introduction to algorithms	1
		Time complexity and space complexity Analyzing performance of algorithm Big Oh, Theta, small Oh notations	1
Linear Lists (Array)	Representation and Operations	Arrays, representation	1
	Searching in Linear List	Linear Search Binary Search	1
	Sorting	Insertion Sort, Merge Sort, Quick Sort, Radix Sort	4
Additional Topics		Evaluation of Postfix expression, Round Robin algorithm, Fibonacci Search	

UNIT II **10 Hours**

Stacks, Queues and Linked List : Stacks, Queues, Single Linked List, Double Linked List, Circular Linked List, Stack and Queues using Linked list.

Unit	Module	Micro content	# hrs
Stacks	Representation and Operations	Stacks : Representation using arrays Operations : push, pop, peek	2

Queues	Representation and Operations	Queue : Representation using arrays Operations : enqueue, dequeue, search	2
Linked List	Representation and Operations	Singly Linked List : Representation Operations: Insert at begin, Insert at end, Insert at position, Delete at begin, Delete at end, Delete at position, search	2
		Doubly Linked List: Representation Operations: Insert at begin, Insert at end, Insert at position, Delete at begin, Delete at end, Delete at position, search	2
		Circular Linked List: Representation Operations: Insertion, Deletion and search	1
		Stack using Linked list, Queue using Linked List	1
Additional Topics:		Huffman Coding, Generalized Linked List	

UNIT III **10 Hours**

Trees: Binary Trees Operations, Tree traversal, Threaded Binary Trees, Binary Search Trees, Priority Queues: Heap

Unit	**Module**	**Micro content**	**# hrs**
Trees	Introduction	Terminology: Node, Root, Leaf, InternalNode, Representation , Types of Binary Trees	2
	Binary Trees	Binary Trees: properties, representation, Traversals: Inorder, Preorder, Postorder Threaded Binary Trees	2
	Binary Search Trees	Representation, Operations: Insert, delete, search Skewed Trees	2
Priority Queues	Binary Heap: Representation and operations	Heap : Min Heap, Max Heap Operations: insert, delete, findMin, reheapify	2
Additional Topics:		Balanced Binary Search Trees	

UNIT IV **10 Hours**

Graphs- Elementary Graph Operations, Graph Traversals,
Minimum cost spanning tree Algorithms , Shortest paths algorithms

Unit	**Module**	**Micro content**	**# hrs**
Graphs	Introduction	Definition, Representation, Degree of graph, Connected Components, Biconnected Components	2
	Graph Traversal	Breadth First Search Traversal, Depth First Search Traversal	2
	Minimum cost spanning tree	Prims algorithm, Kruskals algorithm	3
	Shortest path and Transitive closure	Single Source shortest path algorithm: Dijkstra's algorithm, All pair Shortest Path algorithm: Floyd – Warshall, Transitive Closure	3
Additional Topics:		Directed Acyclic Graph, Bellman Ford Algorithm	

UNIT-V **10 Hours** **Hashing and Sorting :** Concept Hashing, Hash Functions, Collision Resolution Techniques, Sorting algorithms			
Unit	**Module**	**Micro content**	**# hrs**
Hashing	Collision Resolution using Hashing	Concept of Hashing, Hash Functions: Division Method, Folding Method, Mid Square Method Collision Resolution Techniques: Linear Probing, Quadratic Probing, Double Hashing, Separate Chaining	6
Pattern Matching	Algorithms	Brute Force, Boyer Moore Pattern Algorithm,	4
Additional Topics		Digital Search Trees	

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II- Year I- Semester	Name of the Course	L	T	P	C
PC2103	Java Programming	3	0	0	3

Course Objectives:

1. To understand object oriented programming concepts, and apply them in solving problems.
2. To make the students to learn the principles of inheritance and polymorphism; and to demonstrate how they relate to the design of abstract classes; to introduce the implementation of packages and interfaces.
3. To make the students to learn the concepts of exception handling.
4. To make the students to learn the concepts of multithreading.
5. To make the students to develop GUI applications.

Unit-1: Introduction to OOPS Concepts, Classes and Strings 12 Hrs

Introduction to Object Oriented Programming, Java buzzwords, Java Programming Basics, Sample programs, Data types and operators, Control statements.

Classes: Classes, Objects, Methods, Constructors, this and static keywords, Method and Constructor Overloading, Access modifiers, arrays-One Dimensional and multi-dimensional arrays, Searching, Sorting.

Strings-Exploring the String class, String buffer class, Command-line arguments.

Unit – II: Inheritance, Interfaces, Packages 10 Hrs

Inheritance: Need of inheritance, types, super keyword, abstract classes, interfaces, compile time and runtime polymorphism, Packages.

UNIT – III: EXCEPTION HANDLING AND I/O STREAMS 10 HRS

Exception Handling: Concepts of Exception handling, Built-in exceptions, creating own exception sub classes, Assertions.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, Object Serialization, exploring java.nio

Unit – IV: Multithreading 8 Hrs

MULTITHREADING : **CONCEPTS OF MULTITHREADING, DIFFERENCES BETWEEN PROCESS AND THREAD, THREAD LIFE CYCLE, THREAD CLASS, RUNNABLE INTERFACE, CREATING MULTIPLE THREADS, SYNCHRONIZATION, THREAD PRIORITIES, INTER THREAD COMMUNICATION, DAEMON THREADS, THREAD GROUPS.**

Unit – V: GUI Programming 10 Hrs

GUI Programming with Swing: Introduction, limitations of AWT, Various swing components & hierarchy.

Event Handling- event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

Text Books

.Java – The Complete Reference, Herbert Schildt, MC GRAW HILL Education, 9th Edition, 2016

Reference Books

1. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

2. "Core Java", Nageswar Rao, Wiley Publishers.

3. "Thinking in Java", Bruce Eckel, Pearson Education

4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.

Course Outcomes: By the end the of the course, the student will be able to

CO-1: Understand object-oriented programming concepts for problem solving.
CO-2: Build class hierarchy and packages for real world problems.
CO-3: Develop thread safe Java programs with appropriate Exception handling.
CO-4: Demonstrate multithreaded application programs through a language
CO-5: Design GUI applications using swings and multithreading.

CO-PO MAPPING MATRIX:

Mapping	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
C01	-	2	1	1	-	-	-	-	-	-	-	-	2	1
C02	-	2	2	2	1	-	-	-	-	-	-	-	2	1
C03	-	2	2	2	1	-	-	-	-	-	-	-	2	2
C04	-	2	2	2	1	-	-	-	-	-	-	-	2	1
C05	-	2	2	2	2	-	-	-	-	-	-	-	2	1

Micro syllabus for Java Programming

Unit – I: Introduction to OOPS Concepts, Classes and Strings **10 Hrs**

Introduction to Object Oriented Programming, Java buzzwords, Java Programming Basics, Sample programs, Data types and operators, Control statements.

Classes: Classes, Objects, Methods, Constructors, this and static keywords, Method and Constructor Overloading, Access modifiers, arrays-One Dimensional and multi-dimensional arrays, Searching, Sorting.

Strings-Exploring the String class, String buffer class, Command-line arguments.

Unit	Module	Micro content
Introduction to OOPS Concepts, Classes and Strings	OOPs	Need of Java, JVM, JDK
		Introduction to Object Oriented Programming
		OOPS Vs structured programming
		Java buzzwords, Sample programs
		Data types & operators
		Control statements

	Classes	Classes, Objects, Methods
		Constructors, this and static keywords
		Method and Constructor Overloading,
		Arrays, searching & sorting
	Strings	String class & methods, problems related
		String buffer & String tokenizer
		Command line arguments

Unit – II: Inheritance, Interfaces, Packages **10 Hrs**

Inheritance: Need of inheritance, types, super keyword, abstract classes, interfaces, compile time and runtime polymorphism, Packages.

Inheritance, Interface & Packages	Inheritance	Need for inheritance
		Types of inheritance
		Super keyword
		Abstract classes
		Calling super class with sub class
	Interface	Introduction
		Dynamic method despatch
		Compile time & runtime polymorphism
	Packages	Introduction, classpath
		Built-in packages
		User defined package,

UNIT – III: EXCEPTION HANDLING AND I/O STREAMS 10 HRS

Exception Handling: Concepts of Exception handling, Built-in exceptions, creating own exception sub classes, Assertions.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, Object Serialization, exploring java.nio

Exceptions & I/o	Exception Handling	Introduction, Concepts of Exceptions – try, catch, throw & throws, finally
		Built-in exceptions
		exception hierarchy
		User defined exceptions
	Stream & I/O	Readers & Writers, Byte Stream, Random Access files, object serialization
		Exploring java.nio package
		Reading console Input and Writing Console Output

Unit – IV: Multithreading **8 Hrs**

MULTITHREADING : **CONCEPTS OF MULTITHREADING, DIFFERENCES BETWEEN PROCESS AND THREAD, THREAD LIFE CYCLE, THREAD CLASS, RUNNABLE INTERFACE, CREATING MULTIPLE THREADS, SYNCHRONIZATION, THREAD PRIORITIES, INTER THREAD COMMUNICATION, DAEMON THREADS, THREAD GROUPS.**

Multithreading	Multithreading	Introduction of Multitasking, Multitasking Vs Multithreading
		Process Vs Thread
		Thread life cycle
		Using Thread & Runnable Interfaces
		Creation of multiple threads
		Synchronization – Producer consumer problems, Banker problems

		Thread priorities
		Inter thread communication
		Daemon threads
		Thread groups
		All thread related methods
Unit – V: GUI Programming **10 Hrs** **GUI Programming with Swing:** Introduction, limitations of AWT, Various swing components & hierarchy. **Event Handling**- event delegation model, sources of event, Event Listeners, adapter classes, inner classes.		
Gui Programming	GUI with Swings	Introduction, AWT Vs Swings
		Components & hierarchy
	Event Handling	Event Delegation Model
		Sources of events
		Event Listeners
		Adapter Classes, Inner classes

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II- Year I- Semester	Name of the Course	L	T	P	C
PC2104	Software Engineering	3	0	0	3

COURSE OBJECTIVES: The student should be able to

1. To understand the software life cycle models.
2. To understand the software requirements and SRS document.
3. To understand the importance of modeling and modeling languages.
4. To design and develop correct and robust software products.
5. To understand the quality control and how to ensure good quality software.

Unit-1: Introduction to Software Engineering: (10 Hrs)

Software, Software Classifications and Characteristics, Emergency of Software Engineering, What is Software Engineering? Software Engineering Challenges

Software Processes Process model, Elements and Characteristics of Process model, Process Classification, Phased Development Life Cycle, Software Development

Process Models: Prescriptive Process Models, Agile process models, and RUP process model

Unit-2: Project Management & Planning: (10 Hrs)

Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management. Project planning activities, Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit-3: Requirement Engineering: (8 Hrs.)

Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

Unit-4: Software Design: (10 Hrs.)

Software Design Process, Characteristics of a Good Design**,** Design Principles, Modular Design (Coupling and Cohesion), Software Architecture, Design

Methodologies (Function Oriented Design and Object Oriented Design), Structured Design Methodology (SDM), Transaction Analysis and Logical Design;

Coding: Coding principles, Coding process, Code verification and documentations.

Unit-5: Software Testing: (10 Hrs)

Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Debugging Approaches

Quality of Software: Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma.

Maintenance: Software Maintenance, Maintenance Process Models and Reengineering.

Text Books

1. Software Engineering: Concepts and Practices- Ugrasen Suman, Cengage Learning Publications.
2. Fundamentals of Software Engineering-Rajib Mall, PHI, New Delhi.

Reference Books

1. An Integrated Approach to S/w Engineering- Pankaj Jalote, Narosa Publishing House.
2. Software Engineering- Ian Sommerville, Pearson Education, New Delhi.
3. Software Engineering Concepts-Richard E. Fairly, Tata McGraw Hill Inc. New York.

e- resources

https://www.javatpoint.com/software-engineering-tutorial

COURSE OUTCOMES: Upon successful completion of the course, the student will be able to

CO1: Define and develop s/w projects from requirement gathering to implementation.
CO2: Obtain knowledge about principles and practices of software engineering.
CO3: Focus on the fundamentals of modeling a software project.
CO4: Obtain knowledge about estimation and maintenance of software systems
CO5: Design test cases, schedules and perform testing for SQA

CO-PO MAPPING MATRIX:

Mapping	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
C01	1	2	1	-	-	-	3	-	2	3	2	1	2	1
C02	-	2	3	1	2	2	2	-	1	2	1	-	3	1
C03	-	-	2	-	3	3	1	-	2	1	3	-	3	2
C04	1	3	2	2	2	2	3	-	-	2	2	-	3	1
C05	-	-	2	-	3	2		2	2	-	2	-	2	1

Micro Syllabus of Software Engineering

UNIT I: Introduction to Software Engineering: (10Hrs)
Software, Software Classifications and Characteristics, Emergency of Software Engineering, What is Software Engineering? Software Engineering Challenges
Software Processes Process model, Elements and Characteristics of Process model, Process Classification, Phased Development Life Cycle, Software Development
Process Models: Prescriptive Process Models, Agile process models, and RUP process model

Unit	Module	Micro Content
UNIT I	**Software Engineering**	Software Classifications, Characteristics
		Engineering Discipline
		Emergency Of Software Engineering
		What Is Software Engineering?
		Software Engineering Challenges
	Software Processes	Process Model
		Elements And Characteristics Of Process Model
		Process Classification
		Phased Development Life Cycle
		Software Development
	Process Models	Prescriptive Process Models
		Agile Process Models,
		RUP Process Model

UNIT – II: Project Management & Planning: (10Hrs)

Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management. Project planning activities, Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit	Module	Micro Content
UNIT II	Project Management Essentials	Project, People, Process, Product
	Project Success &Failures	Why Project Fails, Keys To Success
	Project Life Cycle	Project Vs Product Life Cycles
	Project Team Structure And Organization, S/W Configuration Management	Configuration Identification, Change Control
		Configuration Status Accounting, Auditing
	Project Planning And Estimation	Project Planning Activities
		Metrics And Measurements
		Project Size Estimation
		Effort Estimation Techniques
		Staffing And Personnel Planning
		Project Scheduling
		Miscellaneous Plans

UNIT –III :Requirement Engineering: (8 Hrs.)

Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

Unit	Module	Micro Content
Unit III	Requirements Engineering	Software Requirements
		Requirement Engineering Process
		Requirement Elicitation
		Requirement Analysis
	Structured Analysis	Data Flow Diagrams, Dictionary
		Structured Analysis Method, Pros &Cons
	Data Oriented Analysis	ERM, Data Oriented Analysis Method
	Object Oriented Analysis	OO Method, Modeling
		Dynamic And Functional Modeling
	Prototyping Analysis	Throwaway Prototyping
		Evolutionary Prototyping
	Requirements Specification, Validation, And Management	SRS Characteristics And Components
		Structure And Methods
		Review And Reading

UNIT – IV :Software Design: (10 Hrs.)

Software Design Process, Characteristics of a Good Design**,** Design Principles, Modular Design (Coupling and Cohesion), Software Architecture, Design Methodologies (Function Oriented Design and Object Oriented Design), Structured Design Methodology (SDM), Transaction Analysis and Logical Design;

Coding: Coding principles, Coding process, Code verification and documentations.

Unit	Module	Micro Content
UNIT IV	Software Design Process	Software Design Process
	Characteristics Of A Good Design	Characteristics of a Good Design
	Design Principles	Abstraction and information hiding
		Functional decomposition and TD BU strategies

	Modular Design	coupling and cohesion
	Software Architecture	importance of SA and styles
		designs and documentation evaluation
	Design Methodologies	FO & OO designs
	Structured Design Methodology	DFD I/p process & O/p segments
		First level factoring
		additional factoring
	Transaction Analysis And Logical Design	PDL and algorithmic design
	Coding Principles & Process	Coding principles & process
	Verification And Documentation	Verification and documentation

UNIT V : Software Testing: (10 Hrs)

Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Debugging Approaches

Quality of Software: Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma.

Maintenance: Software Maintenance, Maintenance Process Models and Reengineering.

Unit	Module	Micro Content
UNIT V	Testing Fundamentals	Errors, Faults, Failures, Cost, Process, Role
	Planning	Case Design And Execution Stubs And Drivers
		Defect Tracking And Stats
	Black box testing	Ecp, Bva
		Cause Effect Graphing And Error Guessing
	White box testing	CF Based, Path Testing
		DF Base, Mutation Testing
	Levels of testing	Unit Integration System Acceptance
	Debugging approaches	Brute Force, Backtracking
		Breakpoint And Debugging By Induction
		Deduction And Testing
	Quality of software	Concept, Factors
	Verification and validation	Verification And Validation
	SQA	SQA Activities And Plan
	Quality standards	CMM, ISO 900, Six Sigma
	Maintenance	Maintenance Process Models
		Reengineering

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II- Year I- Semester	Name of the Course	L	T	P	C
PC2101L	Data Structures Lab	0	0	3	1.5

Course Objectives:

1. Ability to apply computational thinking to a diverse set of problems.
2. Ability to adapt to new challenges and computational environments.
3. Proficiency in the design and implementation of algorithms.

List of experiments:

Prerequisites: Solve the following problems in Hackerrank

1. Time Conversion
2. Diagonal Difference
3. Stair case
4. Birthday Cake candles

UNIT I

1. Implement Binary Search using arrays
2. Implement Insertion Sort.
3. Implement Quick Sort
4. Implement Merge Sort
5. Implement Radix Sort

String Pairs
Anagram

UNIT II

6. Implement stack using arrays
7. Implement conversion of infix to postfix expression.
8. Implement queue using arrays.
9. Implement circular queue
10. Implement Singly Linked List
11. Implement Doubly Linked List
12. Implement Binary Heap Operations.

Minimize the Sum
Implement Expression Tree.

UNIT III

13. Implement Complete Binary Tree
14. Implement Binary Trees Traversal techniques (recursive and non-recursive)
15. Implement Binary Search Tree
16. Implement Binary Heap Operations.

UNIT IV

17. Implement Graph and its operations
18. Implement Breadth First Search
19. Implement Depth First Search
20. Implement Prims' Algorithm
21. Implement Kruskal's Algorithm

Implement Island Strikes.
Implement Pawn Moves.

UNIT V

22. Implement Linear Probing on a dictionary.
23. Implement Separate Chaining.
24. Implement Brute Force Pattern Matching.
25. Implement Boyer Moore Pattern Matching.

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II- Year I- Semester	Name of the Course	L	T	P	C
PC2102L	Java Programming Lab	0	0	3	1.5

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection frame work.
3. To write multithreaded programs.
4. To design GUI application using swing controls.
5. To introduce java compiler and eclipse platform
6. To impart hands on experience with java programming.

NOTE:

Mandatory to follow test driven development with Eclipse IDE empowered JUnit testing framework and code coverage plugin.

The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list asneeded.

List of Experiments

1. Create a class called Invoice that a hardware store might use to represent an invoice for an item sold at the store. An Invoice should include four pieces of information as instance variables-a part number (type String),a part description(type String),a quantity of the item being purchased (type int) and a price per item (double). Your class should have a constructor that initializes the four instance variables. Provide a set and a get method for each instance variable. In addition, provide a method named getInvoiceAmount() that calculates the invoice amount (i.e., multiplies the quantity by the price per item), then returns the amount as a double value. If the quantity is not positive, it should be set to 0. If the price per item is not positive, it should be set to 0.0. Write a test application named InvoiceTest that demonstrates class Invoice's capabilities. [CO1]

2. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, and type of EB connection (i.e. domestic or commercial). Compute the bill amount using the following tariff. [CO1]

   If the type of the EB connection is domestic, calculate the amount to be paid as follows:

   1. First 100 units - Rs. 1 per unit
   2. 101-200units - Rs. 2.50 per unit
   3. 201 -500 units - Rs. 4 per unit
   4. >501 units - Rs. 6 per unit

   If the type of the EB connection is commercial, calculate the amount to be paid as follows:

   5. First 100 units - Rs. 2 per unit
   6. 101-200units - Rs. 4.50 per unit
   7. 201 -500 units - Rs. 6 per unit
   8. >501 units - Rs. 7 per unit

3. Create class SavingsAccount. Use a static variable annualInterestRate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savingsBalance indicating the amount the saver currently has ondeposit. Provide method calculateMonthlyInterest to calculate the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12 this interest should be added to savingsBalance. Provide a static method modifyInterestRate that sets the annualInterestRate to a new value.Write a program to test class SavingsAccount. Instantiate two savingsAccount objects, saver1 and saver2, with balances of $2000.00 and $3000.00, respectively. Set annualInterestRate to 4%, then calculate the monthly interest and print the new balances for both savers. Then set the annualInterest Rate to 5%, calculate the next month's interest and print the new balances for both savers. [CO1]

4. Create a class called Book to represent a book. A Book should include four pieces of information as instance variables-a book name, an ISBN number, an author name and a publisher. Your class should have a constructor that initializes the four instance variables. Provide a mutator method and accessor method (query method) for each instance variable. In addition, provide a method named getBookInfo that returns the description of the book as a String (the description should include all the information about the book). You should use this keyword in member methods and constructor. Write a test application named BookTest to create an array of object for 30 elements for class Book to demonstrate the class Book's capabilities. [CO1].
5. Write a JAVA program to search for an element in a given list of elements using binary search mechanism. [CO1]
6. Write a Java program that implements Merge sort algorithm for sorting and also shows the number of interchanges occurred for the given set of integers. [CO1]
7. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles. Hint: Math.random() [CO1].
8. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary. [CO1]
9. Write a Java Program to create an abstract class named Shape that contains two_integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.[CO2]
10. Develop a java application to implement currencyconverter(DollartoINR,EURO toINR,YentoINR and vice versa), distance converter (meter to KM, miles to KM and vice versa), timeconverter (hours to minutes, seconds and vice versa) using packages. [CO1]
11. Write a Java Program to Handle Arithmetic Exceptions and InputMisMatchExceptions. [CO1]
12. Write a multi-threaded Java program to print all numbers below 100,000 that are both prime and Fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates Fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both. [CO3].
13. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of thenumber. [CO3].

14. Write a Java program that correctly implements the producer – consumer problem using the concept of inter-thread communication. [CO3].

15. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file inbytes. [CO1].

16. Write a Java program to build a Calculator in Swings/ [CO4]

17. Write a Java program to implement JMenu to draw all basic shapes using Graphics. [CO4]

18.Write a Java program to implement JTable and JTree. [CO4]

19. Write a Java program to implement JTabbedPane. [CO4]

20. Write a Java Program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle and the result produced by the server is the area of the circle. [CO3]

Course Outcomes: at the end of the lab, the student will be able to

CO1: Develop programs for solving real world problems using java collection frame work.
CO2: Develop and apply multithreaded programs in network applications.
CO3: Develop GUI programs using swing controls in Java.

CO-PO mapping Table with justification

Mapping	**P01**	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P010**	**P011**	**P012**	**PS01**	**PSO2**
C01	2	2	2		2				2				2	2
C02	2	2	2		2				2				2	2
C03	2	2	2		2				2				2	2

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II- Year I- Semester	Name of the Course	L	T	P	C
PC2103L	UML Lab	0	0	3	1.5

Pre-Requisites: Prior knowledge Software Engineering, Object Oriented Concepts

COURSE OBJECTIVES:

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioural patterns for given applications.

Week 1:

For each case study: Familiarization with Rational Rose or Umbrello

Analyse the following systems:

a. Library Management System
b. Automated Teller Machine
c. Online Shopping System
d. Point of Sale

Week 2, 3 & 4:

For each case study:

a) Identify and analyse events
b) Identify Use cases
c) Develop event table
d) Identify & analyse domain classes
e) Represent use cases and a domain class diagram using Rational Rose
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

For each case study:

a) Develop Use case diagrams
b) Develop elaborate Use case descriptions & scenarios
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

a) Develop high-level sequence diagrams for each use case
b) Identify MVC classes / objects for each use case
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing Interactions among all the three-layer objects
d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
e) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them

d) Refine domain class model by showing all the associations among classes

Week 13 onwards:

For each case study:

a) Develop sample diagrams for other UML diagrams – state chart diagrams, activity diagrams and deployment diagrams

COURSE OUTCOMES:

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.
- Construct design solutions by using structural and behavioural patterns

TEXT BOOKS:

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, RobertA. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, KelliaHouston, 3rd edition, 2013, PEARSON.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

REFERENCE BOOKS:

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI"Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
2. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
3. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesle

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II- Year I- Semester	Name of the Course	L	T	P	C
SOC2101	Advanced Python Programming	0	0	4	2

PRE-REQUISITES:

- Fundamentals of Python
- Problem solving skills

Course objectives: The student should be able to

1. Able to learn advanced concepts in Python
2. Able to use advanced packages like numpy, scipy, opencv in Python for building data processing & visualizing applications.
3. Able to process digital imaging applications

Unit-1: Python Fundamentals: Introduction to Python, Data Structures – List, Dictionaries, Sets and Tuples. **(6 hrs)**

Modules, Python Packages, Libraries: Modules – Creating modules, import statement, from Import statement, name spacing. Math Module: Constants, Power and logarithmic functions, Trigonometric functions. Numpy Library: Numpy import, Basic functions, Matrices Addition, Subtraction Multiplication, Transpose, Inverse, Eigen values and Eigenvectors using Numpy **(8hrs)**

Unit-2: Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages **(4hrs)**

Data Visualization – Matplotlib – Loading the library and importing the data, How Mat plot lib works?, modifying the appearance of a plot, Plotting multiple plots, Modifying the tick marks, Scatter plots, Bar plots. **(8hrs)**

Unit-3: File Handling – Introduction to Files, File modes, Reading, Writing data from files, Copy one file to another, deletion of files. Other file programs in Python. **(4hrs)**

Text Processing: Word, character and line counting, Frequency count. Usage of with() and split(). Reading and writing into CSV formats**.** **(8hrs)**

Unit-4: Image Processing – Installing Jupiter notebook. Image & Its properties. Image processing applications. Image I/O and display with Python, Reading, saving and displaying an image using Open CV – PyPI, matplotlib

Sample programs – Image statistics Croping, Converting images from RGB to Gray and resizing the image. **(12 hrs)**

Unit-5: Using Databases and SQL – Introduction to Database Concepts, usage of SQLite, Create, Insert & Retrieve data, Spidering twitter using a database. Sample Python codes **(8 hrs)**

Text books:

1. **PYTHON FOR EVERYBODY: EXPLORING DATA USING PYTHON 3, CHARLES SEVERANCE**
2. The Hitchiker's Guide to Python, O'Reilly publication

Reference books:

1. Hands-On Image Processing with Python, O'Reilly Publications
2. *Think Python*, Allen Downey, Green Tea Press

e- Resources & other digital material

1. https://nptel.ac.in/courses/117/105/117105079/
2. https://nptel.ac.in/courses/106/106/106106145/#
3. https://realpython.com/python-mysql/

Course Outcomes: Upon successful completion of the course, the student will be able to

CO1: Recall the usage of Python Concepts.

CO2: Use different Python packages for Data Visualization

CO3: Demonstrate File handling & text processing

CO4: Demonstrate applications that performs Image processing

CO5: Connect database with Python.

Text books:

1. **PYTHON FOR EVERYBODY: EXPLORING DATA USING PYTHON 3, CHARLES SEVERANCE**
2. The Hitchiker's Guide to Python, O'Reilly publication

Reference books:

1. Hands-On Image Processing with Python, O'Reilly Publications
2. *Think Python*, Allen Downey, Green Tea Press

Digital resources:

1. https://nptel.ac.in/courses/117/105/117105079/
2. https://nptel.ac.in/courses/106/106/106106145/#
3. https://realpython.com/python-mysql/

Course Outcomes:

CO1: Recall the usage of Python Concepts.
CO2: Use different Python packages for Data Visualization
CO3: Demonstrate File handling & text processing
CO4: Demonstrate applications that performs Image processing
CO5: Connect database with Python.

CO-PO mapping Table

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO -1	PSO -2
CO 1	1	1	1	2										
CO 2	1	2	2	2										
CO 3	1	2	2	2										
CO 4	2	2	2	2										
CO 5	1	2	2	1										

Micro-Syllabus for Advanced Python Programming

Python Fundamentals: Introduction to Python, Data Structures – List, Dictionaries, Sets and Tuples.

Modules, Python Packages, Libraries: Modules – Creating modules, import statement, from Import statement, name spacing. Math Module: Constants, Power and logarithmic functions, Trigonometric functions. Numpy Library: Numpy import, Basic functions, Matrices Addition, Subtraction Multiplication, Transpose, Inverse, Eigen values and Eigenvectors using Numpy

Unit No	Module	Micro content
I a	Python Fundamentals	Introduction to Python features, advantages and disadvantages, applications
		Lists – different types of problems using lists
		Tuples
		Dictionaries – converting lists into dictionaries and other problems
		sets
I b	Modules, Python Packages, Libraries	Module creation and import
		Math module and functions – basic math, statistical and logarithmic, trigonometric functions
		Numpy basic mathematical operations – matrix applications
		Eigen values and vectors

Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages

Data Visualization – Matplotlib – Loading the library and importing the data, How Mat plot lib works?, modifying the appearance of a plot, Plotting multiple plots, Modifying the tick marks, Scatter plots, Bar plots.

Unit No	Module	Micro content
I a.	Introduction to PIP	Installation process, commands
		Installation of various packages
		Using Python packages
II b.	Data Visualization	Loading and importing matplotlib
		Multiple plots – small applications
		Updating plot ticks, scatter plots – sample applications
		Bar plots sample applications

File Handling – Introduction to Files, File modes, Reading, Writing data from files, Copy one file to another, deletion of files. Other file programs in Python. **(4hrs)**

Text Processing: Word, character and line counting, Frequency count. Usage of with() and split(). Reading and writing into CSV formats**.** **(8hrs)**

Unit No	Module	Micro content
3a.	File Handling	Introduction to Files, File modes
		Reading and writing files – sample
		programs – copy, reverse, reading lines, reading words, deletion of files
		Updating a file
3b.	Text processing	Word, line, character count programs
		Frequency count
		Usage of with() and split()
		Reading different files like CSV
		Implement read, update, cells/rows/columns in a CSV file

Image Processing – Installing Jupiter notebook. Image & Its properties. Image processing applications. Image I/O and display with Python, Reading, saving and displaying an image using Open CV – PyPI, matplotlib

Unit No	Module	Micro content
IV	Image processing	• Introduction to images and their properties • Reading and writing images • Types of images • Display images using opencv • Usage of PyPI (methods for image processing) • Image enhancement operations • other simple image based programs

Using Databases and SQL – Introduction to Database Concepts, usage of SQLite, Create, Insert & Retrieve data, Spidering twitter using a database. Sample Python codes **(8 hrs)**

Unit No	Module	Micro content
V	**Database connectivity**	Database concepts – tables, rows and columns, primary keys, referential integrity
		Usage of Sqlite
		DDL and DML commands
		Basic storage and retrieval operations on database
		Spidering twitter data and related python code modules

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II- Year I- Semester	Name of the Course	L	T	P	C
MC2101	Essence of Indian Tradition and Knowledge	2	0	0	0

Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.
- To know the student traditional knowledge in different sector.

Unit-I: 10Hrs

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Learning Outcomes:

At the end of the unit the student will able to:

- Understand the traditional knowledge.
- Contrast and compare characteristics importance kinds of traditional knowledge.
- Analyse physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

Unit-II: **10Hrs**

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:

At the end of the unit the student will able to:

- Know the need of protecting traditional knowledge.
- Apply significance of TK protection.
- Analyse the value of TK in global economy.
- evaluate role of government

Unit-III: 10Hrs

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyse plant variant protections
- Evaluate farmers right act

Unit-IV: 7Hrs

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FOR A for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

Unit-V: 9Hrs

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:

At the end of the unit the student will able to:

- know TK in different sectors.
- apply TK in engineering.
- analyze TK in various sectors.
- evaluate food security and protection of TK in the country.

Reference Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

E-Resources:

1. https://www.youtube.com/watch?v=LZP1StpYEPM

2. 2.http://nptel.ac.in/courses/121106003/

Course Outcomes: After completion of the course, students will be able to:

1. understand the concept of Traditional knowledge and its importance
2. know the need and importance of protecting traditional knowledge
3. know the various enactments related to the protection of traditional knowledge.
4. understand the concepts of Intellectual property to protect the traditional knowledge

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II- Year II- Semester	Name of the Course	L	T	P	C
BS2201	Probability and Statistics	2	1	0	3

Course objectives:

1. To **Classify** the concepts of data science and its importance (L4) or (L2)
2. To **Interpret** the association of characteristics and through correlation and regression tools (L4)
3. To **Understand** the concepts of probability and their applications, **apply** discrete and continuous probability distributions (L3)
4. To **Design** the components of a classical hypothesis test (L6)
5. To **Infer** the statistical inferential methods based on small and large sampling tests (L4)

UNIT-I

Descriptive statistics and methods for data science: 8 hrs

Data science-Statistics Introduction-Population vs Sample-Collection of data-primary and secondary data-Types of variable: dependent and independent Categorical and Continuous variables-Data visualization-Measures of Central tendency-Measures of Variability (spread or variance)-Skewness Kurtosis.

UNIT-II

Correlation and Curve fitting: 10 hrs

Correlation- correlation coefficient-Rank correlation-Regression coefficient and properties-regression lines-Multiple regression-Method of least squares-Straight line-parabola-Exponential-Power curves.

UNIT-III

Probability and Distributions: 10 hrs

Probability-Conditional probability and Baye's theorem-Random variables-Discrete and Continuous random variables-Distribution function-Mathematical Expectation and Variance-Binomial, Poisson, Uniform and Normal distributions.

UNIT-IV

Sampling Theory: 10 hrs

Introduction–Population and samples-Sampling distribution of Means and Variance (definition only)-Central limit theorem (without proof)-Point and Interval estimations, Good estimator, Unbiased estimator, Efficiency estimator-Maximum error of estimate.

UNIT-V

Test of Hypothesis: 10 hrs

Introduction–Hypothesis-Null and Alternative Hypothesis-Type I and Type II errors-Level of significance-One tail and two-tail tests-Tests concerning one mean, two means, and proportions using

Z test, Tests concerning one mean, two means using t test, also chi-square and F tests use for small samples.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: **Classify** the concepts of data science and its importance (L4) or (L2) (**Understand, Analyze)**

CO2: **Interpret** the association of characteristics and through correlation and regression tools (L4) **Analyze**

CO3: **Understand** the concepts of probability and their applications, **apply** discrete and continuous probability distributions (L3) **Understand, Apply**

CO4: **Design** the components of a classical hypothesis test (L6) **Understand, Design, create**

CO5: **Infer** the statistical inferential methods based on small and large sampling tests (L4) **Understand, Analyze**

Text books:

1. **Miller and Freund's,** Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **S. C. Gupta and V. K. Kapoor,** Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012

Reference books

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **Jay I. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross,** Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg,** Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.
5. **T. K. V. Iyenger**, Probability and Statistics, S. Chand & Company Ltd, 2015.

e- Resources & other digital material

1. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE (For Probability and Statistics)
2. https://www.youtube.com/watch?v=VVYLpmKRfQ8&list=PL6C92B335BD4238AB (For Probability and Statistics)
3. https://www.mathsisfun.com/data/standard-normal-distribution-table.html (Information about Normal distribution)
4. https://www.statisticshowto.com/tables/t-distribution-table/(Information about T- distribution)

Statistical Tables to be allowed in examinations:

1. Normal distribution table
2. T- distribution table

Table CO-PO Mapping:

CO-PO mapping Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	2	2												
CO2	2	3												
CO3	2	2												
CO4	2	2												
CO5	2	3												

Micro-Syllabus of Probability and Statistics

UNIT-I:Descriptive statistics and methods for data science: 8 hrs

Data science-Statistics Introduction-Population vs Sample-Collection of data-primary and secondary data-Types of variable: dependent and independent Categorical and Continuous variables-Data visualization-Measures of Central tendency-Measures of Variability (spread or variance)-Skewness Kurtosis.

Unit	Module	Micro content	No of hrs
1a.Descriptive Statistics	Introduction-Population vs Sample	Collection of data-primary and secondary data	2
		Population	
		Sample	
	Types of variable	dependent and	2
		independent	
		Categorical	
		Continuous variables	
	Data visualization	-Data visualization	1
1b.methods for data science	Measures of Central tendency and Measures of Variability	Measures of Central tendency	1
		Measures of Variability	2
		Skewness Kurtosis.	

UNIT-II: Correlation and Curve fitting: 10 hrs

Correlation-correlation coefficient-Rank correlation-Regression coefficient and properties-regression lines-Multiple regression-Method of least squares-Straight line-parabola-Exponential-Power curves.

Unit	Module	Micro content	No of hrs
2.Correlation and Curve fitting	Correlation	correlation coefficient	4
		Rank correlation	
	Regression	Regression coefficient	4
		properties	
		regression lines	
		Multiple regression	
	Method of least squares	Straight line	4

		Parabola.	
		Exponential curves	
		Power curves.	

UNIT-III: Probability and Distributions: 10 hrs

Probability-Conditional probability and Baye's theorem- Random variables -Discrete and Continuous random variables-Distribution function-Mathematical Expectation and Variance-Binomial, Poisson, Uniform and Normal distributions.

Unit	**Module**	**Micro content**	**No of hrs**
3. Probability and Distributions	Probability	Conditional probability	2
		Baye's theorem	
	Random variables	Discrete Random variables	1
		Continuous Random variables	1
		Distribution function	1
		Mathematical Expectation and variance	1
	Distributions	Binomial distribution.	2
		Poisson distribution	
		Uniform distribution	
		Normal distribution	

UNIT-IV: Sampling Theory: 10 hrs

Introduction–Population and samples-Sampling distribution of Means and Variance (definition only)-Central limit theorem (without proof)-Point and Interval estimations, Good estimator, Unbiased estimator, Efficiency estimator-Maximum error of estimate.

Unit	**Module**	**Micro content**	**No of hrs**
4.Sampling Theory	Introduction	Population samples	1
		Central limit theorem (without proof	
	Sampling distributions	Sampling distribution of Means	4
		Sampling distribution of Variance	
	Estimation	Point estimations	5
		Interval estimation	
		Good estimator	
		Unbiased estimator	
		Efficiency estimator	
		Maximum error of estimate.	

UNIT-V: Test of Hypothesis: **10 hrs**

Introduction–Hypothesis-Null and Alternative Hypothesis-Type I and Type II errors-Level of significance-One tail and two-tail tests-Tests concerning one mean, two means, and proportions using Z test, Tests concerning one mean, two means using t test, also chi-square and F tests use for small samples.

Unit	**Module**	**Micro content**	**No of hrs**
5. Test of Hypothesis	Hypothesis	Null Hypothesis	**2**
		Alternative Hypothesis	
		Type I and Type II errors	
		Level of significance	
		One tail and two-tail tests	
	Test for large samples	Tests concerning one mean using Z test	**4**
		Tests concerning one two means using Z test.	
		Tests concerning proportions using Z test	
	Tests for small samples	Tests concerning one mean, two means using t test	**4**
		chi-square test	
		F test	

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II- Year II- Semester	Name of the Course	L	T	P	C
ES2201	Computer Organization	3	0	0	3

Course Objectives:

1. To understand basic structures of computers and to understand various machine instructions.
2. To understand basic structures of computers and to understand various machine instructions.
3. To analyse ALU & I/O organization of a computer.
4. To understand various memory systems.
5. To analyse functionalities done by processing unit and also learn micro programmed control.

Unit – I: Basic Structure of a Computer and Machine Instructions. 8 Hrs

Introduction, History of Computer Generations, Functional unit, Basic Operational concepts, Bus structures, System Software, Performance. Number representation: Fixed Point and Floating Point representation. Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types

Unit – II: Addressing modes and types of Instructions 10Hrs

Addressing Modes, Basic Input/output Operations, and role of Stacks and Queues in computer programming equation.

Component of Instructions: Logical Instructions, shift and Rotate Instructions. Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

Unit – III: **Basic building blocks for the ALU: 10Hrs**

Adder, Subtractor, Shifter, Multiplication and division circuits. Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

Unit – IV: The Memory Systems 10Hrs

Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Associative Memory, Cache Memories: Mapping Functions, INTERLEAVING, Secondary Storage: Magnetic Hard Disks, Optical Disks.

Unit – V: Processing unit 10Hrs

Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control, MICRO PROGRAMMED CONTROL: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field.

Text Books:

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization by William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003

Reference Books:

1. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.
2. Computer System Architecture by M Morris Mano, Prentice Hall of India, 2001

Course Outcomes: By the end the of the course, the student will be able to

CO-1: Able to **understand** basic structures of computers and to **understand** various machine Instructions.
CO-2: Able to **learn and use** the addressing modes and types of instructions.
CO-3: Able to analyze I/O organization of a computer.
CO-4: Able to **understand** various memory systems.
CO-5: Able to **analyze** functionalities done by processing unit and also learn micro programmed control.

CO-PO Mapping Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	**2**	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	**2**	-	**2**	-	-	-	-	-	-	-	-	-	-	2
CO3	-	**2**	**2**	-	-	-	-	-	-	-	-	-	2	-
CO4	-	**2**	**2**	-	-	-	-	-	-	-	-	-	2	-
CO5	**2**	**2**	**2**	**1**	-	-	-	-	-	-	**2**	**2**	2	2

Micro Syllabus of Computer Organization

UNIT I: Basic Structure of a Computer and Machine Instructions.		
Unit	**Module**	**Micro Content**
UNIT I	Introduction	Introduction, History of Computer Generations, Functional unit
		Basic Operational concepts, Bus structures, System Software, Performance
	Number representation	Integer - unsigned, signed (sign magnitude, 1's complement, 2's complement);
		Characters - ASCII coding, other coding schemes;
		Real numbers - fixed and floating point, IEEE754 representation
	Instruction and Instruction Sequencing	Register Transfer Notation
		Assembly Language Notation
		Basic Instruction Types
UNIT – II: Addressing modes and types of Instructions		
Unit	**Module**	**Micro Content**
UNIT II	Addressing modes	Addressing Modes
		Basic Input/output Operations

		Role of Stacks and Queues in computer programming equation
	Component of Instructions	Logical Instructions
		Shift and Rotate Instructions.
	Type of Instructions	Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations
UNIT – III: Basic building blocks for the ALU		
Unit	**Module**	**Micro Content**
UNIT III	Basic Building blocks	Adder, Subtractor, Shifter, Multiplication and division circuits. Accessing I/O Devices
	Interrupts	Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory access
	Buses	Synchronous Bus, Asynchronous Bus, Interface Circuits
	Standard I/O Interface	Peripheral Component Interconnect (PCI) Bus, Universal Sefrial Bus (USB)
UNIT - IV - The Memory Systems		
Unit	**Module**	**Micro Content**
UNIT IV	Main Memory	Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, and Associative Memory.
	Cache Memories	Mapping Functions
		INTERLEAVING
	Secondary Storage	Magnetic Hard Disks, Optical Disks.
UNIT V - Processing unit		
Unit	**Module**	**Micro Content**
UNIT V	Fundamental Concepts	Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory
		Execution of Complete Instruction, Hardwired Control
	Micro Programmed Control	Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field.

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2203	Operating Systems	3	0	0	3

Course Objectives:

1. Study the basic concepts and functions of operating system
2. Learn about Processes, Threads and Scheduling algorithms
3. Understand the principles of concurrency and Deadlocks
4. Learn various memory management schemes
5. Study I/O management and File systems

UNIT-I **10 Hours**

Introduction to Operating System Concepts: What Operating Systems do, Computer System Organization, Functions of Operating systems, Types of Operating Systems, Operating Systems Services, System calls, Types of System calls, Operating System Structures, Distributed Systems, Special purpose systems.

UNIT-II **10 Hours**

Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithms and their evaluation, Operations on Processes, Inter-process Communication.

Threads: Overview, User and Kernel threads, Multi-threading Models.

UNIT-III **10 Hours**

Concurrency: Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, and Classic Problems of Synchronization.

Principles of deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

UNIT- IV **10 Hours**

Memory Management: Logical vs physical address space, Swapping, Contiguous Memory Allocation, Paging, Structures of the Page Table, Segmentation.

Virtual Memory Management: Virtual memory overview, Demand Paging, Page-Replacement & its algorithms, Allocation of Frames, Thrashing.

UNIT-V **8 Hours**

File system Interface: The concept of a file, Access Methods, Directory structure, files sharing, protection.

File System implementation: File system structure, Allocation methods, and Free-space management.

Mass-storage structure: overview of Mass-storage structure, Disk scheduling, Swap space management.

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012

2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley.

2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGraw Hill Education.

3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata McGraw-Hill Education

e-Resources

1. https://en.wikipedia.org/wiki/Operating_system
2. https://www.tutorialspoint.com/operating_system/

Course Outcomes: By the end the of the course, the student will be able to

CO-1: Understand the structure and functionalities of Operating System
CO-2: Demonstrate the concept of Process, Threads and CPU Scheduling Algorithms
CO-3: Use the principles of Concurrency to solve Synchronization problems
CO-4: Demonstrate various methods for handling Deadlocks
CO-5: Infer various Memory Management Techniques

CO-PO-Mapping

CO / PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**P01 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO 1	2	3	3	-	-	-	-	-	-	-	-	-	3	2
CO 2	3	3	3	1	2	-	-	-	-	-	-	-	3	--
CO 3	2	2	3	-	2	-	-	-	-	-	-	-	2	--
CO 4	2	2	3	-	2	-	-	-	-	-	-	-	2	2
CO 5	3	3	3	-	2	-	-	-	-	-	-	-	3	2

Micro Syllabus of Operating Systems

UNIT I : Introduction to Operating System Concepts: What Operating Systems do, Computer System Organization, Functions of Operating systems, Types of Operating Systems, Operating Systems Services, System calls, Types of System calls, Operating System Structures, Distributed Systems, Special purpose systems.

Unit	**Module**	**Micro Content**
	What Operating Systems do	User View, System View, Defining Operating Systems.
	Computer System Organization	Computer-system operation, Storage structure, i/o structure.

UNIT I	Functions of Operating systems	Process Management, Memory Management, File Management, I/O Management, Protection, Security, Networking.
	Types of Operating Systems	Batch processing, Multiprogramming, Timesharing, Distributed, Real time, Multi user, Multi-tasking, Embedded, Mobile operating system.
	Operating Systems Services	User interface, Program execution, I/O operations, File system manipulation, Communication, Error Detection.
	System calls, Types of System calls	Process control, File management, Device management, Information maintenance, and Communication maintenance, Protection and security maintenance system calls.
	Operating System Structures	Simple Structure Approach, Layered Approach, Microkernel Approach, Modules Approach.
	Distributed Systems	About Distributed Systems.
	Special purpose systems	Real Time Embedded Systems, Multimedia Systems, And Handheld Systems.

UNIT - II

Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithms and their evaluation, Operations on Processes, Inter-process Communication.

Threads: Overview, User and Kernel threads, Multi-threading Models.

Unit	Module	Micro Content
UNIT II	Process concept	Define process, process in memory.
	Process State Diagram	Process states, diagram of process states.
	Process control block	Process state, process number, program counter, CPU registers, CPU switch from process to process, memory management information, accounting information, I/O status information.
	Process Scheduling	Introduction to process scheduler.
	Scheduling Queues	Job queue, ready queue, device queue, queueing diagram.
	Schedulers	Importance of scheduler, long term scheduler, short term scheduler, medium term scheduler, degree of multiprogramming, i/o bound process, cpu-bound process, swapping.
	Scheduling Criteria	Throughput, Turnaround time, Waiting Time, Response time.
	Scheduling algorithms	First-Come First-Served (FCFS) Scheduling, Shortest-Job-First(SJF) Scheduling, Priority Scheduling, Round Robin(RR) Scheduling, Multiple-Level Queue Scheduling, Multilevel Feedback Queue Scheduling.
	Evaluation of Scheduling algorithms	Deterministic modelling, Queueing models, Simulations and Implementation.
	Operations on Processes	Process creation, Process termination.
	Inter-process Communication	Shared memory systems, Message passing systems.
	Threads: Overview	Definition of thread, single threaded process, multithreaded process, benefits.
	Multi-threading Models	User and Kernel threads, many-to-one model, one-to-one model, many-to-many model.

UNIT-III

Concurrency: Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, and Classic Problems of Synchronization.

Principles of deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit	Module	Micro Content
UNIT III	Process Synchronization	What is synchronization, why is it required, cooperating processes, race condition.
	Critical- Section Problem	Critical section, entry section, remainder section, mutual exclusion, progress, bounded waiting.
	Peterson's Solution	Software based solution to critical section between two processes.
	Synchronization Hardware	Locking, test and set instructions, mutual exclusion implementation with test and set, compare and swap instructions, mutual exclusion implementation with compare and swap.
	Semaphores	Semaphore usage, counting and binary semaphore, semaphore implementation, deadlock and starvation.
	Monitors	Structure of monitors, monitors vs semaphores, monitor usage, implementing a monitor using semaphores, dining-philosophers solution using monitors.
	Classic Problems of Synchronization	Bounded-buffer problem, reader-writer problem, dining-philosophers problem.
	Principles of deadlock: System Model	Deadlock definition, resources, request-use-release of resources.
	Deadlock Characterization	Necessary conditions for occurrence of deadlock, Resource allocation graph.
	Deadlock Prevention	Mutual exclusion, hold and wait, no-preemption, circular wait.
	Deadlock Detection	Graph algorithm, Banker's algorithm.
	Deadlock Avoidance	Safe state, Graph algorithm, Banker's algorithm.
	Recovery form Deadlock	Process termination, resource pre-emption.

UNIT- IV

Memory Management: Logical vs physical address space, Swapping, Contiguous Memory Allocation, Paging, Structures of the Page Table, Segmentation.

Virtual Memory Management: Virtual memory overview, Demand Paging, Page-Replacement & its algorithms, Allocation of Frames, Thrashing

Unit	Module	Micro Content
	Memory Management	Base register, limit register, protection with base and limit register.
	Logical vs physical address space	Logical address, memory address register, physical address, dynamic relocation using relocation register.
	Swapping	Swapping of two processes using a disk as backing store, swapping on mobile systems.
	Contiguous Memory Allocation	Memory protection, memory allocation, fragmentation.
	Paging	Basic method for implementing paging, paging hardware, TLB, protection, shared pages.
	Structure of the Page Table	Hierarchical paging, hashed page tables, inverted page tables.
	Segmentation	Basic method, segmentation hardware.
	Virtual memory overview	Virtual memory, virtual address space.

UNIT IV	Demand Paging	Demand paging technique, basic concepts, steps in handling page fault, locality of reference.
	Page-Replacement & its algorithms	Need for page replacement, page replacement techniques: FIFO, Optimal, LRU, LRU Approximation, Counting based.
	Allocation of Frames	Minimum number of frames, allocation algorithms: equal, proportional, global vs local allocation, non-uniform memory access,
	Thrashing	Cause of thrashing, working set model.

UNIT-V

File system Interface: The concept of a file, Access Methods, Directory structure, files sharing, protection.

File System implementation: File system structure, Allocation methods, and Free-space management.

Mass-storage structure: overview of Mass-storage structure, Disk scheduling, Swap space management.

Unit	Module	Micro Content
UNIT V	File Concept	File - attributes, operations, types, structure.
	Access Methods	Sequential, Direct, other access methods.
	Directory structure	Typical file system organization, storage structure, single level directory, two-level, tree-structured, acyclic-graph, general graph directory.
	Files sharing	Multiple users, remote file system, Consistency semantics.
	Protection	Types of access, access control.
	File system structure	File systems, basic file system, layered file system, file organization module, logical file system, FCB.
	Allocation methods	Contiguous, linked, indexed, efficiency of these methods.
	Free-space management	Free-space list, bit vector, linked list, grouping, counting.
	Overview of Mass-storage structure	Magnetic disks, solid state disks.
	Disk scheduling	FCFS, SSTF, SCAN,C-SCAN, LOOK,C-LOOK.
	Swap space management	Swap-space use, location

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2202	Database Management System	3	0	0	3

Course Objectives:

1. Study the basic concepts and importance of Database Management Systems
2. Learn and understand the conceptual design of database and information retrieval
3. Learn various commands and writing of queries for information retrieval
4. Understand the concepts of Database design
5. Study of internal storage and its access

Unit-I: Introduction (10hrs)

Introduction to Database, Applications of Database, Purpose of Database, View of Data, Data Independence, Data Models, Users of Database, DBA, Query Processor, Storage Manager, Database Architecture

Unit-II: Conceptual Design & Relational Query Languages (10 hrs)

Conceptual Design of Database using ER Model, Notations, Types of attributes, Relation, Mapping Constraints, Features of ER Diagram, Weak Entity Set, Examples of Conceptual Design

Relational Algebra: Selection, Projection, Set Operations, Rename, Cartesian-Product, Join, Outer Join, Examples

Relational Calculus: Tuple Relational Calculus and Domain Relational Calculus, Safety Expressions

Unit-III: SQL & PL/SQL (10 hrs)

SQL Commands: DDL, DML, TCL, DCL

Types of Constraints (Primary, Alternate, Not Null, Check, Foreign), Basic form of SQL query, joins, outer joins, set operations, group operations, various types of queries, PL/SQL (Cursor, Procedures, Functions, Packages, Triggers…)

Unit-IV: Database Design (8 hrs)

Database Design: Normalization, Purpose of Normalization, Functional Dependency, Closure, 1NF, 2NF, 3NF, BCNF, MVFD, 4NF, Join Dependency, 5NF

Why NoSQL? Importance of NoSQL

Unit-V: Transaction, Data Recovery & Storage Management (10 hrs)

Transaction Management: ACID Properties of Transactions, Conflict & View serializability, Lock based protocols, Time Stamp based protocol, Thomas Write Rule, Validation Based Protocol, Deadlock detection, Deadlock avoidance, Deadlock prevention: wait-die and wound-wait

Recovery Management: Types of failures, ideal storage, Log, Log records, log based recovery techniques, Shadow Paging, ARIES

File Organization & Indexing: Types of File Organizations, Primary Indexing, Secondary Indexing, Multi-level Indexing, Hash Indexing, Tree Indexing

Text Books:

1. Data base System Concepts,5/e, Silberschatz, Korth, TMH

2. Introduction to Database Systems, CJ Date, Pearson

Reference Books:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, and TATA McGraw Hill 3rd Edition
2. Fundamentals of Database Systems, ElmasriNavate Pearson Education

Course Outcomes:

By the end the of the course, the student will be able to

CO1: To **understand** the basics of database systems and applications

CO2: To **construct** logical design of database and information retrieval

CO3: To **demonstrate** relational model practically (Structured Query Language)

CO4: To **demonstrate** and relate normalization for database design

CO5: To **outline** the necessity of transaction management, recovery management, file organization & indexing

CO-PO Mapping Matrix:

Mapping	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
C01	2	--	--	--	--	--	3	--	--	--	--	--	1	--
C02	3	2	2	--	--	--	--	--	--	--	--	--	--	2
C03	3	2	1	--	3	--	--	--	--	--	--	--	2	3
C04	3	2	1	--	--	--	--	--	--	--	--	--	1	3
C05	2	--	--	--	--	--	--	--	--	--	--	--	1	--

Micro Syllabus of Database Management Systems

UNIT - I : INTRODUCTION

Introduction to Database, Applications of Database, Purpose of Database, View of Data, Data Independence, Data Models, Users of Database, DBA, Query Processor, Storage Manager, Database Architecture

Unit	Module	Micro Content
UNIT I	Introduction to Database	Definitions of data, database and information
		History of data
		Importance of databases over file systems
		Applications of Database
		Purpose of Database
		View of Data

		Data Independence
		Data Models
		Users of Database
		DBA
		Query Processor
		Storage Manager
		Database Architecture

UNIT – II: Conceptual Design & Relational Query Languages

Conceptual Design of Database using ER Model, Notations, Types of attributes, Mapping Constraints, Features of ER Diagram, Weak Entity Set, Examples of Conceptual Design

Relational Algebra: Selection, Projection, Set Operations, Rename, Cartesian-Product, Join, Outer Join, Examples

Relational Calculus: Tuple Relational Calculus and Domain Relational Calculus, Safety Expressions

Unit	Module	Micro Content
UNIT II	Conceptual Design	ER Model
		Notations
		Types of attributes
		Mapping Constraints
		Features of ER Diagram
		Weak Entity Set
		Examples of Conceptual Design
	Relational Algebra	Selection
		Projection
		Set Operations
		Rename
		Cartesian-Product
		Join
		Outer Join
		Safety Expressions
	Relational Calculus	Tuple Relational Calculus
		Domain Relational Calculus
		Safety Expressions

UNIT – III: SQL & PL/SQL

SQL Commands: DDL, DML, TCL, DCL

Types of Constraints (Primary, Alternate, Not Null, Check, Foreign), Basic form of SQL query, joins, outer joins, set operations, group operations, various types of queries, PL/SQL (Cursor, Procedures, Functions, Packages, Triggers)

Unit	Module	Micro Content
UNIT III	SQL Commands	DDL
		DML
		TCL
		DCL
	Types of Constraints	Primary
		Alternate
		Not Null
		Check
		Foreign
	SQL Queries	Basic

		Joins
		Set operations
		Group operations
		Various types of queries
	PL/ SQL	Cursor
		Procedures
		Functions
		Packages
		Triggers

UNIT – IV: Database Design

Database Design: Normalization, Purpose of Normalization, Functional Dependency, Closure, 1NF, 2NF, 3NF, BCNF, MVFD, 4NF, Join Dependency, 5NF. Why NoSQL?, Importance of NoSQL

Unit	Module	Micro Content
UNIT IV	Database Design	Normalization
		Purpose of Normalization
		Functional Dependency
		Closure
		1NF
		2NF
		3NF
		BCNF
		MVFD
		4NF
		Join Dependency
		5NF
	NoSQL	Why NoSQL?
		Importance of NoSQL
		Overview of NoSQL tools

UNIT - V: Transaction, Data Recovery & Storage Management

Transaction Management: ACID Properties of Transactions, Conflict & View serializability, Lock based protocols (2PLP, Tree & Multiple Granularity), Time Stamp based protocol, Thomas Write Rule, Validation Based Protocol, Deadlock detection, Deadlock avoidance, Deadlock prevention: wait-die and wound-wait

Recovery Management: Types of failures, ideal storage, Log, Log records, log based recovery techniques, Shadow Paging, ARIES

File Organization & Indexing: Types of File Organizations, Primary Indexing, Secondary Indexing, Multi-level Indexing, Hash Indexing, Tree Indexing.

Unit	Module	Micro Content
UNIT V	Transaction Management	ACID Properties of Transactions
		Conflict & View serializability
		Lock based protocols (2PLP, Tree & Multiple Granularity)
		Time Stamp based protocol, Thomas Write Rule
		Validation Based Protocol
		Deadlock detection
		Deadlock avoidance
		Deadlock prevention: wait-die and wound-wait
	Recovery Management	Types of failures
		Ideal storage

		Log, Log records, log based recovery techniques
		Shadow Paging
		ARIES
	File Organization & Indexing	Types of File Organizations
		Primary Indexing
		Secondary Indexing
		Hash Indexing: Static and Dynamic
		Tree Indexing

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2201	Advanced Java Programming	3	0	0	3
Prerequisites: Java Programming					

Course Objectives:

1. To impart the knowledge on collection framework.
2. To make the students to develop network-based applications.
3. To introduce XML and processing of XML Data with Java.
4. To introduce Server-side programming with Java Servlets and JSP

UNIT-I **10 Hours**

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table, Properties, Stack, Vector.

UNIT-II **10 Hours**

Introduction to Networking: Basics of Networking, Networking classes and Interfaces, Networking with URLs, exploring java.net package.

JDBC Connectivity: JDBC connectivity, types of Jdbc Drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database

UNIT-III **10 Hours**

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, and Extensible Style sheet Language and XSL Transformations, Parsing XML Data – DOM and SAX Parsers in java.

UNIT- IV **8Hours**

Introduction to Servlets: Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions.

UNIT-V **10 Hours**

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking.

Text Books:

1. Java The Complete Reference, Herbert Schildt, MC GRAW HILL Education, 9 th Edition, 2016

2. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

3. Java Server Pages –Hans Bergsten, SPD O'Reilly.

Reference Books:

1. Chris Bates, "Web Programming, building internet applications", 2ndEdition, WILEY, Dreamtech, 2008.
2. Thomas A Powel, "The Complete Reference: AJAX", 1st Edition, Tata McGraw Hill, 2008.

3. Web Technologies, Uttam K Roy, Oxford University Press

Course Outcomes: At the end of the course student will be able to:

CO1: Use various data structures using java collections. . **(Implement)**
CO2: understand the trade-offs of implementation of priority queues. **(Understand)**
CO3: Implement web based applications using features of HTML and XML. **(Implement)**
CO4: Appreciate the importance and significance of graph algorithms in building and solving real world applications. **(Analyse)**
CO5: Understand and implement algorithms for pattern matching in a text. **(Understand)**

CO-PO Mapping Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	-	**1**	**1**	**2**	-	-	-	-	-	-	-	-	2	1
CO2	-	**1**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO3	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO4	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO5	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1

Micro Syllabus of Advanced Java Programming

Unit – I : The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable, Properties, Stack, Vector.

Unit	Module	Micro content
I	**The Collections Framework** (java.util)	Collections overview, Collection Interfaces
		The Collection classes- Array List
		Linked List
		Hash Set, Tree Set,
		Priority Queue, Array Deque.
		Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative

		Map Interfaces and Classes
		Comparators, Collection algorithms, Arrays
		The Legacy Classes and Interfaces- Dictionary, Hashtable, Properties, Stack, Vector.

Unit – II :

Introduction to Networking: Basics of Networking, Networking classes and Interfaces, Networking with URLs, exploring java.net package.

JDBC Connectivity: JDBC connectivity, types of Jdbc Drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database.

Unit	Module	Micro content
II	**Introduction to Networking**	Basics of Networking
		Networking classes and Interfaces
		Networking with URLs
		exploring java.net package
	JDBC Connectivity	Database Application
		Need and Objective of JDBC
		types of Jdbc Drivers- Type1,Type2,Type3 and Type4
		Steps to connect to Database using Jdbc
		JDBC Statements- Statement, PreparedStatement and CallableStatement Interfaces
		JDBC Exceptions-SQLException and its Methods
		Manipulations on the database

UNIT – III : HTML & XML

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, Extensible Style sheet Language and XSL Transformations, Parsing XML Data – DOM and SAX Parsers in java.

Unit	Module	Micro content
III	**HTML**	Standard HTML Document Structure
		Basic Text Markup, HyperLinks
		List-Unordered List, Ordered -List and Definition List
		Tables-Table related tags, Formatting of Tables, Use of COLSPAN and ROWSPAN
		Images-<img> tag and its attributes
		Forms-HTML 5 form elements, GET and POST Method
		Frames-Advantages of Frames, InlineFrames
		CSS-Levels of Style Sheets
		Style Specification Formats, Selector Forms
		The Box Model, Conflict Resolution
	XML	Basic Building blocks of XML
		Defining XML tags, their attributes and values
		Define DTD and Elements of DTD
		Internal and External DTD
		XML Schemas

		Document Object Model
		Extensible Style sheet Language and XSL Transformations- XPATH
		Parsing XML Data – DOM and SAX Parsers in java

Unit – IV: Servlets

Introduction to Servlets: Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions.

Unit	Module	Micro content
IV	Servlets	Introduction Servlet
		Web server, Tomcat Installation
		deploying a servlet
		The Servlet API- javax.servlet and javax.servlet.http packages
		Reading Servlet parameters
		Reading Initialization parameters
		Handling Http Request & Responses
		Session Tracking
		Session Tracking Using Cookies and Sessions.

Unit – V: JSP

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking.

Unit	Module	Micro content
V	JSP	Advantages of JSP over servlet
		The Anatomy of a JSP Page
		JSP Processing
		Declarations, Directives, Expressions and Scripting Elements
		Code Snippets, implicit objects
		Using Beans in JSP Pages
		Using Cookies and session for session tracking

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2203L	R Programming Lab	0	0	3	1.5

Prerequisites: Basic mathematical background, basic knowledge in programming, fundamental knowledge of mathematical and statistical computations, simulations and data analysis and data science and modelling.

Learning Outcomes: After successful completion of the course, students should be able to

- Understand the basics in R programming in terms of constructs, control statements, functions, vectors,lists, etc.
- import, review, manipulate and summarize data-sets in R.
- Learn how to apply R programming for Data processing.
- Able to appreciate and apply the R programming from a statistical perspective.

Week1:

1. Write an R-Program to print Hello World .

2. Write an R-Program to take input from user.

3. Write a program to illustrate Variable assignment in R.

Week2:

1. Write a program to illustrate basic Arithmetic in R.

2. Write a program to illustrate data types in R .

Week3:

1. Write a program to illustrate creating and naming a vector in R (create vector using : operator, create vector using seq() function).

2. Write a program to create two vectors and perform different operations(+,-,*.etc.) on them and print the result.

3. Write a program to create two vectors and use the functions i)dim() ii)length( ) iii)is.numeric() iv)is.character() v)rbind() vi) cbind()

Week4:

1. Write a program to illustrate create a matrix and naming matrix in R .

2. Write a program to illustrate Add column and Add a Row in Matrix in R.

3. Write a program to illustrate Selection of elements in Matrixes in R .

4. Write a program to illustrate Performing Arithmetic of Matrices .

Week5:

1. Write a program to illustrate if-else-else if in R .

2. Write a Program to illustrate While and For loops in R .

3. Write a program to illustrate Compare and Matrices and Compare vectors .

4. Write a program to illustrate Logical & and Logical | operators in R.

Week6:

1. Write an R Program to Find the Factorial of a Number

2. Write an R Program to Find the Factors of a Number .

3. Write an R Program to Find the Fibonacci sequence Using Recursive Function.

Week7:

1.Write a program to print 1 to N numbers in reverse order using rev function in R.

2. Write a program to find cumulative sum 1:10 using cumsum function in R.

3. Write a program to compute log to base 10 of the sqrt of 50.

Week8:

1. Write a program to illustrate Functions in Quick sort implementation in R.
2. Write a program to illustrate Function inside function in R
3. Write a program to count the odd numbers in a vector of integers by defining function named oddcount().

Week9:

1. Write a program to illustrate List ? Why would you need a List .

2. Write a program to illustrate Adding more elements into a List .

Week10:

1. Write a program to illustrate Factors in R .

2. Case study of why you need use a Factor in R .

3. Write a program to illustrate Ordered Factors in R .

Week11:

1. Write a program to illustrate Data Frame Selection of elements in a Data frame. Create a data frame with the following fields

Name	Age	Height	Weight	Gender
Ramu	21	171	71	M
Arun	20	168	69	M
Rani	22	160	64	F
John	19	173	70	M

i)Find the Mean height of students and weight of students.

ii)Find the standard deviation of heights and weights of students
iii)Find the number of male and female students.

2. Write a program to illustrate Sorting a Data frame .

Week12:

1. Write a program to illustrate to create graphs and usage of plot() function in R .

2. Write a program to illustrate Customising and Saving to Graphs in R.

3. Write a program to illustrate some built in Mathematical Functions.

Course Outcomes: By the end of the Lab, the student able to

1. **Comprehend** the various concepts of a R language
2. **Develop** R Programming for Data Processing
3. **Design** and development of R problem solving skills.
4. **Apply** the R programming from a statistical perspective.

CO-POS MAPPING

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	1	2	3	2	2	-	-	-	3		1	2		
CO 2	2	3	3	2	2	-	-	-	1		2	2		
CO 3	3	3	3	2	-	-	-	-	2		2	2		
CO 4	2	2	2	2	2	-	-	-	2		2	2		

****

II- Year II – Semester	Name of the Course	L	T	P	C
PC2202L	DATABASE MANAGEMENT SYSTEMS LAB	0	0	3	1.5

Course Objectives:

1. To familiarize the participant with the distinctions of database environments towards an information-oriented framework
2. To give a good formal foundation on the relational model of data
3. To present SQL and procedural interfaces to SQL comprehensively

List of experiments:

SQL

1. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints **[CO1]**
2. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions. **[CO1]**
3. Queries using operators in SQL **[CO2]**
4. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update **[CO2]**
5. Queries using Group By, Order By, and Having Clauses **[CO2]**
6. Queries on Controlling Data: Commit, Rollback, and Save point **[CO2]**
7. Queries to Build Report in SQL *PLUS **[CO2]**
8. Queries on Joins and Correlated Sub-Queries **[CO2]**
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features **[CO2]**

PL/SQL

1. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation **[CO3]**
2. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL **[CO3]**
3. Write a PL/SQL block using SQL and Control Structures in PL/SQL **[CO3]**
4. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types **[CO3]**
5. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS **[CO4]**
6. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. **[CO4]**
7. Demonstration of database connectivity **[CO4]**

Course Outcomes:

CO1: To create database for user (Creation of Database)
CO2: To solve various SQL queries for user defined schemas
CO3: To generalize PL/ SQL blocks
CO4: To illustrate the usage of user defined packages

CO-PO mapping Matrix:

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	1	--	3	--	--	--	--	--	--	--	--	--	3	2
C02	3	2	1	1	--	--	--	--	--	--	--	--	1	3
C03	2	1	1	--	--	--	--	--	--	--	--	--	1	--
C04	2	--	--	--	--	--	--	--	--	--	--	--	1	--

****

II- Year II- Semester	Name of the Course	L	T	P	C
PC2201L	Advanced Java Programming Lab	0	0	3	1.5

Course Objectives

At the end of the course the students will understand

1. Implementing data structures using collection Framework
2. Basic technologies to develop web documents.
3. Developing Client-Server applications.
4. XML and Web Servers.
5. Java Servlet technologies.

LIST OF EXPERIMENTS

1. To write a Java Program to design an interface for Stack ADT and implement Stack ADT using both Array and Linked List.
2. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
3. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.
4. Write a java program that prints the meta-data of a given table
5. Write a java program to implement client-server application
6. Develop and demonstrate a HTML5 document that illustrates the use of ordered list, unordered list, table, borders, padding, color, and the & tag.
7. Write HTML5 code to provide intra and inter document linking.
8. Create a web page with the following using HTML5:
   i. To embed an image map in a web page
   ii. To fix the hot spots
   iii. Show all the related information when the hot spots are clicked
   iv. Create a web page with all types of Cascading style sheets.
9. Create a web page with the following using CSS:
   v. Text shadows, rounded corners and box shadows.
   vi. Linear and Radial gradients.
   vii. Animation
   viii. Transitions and Transformations.
11. Create a home page for "Cyber book stores" that will display the various books available, the authors and prices of the books. Include a list box that contains various subjects and a "submit" button, which displays information about the books on the subject required by the user.
12. Write an XML file which displays the book details that includes the following:
    1) Title of book
    2) Author name

3) Edition

4) Price

Write a DTD to validate the above XML file and display the details in a table (to do this use XSL).

13. Design an XML document to store information about a student in an engineering college . The information must include: college id, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
14. Write a program to demonstrate XML SAX Parser.
15. Write a program to demonstrate XML DOM Parser.
16. Create tables in the database which contain the details of items (books in our case Like Book name, Price, Quantity, Amount) of each category.

    Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.
17. Using java servlets and JDBC store and retrieve the following information from a database:
    a. Name
    b. Password
    c. Email id
    d. Phone number
18. Demonstrate Cookie and Session Management in Servlets.
19. Write a program to demonstrate Java Bean using JSP Implicit objects.
20. Write a JSP program to conduct online examination and to display student mark list available in a database.
21. Write a program to demonstrate cookie & Sessions using JSP.

Course Outcomes: At the end of the course the students will be able to

CO-1: Create static web pages using HTML, CSS.

CO-2: Develop Client-Server Applications.

CO-3: Create XML documents and work with web servers to create web applications

CO-4: Build server side programs using Java Servlets and Jsp.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	-	**1**	**1**	**2**	-	-	-	-	-	-	-	-	2	1
CO2	-	**1**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO3	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO4	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1

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II- Year II- Semester	Name of the Course	L	T	P	C
SOC2201	Mobile Application Development	0	0	4	2
Prerequisites: Basic Java programming					

Course Objectives:

1. Understand Mobile application basics.
2. Understand components in SDK
3. Use different application tools
4. Build several applications

UNIT-I

Introduction: What is Android, Android versions and its feature set The various Android devices on the market , The Android Market application store , Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs)

Android Architecture Overview and Creating an Example Android Application: The Android Software Stack, the Linux Kernel, Android Runtime, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project, Defining the Project Name and SDK Settings, Project Configuration Settings.

UNIT-II

Android Software Development Platform : Understanding Java SE, The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder , Leveraging Android XML, Screen Sizes , Launching Your Application: The AndroidManifest.xml File, Creating Your First Android Application

Android Framework Overview: Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components

UNIT-III

Understanding Android Views : View Groups and Layouts, Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool, Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using views, Displaying Pictures, Gallery, ImageSwitcher, GridView, and ImageView views to display images, Creating Animation

UNIT- IV

Content Providers, and Databases

Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers.

Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers

A Basic Overview of Android Threads and Thread handlers

An Overview of Threads, The Application Main Thread, Thread Handlers, A Basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler

UNIT-V

Messaging and Location-Based Services

Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location-Based Services, Geocoding and Map-Based Activities

Multimedia: Audio, Video, Camera

Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures

Text Books:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

Reference Books:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. A ndroid Application Development All in one for Dummies by Barry Burd, Edition: I

e-digital resources:

1. https://developer.android.com/courses/fundamentals-training/toc-v2
2. https://google-developer-training.github.io/android-developer-fundamentals-course-concepts-v2/

List of Experiments

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop a native application that uses GPS location information.
7. Implement an application that writes data to the SD card.
8. Implement an application that creates an alert upon receiving a message.
9. Develop a mobile application that creates alarm clock.
10. User interface design layouts

Course Outcomes:

1. Implement Basic Mobile Mapplicaitons
2. Design GUI Applications
3. Implement GPS tracking Applicaitons
4. Deploy web applications

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	-	**1**	**1**	**2**	-	-	-	-	-	-	-	-	2	1
CO2	-	**1**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO3	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1
CO4	-	**2**	**2**	**2**	-	-	-	-	-	-	-	-	2	1

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II-II to IV-I	Name of the Course	L	T	P	C
	NPTEL/SWAYAM Professional Elective-I	**3**	**0**	**0**	**3**

****** A candidate shall complete at least one MOOC course as Professional Elective course 1 of 12 weeks duration.

Enrollment of MOOC course will be initiated from the date of commencement of class work for the second year second semester.

MOOC Course completion certificate must be submitted on or before the completion of fourth year first semester to consider it for regular evaluation, otherwise it will be considered as supplementary.

Student has to pursue and acquire a certificate for a MOOC course only from SWAYAM/NPTEL through online with the approval of Head of the Department concerned in order to earn the 3 credits. List of courses will be announced by the respective board of studies at the time of commencement of classwork for second year second semester.

III- Year I- Semester	Name of the Course	L	T	P	C
PC3101	Computer Networks	3	0	0	3
Prerequisites: MFCS, Data Structures					

Course Objectives:

1. To summarize OSI and TCP/IP reference models and Example networks, characteristics of transmission media and classify multiplexing techniques
2. To explain the Error Control, Flow Control
3. To Compute optimal path using Routing Algorithms.
4. To summarize the concepts of reliable unreliable transmission
5. To explain the knowledge on various application layer protocols

UNIT-I: Introduction to Computer Networks and Physical Layer 10 Hrs

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model – A Comparison of the OSI and TCP/IP Reference Models, Example Networks, Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel Guided Transmission Media, Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

UNIT-II : Data Link Layer 8 Hrs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Control Protocols, Sliding Window Protocols, HDLC, PPP

UNIT– III: Medium Access Control Sub Layer 8 Hrs

Channel Allocation Problems, Multiple Access Protocols, IEEE standards for Local Area Networks, WLAN, Bluetooth

UNIT-IV: Network Layer 10 Hrs

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and super netting.

UNIT – V: Transport and Application Layers 8 Hrs

Transport Layer Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols

Application layer Design Issues, DNS, WWW, HTTP/HTTPS, E-mail, FTP

Text Books:

1. Computer Networks, Andrew S Tanenbaum, Pearson, 5th Edition
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw Hill, 4th Edition

Reference Book:

3. TCP/IP Protocol Suite, Behrouz A Forouzan**,** Tata McGraw Hill Edition, 3rd Edition

Web Resources:

1.https://youtube.com/playlist?list=PLbRMhDVUMngfpeFloB7kyiA40EptH1up
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3.https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13788-3.html

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Explain OSI and TCP/IP reference models and Example networks, characteristics of transmission media and classify multiplexing techniques (L2)

CO2: Summarize various Error Control and Flow Control techniques (L2)

CO3: Identify Channel Allocation problems and IEEE protocols w.r.t LAN, WLAN. (L1)

CO4: Compute optimal path using Routing Algorithms and Design the subnetworks(L4)

CO5: Illustrate the working of various Transport and application layer protocols (L3)

CO-PO-PSO Mapping Matrix:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PPO2**
CO-1	2										2		2	2
CO-2	2	2									2		2	2
CO-3		2	2								2	2	2	2
CO-4	2		2								2	2	2	2
CO-5	-		2								2	2	2	2

MICRO SYLLABUS

UNIT-I: Introduction and Physical Layer

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model – A Comparison of the OSI and TCP/IP Reference Models, Example Networks, Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

Unit	**Module**	**Micro content**	**No of hrs**
Introduction to Computer Networks and Physical Layer	Introduction	Uses of Computer Networks, Topologies, Types of Networks (LAN, MAN,WAN) Network Hardware, Network Software	2
	Reference Models	OSI and TCP/IP	2
	Example Networks	ARPANet, Novell Netware, ATM Networks	2

	Physical Layer	Design Issues, Maximum Data Rate of a Channel, Nyquist Theorem for a noiseless channel, Shannon Theorem for noisy channel	1
	Transmission Media	Guided and Unguided Transmission media	1
	Multiplexing	FDM,TDM,WDM,CDM	2

UNIT-II: Data Link Layer

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Control Protocols, Sliding Window Protocols, HDLC,PPP

Unit	Module	Micro content	No of hrs
Data Link Layer	Design Issues	Framing, Physical Addressing, Error Control, Flow Control, Access Control,	2
	Error Detection and Correction	VRC, LRC, CRC, Checksum, Single Bit Correction : Hamming Codes	2
	Flow Control	Elementary Data Link Control Protocols: An unrestricted Simplex, Simplex Stop and Wait, Stop Wait ARQ Sliding Window Protocols: 1-bit Sliding Window, Sliding window using Go Back N, Sliding Window Using Selective Repeat	2
	Example Data Link Control Protocols	HDLC, PPP	2

UNIT– III: Medium Access Control Sub Layer

Channel Allocation Problems, Multiple Access Protocols, IEEE standards for Local Area Networks, WLAN, Bluetooth

Unit	Module	Micro content	No of hrs
Medium Access Control SubLayer	Channel Allocation Problem	Static Channel Allocation, Dynamic Channel Allocation	2
	Multiple Access Protocols	Aloha, CSMA, Collision Free Protocols,	2
	IEEE standards LAN Protocols	IEEE-802.3,802.4,802.5	2
	IEEE WLAN Protocols	IEEE 802.11, Bluetooth	2

UNIT-IV: Network Layer

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and super netting.

Unit	Module	Micro content	No of hrs

Network Layer	Design Issues	Connection Oriented and Connection less service, Comparison of Virtual Circuit subnets and Datagram Networks	1
	Routing Algorithms	Shortest path, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts	3
	IP Headers	IPV4 and IPV6	2
	IP Addresses	Classful IP Addressing, Classless IP Addressing, Types of IP Addresses Subnetting and Super netting	4

UNIT – V: Transport and Application Layers

Transport Layer Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols**.** Application layer Design Issues, DNS, WWW, HTTP/HTTPS, E-mail.

Unit	**Module**	**Micro content**	**No of hrs**
Transport Layer	Design Issues	Design Issues, Process Addressing, Service Primitives	2
	TCP Phases	Connection Establishment, Connection Termination, Data Transfer	
	Protocols	TCP, UDP	1
	Design Issues	File Transfer and Access Management Network Virtual Terminals Mail Services	1
	DNS	DNS Name space, Resource Records, Name servers	1
	WWW	Architecture and overview, Static/Dynamic web pages,	1
	HTTP/HTTPS	HTTP Request and Response headers and methods	1
	E-mail	Architecture, User Agents, Message formats, Message Transfer Agents, SMTP, S/MIME, POP	1

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III- Year I- Semester	**Name of the Course**	**L**	**T**	**P**	**C**

PC3102	Artificial Intelligence	3	0	0	3
Prerequisites: Data Structures					

OBJECTIVES:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To improve analytical and problem solving skills based on the characteristics of the problem using various heuristic search techniques and to improve designing and playing a game
- To have knowledge on propositional calculus, proportional and predicate logic to understand few systems such as natural deduction, axiomatic system, etc.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning
- To have basic knowledge on probabilistic analysis and networks as well as fuzzy systems and fuzzy logics.

UNIT-I: Introduction to AI and Problem solving 14 hrs

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, A*,AO*, constraint satisfaction

UNIT-II: Problem Reduction and Logic Concepts 12 hrs

Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games

Logic concepts: Introductiorn, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-III: Knowledge representation 12hrs

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-IV: Expert system and applications 12hrs

Introduction, phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-V: Uncertainty measure, Fuzzy sets and fuzzy logic 10hrs

probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

REFERNCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

Course Outcomes:

By the end the of the course, the student will be able to

CO1:Ability to develop a basic understanding of AI building blocks presented in intelligent agents.
CO2: Ability to choose an appropriate problem solving method and knowledge representation technique.
CO3: Ability to analyze the strength and weaknesses of AI approaches to knowledge– intensive problem solving.
CO4: Ability to design and develop the AI applications in real world scenario.
CO5: Ability to empirical evaluation of different algorithms of a problem formalisation and state the conclusions that the evaluation supports.

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**	**PSO 1**	**PSO2**
CO-1	2	1										2		2
CO-2		2	2		3									1
CO-3		2												
CO-4												2	1	
CO-5	1	2			3								1	

MICRO SYLLABUS

UNIT-I: Introduction to AI and Problem solving **14 hrs**

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI
Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, A*,AO*, constraint satisfaction

Unit-I	**Module**	**Micro content**	**No of hrs**

Introduction to AI and Problem solving	**Introduction to AI**	History, Intelligent Systems, Foundations of AI, Applications, Tic-tac-toe game playing, Development of AI languages,Current trends	2
	Introduction to Problem solving	Introduction, general problem solving, characteristics of problem,	1
	exhaustive searches	Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening Depth First Search,	5
	heuristic search techniques,	Generate& test, Branch and Bound,Hill Climbing, Best First Search, *A**, AO*, constraint satisfaction,	6

UNIT-II: Problem Reduction and Logic Concepts 12 hrs

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

Unit-II	**Module**	**Micro content**	**No of hrs**
Problem Reduction and Logic Concepts	**Problem reduction and game playing**	Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games	6
	Logic concepts	Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic	6

Unit –III: Knowledge representation 12hrs

Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

Unit-III	**Module**	**Micro content**	**No of hrs**
Knowledge representation	**Knowledge representation**	Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames	7

	Advanced knowledge representation technoques	Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web	5

UNIT-IV: Expert system and applications **12hrs**

Introduction, phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

Unit-IV	**Module**	**Micro content**	**No of hrs**
Expert system and applications	**Expert system and applications**	Introduction, phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools	12

UNIT-V: Uncertainty measure, Fuzzy sets and fuzzy logic **10hrs**

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic

Unit-V	**Module**	**Micro content**	**No of hrs**
Uncertainty measure, Fuzzy sets and fuzzy logic	**Uncertainty measure**	Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.	5
	Fuzzy-logic	Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic. Fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.	5

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3103	Automata Theory and Compiler Design	3	0	0	3
Prerequisites:					

Course Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines
- To understand the relation between Contexts free Languages, Push Down Automata and Turing Machine
- To study various phases in the design of compiler and understanding the machine independent phases of compiler
- To understand machine dependent phases of compiler

UNIT-I: Finite Automata **12 hrs**

Automata: Need for Automata Theory, Chomsky hierarchy, Acceptance of a string, Design of NFA with Є, NFA without Є, DFA, Equivalence of NFA, DFA

Finite Automata Conversions: Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines.

UNIT-II: Regular Expressions and Grammars **14 hrs**

Regular Expressions: Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets

Grammars: Grammars, Classification of Grammars, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars, Normal Forms- Chomsky Normal Form, Griebach Normal Form.

Unit-III: Push Down Automata and Turing Machines **12 hrs**

Push Down Automata (PDA): Design of PDA, Deterministic PDA, Non-deterministic PDA, Equivalence of PDA and Context Free Grammars.

Turing Machine (TM): Design of Turing Machine, Deterministic TM, Non-deterministic TM.

UNIT-IV: Machine Independent Phases **14 hrs**

Lexical Analysis: Logical phases of compiler**,** Lexical Analysis, Lexemes Tokens and patterns, Lexical Errors, Regular Expressions, Regular definitions for the language constructs, Strings, Sequences, Comments, Transition diagram for recognition of tokens, Reserved words and identifiers.

Syntax Analysis: Parsing definition, types of parsing, left recursion, left factoring, Top-down parsing, First and Follow, LL(1) Grammars, Non- Recursive predictive parsing, Bottom-up Parsers, Shift Reduce Parsing, LR parsers.

Semantic Analysis: Syntax Directed Translation, L-attributed and S-attributed definitions

Symbol tables: use and need of symbol tables.

UNIT-V: Machine Dependent Phases **12 hrs**

Intermediate Code Generation: Intermediate code, three address code, quadruples, triples, directed acyclic graph.

Code Optimization: Common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization.

Code Generation: Basic blocks & flow graphs, Peephole optimization, Register allocation and assignment.

Text Books:

1. Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008
2. Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007
3. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nd ed, Pearson,2007.

Reference Books

1. Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI
2. Theory of Computation, V. Kulkarni, Oxford University Press, 2013
3. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.
4. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE

e- Resources & other digital material

https://nptel.ac.in/courses/106/104/106104028/

https://nptel.ac.in/courses/106/105/106105190/

University Academy You tube Channel for Automata Theory and Compiler Design:

https://www.youtube.com/playlist?list=PL-JvKqQx2AtdhlS7j6jFoEnxmUEEsH9KH

https://www.youtube.com/playlist?list=PL-JvKqQx2Ate5DWhppx-MUOtGNA4S3spT

GATE Lectures:

https://www.youtube.com/playlist?list=PLEbnTDJUr_IdM___FmDFBJBz0zCsOFxfK

https://www.youtube.com/playlist?list=PLMzYNEvC0P7FwwnrXwAjPq8zLTC4MDQKQ

Course Outcomes:

By the end the of the course, the student will be able to

CO1:Classify machines by their power to recognize languages.

CO2:Summarize language classes and grammars relationship among them with the help of Chomsky hierarchy.

CO3: employ finite state machines in problem solving and also illustrate deterministic and non-deterministic machines.

CO4: design and implement scanners and parsers.

CO5: perform code optimization to improve performance and apply algorithms to generate code.

CO-PO-PSO Mapping Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSPO1	PSPO2
CO-1	2	2	1	-	-	-	-	-	-	-	-	-	1	1
CO-2	1	2	2	-	-	-	-	-	-	-	-	-	2	1
CO-3	1	-	2	2	-	-	-	-	-	-	-	-	2	1
CO-4	2	-	2	1	-	-	-	-	-	-	-	-	1	1
CO-5	-	2	1	2	-	-	-	-	-	-	-	-	1	1

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UNIT-I: Finite Automata **12 hrs**

Automata: Need for Automata Theory, Chomsky hierarchy, Acceptance of a string, Design of NFA with Є, NFA without Є, DFA, Equivalence of NFA, DFA

Finite Automata Conversions: Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines.

Unit	Module	Micro content	No of hrs
Unit-I Finite Automata	**Automata**	Need for Automata Theory, Chomsky hierarchy, Acceptance of a string, Design of NFA with Є, NFA without Є, DFA, Equivalence of NFA, DFA	5
	Finite Automata Conversions	Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines,	7

UNIT-II: Regular Expressions, Grammar **14 hrs**

Regular Expressions: Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets

Grammars: Grammars, Classification of Grammars, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion. Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars, Normal Forms- Chomsky Normal Form, Griebach Normal Form.

Unit	Module	Micro content	No of hrs
UNIT-II Regular Expressions, Regular Grammars	**Regular Expressions**	Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion	3
		Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets	2
	Regular Grammars	Grammars, Classification of Grammars, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.	4
		Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars	2
		Normal Forms- Chomsky Normal Form, Griebach Normal Form.	3

Unit – III: Push Down Automata and Turing Machines 12 hrs

Push Down Automata (PDA): Design of PDA, Deterministic PDA, Non-deterministic PDA, Equivalence of PDA and Context Free Grammars.

Turing Machine (TM): Design of Turing Machine, Deterministic TM, Non-deterministic TM.

Unit	Module	Micro content	No of hrs
Unit – III Push Down Automata and Turing Machines	**Push Down Automata (PDA)**	Design of PDA, Deterministic PDA, Non-deterministic PDA, Equivalence of PDA and Context Free Grammars	6
	Turing Machine (TM)	Design of Turing Machine, Deterministic TM, Non-deterministic TM	6

UNIT-IV: Machine Independent Phases 14 hrs

Lexical Analysis: Logical phases of compiler**,** Lexical Analysis, Lexemes, Tokens and patterns, Lexical Errors, Regular Expressions, Regular definitions for the language constructs, Strings, Sequences, Comments, Transition diagram for recognition of tokens, Reserved words and identifiers.

Syntax Analysis: Parsing definition, types of parsing, left recursion, left factoring, Top-down parsing, First and Follow, LL(1) Grammars, Non- Recursive predictive parsing, Bottom-up Parsers, Shift Reduce Parsing, LR parsers.

Semantic Analysis: Syntax Directed Translation, L-attributed and S-attributed definitions

Symbol tables: use and need of symbol tables.

Unit	Module	Micro content	No of hrs
UNIT-IV Machine Independent Phases	**Lexical Analysis**	Logical phases of compiler, Lexical Analysis, Lexemes, Tokens and patterns, Lexical Errors, Regular Expressions, Regular definitions for the language constructs, Strings, Sequences, Comments, Transition diagram for recognition of tokens, Reserved words and identifiers.	4

	Syntax Analysis	Parsing definition, types of parsing, left recursion, left factoring, Top-down parsing, First and Follow, LL(1) Grammars, Non- Recursive predictive parsing, Bottom-up parsers, Shift Reduce Parsing, LR parsers.	7
	Semantic Analysis	Syntax Directed Translation, L-attributed and S-attributed definitions	2
	Symbol tables	use and need of symbol tables.	1

UNIT-V: Machine Dependent Phases **12 hrs**

Intermediate Code Generation: Intermediate code, three address code, quadruples, triples, directed acyclic graph.

Code Optimization: Common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization.

Code Generation: Basic blocks & flow graphs, Peephole optimization, Register allocation and assignment.

Unit	Module	Micro content	No of hrs
Unit-V Machine Dependent Phases	**Intermediate Code Generation**	Intermediate code, three address code, quadruples, triples, directed acyclic graph.	4
	Code Optimization	common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization.	4
	Code generation	Basic blocks & flow graphs, Peephole optimization, Register allocation and assignment.	4

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III- Year I- Semester	Name of the Course	L	T	P	C
PE 3101	Data Warehousing and Data Mining Professional Elective IIA	3	0	0	3
Prerequisites: DBMS, Basic Mathematics					

Course Objectives:

1. To understand basic concepts, architectures and classical models in data warehousing
2. To understand data mining concepts and preprocessing techniques
3. To master in association analysis techniques in various applications like social, scientific and environmental context.
4. To develop skill in selecting the appropriate classification algorithm for solving practical problems
5. To characterize the kinds of patterns that can be discovered by clustering.

UNIT-I **12 Hrs**

Introduction to Data Warehousing: Introduction to Data Ware House, Differences between operational data base systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction-Transformation-Loading, Data warehouse Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT-II **14 Hrs**

Introduction to Data Mining: Introduction, Definition, KDD, Challenges, Data Mining Functionalities. Data Objects and Attribute Types, Measuring Data Similarity and Dissimilarity, **Data Preprocessing**: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT- III **12 Hrs**

Association Analysis: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithm, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT -IV **13 Hrs**

Classification: Problem definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision trees: Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest neighbor classification-Algorithm and characteristics.

UNIT-V **14 Hrs**

Clustering: Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, DBSCAN Algorithm, Strengths and Weaknesses.

TEXT BOOKS:

1.Han, Kamber, "Data Mining Concepts and Techniques", 3rd Edition
2. P. N. Tan, M. Steinbach, Vipin Kumar, “Introduction to Data Miming”, Pearson Education.

REFERENCE BOOKS:

1.**DATA MINING TECHNIQUES, ARUN K PUJARI, 3RD EDITION, UNIVERSITIES PRESS.**

2.Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.

3.The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.

4.Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University.

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UNIT-I: Introduction to Data Warehousing **12 Hrs**

Introduction to Data Ware House, Differences between operational data base systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction-Transformation-Loading, Data warehouse Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

Unit	Module	Micro content	No of hrs
Introduction to Data warehousing(DW)	Introduction	Definition of DW,Diff b/w DB and DW	2
	DW Architecture	DW Architecture and its components, Extraction-Transformation-Loading,	2
	DW Modeling	Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table,	3
	Measures	Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table characteristics;	2
	OLAP	OLAP definition, OLAP cube, OLAP Operations	2
	OLAP Server Architecture	ROLAP, MOLAP and HOLAP.	1

UNIT-II: Introduction to Data Mining **14 Hrs**

Introduction, Definition, KDD, Challenges, Data Mining Functionalities. Data Objects and Attribute Types, Measuring Data Similarity and Dissimilarity, **Data Preprocessing**: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit	Module	Micro content	No of hrs
Introduction to Data Mining(DM)	Introduction	Why DM, Definition of DM,KDD	1
	DM functionalities	Classification, Association analysis, cluster analysis etc..	2
	Challenges	Major issues DM	1
	Data objects & attribute types	Definitions, types of attributes	2
	Measuring Data Similarity and Dissimilarity	Data matrix, similarity matrix, proximity measures for different types of attributes	2

	Data cleaning	Missing values, noisy data, data cleaning as process	2
	Data integration & transformation	Different issues in data integration, different data transformation techniques	2
	Data reduction	Different data reduction techniques	2

UNIT-III: Association Analysis **12 Hrs**

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithm, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set

Unit	Module	Micro content	No of hrs
Association Analysis	Problem Definition	Basic concepts, Market basket analysis	2
	Frequent Item Set Generation	The APRIORI Principle, Support and Confidence Measures, Association Rule Generation,	2
	APRIORI algorithm	The Partition Algorithms, examples	3
	FP-Growth Algorithm,	Algorithm, examples	3
	Compact Representation of Frequent Item	Maximal Frequent Item Set, Closed Frequent Item Set	2

UNIT-VI: Classification **13 Hrs**

Problem definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision trees: Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest neighbor classification-Algorithm and characteristics.

Unit	Module	Micro content	No of hrs
Classification	Problem definition	Definition, basic concepts, General Approaches to solving a classification problem,	3
	Evaluation of Classifiers	Metrics, methods for evaluation, techniques to improve classification accuracy	2
	Classification techniques:Decision trees:	Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction,	3
	Naïve-Bayes Classifier	Bayes theorem, naïve bayesian classification, Bayesian Belief Networks; concepts and training	3
	K-nearest neighbor classification-	Algorithm, example, characteristics.	2

UNIT-V: Clustering: 14 Hrs

Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering- Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, DBSCAN Algorithm, Strengths and Weaknesses

Unit	Module	Micro content	No of hrs
Clustering	Problem Definition	Definition , Overview, requirements	2
	Evaluation of clustering algorithms	Techniques of evaluation for clustering	2
	Partitioning clustering	K-Means Algorithm, Strengths and Weaknesses, K-Means Additional Issues, PAM Algorithm,	4
	Hierarchical Clustering-Algorithm-	Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm,	3
	DBSCAN Algorithm	DBSCAN Algorithm, Strengths and Weaknesses	3

Course Outcomes:

By the end the of the course, the student will be able to
CO-1: Understand basic concepts, architectures and classical models in data Warehousing
CO-2: Understand data mining concepts and preprocessing techniques
CO-3: Master in association analysis techniques in various applications like social, scientific and environmental context.
CO-4: Develop skill in selecting the appropriate classification algorithm for solving practical problems
C0-5: Characterize the kinds of patterns that can be discovered by clustering.

CO-PO-PSO Mapping Matrix:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSPO1**	**PSPO2**
CO-1	3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO-2	-	2		-	-	-	-	-	-	-	-	-	-	2
CO-3	-	-	2	3	-	-	-	-	-	-	-	-	2	-
CO-4	-	-	-	3	-	-	-	-	-	-	-	2	3	1
CO-5	2	2	-	-	-	-	-	-	-	-	-	-		2

III- Year I- Semester	Name of the Course	L	T	P	C
PE3101	Software Project Management Professional Elective IIB	**3**	**0**	**0**	**3**
Prerequisites: Software Engineering					

Course Objectives:

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning
3. To Study Tracking and oversight in the implementation of the software project management process.
4. To understand successful software projects that support organization's strategic goals.
5. To study Software Project monitoring and control ,software quality.

UNIT -I: Introduction Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT -II: Project Approach Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

UNIT -III: Effort estimation & activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis.

UNIT -IV: Risk Management& Risk categories: Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach.

Project Monitoring & Control, Resource Allocation

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT-V

Software Quality and Planning Quality:, Defining Quality – ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality

TEXT BOOKS: 1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill 2. Software Project Management, Walker Royce: Pearson Education, 2005. 3. Software Project Management in practice, Pankaj Jalote, Pearson.

REFERENCE BOOKS: 1. Software Project Management, Joel Henry, Pearson Education.

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Match organizational needs to the most effective software development model and to understand the basic concepts and issues of software project management

CO2: Effectively Plan the software projects and to implement the project plans through managing people, communications and change.

CO3: Select and employ mechanisms for tracking the software projects.

CO4: Conduct activities necessary to successfully complete and close the Software projects.

CO5: Develop the skills for tracking and controlling software deliverables.

CO-PO-PSO Mapping Matrix:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PPO 2**
CO-1	3												1	
CO-2	3	2											2	
CO-3		3											3	
CO-4	3	2											1	
CO-5			3					1	2	1	2	1	2	

MICRO SYLLABUS

UNIT-I:

Introduction Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

Unit	**Module**	**Micro content**	**No of hrs**
Introduction to Software Project Management	Introduction Project	What is a project? Software projects versus other typesof project The project as a system	2
	Introduction to Management	What is management	2

	Software Project Management activities	Activities covered by software project management	2
	Challenges in software projects	Problems with software projects Management Control	2
	Stakeholders	Requirement Specification Information and control in Oragnization	2
	Objectives & goals Project Planning:	Step-wise planning Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure	3

UNIT-II:

Project Approach Lifecycle models: Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

Unit	Module	Micro content	No of hrs
Project Approach Lifecycle models,	Project Approach Lifecycle models,	Rapid Application Development The waterfall Model The V-process Model The Spiral Model	3
	Choosing Technology	Software Prototyping Other ways of categorizingPrototypes Tools A Prototyping Examples	3
	Prototyping Iterative & incremental Process Framework	Lifecycle phases Process Artifacts, Process workflows	3

UNIT-III:

Effort estimation & activity Planning: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis.

Unit	Module	Micro content	No of hrs
Effort estimation & activity Planning:	Estimation techniques	Where are estimates done Problems with over and under estimates The basis of software	3

		estimating Software effort estimation techniques Estimating by Anology	
	Function Point analysis	SLOC COCOMO:A parametric Model Use case-based estimation	2
	Activity Identification Approaches,	Objectives of Activity Planning When to plan Project Schedule Projects and Activities Sequencing and Scheduling Activities	2
	Network planning models	Formulating a Network Model Adding the Time Dimension The forward pass The Backward pass	3
	Critical path analysis	Identifying Critical Path Activity Float Shortening the Project Duration Identifing Critical Activities Activity –On-Arrow Networks	3

UNIT-IV:

Risk Management& Risk categories: Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach.

Project Monitoring & Control, Resource Allocation

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling.

Unit	Module	Micro content	No of hrs
RiskManagement & Risk categories	Risk categories	Identification, Assessment, Planning and management	3
	Risk Management	PERT technique, Monte Carlo approach	3
Project Monitoring & Control	Creating a framework for monitoring &	Creating the framework	2

	control	Collecting the data	
	Progress monitoring	Visualising Progress	2
	Cost monitoring	Cost monitoring, Earned value Analysis	2
	Tracking	Defects Tracking, Issues Tracking, Status reports,	2
	Resources	Types of Resources, Identifying resource requirements, Resource scheduling	2

UNIT-V:

Software Quality Planning Quality: Defining Quality – ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality

Unit	**Module**	**Micro content**	**No of hrs**
Software Quality And Planning Quality	**Software Quality**	Defining Quality – ISO 9016, Quality Measures,	3
	Planning Quality	Quantitative Quality Management Planning,	3
	Product Quality	Statistical Process	1
	Process Quality Metrics	Control Capability Maturity Model Enhancing software Quality	2

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III- Year I- Semester	Name of the Course	L	T	P	C
PE3101	**Computer Graphics** Professional Elective IIC	3	0	0	3
Prerequisites: Basic Mathematics					

Course Objectives:

1. To develop, design and implement two and three dimensional graphical structures
2. To enable students to acquire knowledge Multimedia compression and animations.
3. To learn Creation, Management and Transmission of Multimedia objects.

UNIT - I 12 HOURS

Introduction to Computer Graphics : Applications of Computer Graphics, 2D Primitives:- Output Primitives: Points, Lines, Planes, Frame-Buffers, Video-display devices, Line Drawing Algorithms: DDA Line drawing, Bresenham's Line Drawing ,Parallel Line Drawing ,Circle and Ellipse Generation, Polygon Generation, Polygon Filling Algorithms, Attributes of Output Primitives.

UNIT - II 12 HOURS

2D Transformations & Viewing : Basic Transformations :Translationa,Rotation,Scaling, Other Transformations: Reflection, Shear, Composite Transformations, Coordinate Transformation, Viewing Pipeline :Viewing Reference Frame, window, view-port, window-to- view-port Transformation, Multiple window transformation, Clipping: Line Clipping: cohen- sutherland line clipping algorithm , Polygon Clipping: Sutherland-Hodheman polygon clipping algorithm, Text Clipping. .

UNIT - III 14 HOURS

3D Concepts: 3D Object Representation: Polygons, Curved Lines, Splines, Quadric Surfaces, **3D Transformations : Basic :**Translation, Coordinate-axis-Rotation, Arbitrary-axis Rotation, Scaling, Other: Reflection, Shear, Composition of 3D transformations, ,Projections : Parallel, Perspective, 3D Viewing, Visible-Surface Detection Algorithms: Back face removal, Z-Buffer, A-Buffer, Area-sub-division, Depth-Sorting(painter's),BSP-Tree,Octree,3D Clipping

UNIT - IV 10 HOURS

Graphics Programming Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe
Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes
Rendering Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows

UNIT - V 12 HOURS

Fractals Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals.
Overview of Ray Tracing Intersecting rays with other primitives – Adding Surface texture – Reflections andTransparency – Boolean operations on Objects.

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition Pearson Education,2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and practice, Second Edition in C, Pearson Education, 2007.

Course Outcomes: At the end of the course student will be able to:

CO'S	STATEMENT
CO1	**Understand** Applications, Video devices and **analyze** 2D Objects by learning output primitives
CO2	**Analyze** various 2D Object representation models by **learning** various visualization techniques
CO3	**Analyze** various 3D Object representation models by **learning** various visualization techniques
CO4	**Develop** programs in OPENGL by using apt functions for efficacy in Computer Graphics 2D/3D and Animation**Perform Rendering** of 2D/3D Objects by **learning** about shading, texture mapping techniques and drawing shadows
CO5	**Design** complicated Real World Scenes by **learning** Iterated Function Systems for implementing Fractals **Apply** 3D Solid Geometric Techniques for representing 3D objects

Micro Syllabus of Computer Graphics

UNIT I : Applications of Computer Graphics, 2D Primitives:-Output Primitives, Line Drawing Algorithms ,Circle and Ellipse Generation, Polygon Generation, Attributes of Output Primitives.

Unit	Module	Micro Content
UNIT I	Applications of Computer Graphics, Display Devices	Engineering, Art, Science,Presentation
		Visualization, Education, Entertainment
		CRT, DVST, LED, LCD
		Raster Scan
		Random Scan, Color Display's
	2D Output-Primitives	Points, Frame Buffer Loading, Line drawing Algorithms,DDA
		Bresenham's Examples
		Parallel Line Drawing,Circle & ellipse Generation
		Polygon Filled Algorithms ,scan line, boundary fill,flood fill
		Attributes of output primitives
	Circle & Ellipse Generation	Circle & ellipse Generation Algorithm
		Example of mid-point circle generation
		Example of ellipse algorithm

UNIT – II: 2D Transformations ,2D Viewing & Clipping : Basic Transformations, Other Transformations , Composite transformations, Viewing Pipeline, Clipping.

Unit	Module	Micro Content
UNIT II	Transformations	Basic:Translation,Rotation,Scaling,Other:Reflection,Shear
	composite transformations	Additive, commutative
		Coordinate transformation
	Viewing pipeline	Coordinate reference frame
		Window to view port transformation
		Multiple Windowing
	Clipping	Point, line, polygon, text

UNIT – III : 3D Concepts: 3D Object Representation, 3D Transformations,Projections, 3D Viewing, Visible Surface Detection Algorithms

Unit	Module	Micro Content
UNIT III	3D Object Representation	Boundary, Spatial
		Polygons, curves quadric surfaces
	3D Transformations	Basic:Translation,Rotation,Scaling Other: Reflection, Shear
		Rotations: coordinate axis, Arbitrary-axis
		Additive & commutative proveings on composite
	Projections	Parallel,perspective
		View volumes
	3D Viewing	Projection planes
		Projection coordinate transformations
	3D Clipping & visible surface detection algorithms	Clipping against view volume boundaries, applying visible surface detection
		Operations on B^+ Tree: Insertion, Deletion, Search

UNIT - IV : Color Models: RGB,HSV,CMY,YIQ,Animation&Open GL Primitives, 3D Scenes ,Shading models.

Unit	Module	Micro Content
UNIT IV	Color Models	RGB ,CMY
		HSV, YIQ
	Animation, Open GL primitives	Key frame animation
		Basic primitives : Begin, end, polygon, vertex etc
		3D Scene representation
	Shading Models	Flat
		Smooth, surface renderings

	Shadows	Shadow buffer
		Textures
UNIT V : Fractals : Self similarity objects, random fractals, Mandelbrot set, Julia set, snowflake **Ray Tracing:** Forward ray tracing, backward ray tracing, boolean operations		
Unit	**Module**	**Micro Content**
UNIT V	Fractals	Introduction, applications, random fracrals
		Snowflakes
		Mandelbrot set
		Julia sets
		Created an image by using Iterated Functions
	Ray Tracing	Introduction, forward, backward
		Boolean Operations on CSG objects

CO-PO-PSO MAPPING MATRIX:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO-1	1		2	2								1	1	1
CO-2				3									2	
CO-3			3	3									3	
CO-4	1	1	3										2	
CO-5	1	3	3										3	

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III- Year I- Semester	Name of the Course	L	T	P	C
PE3101	**E-Commerce** Professional Elective IID	**3**	**0**	**0**	**3**

Course Objectives:

This course provides

- An introduction to information systems for business and management.
- It is designed to familiarize students with organizational and managerial foundations of systems.
- Technical foundation for understanding information systems.

Course Outcomes:

- Demonstrate an understanding of the foundations and importance of E-commerce
- Analyze the impact of E-commerce on business models and strategyDiscuss legal issues and privacy in E-Commerce
- Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.
- Describe the infrastructure for E-commerce and describe the key features of Internet, Intranets and Extranets and explain how they relateto each other.
- Assess electronic payment systems and Recognize and discuss global E-commerce issues

UNIT-I: Electronic Commerce, Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce, Mercantile Process models.

UNIT-II: Electronic payment systems-Digital Token Based, SmartCards, CreditCards, Risks in Electronic Payment systems.

UNIT-III: Inter Organizational Commerce-EDI, EDI Implementation, Value added networks. Intra Organizational Commerce-work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT-IV: Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing, Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT-V: Consumer Search and Resource Discovery, Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia –key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing.

Text Book:

1. Frontiers of ElectronicCommerce, Kalakata, Whinston, PEA,2006.

Reference Books:

1. E-Commerce Fundamentals and Applications, Hendry Chan, Raymond Lee, Dillon, Chang, John Wiley.
2. E-Commerce, A Managerial Perspective, Turban E, LeeJ, King,ChungH.M.,PEA, 2001.
3. E-Commerce An Indian Perspective,3/e, P.T. Joseph, PHI, 2009.
4. E-Commerce, S.Jaiswal, Galgotia.
5. Electronic Commerce, Gary P.Schneider, Thomson.

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III- Year I- Semester	Name of the Course	L	T	P	C
OE3101	**Front-End Development** (Open Elective I/Job Oriented Course I)	**3**	**0**	**0**	**3**
Prerequisites: Web Technologies					

Course Objectives:

1. To learn Client-side application development using HTML and CSS
2. To understand Java script ES6 features
3. To focus on contemporary front-end technologies like React
4. To understand data access through NodeJS

Course Outcomes: by the end of the course the student will be able to

- Summarize Client-side design of the web.
- Explore different ES6 features in Java script.
- Implement components and props through React.
- Comprehend React Hooks
- Use NodeJs for data availability

.

Unit-1: Introduction to HTML 5, syntax, attributes, events, SVG, Web storage, Introduction to Canvas, Audio & Video, Geolocations, Drag & Drop, Web workers, working with Fonts, working with other graphics.
Style sheets: Introduction CSS, Applying CSS to HTML, Selectors, Properties and Values, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties

Unit-2: Introduction to ES6 features, Arrow functions, default parameters, destructuring elements, Higher order functions, defining classes, accessing data members, constructors, inheritance, super.

Unit-3: ReactJS: Introduction, creating a simple react project, Templating using JSX, Components, Rendering, State and Props, Types of Components – Component Lifecycle, Forms and User Input, Event Handling, Communicate Between Components.

Unit-4: React **JS:** React Routing, Introduction to Hooks, State management, Types of Hooks -useState, useEffect, useContext. CORS policies, Usage of Web API calls- fetch and axios, Error Handling.

Unit-5: Node JS: Overview, Node js - Basics and Setup, Node js Console, Node js Command Utilties, Node js Modules, Node js Concepts, Node js Events, Node js with Express js.
Introduction to MongoDB, creating databases, Operations – insert, update, delete and Querying.

Text Books:

1. HTML5, Black book, Dreamtech Publications
2. Beginning React, Greg Lim
3. Learning AngularJS: A Guide to AngularJS Development, O' Reilly Publication

References:

1. React Cook Book, Carlos Santana Roldan
2. Learning React, 2nd Edition, O' Reilly publications.
3. React in Action by Mark Tielens Thomas

Web Resources:

https://developer.mozilla.org/en-US/docs/Web/JavaScript
https://reactjs.org/docs/getting-started.html
https://nodejs.org/en/docs/

Micro Syllabus of Full Stack Development

Unit-1: Introduction to HTML 5, syntax, attributes, events, SVG, Web storage, Introduction Canvas, Audio & Video, Geolocations, Drag & Drop, Web workers, working with Fonts, working h other graphics.

Style sheets: Introduction CSS, Applying CSS to HTML, Selectors, Properties and Values, S Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and t Properties.

Unit No.	Topic	Sub Topic
I	Introduction to HTML 5	Syntax, attributes, events
		SVG, Web storage
		Introduction to Canvas, Audio & Video, Geolocations
		Drag & Drop, Web workers
		Working with Fonts, working with other graphics.
	Style Sheets	Introduction CSS
		Applying CSS to HTML
		Selectors, Properties and Values
		CSS Colors and Backgrounds
		CSS Box Model, CSS Margins
		Padding, and Borders
		CSS Text and Font Properties
II	Introduction	Primitive Types, operators, Type conversions, control flow – conditions & loops
	ES6 features	Let and const, Arrow functions, destructuring elements, multi-line strings, default parameters, promise.
	Higher order functions	Map(), filter(), reduce()
	OOPs	Classes & objects, properties, constructors, this, inheritance, super.

Unit-3: ReactJS: Introduction, Component – types of Components – Component ecycle, Rendering, State and Props, Forms and User Input, Event Handling, Communicate Between nponents.

Unit No.	Topic	Sub Topic

III	Introduction	Introduction, Need of React, Advantages of React JS
		Creating a simple react application
		Directory structure, Package.json structures
		Templating using JSX
	Components	Class & functional components
		Component Life cycle – methods.
	Use Input & Event Handling	Text events, button events, mouse events, drop down
	Communication	From parent to child & child to parent – rendering props, context & call backs

ct **JS:** React Routing, Introduction to Hooks, State management, Types of Hooks -useState, Effect, useContext. CORS policies, Usage of Web API calls- fetch and axios, Error Handling.

Unit No.	Topic	Sub Topic
IV	React Routing	Need of Routing
		Brower Router, Routes, Route
		Nested Routing
	Introduction to Hooks	Need of hooks, State management
		Types of Hooks
		Implementation of useState, useEffect & useContext
	CORs policies & Usage of Web API calls	Need of Web API calls
		Fetch
		axios
		Error handling

Unit-5: Node JS: Overview, Node js – Basics and Setup, Node js Console, Node js Command ties, Node js Modules, Node js Concepts, Node js Events, Node js with Express js.
oduction to MongoDB, creating databases, Operations – insert, update, delete and Querying.

Unit No.	Topic	Sub Topic
V	Overview	Introduction, Node js – Basics and Setup, Differences between NPM and NPX
		Installation of Node JS
		Architecture of Node JS
	Modules & Events	Node js Modules – HTTP module, URL module
		Installing Express, Request & response, Basic Routing, Get and post.
	Introduction to MongoDB	Introduction, advantages of MongoDB
		Creating a database, create and drop collections
	Operations	Implementation of insert, delete, update, querying documents.

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3101L	Unix and Network Programming Lab	0	0	3	1.5
Prerequisites: Computer Networks, Basics of Operating Systems					

Course objectives:
The main objectives are

1. To familiarize students with the Unix environment.
2. To learn the fundamentals of shell scripting/programming
3. To gain understanding of inter process communication and implementation of different forms of IPC in client-server environment.
4. To understand the core network programming by using sockets and transport layer protocols like TCP and UDP

List of Programs

1. General purpose utilities: date, tput, cal, who, who am i, ps, ls, man, bc, passwd, uname,
2. File Operations : pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, more, file, cmp, comm., diff, wc
3. File Permissions: chmod, chown, chgrp,
4. Base conversion : obase, ibase
5. Filters : pr, head, tail, cut, paste, sort, tr, uniq, grep, sed
6. Shell Programs.: Fibonacci Series., Designing Calculator
7. Design TCP iterative Client and server application to reverse the given input
8. Design UDP Client and server application to reverse the given input
9. Design TCP client and server application to transfer a file.
10. Design UDP Client server application to transfer a file
11. Design a TCP concurrent server to convert a given text into upper case

TextBooks:

1) The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2) Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.
3) UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia

Course Outcomes: Upon successful completion of the course, the student will be able to

CO1	Use Unix utilities and perform basic shell control of the utilities
CO2	Use the Unix file system and file access control.
CO3	Write shell scripts to automate various tasks
CO4	Describe and analyse the various Internet Transport layer protocols used in TCP/IP and UDP.
CO5	Write various real-life client-server applications using socket programming

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3102L	Front-End Development Lab	0	0	3	1.5
Prerequisites: Web Technologies					

Course Objectives

At the end of the course the students will understand

- ✓ Higher order functions
- ✓ Class Components.
- ✓ Functional Components.
- ✓ Different types of Hooks.
- ✓ React application with data base connectivity.

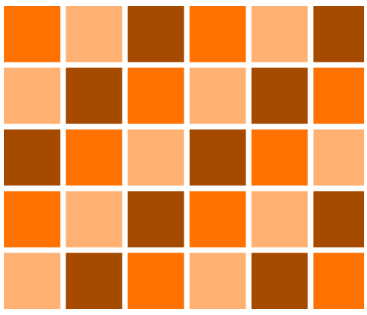
Course Outcomes:

At the end of the course the students will be able to

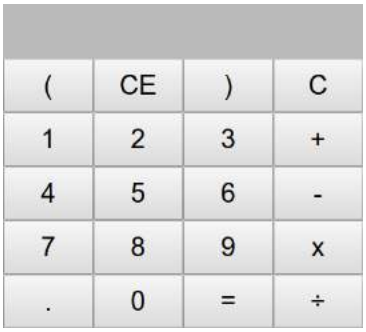
1. Use Higher Order functions like filter(), reduce(), map() .
2. Develop a react application using class components.
3. Develop a react application using functional components.
4. Develop a complete react application with data base connectivity.

List of experiments:

1. Try to recreate the following patterns using HTML and CSS only.



2. Implement Drag n Drop feature in HTML 5
3. Demonstrate Event bubbling with necessary examples.
4. Design a Calculator using Java script and relevant CSS.



5. Demonstrate Higher order functions with necessary examples – filter(), reduce() and map()
6. Create a Class Component for Counter in React JS
7. Create a Class component for Changing the color of the text given in React JS
8. Class a Class Component for viewing an array of objects in a tabular form.
9. Display a digital clock in React JS.
10. Demonstrate useState Hook with the help sample text.
11. Demonstrate useContext Hook with necessary example.
12. Demonstrate useEffect Hook with necessary example.
13. Demonstrate consuming web API using fetch & axios (AXIOS API). Demonstrate with the help of fake URL.
14. Design a BMI calculator using React JS based on the description given below:

BMI is a measurement of a person's leanness or corpulence based on their height and weight, and is intended to quantify tissue mass. It is widely used as a general indicator of whether a person has a healthy body weight for their height.

Formula:

weight (kg) / [height (m)]2 (or) [weight (kg) / height (cm) / height (cm)] x 10,000

BMI table for adults: This is the World Health Organization's (WHO) recommended body weight based on BMI values for adults. It is used for both men and women, age 18 or older.

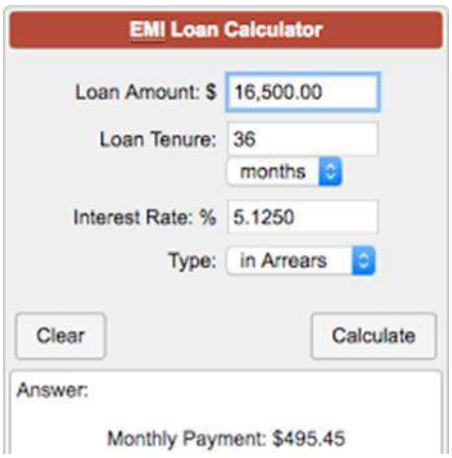
Category	BMI range - kg/m^2
Severe Thinness	< 16
Moderate Thinness	16 - 17
Mild Thinness	17 - 18.5
Normal	18.5 - 25

Overweight	25 - 30
Obese Class I	30 - 35
Obese Class II	35 - 40
Obese Class III	> 40

15. Display a selected set of images in tabular format using React JS.

16. Implement Upload & down load options on a given file.

17. Create a React application to view EMI calculator. A specific view is given below:



$$E = P \times r \times \frac{(1+r)^n}{(1+r)^n - 1}$$

Where,

E is the EMI
P is the principal amount
r is the monthly rate of interest
n is the number of months

18. Design the following Hotel bill screen. User can select as many items as possible from the dropdown box and is allowed to enter in the text field provided. Each transaction must be added in the table given below along with the bill amount.

GREEN STAR HOTEL

Customer Bill

Date:

Items: Biryani No of Items:

1.	Biryani	2	Rs. 140 Each	Rs.280
2.	Fried Rice	1	Rs. 110 Each	Rs.110
3.	Chicken Curry	2	Rs. 230 Each	Rs.460

Total	Rs. 850
GST @5%	Rs. 42.50
Bill to be paid	Rs. 892.50

19. Demonstrate the procedure to create a schema in MongoDB.

20. Demonstrate CRUD operations using MongoDB.

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III- Year I- Semester	Name of the Course	L	T	P	C
SAC3101	.Net Eco Systems	**0**	**0**	**4**	**2**
Prerequisites: Object Oriented Programming					

UNIT-I: Introduction to .NET Technology **7 Hrs**

Introduction: Introduction to .NET Framework, Visual Studio, Features of .NET, .NET Framework Architecture.

UNIT-II: Introduction to C#.NET **13 Hrs**

Introduction to C#.NET, OOPS in C#.NET, IDE OF Forms, Assemblies, and Namespaces, Streams, Multithreading.

UNIT– III: Introduction to ASP.NET and Programming **12 Hrs**

Introduction to ASP.NET and Programming, Web Form Fundamentals, Web Controls, State Management, Tracing, Session tracking, Fundamentals of ASP.net core.

UNIT-IV: Introduction to ADO.NET Fundamentals **9 Hrs**

ADO.NET Fundamentals, Data Binding-Single valued, Multi valued, The Data Controls-Form View, Grid View.

UNIT – V: Introduction to LINQ and Entity Framework. **9 Hrs**

LINQ and the Entity Framework, working with Services, Putting ASP.NET MVC in Context, Your First MVC Application.

MICRO SYLLABUS

UNIT-I: Introduction to .NET Technology

Introduction: Introduction to .NET Framework, components of .net, Features of .NET, versions & phases of .net .NET Framework Architecture.

Unit	Module	Micro content	No of hrs
Introduction to .NET Technology	Introduction	Introduction to .net, Overview of .net, .NET Languages, Intermediate languages, Common language runtime, visual Studio, Features of .net, the .NET class library.	2
	Components of .net	Common Language Runtime, Framework Class Library	2

	Phases in .net	OLE Technology COM Technology .NET Technology	1
	.net version	Different types of .net versions	1
	.net framework Architecture	The basic architecture and a component stack of the .NET framework	1

UNIT-II: Introduction to C#.NET

Introduction to C#.NET, OOPS in C#.NET, Web-based programming, Assemblies, and Namespaces, Streams, Multithreading.

Unit	Module	Micro content	No of hrs
Introduction to C#.NET	Core C#	Variables, datatypes, flow control, loops, operator and casts, arrays & collections.	2
	OOPS in C#.NET	Objects, classes, constructors, methods, inheritance, overloading, overriding, static class members, strings.	2
	Window-based programming	Introduction to windows forms application, IDE of Forms, Working with multiple forms & window form controls, Graphics, creating dialogs, user controls & runtime controls	3
	Assemblies, and Namespaces	Differences between DLL and EXE, Types of DLLs, Structure of Assembly, types of assemblies, namespace, access modifiers IN and OUT of Assembly.	2
	Streams	Types of streams, Stream classes, Serialization, and deserialization.	2
	Multithreading	Introduction, types of scheduling, thread states, thread synchronization.	2

UNIT-III: Introduction to ASP.NET and Web programming

Web Form Fundamentals, Web Controls, State Management, Tracing.

Unit	Module	Micro content	No of hrs
Introduction to ASP.NET and Web Programming	Web Form Fundamentals	Understanding the anatomy of an ASP.NET application, Introducing server controls,	2

		taking a deeper Look at HTML control classes, using the page class, and using Application events.	
	Web Controls	Stepping up to web controls, web control classes, List controls, Table controls, Web control events, and AutoPostBack, An interactive web page.	3
	State Management	Understanding the problem of the state, using View State, Transferring information between pages, using cookies, managing session state Configuring session state, and using application state.	3
	Tracing, Session tracking	Enabling Tracing, Writing Trace Information, Performing Application-Level Tracing.	2
	Fundamentals of ASP.net core	Over view of Asp.net Fundamental concepts	2

UNIT-IV: Introduction to ADO.NET Fundamentals

Introduction to ADO.NET Fundamentals, Data Binding, The Data Controls

Unit	Module	Micro content	No of hrs
Introduction to ADO.net	ADO.NET Fundamentals	Understanding databases, configuring your database, Understanding SQL basics, Understanding the data provider model, using direct data Access, using disconnected data access.	3
	Data Binding-Single valued, Multi valued	Introducing data binding, using single valued data binding, using repeated value data binding, working with data source controls.	3
	The Data Controls-Form View, Grid View	The grid view, formatting the grid view, selecting a grid view row, Editing with a grid view row, sorting and paging in grid view, using grid view templates The details view	3

		and form view.	

UNIT-V: Introduction to LINQ and Entity Framework

Introduction to LINQ and the Entity Framework, working with Services, Putting ASP.NET MVC in Context, Your First MVC Application.

Unit	Module	Micro content	No of hrs
Introduction to LINQ and Entity Framework	LINQ and the Entity Framework	Understandin LINQ, LINQ basics, using entity framework, Getting more advanced with entity framework, using the entity data source.	2
	Working with Services	What is WCF Web Service, Application for Creating and Consuming a WCF Web Service?	3
	Putting ASP.NET MVC in Context	Understanding the history of ASP.NET, Key Benefits of ASP.NET MVC.	2
	Your First MVC Application	Preparing Visual Studio, Creating a new ASP.NET MVC Project, Rendering Web Page, Creating a simple Data Entry Application.	2

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III- Year I- Semester	Name of the Course	L	T	P	C
MC3101	**Indian Constitution**	3	0	0	0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution – Sources and constitutional history, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

LEARNING OUTCOMES:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration Governor – Role and Position – CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariate

UNIT-IV

Local Administration – District's Administration Head – Role and Importance, Municipalities - Mayor and role of Elected Representative – CEO of Municipal Corporation Panchayati: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level

Organizational Hierarchy – (Different departments), Village level – Role of Elected and Appointed officials – Importance of grass root democracy

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zilla panchayat block level 189rganization

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

LEARNING OUTCOMES: -After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt.Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Course Outcomes:

CO-1	Know the sources, features and principles of Indian Constitution.
CO-2	Learn about Union Government, State government and its administration.
CO-3	Get acquainted with Local administration and Pachayati Raj.
CO-4	Be aware of basic concepts and developments of Human Rights.
CO-5	Gain knowledge on roles and functioning of Election Commission

CO-PO Matrix:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	3			3		2	3	-	3	2
CO2	2	-	2			2		2	2	-	3	2
CO3	3	-	3			2		2	2	-	3	3
CO4	2	-	3			2		2	2	-	3	3
CO5	3	-	1			3		3	3	-	3	2

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III-Year II- Semester	Name of the Course	L	T	P	C
HS3101	Engineering Economics and Management	**3**	**0**	**0**	**3**

Course objectives: The student should be able to

CO 1: To understand the concept and nature of Economics and Demand and to familiarize about the Production function, Input Output relationship, Cost-Output relationship and Break Even Analysis.

CO 2: To understand the nature of markets and the concepts of Money and RBI functions.

CO 3: To familiarize with the process of management, principles, and to provide conceptual knowledge on functional management that is on Human resource management and Marketing management.

CO 4: To learn different Accounting Systems, preparation of Financial Statement and to familiarize with the tools of project Management.

CO 5: To understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT -I Introduction to Economics and Theory of Production 13 Hrs

Introduction to Economics; Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics –Concept of Demand, Types of Demand, Determinants of Demand-Law of Demand -Elasticity of Demand, Types of Elasticity of Demand. Theory of production; production function, Law of variable proportions & law of returns to scale, Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, simple problems.

UNIT -II Introduction to Markets and Money 12 Hrs

Markets: meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly). National Income, GNP, GDP, NNP, NDP, Personal income and GST (Goods & Service Tax).

Money: meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools, Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR.

UNIT -III Introduction to Management 12 Hrs

Concept –nature and importance of Management Functions of Management, Principles of Management.

Human Resource Management: Meaning and difference between Personnel Management and Human Resource Management, Functions of Human Resource Management.

Marketing Management: Functions of Marketing - Marketing strategies based on product Life Cycle, Channels of distributions.

UNIT -IV Introduction to Accounting & Project Management **15 Hrs**

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements.

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path (Simple Problems).

UNIT -V Capital and Capital Budgeting **12 Hrs**

Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index).

Content Beyond the syllabus:

Introduction to Managerial Economics and demand Analysis: Managerial Economics, Nature & Scope, Demand fore casting Concept of supply**.**

Theory of Production and Cost Analysis: Production Process, Types of production, ISO- Quants, ISO Costs.

Introduction to Markets: Price Output determination, Pricing Methods.

Introduction to Management: Evolution of Management thought, theories of Motivation, Leadership styles.

Project Management: Brief about Project crashing

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Estimate the Demand and demand elasticity's for a product and Input-Output-Cost relationships.
CO2	Understand the nature of different markets and also to have the knowledge of Money & Banking.
CO3	Acquire the knowledge on management, HRM and Marketing.
CO4	Acquire the knowledge to prepare Financial Statements and the techniques of project management.
CO5	Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Learning Resources

Text books:

1. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2018, 2e.
2. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2012.
3. Management Science, Aryasri, Tata McGraw Hill, 2014.
4. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Introduction to *Management Science'* Cengage, Delhi, 2012.
5. Engineering Economy and Management 1 Edition Pravin Kumar – Wiley Publication.
6. Engineering Economics & Management- Dr. Vilas Kulkarni & HardikBavishi - Vikas Publishing.

Reference books:

1. R. L Varshney, K.L. Maheshwari : Managerial Economics, Sultan Chand&Sons 2014,22e.
2. Suma Damodaran : Managerial Economics, Oxford 2010,2e.
3. Ambrish Gupta: 'Financial Accounting for Management', Pearson 2015,5e.
4. Dr. S.N. Maheswari: Financial Accounting, Vikas Publications 2018.
5. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2017.
6. Principles of Marketing: A South Asian Perspective, Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan ul Haque , 17th Edition, Pearson Education/ Prentice Hall of India, 2018.
7. Human Resource Management: Gary Dessler, 14th Edition, pearson 2015.
8. Project Planning and Control with PERT and CPM: Dr. B. C. Punmia, K. K Khandelwal, Laxmi Publication, 2017, 4th Edition.

e- Resources & other digital material

1. **www.managementstudyguide.com**
2. **www.tutorialspoint.com**
3. **www.lecturenotes.in**

Micro-Syllabus

UNIT – I Introduction to Economics and Theory of Production **13 Hrs**

Introduction to Economics; Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics –Concept of Demand, Types of Demand, Determinants of Demand-Law of Demand -Elasticity of Demand, Types of Elasticity of Demand.

Theory of production; production function, Law of variable proportions & law of returns to

scale, Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, simple problems.		
Unit	**Module**	**Micro Content**
Unit I	Concept of Economics	Economics, Definitions of Economics
		Micro economics, Macro economics
		Scope of Micro & Macro Economics
		Difference Between Micro & Macro Economics
		Meaning & Definitions of Managerial Economics
	Basic Economic tools of Managerial economics	Opportunity cost Principle
	Concept of Demand	What is Demand, Demand Analysis & Objectives
	Types of Demand	Demand distinctions, Demand function
		Factors determining demand
	Demand Schedule	Individual demand schedule, Market demand schedule
	Demand Curve	Individual demand curve, Market demand curve
	Law of Demand	Assumption of law of demand, Change in demand, Exceptions of law of demand, why does demand curve slope downwards.
	Elasticity of Demand, Types of Elasticity of Demand & Measurement	Meaning of elasticity of demand, types of Price and income elasticity of demand, factors effecting elasticity of demand, measurements of elasticity of demand, significance of elasticity of demand
	Theory of Production	Production function, Production process, importance of production, assumptions
	Laws of Returns to scale	Schedule and graph
	Cost Analysis	Types of costs, cost & output relationship in short run and long run
	Break even Analysis	Uses, limitations of Break even analysis, Key terminology in Break analysis, Simple problems on BEP, graphical representation of Break even analysis.
UNIT - II Introduction to Markets and Money: 12 Hrs Markets: meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly).National Income, GNP, GDP, NNP, NDP, Personal income and GST (Goods & Service Tax). Money: meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy- meaning, objectives, tools, Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR.		
Unit II	Market Structures	Meaning, definitions, types of market
	Perfect Competition	Features
	Monopoly	Features

	Monopolistic competition	Features
	Oligopoly	features
	Macro Economics	National income, ,GNP, GDP, NNP, NDP, Personal Income and GST
	Money	Functions, types
		Monetary Policy
		Fiscal Policy
	Banking	Types, Functions
	RBI	Concept and functions
	Bank Rates	CRR, bank rate, repo rate, reverse repo rate, SLR
UNIT – III Introduction to Management: 12 Hrs Concept –nature and importance of Management Functions of Management, Principles of Management. Human Resource Management: Meaning and difference between Personnel Management and Human Resource Management, Functions of Human Resource Management. Marketing Management: Functions of Marketing - Marketing strategies based on product Life Cycle, Channels of distributions.		
Unit III	Management	Concepts, functions, Principles
	HRM	Concepts of HRM, Personnel Management
		Diff B/w HRM & PM
		Function of HRM
	Marketing Management	Concepts of Marketing
		Functions of Marketing
		Product Life Cycle
		Marketing strategies based on product Life Cycle
		Channels of distributions.
UNIT – IV Introduction to Accounting & Project Management 15 Hrs Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements. Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path (Simple Problems).		
Unit IV	Financial Accounting	Meaning, definitions, objectives & significance, users of accounting, accounting cycle, GAAP.
	Book Keeping	Single and double entry book keeping, types of Accounting
	Journal	Features, Pro-forma, Advantages & Limitations, preparation of journal entries, simple problems
	ledger	Features, Pro-forma, Advantages & Limitations, preparation of ledger, simple

		problems.
	Trial Balance	Features, Pro-forma, Advantages & Limitations, preparation of Trial balance, simple problems.
	Final accounts	Trading account- Pro-forma, Simple problems
		Profit & Loss account- Pro-forma, Simple problems
		Preparation of balance sheet with simple adjustments
	Project Management	Net work Analysis –Simple Problems
		PERT – Simple Problems
		CPM – Simple Problems
		Diff B/w PERT & CPM
UNIT - V Capital and Capital Budgeting **12 Hrs** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index).		
Unit V	Capital	What is capital, need of capital types of capital
		Types of fixed capital, types of working capital
	Capital Budgeting	Meaning, Nature & scope of capital budgeting
		Capital budgeting procedure, capital budgeting decisions, method of capital budgeting.
	Payback period	Meaning, formula, advantages & disadvantages, simple problems
	Accounting rate of return(ARR)	Meaning, formula, advantages & disadvantages, simple problems
	Net present value (NPV)	Meaning, formula, advantages & disadvantages, simple problems
	Profitability index (PI)	Meaning, formula, advantages & disadvantages, simple problems
	Internal rate of return (IRR)	Meaning, formula, advantages & disadvantages, simple problems

Course Outcomes: Upon successful completion of the course, the student will be able to

CO1	1. The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product and Input-Output-Cost relationships.
CO2	2. The Learner is also ready to understand the nature of different markets and also to

	have the knowledge of Money & Banking.
CO3	3. The Learner will acquire the knowledge on management, HRM and Marketing.
CO4	4. The Learner will acquire the knowledge to prepare Financial Statements and the techniques of project management.
CO5	5. The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Text books:

1. Engineering Economy and Management 1 Edition Pravin Kumar – Wiley Publication.
2. Engineering Economics & Management- Dr. Vilas Kulkarni & HardikBavishi - Vikas Publishing.
3. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005. 2. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2003.
4. S A Siddhiqui&AS Siddhiqui , Managerial Economics and Financial Analysis, New Age international publishers 2013.
5. M. Kasi Reddy &Saraswathi, Managerial Economics and Financial Analysis ,PHI New Delhi 2012.
6. Principles of Management by Tripathy and Reddy.

Reference books:

1. Management Fundamentals - Concepts, Application, Skill Development - RobersLusier - Thomson
2. Basics of Engineering Economy, Leland Blank & Anthony Tarquin, McGraw Hill Publication (India) Private Limited
3. Engineering Economics, R.Paneerselvam, PHI publication
4. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
5. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
6. Modern Economic Theory, By Dr. K. K. Dewett& M. H. Navalur, S. Chand Publications
7. Koontz &Weihrich: 'Essentials *of management'* TMH 2011
8. Philip Kotler& Armstrong: Principles of Marketing, Pearson publications
9. BiswajitPatnaik: Human Resource Management, PHI, 2011

10. Anil Bhat&Arya Kumar: Principles of Management, Oxford University Press, New Delhi, 2015.

CO-PO mapping Table with Justification

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO 1	1	1	-	-	-	-	1	-	1	1	2	-
CO 2	1	2	-	-	-	1	1	-	1	-	2	-
CO 3	-	-	-	-	-	1	1	1	1	1	2	-
CO 4	1	2	-	3	-	-	1	-	1	2	2	-
CO 5	1	2	-	3	-	-	1	1	1	2	2	-

CO/PSO	**PSO 1**	**PSO 2**
CO1	-	**1**
CO2	-	**1**
CO3	-	**1**
CO4	-	**1**
CO5	-	**1**

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III-Year II- Semester	Name of the Course	L	T	P	C
PC3201	Design and Analysis of Algorithms	**3**	**0**	**0**	**3**
Prerequisites: Basic Mathematics, Data Structures and Basic Programming					

Course Objectives:

1. To provide an introduction to formalisms to understand, analyse and denote time complexities of algorithms
2. To introduce the different algorithmic approaches for problem solving through numerous example problems
3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

UNIT-I: **9 Hrs**

Introduction: Algorithm Definition, Algorithm Specification, Performance Analysis, Performance Measurement, Asymptotic notations.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort.

UNIT-II: **10 Hrs**

The Greedy Method: The General Method, Knapsack Problem, Single Source Shortest Path Problem, Optimal Storage on Tapes Problem, Optimal Merge Patterns Problem.

UNIT– III: **12 Hrs**

Dynamic Programming: The General Method, 0/1 Knapsack Problem, Single Source Shortest Path – General Weights, All Pairs-Shortest Paths Problem, Traveling Salesperson Problem, String Editing Problem.

UNIT-IV: **10 Hrs**

Backtracking: The General Method, The N-Queens Problem, Sum of Subsets Problem, Graph Colouring Problem, Hamiltonian Cycles Problem.

UNIT – V: **10 Hrs**

Branch and Bound: The General Method, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack Problem, Travelling Salesperson Problem.

NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem.

Textbooks:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press

Reference Book:

1. Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

Web Resources:

1. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
2. https://www.javatpoint.com/daa-tutorial

3. https://nptel.ac.in/courses/106106131
4. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm

Course Outcomes: At the end of the course student will be able to:

CO1: Infer the divide-and-conquer paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

CO2: Infer the greedy paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.

CO3: Infer the dynamic-programming paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.

CO4: Infer the backtracking paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.

CO5: Infer the branch and bound paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.

CO-PO-PSO Mapping Matrix:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO -1	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO -2	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO -3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO -4	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO -5	3	3	3	2	-	-	-	-	-	-	-	-	3	1

MICRO SYLLABUS

UNIT-I:

Introduction: Algorithm Definition, Algorithm Specification, Performance Analysis, Performance Measurement, Asymptotic notations.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort.

Unit	Module	Micro content	No of hrs
I	Algorithm Analysis	Definition of Algorithm, Properties of algorithm	1
		Algorithm Specification – Pseudo code Conventions	1
		Performance Analysis – time and space complexity	1
		Performance Measurement – step count and frequency count	1
		Asymptotic Notations – Big Oh, Omega, Theta	1
	Divide and conquer	General Method	1
		Binary Search – Procedure, Example, Algorithm and Computing Time Complexity	1
		Finding the Maximum and Minimum - Procedure, Example, Algorithm and Computing Time Complexity	1
		Quick Sort - Procedure, Example, Algorithm and Computing Time Complexity	1

UNIT-II:

The Greedy Method: The General Method, Knapsack Problem, Optimal Storage on Tapes Problem, Single Source Shortest Path Problem, Optimal Merge Patterns Problem.

Unit	Module	Micro content	No of hrs
II	The Greedy Method	General Method	1
		Knapsack Problem - Description, Example, Algorithm.	2
		Single Source Shortest Path Problem - Description, Example, Algorithm.	2
		Optimal Storage on Tapes Problem - Description, Example, Algorithm.	3
		Optimal Merge Patterns Problem - Description, Example, Algorithm.	2

UNIT-III:

Dynamic Programming: The General Method, 0/1 Knapsack Problem, Traveling Salesperson Problem, All Pairs-Shortest Paths Problem, Traveling Salesperson Problem, String Editing Problem.

Unit	Module	Micro content	No of hrs
III	Dynamic Programming	The General Method	1
		0/1 Knapsack Problem - Description, Example.	2
		Single Source Shortest Path – General Weights - Description, Example.	2

		All Pairs-Shortest Paths Problem - Description, Example.	2
		Travelling Salesperson Problem - Description, Example.	2
		String Editing Problem - Description, Example.	3

UNIT-IV:

Backtracking: The General Method, The N-Queens Problem, Sum of Subsets Problem, Graph Colouring Problem, Hamiltonian cycles Problem.

Unit	Module	Micro content	No of hrs
IV	**Backtracking**	The General Method	1
		The N-Queens Problem - Description, State Space Tree, Algorithm.	2
		Sum of Subsets Problem - Description, Example, State Space Tree, Algorithm	2
		Graph Colouring Problem - Description, Example, State Space Tree, Algorithm.	3
		Hamiltonian Cycles Problem - Description, Example, State Space Tree, Algorithm.	2

UNIT-V:

Branch and Bound: The General Method, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack Problem, Traveling Salesperson Problem. NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem.

Unit	Module	Micro content	No of hrs
V	Branch and bound	The General Method	1
		FIFO Branch and Bound	1
		LC Branch and Bound	2
		0/1 Knapsack Problem - Description, Example	2
		Traveling Salesperson Problem - Description, Example	2
	NP-Hard and NP Complete problems	Basics Concepts	1
		Cook's Theorem	1

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III-Year II- Semester	Name of the Course	L	T	P	C
PC3202	Cryptography and Network Security	**3**	**0**	**0**	**3**
Prerequisites: Computer Networks, MFCS					

Course Objectives:

1.To understand and classify various security attacks, services mechanisms and classical cryptographic techniques
2.To analyse the design principles of block ciphers and their implementation.
3.To compute and analyse asymmetric key cryptographic algorithms
4.To evaluate Authentication, Hash Codes and verify the digital signatures
5.To impart the knowledge on Network security concepts.

UNIT-I: Introduction to Cryptography and Network Security 12 Hrs

Introduction: Security attacks, services & mechanisms, Network Security Model, Symmetric Cipher Model, Mathematics of Cryptography, Substitution Ciphers, Transposition Ciphers Techniques, Steganography.

UNIT-II: Symmetric Key Cryptography 12 Hrs

Mathematics of Symmetric Key Cryptography, Modern Block Ciphers, Modes of Block Ciphers, Design Principles of Block Ciphers, Feistel Cipher, Data Encryption Standard, Double DES, Triple DES, International Data Encryption Algorithm, CAST-128, Blowfish, Advanced Encryption Standard

UNIT–III: Asymmetric (Public) Key Cryptography 10 Hrs

Mathematics of Asymmetric Key Cryptography: Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Primitive Roots, Discrete Logarithms, Principles of Public Key Cryptosystems, Applications, RSA, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, El-Gammal Key Exchange.

UNIT-IV: Data Integrity, Digital Signatures, Authentication Protocols 10 Hrs

Requirements of Hash Functions and Message Authentication Codes, Hash Algorithms: MD5, SHA-160,256,512, RIPEMD, Properties of Digital Signatures, DSS, Authentication Applications: Kerberos Version4 and Version 5.

UNIT – V: Network Security 14 Hrs

IP Security: IP Security Overview, Architecture, Authentication Header, Encapsulating Security Payload,
Web Security: Overview, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction,
Email Security: Pretty Good Privacy, S/MIME,
System Security: Intruders, Password Management, Viruses and Worms.

Text Books:

1. Cryptography and Network Security Principles and Practices: William Stallings, Pearson Education, 5th Edition
2. Cryptography and Network Security, Behrouz A Forouzan, Tata McGraw Hill, 3rd Edition

Reference Book:

1. Practical Cryptography, Bruce Schneier, Wiley, Deamtech India Pvt Ltd.

Web Resources:

1. https://crypto.stanford.edu/~dabo/courses/OnlineCrypto/
2. https://nptel.ac.in/courses/106105162

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Classify various security attacks, services mechanisms and classical cryptographic techniques

CO2: Analyse the design principles of block ciphers and their implementation.

CO3: Computes and Analyse various Asymmetric Key Cryptographic techniques

CO4: Evaluates Authentication, Hash Codes and verify the digital signatures

CO5: Impart the knowledge on Network security concepts.

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PPO2
CO-1	3	2	2					2			2	2	2	2
CO-2	3	2	2					2			2	2	2	2
CO-3	3	2	2					2			2	2	2	2
CO-4	-	2	2					2			2	2	2	2
CO-5	-	2	2					2			2	2	2	2

MICRO SYLLABUS

UNIT-I: Introduction to Security

Introduction: Security attacks, services & mechanisms, Network Security Model, Symmetric Cipher Model, Substitution Ciphers, Transposition Ciphers Techniques, Mathematics of Cryptography, Introduction to Mathematics of Symmetric Key Cryptography

Unit	Module	Micro content	No of hrs
Introduction to security	Introduction	What is security? Security Mechanisms and Services	2
	Security Attacks	Types of Attacks, Network Security Model	2
	Mathematics of Cryptography	Integer Arithmetic, Modular Arithmetic Operations, Finding GCD using Euclidian Algorithm, Extended Euclidian Algorithm, Linear Diophantine Equations	3
	Substitution Ciphers	Caeser, Brute force Cryptanalysis, Additive, Product, Affine, Playfair, Hill, Polyalphabetic ciphers: Vigenère, Vernam, OneTimePad	3
	Transposition Ciphers	Railfence, Columnar Transposition, Row Transposition, Rotor Machines	2
	Steganography	Types of Steganography	

UNIT-II: Symmetric Key Cryptography

Mathematics of Symmetric Key Cryptography, Modern Block Ciphers, Modes of Block Ciphers, Design Principles of Block Ciphers, Feistel Cipher, Data Encryption Standard, Double DES, Triple DES, International Data Encryption Algorithm, CAST-128, Blowfish, Advanced Encryption Standard

Unit	Module	Micro content	No of hrs
Symmetric Key Cryptography	Mathematics of Symmetric Key Cryptography	Algebraic structures: Groups, Permutation Groups, Finite group, Order of a group, Subgroup, Cyclic Subgroup, Legranges Theorem, Order of an Element, Rings, Fields, Finite Fields, Galois Fields, Arithmetic operations on $GF(2^n)$	6
	Block Ciphers	Design Principles, Modes of Block Ciphers	2
	Modern Cryptographic Algorithms,	DES, Double DES, Triple DES, IDEA, CAST 128, Blowfish, AES	4

UNIT-III: Asymmetric Key Cryptography

Mathematics of Asymmetric Key Cryptography: Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Primitive Roots, Discrete Logarithms, Principles of Public Key Cryptosystems, Applications, RSA, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, El-Gammal Key Exchange.

Unit	Module	Micro content	No of hrs
Asymmetric Key Cryptography	Mathematics of Asymmetric Key Cryptography	Number Theory, Prime Numbers, Fermats , Euler's, Chines Remainder Theorems, Primitive Roots, Discrete Logarithms	5
	Public key Cryptography	Introduction, RSA, Security of RSA, Diffie-Hellman, Elliptic Curve Cryptography, El-Gammal Encryption	5

UNIT-IV: Data Integrity, Digital Signatures and Authentication Protocols

Requirements of Hash Functions and Message Authentication Codes, Hash Algorithms: MD5, SHA-160,256,512, RIPEMD, Properties of Digital Signatures, DSS, Authentication Applications: Kerberos Version4 and Version 5.

Unit	Module	Micro content	No of hrs
Data Integrity, Digital Signatures, Authentication Protocols	Data Integrity	Requirements of Message Authentication Codes, Requirements of Hash Functions, Hash Algorithms: MD5, SHA 160,256,512, RIPEMD	5
	Digital Signatures	Introduction, Properties, Types, Digital Signature Algorithm	3
	Authentication Protocols	Introduction, Kerberos Version 4 and 5	2

UNIT-V: Network Security

IP Security: IP Security Overview, Architecture, Authentication Header, Encapsulating Security Payload,

Web Security: Overview, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction,

Email Security: Pretty Good Privacy, S/MIME,

System Security: Intruders, Password Management, Viruses and Worms.

Unit	Module	Micro content	No of hrs
Network Security	IP Security	Overview, Architecture, Authentication Header, Encapsulating Security Payload Header	4
	Web Security	Overview, Secure Socket Layer, Transport Layer Security, Secure Electronic Transaction	4
	Email Security	Introduction, PGP, S/MIME	3
	System Security	Intruders, Password Management, Viruses and Worms	3

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III-Year II- Semester	Name of the Course	L	T	P	C
OE3201	Machine Learning Open Elective II/Job Oriented Course II	**3**	**0**	**0**	**3**

Course Objectives:

The student should be able to:

1. Recognize the importance and characteristics of machine learning.
2. Apply supervised machine learning techniques for data handling and to gain knowledge from it.
3. Apply advanced supervised machine learning and probabilistic models for classification problems.
4. Apply unsupervised machine learning models to real world problems.
5. Evaluate the performance of algorithms and to provide solution for various real-world applications using ensemble models.

UNIT-I Introduction to Machine Learning **14 Hrs**

Introduction, Components of Learning, Learning Models, Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Designing a Learning System, Types of Learning, Supervised, Unsupervised, Reinforcement, Perspectives and Issues, Version Spaces, PAC Learning, VC Dimension.

UNIT-II Supervised Learning **12 Hrs**

Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Decision Trees: ID3, Classification and Regression Trees (CART), Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.

UNIT-III Advanced Supervised Learning **12 Hrs**

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.

Probabilistic Models

Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks.

UNIT– IV: Unsupervised Learning **11 Hrs**

Introduction to clustering, K-means clustering, K-Mode Clustering, Distance based clustering, Clustering around mediods, Silhouettes, Hierarchical Clustering.

UNIT-V: Ensemble Learning **11 Hrs**

Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: RandomForest Trees, Boosting: Adaboost, Stacking.

Text Books:

1. EthemAlpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014.
2. MehryarMohri, AfshinRostamizadeh, AmeetTalwalkar "Foundations of Machine Learning", MIT Press, 2012

3. Machine Learning: The art and Science of algorithms that make sense of data, Peter Flach, Cambridge University Press, 2012

Reference Books:

1. Chris Albon : Machine Learning with Python Cookbook , O'Reilly Media, Inc.2018.
2. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997.
3. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", 2nd Edition, CRC Press, 2015.
4. Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012 Jiawei Han and MichelineKambers and Jian Pei, "Data Mining –Concepts and Techniques", 3rd Edition,Morgan Kaufman Publications, 2012.
5. Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, "Mathematics for Machine Learning", Cambridge University Press, 2019.

E- Resources & Other Digital Material:

1. Kevin Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012, https://www.cs.ubc.ca/~murphyk/MLbook/pml-intro-5nov11.pdf.
2. Professor S. Sarkar , IIT Kharagpur "Introduction to machine learning", https://www.youtube.com/playlist?list=PLYihddLFCgYuWNL55Wg8ALkm6u8U7gps.
3. Professor Carl Gustaf Jansson, KTH, Video Course on Machine Learning https://nptel.ac.in/noc/individual_course.php?id=noc19-cs35.
4. Tom Mitchell, "Machine Learning", http://www.cs.cmu.edu/~tom/10701_sp11/lectures.shtml

Course Outcomes: Upon successful completion of the course, the student will be able to

CO1	**Recognize** the characteristics of machine learning. **{Understand level, KL2} {Analyze level, KL4}**
CO2	Apply various supervised learning methods to appropriate problems. **{Understand level, KL2} {Apply level, KL3}**
CO3	**Identify** and integrate more than one technique to enhance the performance of learning and **Create** probabilistic models for handling unknown pattern. **{Understand level, KL2} {Apply level, KL3} {Evaluate level, KL5}**
CO4	**Apply** unsupervised learning models e.g. clustering algorithms to handle the unknown labeled data. **{Apply level, KL3} {Analyze level, KL4}**
CO5	**Apply** Ensemble models to any real-world problem to **Analyze** its performance effectively. **{Apply level, KL3} {Analyze level, KL4} {Evaluate level, KL5}**

Mapping Matrix:

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO 1	2	1	1	1	2	---	---	---	---	---	---	---	2	2
CO	3	2	2	2	3	---	---	---	---	---	---	---	3	3

2														
CO 3	3	2	2	2	3	---	---	---	---	---	---	---	3	3
CO 4	3	2	2	2	3	---	---	---	---	---	---	---	3	3
CO 5	3	2	2	2	3	---	---	---	---	---	---	---	3	3

MICRO SYLLABUS

UNIT-I Introduction to Machine Learning **14 Hrs**

Introduction, Components of Learning, Learning Models, Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Designing a Learning System, Types of Learning, Supervised, Unsupervised, Reinforcement, Perspectives and Issues, Version Spaces, PAC Learning, VC Dimension.

Unit	Module	Micro Content	No. of Hrs
Introduction to Machine Learning	**Introduction to Machine Learning**	Introduction, Components of Learning, Learning Models, Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Designing a Learning System, Types of Learning, Supervised, Unsupervised, Reinforcement, Perspectives and Issues, Version Spaces, PAC Learning, VC Dimension.	14

UNIT-II Supervised Learning **12 Hrs**

Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Decision Trees: ID3, Classification and Regression Trees (CART), Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.

Unit	Module	Micro Content	No. of Hrs
Supervised Learning	**Supervised Learning**	Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Decision Trees: ID3, Classification and Regression Trees (CART), Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.	12

UNIT-III Advanced Supervised Learning **12 Hrs**

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.

Probabilistic Models

Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks.

Unit	Module	Micro Content	No. of Hrs
Advanced Supervised Learning & Probabilistic Models	**Advanced Supervised Learning**	Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.	7
	Probabilistic Models	Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks	5

UNIT– IV: Unsupervised Learning **11 Hrs**

Introduction to clustering, K-means clustering, K-Mode Clustering, Distance based clustering, Clustering around mediods, Silhouettes, Hierarchical Clustering.

Unit	Module	Micro Content	No. of Hrs
Unsupervised Learning	**Unsupervised Learning**	Introduction to clustering, K-means clustering, K-Mode Clustering, Distance based clustering, Clustering around mediods, Silhouettes, Hierarchical Clustering.	11

UNIT-V: Ensemble Learning **11 Hrs**

Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking.

Unit	Module	Micro Content	No. of Hrs
Ensemble Learning	**Ensemble Learning**	Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: RandomForest Trees, Boosting: Adaboost, Stacking.	11

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III-Year II- Semester	Name of the Course	L	T	P	C
PC3201L	Design and Analysis of Algorithms Lab	**0**	**0**	**3**	**1.5**
Prerequisites: C Programming, Data Structures					

Course objectives:
The main objectives are

1. To learn fundamental algorithmic problems.
2. To understand methods of designing and analyzing algorithms.

List of Programs

1. Write a program to find the maximum and minimum element from the collection of elements using divide and conquer technique.
2. Write a program to find the optimal profit of a Knapsack using Greedy method.
3. Write a program for Optimal Merge Patterns problem using Greedy Method.
4. Write a program for Single Source Shortest Path for General Weights using Dynamic Programming.
5. Write a program to find all pair shortest path from any node to any other node within a graph.
6. Write a program to find the non-attacking positions of Queens in the chess board using backtracking.
7. Find a subset of a given set S = {S_1, S_2, ..., S_n} of n positive integers, whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9, there are two solutions {1, 2, 6} and {1, 8}. A suitable message is to be displayed if the given problem instance doesn't have a solution.
8. Write a program to colour the nodes in the given graph such that no two adjacent can have the same colour using backtracking.
9. Design and implement to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using Backtracking principle.

Course Outcomes: At the end of the course student will be able to:

CO1: Identify and apply the suitable algorithm for the given problem.
CO2: Design and implement efficient algorithms for a specified application.

CO-PO mapping Matrix:

	PO -1	**PO -2**	**PO -3**	**PO -4**	**PO -5**	**PO -6**	**PO -7**	**PO -8**	**PO -9**	**PO -10**	**PO -11**	**PO -12**	**PSO -1**	**PSO -2**
CO -1	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**
CO -2	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**

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III-Year II- Semester	Name of the Course	L	T	P	C
PC3202L	Artificial Intelligence and Machine Learning Lab	**0**	**0**	**3**	**1.5**
Prerequisites: Python Programming					

Course objectives:

1. Understand various AI problem solving techniques
2. Understand various machine learning techniques
3. To work with machine learning tools

List of Programs

1. Write a program to solve travelling salesman problem.
2. Implement A* Search algorithm.
3. Implement AO* Search algorithm.
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
6. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement the k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw gr

Course Outcomes: Upon successful completion of the course, the student will be able to

CO-1	Applying the problem-solving techniques of AI
CO-2	Understand and implement the procedures for machine learning algorithms
CO-3	Design Python programs for various machine learning algorithms
CO-4	Apply appropriate datasets to the Machine Learning algorithms
CO-5	Analyze the graphical outcomes of learning algorithms with specific datasets

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**	**PSO 1**	**PSO2**
CO-1	2	1										2		2
CO-2		2	2		3									1
CO-3		2												
CO-4												2	1	
CO-5	1	2			3								1	

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III-Year II- Semester	Name of the Course	L	T	P	C
PC3202L	Cryptography Lab	0	0	3	1.5

Course objectives:

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize symmetric and asymmetric cryptography

List of Programs

1. Breaking the Shift Cipher
2. Breaking the Mono-alphabetic Substitution Cipher
3. One-Time Pad and Perfect Secrecy
4. Message Authentication Codes
5. Cryptographic Hash Functions and Applications
6. Symmetric Key Encryption Standards (DES)
7. Symmetric Key Encryption Standards (AES)
8. Diffie-Hellman Key Establishment
9. Public-Key Cryptosystems (PKCSv1.5)
10. Digital Signatures

Course Outcomes: Upon successful completion of the course, the student will be able to

CO-1	Identify basic security attacks and services
CO-2	Use symmetric and asymmetric key algorithms for cryptography
CO-3	Make use of Authentication functions

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO 1	PSO2
CO-1	2	1										2		2
CO-2		2	2		3									1
CO-3		2												

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III-Year II- Semester	Name of the Course	L	T	P	C
SAC3201	Soft Skills	**0**	**0**	**4**	**2**

Soft Skills amount to talents for adaptive and optimistic behavior that alter humans to deal effectively with the stress and challenges of life. This notion is additionally termed as psychosocial proficiency. The subject varies greatly reckoning on social norms and community expectations however skills that operate for well-being and aid people to change into active and productive members of their communities' square measure thought-about as Soft Skills.

They exemplify innovativeness, significant thinking, problem-solving, decision-making, the supremacy to speak-up and team-up, in aggregation with personal and social responsibility that contribute to sensible citizenship – all essential skills for achievement within the twenty first century, each for healthy societies and for employable people.

The course of soft skills is introduced to boost the standard of learning and living by complementing scholastic records with skill-based coaching. Realizing that the dual purpose of education i.e. is to foster educational excellence among students and additionally guide them to transform themselves into responsible people and professionals.

Soft Skills are a unit, a crucial facet of having the ability to fulfill the strain of daily & professional lives in a very unendingly dynamical world. The big changes in international economies over the last 5 years have coincided with technological transformations, all of that area unit leaving an impression on education, the geographic point, and our personal lives. Students need dynamically guided soft skills and hands on exposure, like the power to face / tackle stress and frustration, to address the growing pace and alter recent life. Over the course of their careers, today's engineering aspirants can have various new professions, each one with its own set of constraints and necessities, with flexibility & adaptability in demand of learn ability.

Objectives:

By the end of the program students will be able to:

- communicate clearly, confidently, concisely, and persuasively both written as well as orally.
- rediscover and boost self-confidence, to the zenith, and solve issues with ease.
- recognize the results (change) of their behavior / conduct and teach them to take ownership of their acts rather than blaming others.

- build confidence in their speaking / presentation skills and become industry-ready.
- develop a stronger sense of consciousness and appreciation for others by analyzing prospects, and creating choices.
- manage self-competence and self-confidence.

Preamble: Soft skills are character traits and interpersonal skills that portray a person's relationships with other people. In the workplace, soft skills are considered to be a balance to hard skills, which refer to a person's knowledge and professional skills.

Prerequisite: None

Course Outcomes: After completion of the course the students will be able to:

CO 1	master advanced nuances of both written and oral communication skills that are imperative for any professional to succeed coupled with being emphatic.
CO 2	confidently ace different competitive exams and develop writing skills.
CO 3	gain awareness of the industry expectations and craft CV / Résumé in lieu with desired job profiles.
CO 4	crack behavioral (HR) interview confidently and exhibit professional persona.
CO 5	make presentations effective and develop interview strategies while get rid of interview phobia.

UNIT 1 Effective communication skills

- ✓ Start with self and connect with others.
- ✓ The art of narrating and storytelling.
- ✓ Enhance teamwork and influence change.

UNIT 2 Advanced verbal ability concepts – practice and Professional writing skills

- ✓ Nurture and enhance the verbal ability strength through practice.
- ✓ Conducting mock verbal (ability) tests and their timely review.
- ✓ List the steps of writing an email effectively & comprehend the importance of structuring an email.
- ✓ Overview of various elements related to accuracy, brevity and correctness in our everyday writing at the workplace (Project proposals / covering letters / blogs / short essays).

UNIT 3 Industry sneak and résumé / CV building strategies

- ✓ Industry & aspirant career expectations and tailoring action learning plan aptly.
- ✓ Crafting winning résumé(s) suiting to different profiles.
- ✓ Framing responses to résumé based interview questions.

UNIT 4 Behavioral competency building – Part II and psychometric test (HR Round Preparation)

- ✓ Listing personal characteristics and preparing blueprint to inculcate them.
- ✓ Assess the students' ability to fit into a specific work environment or with specific personality types.
- ✓ Determine basic characteristics of an individual.

UNIT 5 Presentation skills & Mock interviews

- ✓ Illustration of presentation structure via impromptu / free speech – and essential criteria for an effective presentation
- ✓ Importance of non-verbal communication (signposting)
- ✓ Inciting the interview process by practicing a gamut of behavioral mock interviews.

UNIT 1 –Tasks

- ✓ Listening & comprehension skills – lessons from the corporate training videos / scenes in films.
- ✓ Role play – story telling & anchoring
- ✓ Extempore – students' experience with college/program.
- ✓ Listening & comprehension skills – lessons from the corporate training videos / scenes in films

UNIT 2 -Tasks

- ✓ Story paraphrasing, peer introduction and monologue.
- ✓ Assignment on short essay and blog building/digital profile creation.

UNIT 3 -Tasks

- ✓ Overview & analysis of a Job Description(JD) and its reflection in resume / self introduction
- ✓ Crafting of resumes by mapping skills & competences to different profiles offered for engineering graduates.
- ✓ An act on – one day in the life of an HR manager/ Project leader etc.

UNIT 4 -Tasks

- ✓ Case scenarios –to identify behavioral competencies and personality traits
- ✓ increase self-awareness and improve interactions with others

UNIT 5 -Tasks

- ✓ Pair & Group work –debating / demonstration of product promotion, etc.
- ✓ Peer mock interview practice on selected profiles.

Reference Books

1. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, PearsonEducation; 1 edition, 2013.
2. Barun K. Mitra, “Personality Development & Soft Skills”, Oxford Publishers, Third impression,2017.
3. ICT Academy of Kerala, "Life Skills for Engineers", McGraw Hill Education (India) Private Ltd.,2016.
4. Caruso, D. R. and Salovey P, “The Emotionally Intelligent Manager: How to Develop and Usethe Four Key Emotional Skills of Leadership”, John Wiley & Sons, 2004.
5. Kalyana, “Soft Skill for Managers”; First Edition; Wiley Publishing Ltd, 2015.
6. Larry James, “The First Book of Life Skills”; First Edition, Embassy Books, 2016.
7. Shalini Verma, “Development of Life Skills and Professional Practice”; First Edition; Sultan Chand (G/L) & Company, 2014.
8. Daniel Goleman, "Emotional Intelligence"; Bantam, 2006.
9. Remesh S., Vishnu R.G., "Life Skills for Engineers", Ridhima Publications, First Edition, 2016.
10. Butterfield Jeff, “Soft Skills for Everyone”, Cengage Learning India Pvt. Ltd; 1 edition, 2011.
11. Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6th Edition, 2015.

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1. Infosys Springboard (https://infyspringboard.uk.onwingspan.com/web/en/login)
2. AICTE Digital Learning Portal (https://free.aicte-india.org/)
3. APSCHE LMS – Bringing Learning to People (https://apschelms.e-pragati.in/#/)
4. Dale Carnegie Academy (https://www.dalecarnegie.com/en)
5. TedX Program (https://www.ted.com/about/programs-initiatives/tedx-program)
6. Toast Masters International (https://www.toastmasters.org/)
7. NPTEL (https://nptel.ac.in/)
8. Coursera / Udemy / Unacademy / Wikipedia (https://en.wikipedia.org/wiki/Main_Page)

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III-Year II- Semester	Name of the Course	L	T	P	C
MC3201	Entrepreneurship Skill Development	3	0	0	3

Course Objective:

1. To impart the basic knowledge of entrepreneurship skills for better understanding of entrepreneurial scenario.
2. To understand the knowledge of theories of entrepreneurship and to motivate students to become entrepreneur.
3. To identify opportunities in starting own ventures.
4. To understand and plan business model for a start up.
5. To analyze the role of government and non government institutions in supporting entrepreneurial activities.

Course Outcomes: After completion of the course, students will be able to

CO1: The basics of entrepreneurship skills for better understanding of entrepreneurial scenario are understood.
CO2: Apply Knowledge of theories of entrepreneurship and to identify entrepreneurial opportunities for women.
CO3: identify opportunities supporting entrepreneurship.
CO4: analyze the milestones and related challenges in developing new venture.
CO5: Understand government role supporting entrepreneurship.

Unit 1
Foundation of Entrepreneurship 10 hrs

Concept and Need of Entrepreneurship, Characteristics and types of Entrepreneurship, Charm of becoming Entrepreneur, Entrepreneurial decision process, Entrepreneurship as a career, Entrepreneurship as style of management, Changing role of Entrepreneur, Entrepreneurial traits, factors effecting Entrepreneur.

Unit 2
Theories of Entrepreneurship and Entrepreneurial motivation 12 Hrs

Influences of Entrepreneurship development, external Influences of Entrepreneurship development, Socio – cultural, political and economical, personal entrepreneurial success and failure, reason and remedies, women entrepreneurs, challenges and achievements of women entrepreneurs. Meaning of Entrepreneurial motivation, motivation cycle or process, theories of Entrepreneurial motivation, Entrepreneurial motivational factors, changes in Entrepreneurial motivation.

Unit 3
Opportunities Identification and Selection 10 Hrs

Need for opportunities identification and selection, Environmental Dynamics and Changes, Business Opportunities in various sectors, Identification of Business opportunities, and Opportunity selection.

Unit 4
Business Planning Process 10 Hrs

The business plan as an entrepreneurial tool, Elements of business planning, Objectives, Market analysis, Development of product/idea, Marketing, Finance, organization and management, Ownership, Critical risk contingencies of the proposal, Scheduling and milestones.

Unit 5
Entrepreneurial Development and Government 10 Hrs

Role of Central Government and State Government in promoting entrepreneurship with various incentives, subsidies, grants, programmed schemes and challenges, Government initiatives and inclusive entrepreneurial growth.

TEXT BOOKS:

1. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.
2. P.Narayana Reddy, Entreprenurship, Cengage Learning, New Delhi,2010.
3. Steven Fisher, Ja-nae Duane, The startup equation – A visual guide book for building your startup, Indian edition, McGraw Hill Education India Pvt. Ltd. 2016.
4. Arya Kumar: "Entrepreneurship", Pearson, Publishing House, New Delhi, 2012.
5. VSP Rao, Kuratko: "Entrepreneurship', Cengage Learning, New Delhi, 2011.
6. K.Ramachandran: "Entrepreneurship Development", TMH, New Delhi, 2012.
7. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 2009.
8. Dollinger: Entrepreneurship, Pearson, 2009.

REFERENCE BOOKS:

1. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
2. Entrepreneurship, a South – Asian Perspective, D.F. Kuratko and T. V. Rao, 3e, Cengage, 2012.
3. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.
4. AnajanRai Chaudhuri, Managing new ventures, concepts and cases, Prentice Hall International, 2010.
5. Rajeev Roy: Entrepreneurship, Oxford university press, New Delhi, 2010.

Web Resources:

1. https://nptel.ac.in/courses/110105067/50
2. http://www.yourarticlelibrary.com/project-management/5-methods-of-project-appraisalexplained/40771
3. https://springhouse.in/government-schemes-every-entrepreneur/
4. http://nptel.ac.in/courses
5. https://www.tutorialspoint.com/
6. https://www.ediindia.org/
7. http://www.quickmba.com/entre/

IV-Year I- Semester	Name of the Course	L	T	P	C
HS4101	Universal Human Values -II Understanding Harmony	3	0	0	3

COURSE OBJECTIVES:

The objective of the course is fourfold:

1. To Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. To Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. To Strengthening of self-reflection.
4. To Development of commitment and courage to act.

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 8Hrs

Purpose and motivation for the course, recapitulation from Universal Human Values-I
Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself! 8Hrs

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT 3: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP 8HRS

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT 4: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE 8HRS

Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics 8Hrs

Natural acceptance of human values. Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad

COURSE OUTCOMES By the end of the course,

CO1: Understand and analyse the essentials of human values and skills, self exploration, happiness and prosperity.

CO2: Evaluate coexistence of the "I" with the body.

CO3: Identify and evaluate the role of harmony in family, society and universal order.

CO4: Understand and associate the holistic perception of harmony at all levels of existence.

CO5: Develop appropriate technologies and management patterns to create harmony in professional and personal lives.

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								3				1
CO2							1					
CO3						2	1					
CO4						2	2					1
CO5						2	2	3				1

MICRO SYLLABUS

UNIT-I:

Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

Unit	Module	Micro content	No of hrs
Need,BasicGuidelines/, Content and Process for ValueEducation	Introduction	Universal Human values-I Self-exploration Natural Acceptance Experiential validation Right Understanding Relationship and physical facility	8

UNIT-II:

Understanding Harmony in the Human Being - Harmony in Myself!

Unit	Module	Micro content	No of hrs
Understanding Harmony in the HumanBeing - Harmony in Myself!	Harmony in Human Being and Myself	Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Understanding the Body as an instrument of 'I' Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body	8

UNIT-III:

Unit	Module	Micro content	No of hrs
UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN- HUMAN RELATIONSHIP	Harmony in Family, Society and relationships	Understanding values in human-human relationship. Understanding the meaning of Trust. Understanding the meaning of Respect. Understanding the harmony in the society.	8

UNIT-IV:

Unit	Module	Micro content	No of hrs
UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE WHOLEEXISTENCE ASCOEXISTENCE	Harmony in the Nature and Existence	Understanding the harmony in the Nature. Understanding Existence as Co-existence	8

UNIT-V:

Unit	Module	Micro content	No of hrs
Implications of the above Holistic Understanding of Harmony on Professional Ethics	Understanding of harmony in professional ethics`	Natural acceptance of human values. Universal Order Competence in professional ethics.	8

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4101	Big Data Analytics Professional Elective IIIA	**3**	**0**	**0**	**3**

Course Objectives:

The student should be able to
1. Understand the Big Data Concepts and Big Data Technologies
2. Provide an overview of Apache Hadoop
3. Provide HDFS Concepts and Interfacing with HDFS
4. Understand Map Reduce Jobs
5. Provide hands on Hadoop Eco System (HDFS, MapReduce, Pig & Hive)

UNIT-I: Introduction to Big Data and Hadoop 14 hrs

Introduction to Big Data:
Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development, Examples of Big Data Analytics.
Introduction to Hadoop:
Working with Big Data: Google File System, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem, Hadoop Releases, Hadoop Installation Modes.
Hadoop Distributed File System:
HDFS, Building Blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo distributed mode, Fully Distributed mode), Configuring XML files

UNIT-II : Map Reduce 12 hrs

A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic Concepts Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

UNIT– III: Hadoop IO 12 hrs

The Writable Interface, WritableComparable and Comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom Comparators.

UNIT-IV: PIG 11Hrs

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Installation and Running of Pig, Execution Types, Evaluating Local and Distributed Modes, Pig Latin Editors,

Comparison with databases, Pig Latin, Functions, Data Processing Operators, Checking out the Pig Script Interfaces, Scripting with Pig Latin, Running Pig Programs.

UNIT – V: Hive **11 hrs**

Installing Hive, Comparison with Traditional Databases, Running Hive, Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Course Outcomes:

By the end the of the course, the student will be able to

Text Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC.
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly.
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C. Zikopoulos, Roman B. Melnyk, Bruce Brown, Rafael Coss.

References:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

Software Links:

1. Hadoop: http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
Pig Latin: http://pig.apache.org/docs/r0.7.0/tutorial.html

CO-PO-PSO

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Understand the concepts of Big Data Analytics, **Master** the concepts of Hadoop Distributed File System and Hadoop Architecture {Understand level, KL2} {Apply level, KL3} {Analyze level, KL4}
CO2: Acquire knowledge on Map Reduce Framework. { Evaluate level, KL5}
CO3: Understand the concepts of Hadoop IO formats and methods. {Understand level, KL2}
CO4: Apply Pig concepts for Data Processing. {Evaluate level, KL5}
CO5: Apply Hive concepts for Data Processing. {Evaluate level, KL5}

CO-PO Mapping Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	--	--	--	--	--	-	--	--	--	--	2	2
CO2	2	2	2	-	--	--	--	--	--	--	--	--	2	2
CO3	2	2	2	--	--	--	--	--	--	--	--	2	2	2
CO4	1	2	2	--	--	--	--	--	--	--	--	2	2	2
CO5	2	2	2	--	--	--	--	--	--	--	--	2	2	2

MICRO SYLLABUS

UNIT-I: Introduction to Big Data and Hadoop **14hrs**

Introduction to Big Data

Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development, Examples of Big Data Analytics.

Introduction to Hadoop

Working with Big Data: Google File System, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem, Hadoop Releases, Hadoop Installation Modes.

Introduction to Hadoop

HDFS, Building Blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo distributed mode, Fully Distributed mode), Configuring XML files

Unit	Module	Micro content	No of hrs
Introduction to Big Data and Hadoop	**Introduction to Big Data**	Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development, Examples of Big Data Analytics.	4

	Introduction to Hadoop	Working with Big Data: Google File System, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem, Hadoop Releases, Hadoop Installation Modes.	4
	Introduction to Hadoop	HDFS, Building Blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo distributed mode, Fully Distributed mode), Configuring XML files	6

UNIT-II: Map Reduce **12 hrs**

A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic Concepts of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

Unit	Module	Micro content	No of hrs
Map Reduce	MapReduce Framework	A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)	6
	Basic Concepts Hadoop MapReduce	Basic Concepts of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.	6

UNIT-III: Hadoop IO **12 hrs**

The Writable Interface, WritableComparable and Comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom Comparators.

Unit	Module	Micro content	No of hrs
Hadoop IO	Writable Classes	The Writable Interface, WritableComparable and Comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections	9
	Custom Comparators	Implementing a RawComparator for speed, Custom Comparators.	3

UNIT-IV: PIG **11Hrs**

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Installation and Running of Pig, Execution Types, Evaluating Local and Distributed Modes, Pig Latin Editors, Comparison with databases, Pig Latin, Functions, Data Processing Operators, Checking out the Pig Script Interfaces, Scripting with Pig Latin, Running Pig Programs.

Unit	Module	Micro content	No of hrs
PIG	Introduction to PIG	Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Installation and Running of Pig, Execution Types, Evaluating Local and Distributed Modes, Pig Latin Editors, Comparison with databases	5

	Working with PIG	Pig Latin, Functions, Data Processing Operators, Checking out the Pig Script Interfaces, Scripting with Pig Latin, Running Pig Programs.	6

UNIT-V: Hive **11hrs**

Installing Hive, Comparison with Traditional Databases, Running Hive, Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Unit	Module	Micro content	No of hrs
HIVE	Introduction to HIVE	Installing Hive, Comparison with Traditional Databases, Running Hive, Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients	6
	Working with HIVE	Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.	5

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4101	Software Testing Methodologies Professional Elective IIIB	**3**	**0**	**0**	**3**
Prerequisites: Software Engineering					

Course Objectives:

1. To study fundamental concepts in software testing and discuss Various Software testing issues and solutions
2. To learn how to plan a test project, design test cases and data, Conduct Testing, manage Software problems and defects, and generate a test report
3. To expose the advanced software testing concepts such as object-oriented Software testing methods, web-based and component-based software testing
4. To understand software test automation problems and solutions
5. To learn how to write software test documents and communicate with Engineers in various forms

UNIT – I: Software Testing

Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing. Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

.

UNIT – II: Dynamic Testing-Black Box testing techniques

Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

UNIT – III: Static Testing

Inspections, Structured Walkthroughs, Technical Reviews. Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques.

UNIT – IV: Efficient Test Suite Management

Growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite Software Quality Management: Software Quality metrics, SQA models. Debugging: process, techniques, correcting bugs.

UNIT – V: Automation and Testing Tools

need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and Junit.

Test Automation using Selenium tool. Testing Object Oriented Software: basics, Object oriented testing Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

TEXT BOOKS

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Software Testing, Yogesh Singh, CAMBRIDGE

Reference Books:

1. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
2. Software testing techniques – Baris Beizer, Dreamtech, second edition.
3. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

Course Outcomes: After completing this course, Students will be able to-

CO1: Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods

CO2: Design and conduct a software test process for a software project

CO3: Analyze the needs of software test automation

CO4: Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects

CO5: Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications

CO – PO Mapping:

Cos	PO1	PO2	PO3	PO4	PO5	PO6 PSO1	PO7 PSO2	PO8	PO9	PO10	PO11	PO12
CO1	3	–	–	–	–	– –	– –	–	–	–	–	–
CO2	3	2	–	–	–	– –	– –	–	–	–	–	–
CO3	3	2	2	2	–	– 2	– 3	–	–	–	–	–

CO4	3	2	2	2	–	– 2	– 3	–	–	–	–	–
CO5	3	2	2	2	–	–	– 2	–	–	–	–	–

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Micro-Syllabus of SOFTWARE TESTING METHODOLOGIES

UNIT I

Introduction: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing. Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

Unit	Module	Micro content
Introduction to Software Testing	Introduction	Introduction to software testing
		Evolution
		Myths and Facts
		Goals of Testing
		Model for Testing
		Effective and Exhaustive Software Testing
		Software Testing Terminology
		Software Testing Life Cycle
		Software Testing Methodology
	Verification and Validation	Verification and Validation Activities
		Verification of Requirements
		High level and low level designs
		Verifying code
		Validation

UNIT – II: Dynamic Testing-Black Box testing techniques

Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

Unit	Module	Micro content

Dynamic Testing-Black Box testing techniques	Dynamic Testing	Boundary Value Analysis
		Equivalence class Testing
		State Table based testing
		Decision Table Based Testing
		Cause-Effect Graphing based testing
	White Box Testing	Need for White Box Testing
		Logic Coverage Criteria
		Basis Path Testing
		Comprehensions

UNIT – III: Static Testing

Inspections, Structured Walkthroughs, Technical Reviews. Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques.

Unit	Module	Micro content
Static Testing	Static Testing	Inspections
		Structured Walkthroughs
		Technical Reviews
		Validation activities: Unit testing, Integration Testing, Function testing, system testing, and acceptance testing.
	Regression testing	Progressives Vs regressive testing
		Regression test ability
		Objectives of regression testing
		Regression testing types
		Regression testing techniques.

UNIT – IV: Efficient Test Suite Management

Growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite Software Quality Management: Software Quality metrics, SQA models. Debugging: process, techniques, correcting bugs.

Unit	Module	Micro content
Efficient Test Suite	Test Suite Management	Growing nature of test suite
		Minimizing the test suite and its benefits

Management		Test suite prioritization,
		Types of test case prioritization exception
		prioritization techniques
		measuring the effectiveness of a prioritized test suite
	Software Quality Management	Software Quality metrics
		SQA models
		Debugging: process, techniques, correcting bugs.

UNIT – V: Automation and Testing Tools

Need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and Junit.

Test Automation using Selenium tool. Testing Object Oriented Software: basics, Object oriented Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

Unit	Module	Micro content
Need for Automation and Testing Tools	Automated Testing	Need for automation
		categorization of testing tools
		selection of testing tools
		Guidelines for automated testing
		overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and Junit
		Test Automation using Selenium tool
	Object oriented Testing Web based Systems	Challenges in Testing Web Based Software
		quality aspects, web engineering
		testing of web based systems
		Testing mobile systems

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4101	Image Processing Professional Elective IIIC	**3**	**0**	**0**	**3**
Prerequisites: Computer Graphics					

Course Objectives:

Students undergoing this course are expected to:

1. Familiarize with basic concepts of digital image processing
2. Learn various image processing techniques like image enhancement
3. Understand Color fundamentals and different Color models
4. Understand Image Compression & Morphological Image Processing

UNIT – I: Introduction

Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

UNIT – II: Image Enhancement in The Spatial Domain:

Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods

UNIT – III: Color Image Processing

Color Fundamentals, Color Models, Pseudo color image processing, Color transformation, Smoothing and sharpening, Image segmentation based on Color, Noise in Color images

UNIT – IV: Image Compression & Morphological Image Processing

Image Compression – Fundamentals, Some basic compression methods, Digital Image water marking.

Morphological Image Processing – Erosion and Dilation, Opening and Closing, Hit-or-Miss Transformation, Some basic morphological algorithms, Gray-scale morphology.

UNIT – V: Image Segmentation:

Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold.

TEXT BOOKS

1. Digital Image Processing, Third Edition, Rafael C Gonzalez, Richard E Wood

Reference Books:

2. Milan Sonka "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition.

3. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India.

4. S. Sridhar, Digital Image Processing, Oxford University Press, 2nd Ed, 2016.

Course Outcomes: After completing this course, Students will be able to-

CO1: Understand Digital Image Fundamentals

CO2: Perform various Image enhancement techniques

CO3: Analyze pseudo and full color image processing methods

CO4: Use various compression techniques and morphological operations.

CO5: Use various Image segmentation methods

CO – PO Mapping:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	-	-	-	-	-	-	-	-
CO2	2	2	2	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	1	-	-	-	-	-	-	-
CO4	2	2	2	2	1	-	-	-	-	-	-	-

CO5	1	2	2	2	1	-	-	-	-	-	-	-

Micro-Syllabus

IV B.Tech I Semester

UNIT I

Introduction:

Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing

Unit	**Module**	**Micro content**
Introduction	Fundamentals	Fundamental Steps in Digital Image Processing
		Components of an Image Processing System
		Sampling and Quantization,
		Representing Digital Images (Data structure)
		Some Basic Relationships Between Pixels
		Neighbors and Connectivity of pixels in image
		Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing

UNIT – II

Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods

Unit	**Module**	**Micro content**
Transformations & filtering	Transformations	Basic Gray Level Transformations
		Histogram Processing
		Enhancement Using Arithmetic/Logic Operations
	Filtering	Basics of Spatial Filtering

		Smoothing Spatial Filters, Sharpening Spatial Filters
		Combining Spatial Enhancement Methods
UNIT III Color Fundamentals, Color Models, Pseudo color image processing, Color transformation, Smoothing and sharpening, Image segmentation based on Color, Noise in Color images		
Unit	**Module**	**Micro content**
Color Image Processing	Color Fundamentals & Models	Color Fundamentals
		Color Models
		Pseudo color image processing
		Color transformation,
		Smoothing and sharpening
		Image segmentation based on Color
		Noise in Color images
UNIT IV Image Compression & Morphological Image Processing Image Compression – Fundamentals, Some basic compression methods, Digital Image water marking. Morphological Image Processing – Erosion and Dilation, Opening and Closing, Hit-or-Miss Transformation, Some basic morphological algorithms, Gray-scale morphology.		
Unit	**Module**	**Micro content**
Image Compression & Morphological Image Processing	Image Compression	Fundamentals
		Basic Compression methods
		Digital Image Water marking
	Morphological operations	Erosion and Dilation
		Opening and closing
		Hit-or-Miss Transformation
		Some basic morphological algorithms
		Gray-scale morphology

UNIT V Image Segmentation Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold.		
Unit	**Module**	**Micro content**
Image Segmentation	Image Segmentation	Introduction
		Detection of isolated points
		Line detection
		Edge Detection
		Edge linking
		Region based segmentation
		Region growing, Split and merge techniques
		Local Processing
		Regional processing
		Hough Transform
		Segmentation using threshold

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4101	Devops Professional Elective IIID	3	0	0	3
Prerequisites: Software Engineering					

Course Objectives:

- DevOps improves collaboration and productivity by automating infrastructure and workflows and
  continuously measuring applications performance

Course Outcomes:

At the end of the course, student will be able to

- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
- Describe DevOps & DevSecOps methodologies and their key concepts
- Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools
  and cloud models
- Set up complete private infrastructure using version control systems and CI/CD tools

UNIT I

Phases of Software Development life cycle, Values and principles of agile software development,

UNIT II

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications,
DevOps delivery pipeline, DevOps eco system.

UNIT III

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation,
People aspect, processes

UNIT IV

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD,
Metrics to track CI/CD practices

UNIT V

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model,

DevOps maturity Assessment

Text Books:

1. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition,
   O'Reilly publications, 2016.
2. What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

1. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
2. The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
3. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
4. Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019

e-Resources:

1. https://www.javatpoint.com/devops
2. https://github.com/nkatre/Free-DevOps-Books-1/blob

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4102	Mobile Computing Professional Elective IVA	3	0	0	3
Prerequisites: Computer Networks					

Course Objectives:

1.To make the student understand the cncept of mobile computing paradigm, its novel applications and limitations.
2.To understand the typical mobile networking infrastructure through a popular GSM protocol.
3.To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
4.To understand the database issues in mobile environments & data delivery models.
5.To understand the ad hoc networks and related concepts.
6.To understand the platforms and protocols used in mobile environment.

UNIT- I **11Hrs**

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.
GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II **8Hrs**

(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III **8Hrs**

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV **10Hrs**

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.
Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT- V **13Hrs**

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination,Data Synchronization – Introduction, Software, and Protocols.
Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc.
Protocols and Platforms for Mobile Computing : WAP, Bluetooth, XML, J2ME, Windows CE, Linux for Mobile Devices, Android.

TEXT BOOKS:

1.Jochen Schiller,"Mobile Communications",Addison-Wesley,Second Edition, 2009.
2.Raj Kamal,"Mobile Computing",Oxford University Press, 2007,ISBN: 01956867

REFERENCE BOOKS:

1.ASOKE K T ALUKDER, HASAN AHMED, ROOP A R Y A V AGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
2.UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

Web Resources:

1.http://nptel.ac.in/courses/106106147/1
2.http://nptel.ac.in/courses/106106147/2
3.https://www.youtube.com/watch?v=OxdUs9E8Aps&list=PLcp8IgxOPM4LATpwQ6qxbItS22wT3UEau
4.https://www.youtube.com/watch?v=mssEMMvbL_Q&list=PLcp8IgxOPM4LATpwQ6qxbItS22wT3Ueau&in dex=12
5.https://www.youtube.com/watch?v=7tbia3T7S0A&list=PLcp8IgxOPM4LATpwQ6qxbItS22wT3Ueau&index =21

Course Outcomes:

By the end the of the course, the student will be able to
CO1:Interpret various mobile communication and computing terminologies,paradigms and architectures.
CO2:Analyze problems in wireless MAC and infer different multiplexing techniques.
CO3: Interpret the working of mobile network layer, based on Mobile IP.
CO4: Analyze the working of conventional TCP/IP and infer different protocols for mobile transport layer.
CO5: Should be able to analyze data synchronization, data hoarding issues and interpret the working of MANETs and technologies in mobile computing environment..

CO-PO-PSO Mapping Matrix:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO-1	2													2
CO-2	2	3											2	
CO-3	2	2	2											2
CO-4	2	2	2	3									2	2
CO-5	2	2	2	2								2	2	2

MICRO SYLLABUS

UNIT-I:Introduction

Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

Unit	Module	Micro content	No of hrs
Introduction	Introduction	Mobile Communications,Mobile Computing-Paradigm,Promises/Novel Applications and Impediments and Architecture	3
	Mobile Devices	Mobile and Handheld Devices,Limitations of Mobile and Handheld Devices	2
	GSM	Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security	4
	New Data Services	HSCD,GPRS	2

UNIT-II Wireless Medium Access Control (MAC)

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Unit	Module	Micro content	No of hrs
Medium Access Control	MAC	Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals)	2
	Multiplexing	SDMA, FDMA, TDMA, CDMA	1
	TDMA	Fixed TDM,Classical Aloha,Slotted Aloha,Carrier Sense Multiple	2

		Access:1-Persistent CSMA,Non-persistent CSMA,P-Persistent CSMA,Demand Assigned Multiple Access,Packet Reservation Multiple Access,Reservation TDMA	
	CDMA	Spread Aloha Multiple Access	1
	Wireless LAN/(IEEE 802.11	System Architecture,Protocol Architecture,Physical Layer,Medium Access Control Layer,MAC Management,802.11b,802.11a,Newer Developments	2

UNIT –III:Mobile Network Layer

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Unit	Module	Micro content	No of hrs
Network Layer	IP and Mobile IP	Need for Mobile IP,Entities and terminology	1
	IP Packet Delivery	Working of MobileIP and Handover management	1
	Registration	Registration of a mobile node,Registration request	2
	Tunneling and encapsulation	IP-in-IP encapsulation,Minimal Encapsulation,Generic Routing encapsulation,Optimization	3
	DHCP	Client initialization	1

UNIT –IV:Mobile Transport Layer

Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

Unit	Module	Micro content	No of hrs
Mobile Transport Layer	Conventional TCP/IP	Congestion control,Slow Start,Fast retransmit/fast recovery,Implications of mobility	1
	Classical TCP	Indirect TCP,Snooping TCP,Snooping TCP,Mobile TCP	2
	Other transport layer protocols	Fast retransmit/fast recovery,Transmission/time out freezing,Selective retransmission,Transaction oriented TCP	2
	Database Hoarding & Caching Techniques	Caching Invalidation Mechanisms	1
	Client-Server Computing & Adaptation	Two-tier client-server architecture,Three-tier client-server architecture,N-tier client-server architecture	1
	Transactional models	ACID rules	1
	Query Processing	Query decomposition,Query Optimization	1
	Data Recovery Process & QoS Issues	Recovery management architecture	1

UNIT-V: Data Dissemination and Synchronization

Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination,Data Synchronization – Introduction, Software, and Protocols.

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc.

Protocols and Platforms for Mobile Computing : WAP, Bluetooth, XML, J2ME, Windows CE, Linux for Mobile Devices, Android.

Unit	Module	Micro content	No of hrs
Data Dissemination and Synchronization	Communications Asymmetry	Introduction,Characteristics	2
	Classification of Data Delivery Mechanism	Push-based mechanism,Pull-based mechanism,Hybrid mechanism,Data dissemination	2
	Data Synchronization	Introduction, Software, and Protocols	1
	MANETs	Introduction, Applications & Challenges of a MANET	2
	Routing	Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc.	4
	Protocols and Platforms for Mobile Computing	WAP, Bluetooth, XML, J2ME, Windows CE, Linux for Mobile Devices, Android.	2

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4102	Deep Learning Professional Elective IVB	3	0	0	3
Prerequisites: Machine Learning					

Course Objectives:

1. To understand basic concepts of neural networks.
2. To emphasize on learning, optimization techniques.
3. To learn CNN, RNN, Autoencoder models.
4. To learn deep learning algorithms to solve real world problems.

Course Outcomes: by the end of the course the student will be able to

- Demonstrate basic neural network models
- Perform optimization and evaluate performance of the neural network Model.
- Able to implement mathematical model of neural network.
- Design convolutional neural network for solving problems.
- Design RNN's, Auto encoders.

Unit-1: Introduction to Deep learning, machine learning vs deep learning Artificial Neural Network:
Biological Model of a Neuron, Models of a Neuron, Perceptron, Activation functions, Realizing
logic gates using perceptron, Network Architectures.

Unit-2: Single Layer Perceptron: Adaptive filtering problem, unconstrained optimization techniques,
Least Mean Square algorithm, Perceptron as a classifier, Proof of Convergence.
Multilayer Perceptron- Preliminaries, functionality of neurons in different layers.

Unit-3: Back propagation algorithm-training and convergence, Practical and design issues,
Linear and logistic regression using MLP.Convolution Neural Networks: the convolution operation,Motivation, Pooling.

Unit-4: Variants of the basic convolution function, Data types, efficient convolution algorithms,
Neuro scientific basis for convolution neural networks.Recurrent
Neural Networks: recurrent neural networks, Bidirectional RNNs, Encoder and Decoder sequence to sequence architectures.

Unit-5: Recurrent Neural Networks: Deep Recurrent Networks, Recursive Neural Networks,
The long short-term memory and other gated RNNs. Autoencoders: Under complete Autoencoders,
Regularized Autoencoders, Stochastic Encoders and Decoders, Denoising Autoencoders,

Contractive Autoencoders.

Text Books:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Goodfellow I, BengioY, and Courville A, Deep Learning, MIT Press, 2016.

References:

1. Artificial Neural Networks, Yegna 28arayana, B., PHI Learning Pvt. Ltd, 2009.
2. Aurélien Géron, Neural networks and deep learning, O'Reilly Media, 2018.

Web Resources:

https://www.deeplearningbook.org/contents/convnets.html
https://www.deeplearningbook.org/contents/rnn.html
https://www.deeplearningbook.org/contents/autoencoders.html

Micro Syllabus

<table>
<tr><td colspan="3">Unit-1: Introduction to Deep learning, machine learning vs deep learning Artificial Neural Network: Biological Model of a Neuron, Models of a Neuron, Perceptron, Activation functions, Realizing logic gates using perceptron, Network Architectures.</td></tr>
<tr><th>Unit No.</th><th>Topic</th><th>Sub Topic</th></tr>
<tr><td rowspan="9">I</td><td rowspan="2">Deep Learning</td><td>Deep learning introduction.</td></tr>
<tr><td>Deep learning, Machine learning comparison.</td></tr>
<tr><td rowspan="7">Artificial Neural Network</td><td>High level functionality of Biological Neuron.</td></tr>
<tr><td>Model of a Neuron.</td></tr>
<tr><td>Perceptron Mathematical Model.</td></tr>
<tr><td>Types of activation functions.</td></tr>
<tr><td>Linear, Threshold, sigmoid , Tanh, Relu, Leaky Relu, Soft Max activation functions.</td></tr>
<tr><td>Realizing OR AND, XOR gates using perceptron.</td></tr>
<tr><td>Single Layer Feed forward, Multilayer Feed forward and Recurrent Networks.</td></tr>
<tr><td colspan="3">Unit-2: Single Layer Perceptron: Adaptive filtering problem, unconstrained optimization techniques, Least Mean Square algorithm, Perceptron as a classifier, Proof of Convergence.
Multilayer Perceptron- Preliminaries, functionality of neurons in different layers.</td></tr>
<tr><td rowspan="6">II</td><td rowspan="5">Single Layer Perceptron</td><td>Adaptive filtering problem.</td></tr>
<tr><td>Unconstrained optimization techniques-Steepest Descent method</td></tr>
<tr><td>Least Mean Square algorithm.</td></tr>
<tr><td>Percptron as a classifier.</td></tr>
<tr><td>Perceptron convergence and its proof.</td></tr>
<tr><td>Multi Layer Perceptron</td><td>Architecture</td></tr>
</table>

		Functionality of each layer neurons.

Unit-3: Back propagation algorithm-training and convergence, Practical and design issues, Linear and logistic regression using MLP.
Convolution Neural Networks: the convolution operation, Motivation, Pooling.

Unit No.	Topic	Sub Topic
III	Multi Layer Perceptron	Back Propagation algorithm-preliminaries, derivations and algorithm.
		Design issues of back propagation algorithm.
		Linear regression using MLP.
		Logistic regression using MLP.
	Convolution Neural Networks	Introduction.
		Convolution operation and its basics.
		Motivations.
		Polling.

Unit-4: Variants of the basic convolution function, Data types, efficient convolution algorithms, Neuro scientific basis for convolution neural networks.
Recurrent Neural Networks: recurrent neural networks, Bidirectional RNNs, Encoder and Decoder sequence to sequence architectures.

Unit No.	Topic	Sub Topic
IV	Convolution Neural Networks	Variants of the basic convolution function.
		Data Types.
		Efficient convolution algorithms.
		Neuro scientific basis for convolution neural networks.
	Recurrent Neural Networks	Introduction.
		Bidirectional RNN
		Encoder and Decoder sequence architectures.

Unit-5: RNN: Deep Recurrent Networks, Recursive Neural Networks, The long short term memory and other gated RNNs. Auto encoders: Under complete Auto encoders, Regularized Auto encoders, Stochastic Encoders and Decoders, De noising Auto encoders, Contractive Auto encoders.

Unit No.	Topic	Sub Topic
V	Recurrent Neural Networks	Deep Recurrent Networks
		Recursive Neural Networks and its structure
		The long short term memory and other gated RNNs.
	Auto encoders	Introduction.
		Under complete auto encoders.
		Regularized auto encoders.
		Stochastic Encoders and Decoders.
		De noising Auto encoders.
		Contractive Auto encoders.

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4102	Multimedia and Animation Professional Elective IVC	3	0	0	3
Prerequisites: Computer Graphics					

Course Objectives:

This course aims to further develop students' competency in:

- To Produce dynamic and creative graphic solutions for multimedia productions.
- To Introduce basic concepts and techniques of interactive authoring.
- To introduce the advanced scripting skills necessary for implementing highly interactive, rich internet applications using multimedia technologies and authoring tools.
- To develop aesthetic value and competencies in multimedia authoring.
- To learn about Artistic visual style and layout design are stressed, as well as the editing and integration of graphic images, animation, video and audio files.
- To master industry-wide software and technologies to create highly interactive, rich internet applications.

UNIT – I: Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT – II: Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. Multimedia Data Compression: Lossless compression algorithms, Lossy compression algorithms, Image compression standards.

UNIT – III: Basic Video compression techniques, Case study: MPEG Video Coding I, Basic Audio compression techniques, Case study: MPEG Audio compression. Web 2.0: What is web 2.0, Search, Content Networks, User Generated Content, Blogging, Social Networking, social media, Tagging, Social Marking.

UNIT – IV: Rich Internet Applications (RIAs) with Adobe Flash: Adobe Flash- Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, publish your flash movie, creating special effects with Flash, Creating a website splash screen, simple Action script.

Rich Internet Applications (RIAs) with Flex 3 - Introduction, Developing with Flex 3, Working with Components, Advanced Component Development, Visual Effects and Multimedia.

UNIT – V

Action scripts – Tools for action script code, Flash programs, Expressions, Event based execution model, classes, objects and packages, constructors, Instance methods, loops, Constructors, Inheritance, simple scripts.

Text Books:

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI Learning, 2004 (UNITS 1, 2, 3.)
2. Action scripts 3.0, O Reilly publications (Unit 5)

Reference Books:

1. Professional Adobe Flex 3, Joseph Balderson, Peter Ent, et al, Wrox Publications, Wiley India, 2009. (For unit 4)

2. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Pearson Education, 2001, RP 2005.

3. Multimedia making it work, Tay Vaughan, 7th edition, TMH, 2008.

Course Outcomes: After completing this course, Students will be able to-

CO-1: Understand development of Multimedia & Color models

CO-2: Work with Image, audio and compression techniques

CO-3: Understand Video compression techniques.

CO-4: Summarize Rich application development through Flash & Flex

CO-5: Build action scripts for animation

CO – PO Mapping:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1	-	-	-	-	-	-	-
CO2	-	2	1	1	1	-	-	-	-	-	-	-
CO3	-	2	1	1	1	-	-	-	-	-	-	-

CO4	-	2	1	1	-	-	-	-	-	-	-	-
CO5	-	2	1	1	2	-	-	-	-	-	-	

[1-Slight (low), 2-Moderate (Medium), 3-Substantial (High)]

Micro-Syllabus

UNIT I

Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

Unit	**Module**	**Micro content**
Introduction to Multimedia	Introduction	What is multimedia
		Components of Multimedia
		Hyper media, WWW and Internet
	Software Tools	Digital audio
		Graphic and Image Editing
		Video editing, authoring
	Graphics & Image Data types	file formats
		Color in image and video: color science
		color models in images
		color models in video

UNIT – II

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. Multimedia Data Compression: Lossless compression algorithms, Lossy compression algorithms, Image compression standards.

Unit	Module	Micro content
Fundamental concepts in Video and audio	Video and Audio	Types of video signals, analog video, digital video
		digitization of sound
		MIDI, quantization and transmission of audio
	Multimedia Data Compression	Lossless compression algorithms -Run length, variable length, lossless image compression
		Lossy compression algorithms – Transform coding, Wavelet based coding, SPIHT
		Image compression standards – JPEG, JPEG 2000

UNIT III

Basic Video compression techniques, Case study: MPEG Video Coding I, Basic Audio compression techniques, Case study: MPEG Audio compression. Web 2.0: What is web 2.0, Search, Content Networks, User Generated Content, Blogging, Social Networking, social media, Tagging, Social Marking, Rich Internet Applications

Unit	Module	Micro content
Video Compression and Case study	Basic Video Compression	Introduction to video compression
		Motion compensation
		Search for motion vectors
		H261 – Intra frame and Interframe coding
	Case study	MPEG Video Coding I
		Basic Audio compression techniques, Case study: MPEG Audio compression.
		Web 2.0: What is web 2.0, Search, Content Networks
		User Generated Content, Blogging

		Rich Internet Applications
UNIT IV Rich Internet Applications (RIAs) with Adobe Flash: Adobe Flash- Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, publish your flash movie, creating special effects with Flash, Creating a website splash screen, simple Action script. Rich Internet Applications (RIAs) with Flex 3 - Introduction, Developing with Flex 3, Working with Components, Advanced Component Development, Visual Effects and Multimedia.		
Unit	**Module**	**Micro content**
Rich Internet Applications	Adobe Flash	Adobe Flash- Introduction, Flash Movie Development
		Introduction to Flash, Creating Special effects, Splash screen
		Simple Action Scripts
	Flex 3	Introduction
		Working with components
		Advanced Component Development, Visual Effects and Multimedia.
UNIT V **Action scripts –** Tools for action script code, Flash programs, Expressions, Event based execution model, Time frames, classes, objects and packages, constructors, Instance methods, loops, Constructors, Inheritance, simple scripts		
Unit	**Module**	**Micro content**
Action Scripts		Tools for action script code
		Flash programs, Expressions
		Event based execution model, Time frames
		classes, objects and packages
		constructors, Instance methods, loops
		Constructors, Inheritance, simple scripts

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IV- Year I- Semester	Name of the Course	L	T	P	C
PE4101	Cyber Security and Forensics Professional Elective IVD	3	0	0	3
Prerequisites: Cryptography and basics of security					

COURSE OBJECTIVES:

- Able to identify security risks and take preventive steps
- To understand the forensics fundamentals
- To understand the evidence capturing process
- To understand the preservation of digital evidence

COURSE OUTCOMES:

At the end of the course, student will be able to

- Enumerate the computer forensics fundamentals
- Describe the types of computer forensics technology
- Analyze various computer forensics systems
- Illustrate the methods for data recovery, evidence collection and data seizure
- Identify the Role of CERT-In Security

UNIT I

Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

UNIT II

Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares,Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

UNIT III

Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis,

Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

UNIT V

Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, DigitalSignatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime andPunishment, Cyberlaw, Technology and Students: Indian Scenario.

Text Books:

1) Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY, 2011.
2) Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Reference Books:

1) Michael T. Simpson, Kent Backman and James E. Corley, "Hands on Ethical Hacking and Network Defence", Cengage, 2019.
2) Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media,New Delhi.
3) Alfred Basta, Nadine Basta,Mary Brown and Ravinder Kumar "Cyber Security and Cyber Laws" , Cengage,2018.

e-Resources:

1) CERT-In Guidelines- http://www.cert-in.org.in/
2) https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks [Online Course]
3) https://computersecurity.stanford.edu/free-online-videos [Free Online Videos]
4) Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu. License: Creative Commons BY-NC-SA.

Micro Syllabus

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

Unit	Module	Micro Content
UNIT I	Introduction to Cybercrime	Definition and Origins of the Word, Cybercrime and Information Security
	Cybercriminals	Who are Cybercriminals?
	Classifications of Cybercrime	E-Mail spoofing, spamming, cyber defamation, internet time theft, salami attack, data diddling, forgery, web jacking, hacking, online frauds, password sniffing, credit card frauds etc..
	Cyberstalking	Types of stalkers, cases reported on Cyberstalking, how stalking woks?, real life incident of Cyberstalking
	Cybercafe and Cybercrimes	About Cybercafe and Cybercrimes
	Botnets	The fuel for Cybercrimes
	Attack Vector	Define Attack Vector
	Proliferation of Mobile and Wireless Devices	About Proliferation of Mobile and Wireless Devices
	Security Challenges Posed by Mobile Devices	How Security Challenges Posed by Mobile Devices
	Attacks on Mobile/Cell Phones	Mobile phone theft, mobile viruses, mishing, vishing, smishing, hacking bluetooth, Network and Computer Attacks

UNIT II:

Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

Unit	Module	Micro Content
	Tools and Methods	Introduction, Proxy Servers, and Anonymizers
	Phishing	How does phishing works?
	Password Cracking	Online attacks, offline attacks, strong, weak and random passwords.
	Keyloggersand Spywares	Software/hardware keyloggers, Anti keyloggers, spywares
	Virus and Worms	Types of viruses?
	Trojan Horses and Backdoors	Backdoor, how to protect from Trojan Horses and Backdoors
	Steganography	steganalysis
	Sniffers, Spoofing, Session Hijacking Buffer	Types of buffer overflow, how to minimise buffer overflow

UNIT II	over flow	
	DoS and DDoS Attacks	DoS attacks, classification, types or levels, tools used to launch DoS attacks, DDoS Attacks, how to protect from DoS and DDoS Attacks
	SQL Injection, Buffer Overflow	Steps for SQL Injection attack, how to prevent SQL Injection attacks
	Attacks on Wireless Networks	Traditional techniques of attacks on Wireless Networks, Theft of internet hours and Wi-Fi-based frauds and misuses, how to secure the Wireless Networks
	Identity Theft (ID Theft)	Personally identifiable information, types and techniques of ID Theft,
	Foot Printing and Social Engineering	Definition, advantages
	Port Scanning	About hacking technique
	Enumeration.	Phases of hacking

UNITI III:

Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

Unit	Module	Micro Content
UNIT III	Cyber Crime Investigation	Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation
	E-mail considerations	E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands-on Case Studies
	Cryptographic methods	Encryption and Decryption Methods
	Applications	Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV: Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

Unit	Module	Micro Content
UNIT IV	Understanding Computer Forensics	Computer Forensics versus other related disciplines, understanding case laws, developing computer forensics resources
	Preparing for Computer Investigations	Understanding law enforcement agency investigation, following legal processes, understanding corporate investigations, establishing company policies, etc..
	Current Computer Forensics Tools	Evaluation of software/ hardware tools, validation, and testing of the software's

	techniques	Face, Iris and Fingerprint Recognition, Audio Video Analysis
	Windows System Forensics	About Windows System Forensics
	Linux System Forensics, Graphics and Network Forensics	Advantages of networking, E-mail Investigations, Cell Phone, and Mobile Device Forensics.
UNIT V: Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology, and Students: Indian Scenario.		
Unit	**Module**	**Micro Content**
UNIT V	Cyber Crime Legal Perspectives	Introduction
	Cybercrime and the Legal Landscape around the World	A broad view on cybercrime law scenario in the Asian-Pacific Region, online safety and cybercrime laws: a detailed perspective on the Asian-Pacific scenario, Anti-spam laws in Canada, cybercrimes and federal laws in the US
	The Indian IT Act	Admissibility of electronic records, positive aspects of the ITA 2000, weak areas of the ITA 2000
	, Challenges to Indian Law and Cybercrime Scenario in India	Consequences of Not Addressing the Weakness in Information Technology Act
	Digital Signatures and the Indian IT Act	Public-key certificate, representation of digital signatures in the ITA 2000, impact of oversights in ITA 2000 regarding Digital signatures, implications for certifying authorities, current scenario, cryptographic perspective
	Amendments to the Indian IT Act	Overview of change made to the Indian IT Act, cybercafé-related matters/state government powers.
	Cybercrime and Punishment	Cyberlaw, Technology, and Students: Indian Scenario.

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4103	Ui/Ux Design Professional Elective VA	3	0	0	3
Prerequisites: Basic Web Programming					

Course Objectives:

- Learning UI/UX importance
- Exploring building blocks of UI
- Exploring UI/UX Design common web features
- Exploring UI/UX Design from real life applications
- A case study with some of the best web sites

UNIT-I: 12 hrs

What is User Interface Design (UI) -The Relationship Between UI and UX , Roles in UI/UX, A Brief Historical Overview of Interface Design, Interface Conventions, Approaches to Screen Based UI, Template vs Content, Formal Elements of Interface Design, Active Elements of Interface Design, Composing the Elements of Interface Design, UI Design Process, Visual Communication design component in Interface Design

UNIT-II: 10 hrs

THE ANATOMY OF THE ELEMENTS: GRID AND LAYOUT, TYPOGRAPHY, COLOR, GRADIENTS, SHADOWS, BUTTONS, FORMS, ICONS, IMAGES, ILLUSTRATIONS, NAVIGATIONS

Unit – III: 12 hrs

An Eye for UI/UX Design: Navbars, Headers, Features, Cards, Content, Teams, Logo Areas, Stats, Charts, Tables, Maps, Widgets, Frequently Asked Questions (FAQ), Contact Us, Footers, Sidebars, Wizards, Timelines, Reviews

UNIT-IV: 10 hrs

Real Life Applications: About Us, Profile Page, Blog Post Page, E-commerce Page, Sign Up Page, Sign In Page, Policies Page, Chats & Messages Page, Categories Page, Admin Templates

UNIT-V: 8 hrs

Great Website Designs_A Case Study: apple.com, airbnb.com, about.instagram.com, stripe.com, revolut.com

OUTCOMES:

- Learn UI/UX importance and history
- Explore basic building blocks of UI
- Explore UI/UX Design common web features
- Explore UI/UX Design from real life applications
- Learn best design of UI/UX with case studies

Text Books:

1. "Fundamentals of Creating a Great UI/UX" *by Creative Tim*
2. "Refactoring UI" *by Steve Schoger & Adam Wathan*

Reference Books

1. "The Principles of Beautiful Web Design" *by Jason Beaird*
2. "Designing Interfaces: Patterns for Effective Interaction Design" *by Jenifer Tidwell, Charles Brewer, Aynne Valencia*

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IV Year I-Semester	Name of the Course	L	T	P	C
PE4103	No SQL Databases Professional Elective VB	**3**	**0**	**0**	**3**
Prerequisites: DBMS					

COURSE OBJECTIVES:

- To make student understand about NoSQL, its characteristics and history, and the primary benefits
  for using NoSQL data
- To explore students about various types of NO-SQL databases (wide-column, document, key-value,
  graph and object-oriented) in adding content and running queries
- To make students in understanding the NoSQL data architecture patterns

UNIT-I: Introduction to No-SQL **12 hrs**

What is No-SQL?, NoSQL Overview, features of NoSQL, Benefits and drawbacks of NoSQL,

NoSQL vs SQL, Distributed Models, Consistency, Scalability, ACID and BASE for reliable database

transactions, Brewers CAP theorem.

UNIT-II: Column-Oriented Databases **12 hrs**

Overview of column-oriented databases, features and drawbacks of column-oriented databases,

Apache Cassandra-architecture, data modeling, Cassandra Query Language-CQL.

Unit – III: Key Value Databases **12 hrs**

Overview of key-value databases, features and drawbacks of Key-Value databases, Redis-

Architecture of Redis, Features of Redis, Redis commands

UNIT-IV: Document based Databases **12 hrs**

Overview of document-based databases, features and drawbacks of document-based databases,

MangoDB-CRUD operations, sorting, indexing

UNIT-V: Graph Databases **12 hrs**

Overview of Graph Database, features and drawbacks of Graph databases, Neo4J- Neo4j - Data Model, Neo4j - Building Blocks, Neo4j CQL

Text Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , Author: Sadalage, P. & Fowler, Publication: Pearson Education

Reference Books

1. Name: Redmond, E. &Wilson , Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.

Micro Syllabus of NoSQL Databases

UNIT I: Introduction to No-SQL

What is No-SQL?, NoSQL Overview, features of NoSQL, Benefits and drawbacks of NoSQL, NoSQL vs SQL, Distributed Models, Consistency, Scalability, ACID and BASE for reliable database transactions, Brewers CAP theorem.

Unit	Module	Micro Content
UNIT I	Introduction to NoSQL	Introduction to NoSQL
		What is NoSQL
		Need for NOSQL
		NoSQL Overview
		features of NoSQL Databases
		Benefits to using NoSQL DB
		Drawbacks to Using NoSQL DB
		NoSQL vs. SQL
		Data Models
		Distribution Models
		Consistency

		NoSQL Scalability
		ACID and BASE for reliable database transactions
		Brewers CAP theorem.

UNIT – II

Column-Oriented Databases: Overview of column-oriented databases, features and drawbacks of column-oriented databases, Apache Cassandra-architecture, data modeling, Cassandra Query Language-CQL.

Unit	Module	Micro Content
UNIT II	Column-Oriented Databases	Overview of column-oriented databases
		features and drawbacks of column-oriented databases
	Apache Cassandra	Architecture of Cassandra
		Features of Cassandra
		Cassandra Query Language-CQL
		Definitions
		Data types
		Data definition (DDL)
		Data manipulation (DML)
		Operators
		Secondary indexes
		Materialized views
		Functions
		JSON

UNIT– III

Key Value Databases: Overview of key-value databases, features and drawbacks of Key-Value databases, Redis- Architecture of Redis, Features of Redis, Redis commands

Unit	Module	Micro Content
UNIT III	Key Value Databases	Overview of key-value databases
		features and drawbacks of Key-Value databases

	Redis	Architecture of Redis
		Features of Redis
		Redis - Commands
		Redis - Keys
		Redis - Strings
		Redis - Hashes
		Redis - Lists
		Redis - Sets
		Redis - Sorted Sets
		Redis - HyperLogLog
		Redis - Publish Subscribe
		Redis - Transactions
		Redis - Scripting

UNIT – IV

Document based Databases: Overview of document based databases, features and drawbacks of document based databases, MangoDB-CRUD operations, sorting, indexing

Unit	Module	Micro Content
UNIT IV	Document based Databases	Overview of document based databases
		features and drawbacks of document based databases
	MongoDB	MongoDB - Data Modeling
		MongoDB - Create Database
		MongoDB - Drop Database
		MongoDB - Create Collection
		MongoDB - Drop Collection

		MongoDB - Data Types
		MongoDB - Insert Document
		MongoDB - Query Document
		MongoDB - Update Document
		MongoDB - Delete Document
		MongoDB - Projection
		MongoDB - Limiting Records
		MongoDB - Sorting Records
		MongoDB - Indexing
		MongoDB - Aggregation
		MongoDB - Replication
		MongoDB - Sharding

UNIT V

Graph Databases: Overview of Graph Database, features and drawbacks of Graph databases, Neo4J-Neo4j - Data Model, Neo4j - Building Blocks, Neo4j CQL

Unit	Module	Micro Content
UNIT V	Graph Databases	Overview of key-value databases
		features and drawbacks of Graph databases
	Neo4J	Neo4j - Data Model
		Neo4j - Building Blocks
		Neo4j CQL o Neo4j CQL - Introduction o Neo4j CQL - Creating Nodes o Neo4j CQL - Creating a Relationship
		Neo4j CQL Write Clauses o Neo4j - Merge Command o Neo4j - Set Clause o Neo4j - Delete Clause o Neo4j - Remove Clause

		○ Neo4j - Foreach Clause
		Neo4j CQL Read Clause ○ Neo4j - Match Clause ○ Neo4j - Optional Match Clause ○ Neo4j - Where Clause ○ Neo4j - Count Function
		Neo4j CQL General Clauses ○ Neo4j - Return Clause ○ Neo4j - Order By Clause ○ Neo4j - Limit Clause ○ Neo4j - Skip Clause ○ Neo4j - With Clause ○ Neo4j - Unwind Clause
		Neo4j CQL Functions ○ Neo4j - String Functions ○ Neo4j - Aggregation Function

IV Year I-Semester	Name of the Course	L	T	P	C
PE4103	Human Computer Interaction Professional Elective VC	**3**	**0**	**0**	**3**
Prerequisites: Basic Computer Fundamentals					

COURSE OBJECTIVES:

- To Explain the capabilities of both humans and computers from the viewpoint of humaninformation processing.
- To Describe typical human–computer interaction (HCI) models, styles, and various historic To HCIparadigms.
- To Apply an interactive design process and universal design principles to designing HCIsystems.
- To Describe and use HCI design principles, standards, and guidelines.
- To Analyze and identify user models, user support, socio-organizational issues, and stakeholderrequirements of HCI systems.

UNIT I:

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing **Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

UNIT II:

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT III:

Command and Natural Languages:Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

UNIT IV:

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

UNIT V:

User Documentation and Online Help:

Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

TEXT BOOKS:

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, BenShneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

REFERENCES:

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

COURSE OUTCOMES:

CO1: Explain the capabilities of both humans and computers from the viewpoint of humaninformation processing.

CO2: Describe typical human–computer interaction (HCI) models, styles, and various historic HCIparadigms.

CO3: Apply an interactive design process and universal design principles to designing HCIsystems.

CO4: Describe and use HCI design principles, standards, and guidelines.

CO5: Analyze and identify user models, user support, socio-organizational issues, and stakeholderrequirements of HCI systems.

COO-PO-PSO Mapping Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1
CO 1	2	1	1	2	1	1		1					
CO 2	3	1		2	1		1						
CO 3	1	3		1	1	1		1					
CO 4	2	1		1		2	1						
CO 5	1	2		2	1	2		1					

MICRO SYLLABUS

UNIT-I:

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing **Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

Unit	Module	Micro content	No of hrs
Introduction and Design Process.	Introduction	Usability Goals. Usability motivations.	2
	Design Process	Organizational design Four pillars of design Development methodologies Ethnographic observation Scenario development Early design review Usability Testing	2

UNIT-II:

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization,

Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

Unit	Module	Micro content	No of hrs
Menu Selection, Form Fill-In and Dialog Boxes	Menu Selection		
	Form Fill-In		
	Dialog Boxex		

UNIT-III: Command and Natural Languages

Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

Unit	Module	Micro content	No of hrs
Command and Natural Languages	Command Languages	Command organization Functionality Strategies and Structure, Naming and Abbreviations	1
	Natural Languages	Natural Language in Computing Interaction Devices.	2

UNIT-IV: Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

Unit	Module	Micro content	No of hrs
Quality of Service	Quality of service Balancing Function and Fashion.	Introduction Models of Response time. User productivity. Error Messages Nonanthropomorphic Design. Display Design. Webpage design Window design color	1

UNIT-V: User Documentation and Online Help:

Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated

documentation, Online communities for User Assistance, The Development Process.

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Unit	Module	Micro content	No of hrs
User Documentation and online help	**User Documentation and online help**	Introduction Online vs paper documentation. Accessing the Documentation Animated documentation User Assistance. Development process.	1
	Information Search	Introduction Searching in Textual Documents. Database querying. Multimedia document search Advanced Filtering and searching Interfaces. Visualization.	1

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IV- Year II- Semester	Name of the Course	L	T	P	C
PE4103	Network Programming Professional Elective VD	3	0	0	3
Prerequisites: Computer Networks					

Course Objectives:

1. To summarize OSI model, Unix standards, TCP,connecion establishment,UDP
2. To understand socket API and its basic functions .
3. To gain knowledge on TCP Services and related unix system calls
4. To understand UD Services and related unix system calls
5. To gain the understanding of remote procedure calls and inter process communication, implementationof different forms of IPC in client-server environment

UNIT-I: Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II : Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, forkand exec function, concurrent servers. Close function and related function

UNIT– III: TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdownof server host. **I/O Multiplexing and socket options:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, get-sockopt and set-sockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options

UNIT-IV: Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP. **Elementary name and Address conversions:** DNS, get-host by Name function, Resolver option, Function and IPV6 support, uname function, other networking

UNIT – V: IPC- Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

Text Books:

1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI

Reference Book:

1.UNIX for Programmers and Users, 3rd Edition Graham GLASS, King

abls,Pearson Education
2.Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Summarize OSI model, Unix standards, TCP connection establishment, UDP

CO2: Understand socket API and its basic functions

CO3: Gain knowledge on TCP Services and related unix system calls

CO4:Understand UDP services and related unix system calls.

CO5: Gain the understanding of remote procedure calls and inter process communication, implementationof different forms of IPC in client-server environment

CO-PO-PSO Mapping Matrix:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PPO2**
CO -1	2										2		2	2
CO -2	2	2									2		2	2
CO -3	2	2	2								2	2	2	2
CO -4	-		2								2	2	2	2
CO -5	-		2								2	2	2	2

MICRO SYLLABUS

UNIT-I: Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet

Unit	**Module**	**Micro content**	**No of hrs**
Introduction to Network Programming	OSI model	Layers in OSI model and internet protocol suite	1
	Unix standards	Posix,The Open group,Internet Engineering Task force,Unix versions and portability	1

	TCP &UDP	The Big Picture,Overview of TCP/IP protocols,TCP,UDP	1
	TCP connection establishment and Termination	Three-way handshake,TCP options,TCP connection termination,TCP state transition diagram,	2
	Buffer sizes and limitation	TCP and UDP output	1
	standard internet services, Protocol usage by common internet	Standard TCP/IP services provided by most implementations, Ping,Traceroute,OSPF,RIP,BGP	1

UNIT-II: Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, forkand exec function, concurrent servers. Close function and related function

Unit	**Module**	**Micro content**	**No of hrs**
Sockets	Address structures	IPv4 Socket Address Structure,Generic socket address structure,IPv6 socket address structure	1
	value – result arguments	Socket address structure passed from process to kernel and from Kernel to process	1
	Byte ordering and manipulation function	Little-endian byte order and Big-endian byte order ,bzero,bcopy,bcmp,memset,memcpy,memcmp	1
	Elementary TCP sockets	Socket, connect, bind, listen, accept, forkand exec function,close function	2
	concurrent servers	Outline for typical concurrent server	1

UNIT-III: TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdownof server host

Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, get-sockopt and set-sockopt functions. Socket states, Generic socket option IPV4 socket option ICMPV6 socket option IPV6 socket option and TCP socket options

Unit	**Module**	**Micro content**	**No of hrs**

TCP client server	TCP Echo server functions	Simple echo client and server,TCP echo server: main function,str_echo function,TCP echo clent: main function,str_cli function,normal startup and terminate	2
	Signal handling	Signal function,SIGCHLD,wait and waitpid functions	2
	Termination of server process	Normal termination,Crashing of server host,Crashing and rebooting of server host	1
Multiplexing and Socket options	**I/O models**	Blocking I/O model,Non-Blocking I/O model,I/O multiplexing model,Signal driven model,Asynchronous I/O model,Comparison of I/O	2
	Select function	Syntax, description of arguments,max no of descriptors for select,Batch input,shutdown function	1
	Poll function	Syntax,description of arguments,TCP echo server	1
	Socket options	Getsockopt and setsockopt,socket states	1
	Generic socket option	So_broadcast,so_debug,so_dontroute,so_error,so_keepalive	1
	Ipv6 SOCKET OPTIONS	IPV6_ADDRFORM, IPV6_CHECKSUM,IPV6_DSTOPTS,IPV6_HOPLIMIT,IPV6_HOPOPTS,IPV6_NEXTHOP,IPV6_PKTINFO,IPV6_PKTOPTIONS,IPV6_RTHDR	1
	TCP socket options	TCP_KEEPALIVE, TCP_MAXRT,TCP_MAXSEG,TCP_NODELAY	1
	ICMPV6	ICMP6_FILTER	1
	IPV4	IP_HDRINCL,IP_OPTIONS,IP_RECVDSTADDR,IP_RECVIF,IP_TOS,IP_TTL	1

UNIT-IV: Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP, **Elementary name and Address conversions:** DNS, get-host by Name function, Resolver option, Function and IPV6 support, uname function, other networking.

Unit	**Module**	**Micro content**	**No of hrs**
Elementary UDP Sockets	UDP Echo server function	UDP echo server and client : main function,dg_echo,dg_cli,lost datagram	2

	summary of UDP example	Summary of UDP client-server from clent's perspective and server's perspective,lack of flow control with UDP	1
	determining outgoing interface with UDP	UDP socket that uses connect to determine outgoing interface	1
Elementary name and Address conversions	DNS	Resource Records,Resolvers,Name servers,DNS alternatives	
	gethostbynamefunction	Hostent structure and information it contains,changes in information returned in hostent structure with IPV6 address	
	Resolver option	Ways of using resolver option, gethostname2 function,IPV6 support	
	Uname	Syntax and description of arguments	
	Other networking information	Four types of network related information	

UNIT-V: IPC- Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues

Unit	Module	Micro content	No of hrs
IPC	File and record locking	Advisory and mandatory locks	1
	Pipes	pipe(),popen() and pclose()	1
	FIFO	fifo(),client server communication using FIFO	1
	Message queue	Msgget(),msgctl()msgsnd(),msgrcv()	1
	Semaphores	Semget(),semctl(),semop(),	1
Remote Login	Terminal line disciplines	Discipline module, old discipline,new discipline,Berknet discipline	1
	Terminal modes	Cooked mode,raw mode,Cbreak mode	1
	rlogin overview	Process involved in remote login client and server	1
	RPC and its transparency issues	Steps in normal RPC, Transparency issues: Parameter passing,binding, transport protocol, exception handling,call semantics,data representation,performance,security	2

IV Year I- Semester	Name of the Course	L	T	P	C
OE4101	Data Science	**3**	**0**	**0**	**3**

	Open Elective III/Job Oriented Course III				
Prerequisites: DBMS, Data Mining, Python Programming					

Course Objectives:

1. To gain knowledge in the basic concepts of Data Analysis
2. To acquire skills in data preparatory and preprocessing steps
3. To learn the tools and packages in Python for data science
4. To gain understanding in classification and Regression Model
5. To acquire knowledge in data interpretation and visualization techniques

UNIT I **6hrs**

Introduction: Need for data science – benefits and uses – facets of data – data science process – setting their search goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

UNIT II **8hrs**

Describing Data I: Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs –averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range –variability for qualitative and ranked data.

UNIT III **8hrs**

Python for Data Handling: Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing – combining datasets –aggregation and grouping – pivot tables.

UNIT IV **10hrs**

Describing Data II: Normal distributions – z scores – normal curve problems– finding proportions – finding scores –more about z scores – correlation – scatter plots – correlation coefficient for quantitative data –computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2– multiple regression equations –regression toward the mean.

UNIT V **8hrs**

Python for Data Visualization: Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three dimensional plotting – geographic data – data analysis using state models and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh.

Text Books

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (first two chapters for Unit I)
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications,

2017.(Chapters 1–7 for Units II and III)
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Chapters 2– 4 for Units IV and V)

Reference Books:

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.

Course Outcomes:

By the end the of the course, the student will be able to

CO1: Gain knowledge in the basic concepts of Data Analysis

CO2: Acquire skills in data preparatory and preprocessing steps

CO3: Learn the tools and packages in Python for data science

CO4: Gain understanding in classification and Regression Model

CO5: Acquire knowledge in data interpretation and visualization techniques

CO-PO-PSO Mapping Matrix:

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO -1	2										2		1	2
CO -2	2	2									2		1	1
CO -3	2	2	2								1	2	2	2
CO -4	-		1								2	2	2	2
CO -5	-		2								2	2	2	2

MICRO SYLLABUS

UNIT-I: Introduction: Need for data science – benefits and uses – facets of data – data science process – setting their search goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

Unit	**Module**	**Micro content**	**No of hrs**
Introduction to Data Science	Introduction to Data Science	Scalars, Vectors, Matrices and Tensors, Matrix operations, types	2

		of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.	
	Data Operations	retrieving data – cleansing, integrating, and transforming data – exploratory data analysis	2
	Building Models	build the models – presenting and building applications.	2

UNIT-II: Describing Data I: Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs –averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range –variability for qualitative and ranked data.

Unit	Module	Micro content	No of hrs
Describing Data I	Frequency distributions	Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions	5
	Numerical methods	graphs –averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range –variability for qualitative and ranked data.	3

UNIT-III: Python for Data Handling: Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing – combining datasets –aggregation and grouping – pivot tables.

Unit	Module	Micro content	No of hrs
Python for Data Handling	Basics of Numpy arrays	Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, Boolean logic – fancy indexing – structured	3

		arrays	
	Data manipulation with Pandas	Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing	3
	combining datasets	combining datasets – aggregation and grouping – pivot tables	2

UNIT-IV: Describing Data II: Normal distributions – z scores – normal curve problems– finding proportions – finding scores –more about z scores – correlation – scatter plots – correlation coefficient for quantitative data –computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2– multiple regression equations –regression toward the mean.

Unit	Module	Micro content	No of hrs
Describing Data II	Normal distributions	Normal distributions – z scores – normal curve problems– finding proportions – finding scores –more about z scores	3
	Correlation	correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient	3
	Regression	regression – regression line – least squares regression line – standard error of estimate – interpretation of r2– multiple regression equations –regression toward the mean	4

UNIT-V: **Python for Data Visualization:** Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three dimensional plotting – geographic data – data analysis using state models and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh

Unit	Module	Micro content	No of hrs
Python for Data Visualization	Visualization	Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density	3
	Three-dimensional plotting	three-dimensional plotting – geographic data	2
	Data Analysis Models	data analysis using state models and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh	3

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IV Year I- Semester	Name of the Course	L	T	P	C
OE4102	Blockchain Applications using Solidity Open Elective IV/Job Oriented Course IV	**3**	**0**	**0**	**3**
Prerequisites: Crytography, Java Programming					

COURSE OUTCOMES

CO1: Infer and explore the working of Blockchain technology (Understanding)

CO2: Differentiate the working of Smart Contracts (Analyze)

CO3: identifies and illustrates the working of Hyperledger (Analyze).

CO4: Demonstrates the learning of solidity and de-centralized apps on Ethereum (Apply).

CO5: Interprets various applications

UNIT -1

Introduction of Cryptography and Blockchain: What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain

UNIT -2

BitCoin and Cryptocurrency: What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency

UNIT -3

Introduction to Ethereum: What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Meta mask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction? Smart Contracts

UNIT -4

Solidity Programming: Solidity – Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)

UNIT -5

Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

TEXT Books:

1.Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran,2017.

2.Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.

3.Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.

MICRO SYLLABUS

Introduction to Blockchain: What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.		
Unit No.	**Topic**	**Sub Topic**
I	**INTRODUCTION TO BLOCKCHAIN**	What is Blockchain
		Blockchain Technology Mechanisms
		Networks, Blockchain Origins
		Objective of Blockchain
		Blockchain Challenges
		Transactions and Blocks
		P2P Systems
		Keys as Identity
		Digital Signatures
		Hashing, and public key cryptosystems
		private vs. public Blockchain
BitCoin and Cryptocurrency: What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency.		
II	**BITCOIN AND CRYPTOCURRENCY**	What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process
		Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks

		Ethereum Virtual Machine (EVM), Merkle Tree
		Double-Spend Problem, Blockchain and Digital Currency
		Transactional Blocks
		Impact of Blockchain Technology on Cryptocurrency.

Introduction to Ethereum: What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Meta mask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction? Smart Contracts

Unit No.	Topic	Sub Topic
III	INTRODUCTION TO ETHEREUM	What is Ethereum, Introduction to Ethereum
		Consensus Mechanisms
		How Smart Contracts Work
		Meta mask Setup
		Ethereum Accounts
		Receiving Ether's What's a Transaction? Smart Contracts

Solidity Programming: Solidity – Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)

Unit No.	Topic	Sub Topic
IV	SOLIDITY PROGRAMMING	Solidity – Language of Smart Contracts, Installing Solidity & Ethereum Wallet
		Basics of Solidity, Layout of a Solidity Source File
		Structure of Smart Contracts
		General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)

Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

Unit No.	Topic	Sub Topic
V	BLOCKCHAIN APPLICATIONS	Internet of Things
		Medical Record Management System
		Domain Name Service and Future of Blockchain
		Alt Coins.

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IV Year I- Semester	Name of the Course	L	T	P	C
SAC4101	Selenium /Salesforce Automation/PowerBI	**0**	**0**	**4**	**2**
Prerequisites: Software Engineering, Software Testing Methodologies					