COURSE STRUCTURE

(R19 Regulations)

INFORMATION TECHNOLOGY

FOR

B.Tech., FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2019-20)

VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY

NAMBUR, PEDA KAKANI MANDAL, GUNTUR-522508

An Autonomous Institution, Approved by AICTE,

All Courses Accredited by NBA & NAAC with 'A' Grade, Permanently Affiliated to JNTUK University

COURSE STRUCTURE

I Year I Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	HS	Communicative English (Common to ALL)	3	0	0	3
2	BS	Mathematics – I (Common to ALL)	3	0	0	3
3	BS	Applied Chemistry	3	0	0	3
4	ES	Programming for Problem Solving Using C (Common to ALL)	3	0	0	3
5	ES	Engineering Workshop (Common to CE, CSE & IT)	0	0	3	1.5
6	HS	Communicative English Lab-I (Common to ALL)	0	0	3	1.5
7	BS	Applied Chemistry Lab	0	0	3	1.5
8	ES	Programming for Problem Solving Using C Lab (Common to ALL)	0	0	3	1.5
9	MC	Environmental Studies (Common to CE, CSE & IT)	3	0	0	0
Total Credits						**18**

I Year II Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	BS	Mathematics - II (Common to ALL)	3	0	0	3
2	BS	Mathematics - III (Common to ALL)	3	0	0	3
3	BS	Applied Physics	3	0	0	3
4	ES	Python Programming	3	0	0	3
5	ES	Basics of Electrical & Electronics Engineering	2	1	0	3
6	HS	Communicative English Lab - II (Common to ALL)	0	0	3	1.5
7	BS	Applied Physics Lab	0	0	3	1.5
8	ES	Python Programming Lab	0	0	3	1.5
9	ES	Engineering Graphics and Design	1	0	3	2.5
10	MC	Constitution of India (Common to CE, CSE & IT)	3	0	0	0
Total Credits						**22**

II Year I Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	BS	Probability & Statistics	3	0	0	3
2	PC	Mathematical Foundation of Computer Science	3	0	0	3
3	ES	Digital Logic Design	3	0	0	3
4	PC	Data Structures	3	0	0	3
5	PC	Java Programming	3	0	0	3
6	PC	Data Structures Lab	0	0	0	1.5
7	PC	Java programming Lab	0	0	3	1.5
8	MC	Employability Skills-I	3	0	0	0
9	MC	Essence of Indian Traditional Knowledge (Common to ALL)	2	0	0	0
Total Credits						**18**

II Year II Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	PC	Advanced Data Structures	3	0	0	3
2	PC	Software Engineering	3	0	0	3
3	PC	Operating Systems	3	1	0	3
4	PC	Data Base Management Systems	3	0	0	3
5	PC	Computer Organization	3	0	0	3
6	PC	DBMS Lab	0	0	3	1.5
7	PC	Advanced Data Structures Lab	0	0	3	1.5
8	PR	Social Relevant Project	0	0	2	1
9	MC	Professional Ethics and Human Values (Common to CE, CSE & IT)	2	0	0	0
Total Credits						**19**

III Year I Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	PC	Unix and Shell Programming	3	0	0	3
2	HS	Managerial Economics and Financial Analysis (Common to CE, CSE & IT)	3	0	0	3
3	PC	Advanced Java Programming	3	0	0	3
4	PC	Artificial Intelligence	3	0	0	3
5	PC	Design and Analysis of Algorithms	3	0	0	3
6	PC	Unix and Shell Programming Lab	0	0	3	1.5
7	PC	Advanced Java Programming Lab	0	0	3	1.5
8	PC	Artificial Intelligence Lab	0	0	3	1.5
9	MC	Employability Skills –II	3	0	0	0
Total Credits						**19.5**

III Year II Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	PC	Data Warehousing and Data Mining	3	0	0	3
2	PC	Computer Networks	3	0	0	3
3	PC	Theory of Computation	3	0	0	3
4	PC	Web Technologies	3	0	0	3
5	PE	Professional Elective-I	3	0	0	3
6	PE	Professional Elective-II** MOOCS/NPTEL/SWAYAM- 12weeks duration	3	0	0	3
7	PC	Web Technologies Lab	0	0	3	1.5
8	PC	Data Mining Lab	0	0	3	1.5
9	PR	Industrial Training/Internship	0	0	0	2.5
Total Credits						**23.5**

IV Year I Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	PC	Cryptography and Network Security	3	0	0	3
2	PC	Machine Learning	3	0	0	3
3	PC	Mobile Computing	3	0	0	3
4	OE	Open Elective-I	3	0	0	3
5	PE	Professional Elective –III	3	0	0	3
6	PC	Mobile Application Development Lab	0	0	3	1.5
7	PC	UML Lab	0	0	3	1.5
8	PR	Project- I	0	0	0	3
9	MC	IPR and Patents (Common to CE, CSE & IT)	3	0	0	0
Total Credits						**21**

IV Year II Semester						
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	HS	Management and Organizational Behaviour	3	0	0	3
2	OE	Open Elective –II	3	0	0	3
3	PE	Professional Elective IV** MOOCS/NPTEL/SWAYAM- 12weeks duration	3	0	0	3
4	PE	Professional Elective- V	3	0	0	3
5	PR	Project – II	0	0	14	7
Total Credits						**19**

PROFESSIONAL ELECTIVES

Professional Elective- I	Professional Elective - II	Professional Elective- III	Professional Elective- IV	Professional Elective- V
Software Testing Methodologies	**Can be contemporary Online Certification Courses which are conducted under standard technical bodies or higher learning institutions such as NPTEL, UDACITY, MOOCS by JNTUK etc.	Software Project Management	Object Oriented Analysis and Design	Devops
No SQL Databases		Big Data Analytics	Data Science	Deep Learning
Computer Graphics		Internet of Things	Multimedia and Animation	Biometrics
Full Stack - I		Cloud Computing	Full Stack II	Image Processing
Distributed Systems		Network Programming	Block chain Technologies	Cyber Security and Forensics

OPEN ELECTIVES

Open Elective- I	Open Elective- II
Number theory and cryptanalysis	Statistics with R
Supply Chain Management	Fuzzy Sets, Logic and Systems
MATLAB for Engineering Applications	Entrepreneurship
Operations Management	Optimization Techniques
Green Buildings	Environmental Pollution and Control
	Remote Sensing and GIS Applications

I- Year I- Semester	Name of the Course	L	T	P	C
HS1101	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

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 (L3)
CO2. formulate sentences using proper grammatical structures and correct word forms (L3)
CO3. speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
CO4. write summaries based on global comprehension of reading/listening texts (L3)
CO5. produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
CO6. take notes while listening to a talk/lecture to answer questions (L3)

Syllabus Blueprint

Contents	Learning Outcomes	Bloom's Level	No of Hrs
Unit-1 **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.	1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English 2. ask &answer general questions on familiar topics 3. employ suitable strategies for skimming &scanning to get the general idea of a text and specific information	L3 L2 L3	10

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: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.	4. recognize paragraph structure with beginnings/endings 5. form sentences using proper grammatical structures and correct word forms	L3 L3	
Unit-2 **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, sign posts and transition signals; use of articles and zero article; prepositions.	1. comprehend short talks on general topics 2. speak clearly on a specific topic using suitable discourse markers in informal discussions 3. understand the use of cohesive devices for better reading comprehension 4. write well-structured paragraphs on specific topics 5. make necessary grammatical corrections in short texts	L2 L3 L2 L3 L3	10
Unit-3 **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	1. summarize the content with clarity &precision from short talks 2. report what is discussed in informal discussions 3. infer meanings of unfamiliar words using contextual clues	L3 L3 L3	10

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.	4. write summaries based on global comprehension of reading/ listening texts 5. use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing	L3 L3	
Unit-4 **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	1. infer &predict about content of spoken discourse 2. engage in formal/informal conversationsunderstanding verbal &non-verbal features of communication 3. interpret graphic elements used in academic texts 4. produce a coherent paragraph interpreting a figure / graph / chart / table 5. use language appropriate for description and interpretation of graphical elements	L4 L3 L2 L4 L4	10
Unit-5 **Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.	1. take notes while listening to a talk/lecture to answer questions 2. make formal oral presentations using effective strategies	L3 L3	10

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)	3. produce a well-organized essay with adequate details 4. edit short texts by correcting common errors	L3 L4	

Detailed Syllabus

Unit 1 A Proposal to Girdle the Earth (Excerpt) by Nellie Bly
Theme: Exploration
1. "How to Fashion Your Own Brand of Success" by Howard Whitman
2. "How to Recognize Your Failure Symptoms" by Dorothea Brande
Listening

- identifying thetopic, the context and specific pieces of information

Speaking

- introducing oneself and others

Reading

- skimming for main ideas
- scanning for specific pieces of information

Writing/ Reading for Writing

- paragraphs, beginnings, introducing the topic, key words, main idea

Grammar and Vocabulary

- content words and function words
- word forms: verbs, nouns, adjectives and adverbs
- nouns: countable and uncountable; singular and plural forms
- basic sentence structures; simple question form: why-questions; word order in sentences

Learning Outcomes

- understand social or transactional dialogues spoken by native and non-native speakers of English and identify the context, topic, and pieces of specific information.
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match headings/main ideas with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2 An excerpt from The District School As It Was by One Who Went to It by Warren Burton
Theme: On Campus

3. **"How to Conquer the Ten Most Common Causes of Failure" by Lois Binstock**
4. **"How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz**

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; preparing and delivering short structured talks using suitable cohesive devices

Reading

- identifying sequence of ideas
- recognizing verbal techniques that help link the ideas in a paragraph

Writing/ Reading for Writing

- paragraph writing (specific topics) using suitable cohesive devices; using key words/phrases and organizing points in a coherent manner
- mechanics of writing: punctuation, capital letters

Grammar and Vocabulary

- cohesive devices-linkers, sign posts and transition signals
- use of articles and zero articles
- prepositions

Learning Outcomes

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well-structured paragraphs on specific topics using suitable cohesive devices
- identify basic errors of grammar/usage and make necessary corrections in short texts

Unit 3 The Future of Work?

Theme: Working Together

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**

Listening

- listening for global comprehension
- summarizing what is listened to

Speaking

- discussing specific topics in pairs/ small groups
- 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/ Reading for Writing

- summarizing-identifying main idea/s
- 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

Learning Outcomes

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what discussed

- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structure and a range of reporting verbs in speech and writing.

Unit 4 H.G Wells and the Uncertainties of Progress by Peter J. Bowler
Theme: Fabric of Change

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**

Listening

- making predictions while listening to conversations/transactional dialogues without video
- listening with video

Speaking

- role plays for practice of conversational English in social and academic contexts (formal & informal)
- asking for and giving information/directions/instructions/suggestions

Reading

- understand and interpret graphic elements used in texts (convey information, reveal trends/patterns/relationships, communicate processes or display data)

Writing/ Reading for 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

Learning Outcomes

- make inferences and predictions while listening to spoken discourse
- understand verbal and non-verbal features of communication and hold formal / informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5 Leaves from the Mental Portfolio of a Eurasian by Sui Sin Far
Theme: Tools for Life
9."How to Become a Self-Motivator" by Charles T Jones
10. "How to Eliminate Your Bad Habits"byOgMandino

Listening

- identifying the key terms
- understanding concepts
- 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/ Reading for Writing

- writing structured essays on specific topics using suitable claims and evidences

Grammar and Vocabulary

- reinforcing learning: articles, prepositions, tenses, subject-verb agreement

Learning Outcomes

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts oral and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Books

1.*English All Round: Communication Skills for Undergraduate Learners-Volume 1*, Orient Black Swan, 2019 (to be released)
2.*University of Success* by Og Mandino, 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.

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

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I- Year I- Semester	Name of the Course	L	T	P	C
BS1101	Mathematics-I	3	0	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 $x^n V(x)$ - 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

- solve the differential equations related to various engineering fields.
- utilize mean value theorems to real life problems.
- familiarize with functions of several variables which is useful in optimization.
- apply double integration techniques in evaluating areas bounded by region.
- 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 degree	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 $x^n V(x)$ - 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	Cauchy's mean value theorem
		Taylor's expansions of $f(x)$

Mean value theorems		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

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

Course Objectives:

- Significance and use of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells.
- Understand the mechanism of corrosion and how it can be prevented.
- Importance of advanced materials and their engineering applications.
- Differentiate and discuss the materials used in major industries like steel industry, metallurgical industries, construction industries, electrical equipments and manufacturing industries. Lubrication is also summarized.
- Essentiality of fuel technology.
- Need of water purification and importance of various water purification methods.

Course Outcomes:

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

1. explain the preparation, properties and applications of thermoplastics, thermosettings, elastomers and conducting polymers.
2. know the importance of various materials and their uses in the construction of batteries and fuel cells.
3. know the applications of advanced materials in various industries.
4. apply the principles of supramolecular chemistry in the applications of molecular machines, need of green chemistry.
5. explain the principles of spectrometry such as UV, IR, and NMR.

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-II

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-III

Chemistry of Materials **(12 hrs)**

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 ablation method, and applications.

Refractories: Definition , classification, properties (refractoriness, refractoriness under load, porosity and thermal spalling), failure of refractories.

Lubricants: Definition, mechanism of lubricants and properties (definition and importance).

Cement: Constituents, manufacturing, parameters to characterize the Clinker formation: lime saturation factor (LSF), silica ratio (SR), and alumina ratio (AR). Chemistry of setting and hardening, deterioration of cement.

UNIT-IV

Fuels **(12 hrs)**

Introduction-calorific value - HCV and LCV – problems using Dulong's formula – proximate and ultimate analysis of coal sample – significance of these analysis – problems – petroleum (refining – cracking) – synthetic petrol (Fischer-Tropsch & Bergius) – petrol knocking, diesel knocking – octane and cetane rating – anti-knocking agents – introduction to alternative fuels (bio-diesel, ethanol, methanol, natural gas, LPG, CNG) – Flue gas analysis by Orsat apparatus – rocket fuels.

UNIT-V

Water Technology **(12 hrs)**

Hardness of water – determination of hardness by complexometric method – boiler troubles (priming and foaming, scale formation, boiler corrosion, caustic embrittlement) – internal treatments – softening of hard water (zeolite process and ion exchange process) – treatment of industrial waste water – potable water and its specifications – steps involved in purification of water – chlorination, break point chlorination – reverse osmosis and electro dialysis.

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.

Engineering Chemistry by Prasanth Rath, B. Ramadevi, Ch. Venkata Ramana Reddy, Subendu Chakravarthy; Cengage Publications, 2019 Edition.

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.

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					

I- Year I- Semester	Name of the Course	L	T	P	C
ES1101	Programming for Problem Solving Using C	3	0	0	3

Course Objectives:

1. To familiarize to notion of an algorithm, editing and executing programs in Linux.
2. To Understanding branching, iteration.
3. To represent Data using arrays.
4. To use Modular programming and recursive solution formulation.
5. To familiarize pointers and dynamic memory allocation.
6. To handle data through files

UNIT-I: Introduction to C

Introduction to Computers: hardware, Memory hierarchy, Types of Computers, Types of Software – Operating Systems, Translators, Device drivers and packages. Algorithms and its characteristics, Program development steps. Structure of a C program, Features of C, The main () Function, Standard I/O functions.

Programming Style - Indentation, Comments, Identifiers, Data Types**,** Operators, Precedence and Associativity. Variables and Declarations, Format Modifiers, Escape Sequences, Types of Statements

Casting - Implicit Type Conversions, Explicit Type Conversions, Mathematical Library Functions

UNIT-II: Control Flow & Modules

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pre-test and Post-test Loops, Counter-Controlled andCondition-Controlled Loops, for, while and do while.

Branching: break & continue.

Modular Programming: Function and Parameter Declarations, Returning a Value, Types of parameters. Parameter – scalar data as argument.

Recursion: Definition, Base condition for recursion, Mathematical Recursion, Recursion versus Iteration.

UNIT-III Arrays & Strings

Arrays: Introduction to Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices, 1D & 2D arrays as arguments.

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions, Strings as arguments.

Unit – IV Pointers & Structures

Pointers: Concept of a Pointer, Initialization of Pointer variables, Pointers as function arguments, Passing by address, Dangling memory, Pointer Arithmetic, Character pointers, Pointers to Pointers, Array of pointers & Pointer to array, Dynamic memory management functions, Command line Arguments.

Structures: Derived types, Structure's declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, enum, bit-fields.

UNIT-V: Files

Storage classes – auto, static, extern, register. Pre-processor statements

Data Files: Declaring, Opening, and Closing File Streams, File handling functions, Reading from and Writing to Text Files, File copy, merge, Writing and reading records, Random File Access.

Text Books:

1. ANSI C Programming, E Balaguruswamy, Mc-GrawHill, 5th Edition
2. ANSI C Programming, Gary J. Bronson, Cengage Learning.
3. Programming in C, ReemaThareja, OXFORD Publications

Reference Books:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Let us C, YashwantKanetkar, BPB Publications
3. Mastering in C, KR Venu Gopal, TMH

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

CO 1: Understand algorithms and basic terminology of C

CO 2: Solve problems using control structures and modular approach

CO 3: Make use of 1D and 2D arrays along with strings for linear data handling

CO 4: Determine the use of pointers and structures

CO 5: Implement various operations on data files.

Correlation of Course Outcomes with Program Outcomes

	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
CO5	2	2	2	2	-	-	-	-	2	1	2	2	1	2

Micro-Syllabus of Programming for Problem Solving Using C

UNIT I: Introduction to Computers: Hardware, Memory hierarchy, Types of Computers, Types of Software – Operating Systems, Translators, Device drivers and packages. Algorithms and its characteristics, Program development steps. Structure of a C program, Features of C, The main () Function, Standard I/O functions.
Programming Style - Indentation, Comments, Identifiers, Data Types**,** Operators, Precedence and Associativity. Variables and Declarations, Format Modifiers, Escape Sequences, Types of Statements
Casting - Implicit Type Conversions, Explicit Type Conversions, Mathematical Library Functions

Unit	Module	Micro content
Introduction to C	Introduction to Computers	Components of Computer: Hardware & Software
		Algorithm and its characteristics
		Program development steps
		Structure of a C Program
		Features of C
		The main () function and standard I/O functions
	Programming Style	Indentation, Comments, Identifiers, Data Types
		Operators, Precedence and Associativity. Variables and Declarations
		Format Modifiers, Escape Sequences
		Types of Statements
	Casting	Implicit Type Conversions
		Explicit Type Conversions
		Mathematical Library Functions

UNIT II: Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pre-test and Post-test Loops, Counter-Controlled andCondition-Controlled Loops, for, while and do while.
Branching: break & continue.
Modular Programming: Function and Parameter Declarations, Returning a Value, Types of parameters. Parameter – scalar data as argument.
Recursion: Definition, Base condition for recursion, Mathematical Recursion, Recursion versus Iteration.

Unit	Module	Micro content
Control Flow & Modular Programming	Selection Statements	if else, nested if examples
		Multi Way Selection: switch, else if examples
	Iterative Statements	Counter Controlled Loops
		Logic Controlled Loops
	Unconditional Branching	Break & Continue
	Modular Programming	Function and Parameter Declarations
		Returning a Value
		Types of parameters. Parameter – scalar data as argument.
	Recursion	Definition, Base condition for recursion
		Mathematical Recursion
		Recursion versus Iteration

UNIT III: Arrays: Introduction to Arrays, Input and Output of Array Values, Array Initialization, Arraysas Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices, 1D & 2D arrays as arguments.
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions, Strings as arguments.

Unit	Module	Micro content
Arrays & Strings	Arrays	Introduction to Arrays, Input and Output of Array Values, Array Initialization
		Arraysas Function Arguments
		Two-Dimensional Arrays, Larger Dimensional Arrays
		Matrices, 1D & 2D arrays as arguments
	Strings	String Fundamentals, String Input and Output
		String Processing, Library Functions
		Strings as arguments

UNIT IV: Pointers: Concept of a Pointer, Initialization of Pointer variables, Pointers as function arguments,Passing by address, Dangling memory, Pointer Arithmetic, Character pointers, Pointers to Pointers, Array of pointers & Pointer to array, Dynamic memory management functions, Command line Arguments.
Structures: Derived types, Structures declaration, Initialization of structures, accessing structures,nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, enum, bit-fields.

Unit	Module	Micro content
Pointers and Structures	Pointers	Concept of a Pointer, Initialization of Pointer variables
		Pointers as function arguments,Passing by address
		Dangling memory, Pointer Arithmetic, Character pointers
		Pointers to Pointers
		Dynamic Memory Allocation
		Pointer to Arrays and Array of Pointers
	Command line Arguments	Command line Arguments
	Structures	Derived types, Structures declaration, Initialization of structures
		Accessing structures,nested structures, arrays of structures
		structures and functions, pointers to structures, self-referential structures
		Unions, typedef, enum, bit-fields.

UNIT V: Storage classes – auto, static, extern, register. Preproessor statements
Data Files: Declaring, Opening, and Closing File Streams, File handling functions, Reading from and Writing to TextFiles, File copy, merge, Writing and reading records, Random File Access.

Unit	Module	Micro content
Storage Classes and Files	Storage Classes	auto, static, extern and register
	Preprocessor Statements	Preprocessor Statements
	Data Files	Declaring, Opening, and Closing File Streams
		File handling functions, Reading from and Writing to TextFiles
		File copy, merge, Writing and reading records
		Random File Access

I- Year I- Semester	Name of the Course	L	T	P	C
ES1101L	Engineering Workshop	0	0	3	1.5

Course Objective: To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Dovetail joint
c) Bridle joint

Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) square fit d) Semi-circular e) Two Wheeler tyre puncture and change of two wheeler tyre

Electrical Wiring: Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light

e) Three phase motor f) Soldering of wires

Course Outcomes: After completion of this lab the student will be able to

1. Apply wood working skills in real world applications. (L3)
2. Build different parts with metal sheets in real world applications. (L3)
3. Apply fitting operations in various applications. (L3)
4. Apply different types of basic electric circuit connections. (L3)
5. Demonstrate soldering and brazing. (L2)

CO-PO 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**	**PSO 2**
CO 1	2	2	-	-	-	-	-	-	-	-	-	1	2	2
CO 2	2	2	-	-	-	-	-	-	-	-	-	1	2	2
CO 3	2	2	-	-	-	-	-	-	-	-	-	1	2	2
CO 4	2	2	-	-	-	-	-	-	-	-	-	1	2	2
CO 5	2	2	-	-	-	-	-	-	-	-	-	1	2	2

I- Year I- Semester	Name of the Course	L	T	P	C
HS1101L	Communicative English Lab I	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

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)

CO4. 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

Detailed Syllabus

CALL based activity. English course books selected for classroom teaching will be used for practice in the computer-based language labs. However, a brief introduction to the English Phonetics will be given to the students. Activities that encourage individual learning of the students based on the suggested texts and web resources will be used in the practical sessions.

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.

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 Dorthea Brand
3. "How to Conquer the Ten Most Common Causes of Failure" by Lois 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 Tom Rust and Randy Reed
9. "How to Become a Self-Motivator" by Charles T Jones
10. "How to Eliminate Your Bad Habits" by OgMandino

Text Books

1. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019 (to be released)
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-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/shortstories.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/	

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 .

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)

Note: Choice of any 10 experiments from the above.

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

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

Reference Books:

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

Learning 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.

Course Outcomes:

At the end of the course, the students will be able

- To estimate the amount of metal ions present in different solutions (L4 & L3)
- To analyze the quality parameters of water (L4)
- 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			

I- Year I- Semester	Name of the Course	L	T	P	C
ES1101L	Programming for 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 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.

b) Write a C Program to find second biggest of three numbers (Assume that all the numbers are unique).

Exercise – 2 Control Flow - II

b) Write a C Program to Find Whether the Given Number is

i) Prime Number

ii) Armstrong Number

Exercise – 3 Control Flow - III

a) Write a C program to print Floyd Triangle

b) Write a C Program to print Pascal Triangle

c) Write a C program to display a Pyramid

Exercise – 4 Arrays - Demonstration of arrays

a) Search-Linear.

b) Sorting-Bubble

c) Operations on Matrix. - Add, Subtract, Multiply

Exercise – 5 Strings

a) Implementation of string manipulation operations **with** library function: Copy, length, compare

b) Implementation of string manipulation operations **without** library function: copy, length, compare

Exercise – 6 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 7 Functions - Continued

Write a C Program to compute the values of sin x and cos x and ex values using Series expansion. (Use factorial function)

Exercise - 8 Arrays, Strings and Pointers

a) Write a C Program to find min and max of an array of elements using pointers

b) Write a C Program to concatenate one string to another using pointer.

Exercise – 9 Dynamic Memory Allocations

Write a C program to represent 1D and 2D arrays using malloc () function.

Exercises - 10 Structures

a) Write a C Program to Store Information of a Movie Using Structure

b) Write a C Program to sort a set of student records in ascending order.

c) Write a C Program to Add, subtract & multiply Two Complex Numbers.

Exercise -11 Files

a) Write a C programming code to open a file and to print it contents on screen.

b) Write a C program to copy the content of one file to another.

C) Write a C program merges two files and stores their contents in another file

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

1. **Comprehend** the various concepts of a C language
2. **Develop** algorithms and flowcharts
3. **Design** and development of C problem solving skills.
4. **Acquire** modular programming skills.

Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes

	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

I- Year I- Semester	Name of the Course	L	T	P	C
MC1101	Environmental Science	2	0	0	0

OBJECTIVE:
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 – I: 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:

LEARNING OUTCOMES
Students will be able to
1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer's perception of environmental problems and solutions.

UNIT – II: 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.

LEARNING OUTCOMES
Students will be able to
1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behaviour.

UNIT – III: 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.

LEARNING OUTCOMES UNIT-3

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

UNIT – IV: Social Issues and the Environment

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.

LEARNING OUTCOMES:

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.

UNIT – V: Human Population and the Environment

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.

LEARNING OUTCOMES

Students will have

1. knowledge about watershed management and environmental ethics.

2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.AzeemUnnisa, 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 byJ.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

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I- Year II- Semester	Name of the Course	L	T	P	C
BS1201	Mathematics-II	3	0	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: (10 hrs)

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: (12 hrs)

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: (10 hrs)

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: (14 hrs)

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: (14 hrs)

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, 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

- Evaluate approximate in the roots of polynomial and transcendental equations by different algorithms (EVALUATE)
- 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)
- 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)
- Find or compute the Fourier series of periodic signals (SOLVE ,APPLY, FIND, ANALYSE)
- 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

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. Solving given polynomial	Numerical solution of algebraic and transcendental polynomials	Bisection method
		Method of false position
		Iteration method
		Newton-Raphson's method
1b 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
2a.	Finite difference tables	Forward, backward & central difference tables

Equal-Spaced 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
2b. Unequal spaced data & relation between various operators	Unequal spaced data & relation between various operators	Lagrange's interpolation formula
		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
3a. Numerical integration	Numerical Integration	Trapezoidal rule
		Simpson's $1/3^{rd}$ rule
		Simpson's $3/8^{th}$
3b. 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
4a Laplace Transforms	Laplace transforms and theorem	Shifting theorems
		Derivatives and integrals
		Multiplication and division
4b. 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
5a. Fourier Series	Fourier Series	Periodic functions
		Dirichlet's conditions
		Even and odd function's
		Change of interval
		Half range sine and cosine series
5b. 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

I- Year II- Semester	Name of the Course	L	T	P	C
BS1202	Mathematics-III	3	0	0	3

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 (12 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: (12 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: (10 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: (12 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 (14 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:

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

Reference Books:

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

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

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- solve system of linear algebraic equations using Gauss elimination, Gauss Jordan (L3)
- to interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L5)
- 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
	Cayley-Hamilton theorem	Verify Cayley-Hamilton theorem for given matrix A and hence find A^{-1} or A^4.
	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 integraton, 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 throem.	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 PDE	Solve first order linear 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 $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

I- Year II- Semester	Name of the Course	L	T	P	C
BS1203	Applied Physics	3	0	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-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– 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-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-Dielectricpolarization Dielectricpolarizability, Susceptibility and Dielectricconstant- 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– 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– 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-Densityof charge carriers- Dependence of Fermi energy on carrier concentration and temperature-Halleffect-HallcoefficientApplicationsofHalleffect- 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

1. **Understand** the principles such as interference and diffraction to design and enhance the resolving power of various optical instruments.
2. **Learn** the basic concepts of LASER light Sources and Apply them to holography
3. **Study** the magnetic and dielectric materials to enhance the utility aspects of materials.
4. **Analyze** acoustic properties of typically used materials in buildings
5. **Understand** the concepts of shearing force and moment of inertia

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 Applied Physics
(Common to CSE, CSO, AID, CSM, CIC & IT Branches)
I B.Tech II Semester

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	PrincipleofSuperposition&Interferenceof light	Introduction to interference
		Principle of superposition
		Coherence
		ConditionsforsustainedInterference
	Interferencein 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'scoefficients
		Populationinversion
		Pumping mechanisms
	LASERS construction and working	Rubylaser
		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 hologram	Construction of hologram
		Reconstruction of 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- Dielectricpolarization- Dielectricpolarizability,SusceptibilityandDielectricconstant- 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
		Originofmagneticmoment
		Bohr magneton
	Classification of magnetic materials	Dia magnetic materials
		Para magnetic materials
		Ferro magnetic materials
	Domain concept of Ferromagnetism & Hysteresis	Domain concept of Ferromagnetism
		HysteresisCurve (B-H Curve)
		Soft and hard magnetic materials classification based on HysteresisCurve
		Applications of magnetic materials
	Introduction& definitions	Introduction to dielectrics

IIIb.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 Internalfieldsinsolids
		Clausius-Mossotti'sequation
		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 experiment & G.P.Thomson experiment	Davisson and Germer's experiment
		G. P. Thomson experiment
		Heisenberg's uncertainty principle
	Schrödinger wave function & equations	Schrödinger's wave function and it's physical significance
		SchrodingerTimeIndependent wave equation
		SchrodingerTimeDependentwave equation
		Application to particle inone dimensionalbox

Unit– V: Semiconductor Physics

Originofenergybands(qualitative) -Classificationofsolidsbasedonenergybands– Intrinsicsemiconductors-densityof charge carriers –Electricalconductivity-Fermi level - extrinsicsemiconductors-P-type&N-type-Densityof chargecarriers-DependenceofFermienergyoncarrierconcentrationandtemperature-Halleffect-Hallcoefficient-ApplicationsofHalleffect- Drift and Diffusion currents - Einstein's equation.

Unit	Module	Micro content
V.Semiconductor Physics	Originofenergybands	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& extrinsicsemiconductors	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

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

Course Objectives:

- Introduction to Scripting Language
- Use various data handling mechanisms
- Exposure to various problems solving approaches of computer science

UNIT – I

Introduction (8 hrs)

History of Python, Need of Python Programming, differences between C and Python, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions.

UNIT – II

Flow Control & Data Structures (14 hrs)

Control Flow - order of evaluations Control Flow- if, if-elseif, for, while, break, continue, pass

Data Structures- Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – III

Modules & Packages (10 hrs)

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing.

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

UNIT – IV

OOPs (12 hrs)

Object Oriented Programming in Python: Definition, advantages of OOPs, OOPs principles, Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, and Data hiding.

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

UNIT – V

STL (8 hrs)

Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books

1. *Python Programming: A Modern Approach*, Vamsi Kurama, Pearson

2. *Learning Python*, Mark Lutz, Orielly

Reference Books

1. *Think Python*, Allen Downey, Green Tea Press
2. *Core Python Programming*, W.Chun, Pearson.
3. *Introduction to Python*, Kenneth A. Lambert, Cengage.

Course Outcomes:

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

- Understand the need and the Jargon of Python language
- Experiment with various Data structures in interpreted Language.
- Build modules and packages for real software needs.
- Implement object oriented principles in Python
- Identify solutions using GUI and testing mechanisms.

CO – PO Mapping:

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	1	2	2	1	-	-	-	-	-	-	-	-
CO2	1	2	2	1	-	-	-	-	-	-	-	-
CO3	1	3	3	2	1	-	-	-	-	-	-	-
CO4	1	2	2	2	1	-	-	-	-	-	-	-
CO5	1	2	2	2	1	-	-	-	-	-	-	1

Micro-Syllabus of PYTHON PROGRAMMING

I B.Tech II Semester

UNIT I

Introduction: History of Python, Need of Python Programming, differences between C and Python, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions.

Unit	Module	Micro content
Introduction to Python Language	Introduction	History of Python
		Need of Python Programming
		Differences b/w C and Python, Applications
		Python Shell, Running Python Scripts
		Variables
		Input-Output

		Indentation
	Types & Operators	Integers, Strings, Booleans
		Operators
		Membership operators
		Expressions

UNIT – II

Control Flow - order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

Data Structures- Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

Unit	Module	Micro content
Control Statements and Data Structures	Control Flow	Order of Evaluations
		if and if else statement
		for , While loop, break, continue, pass
	Data Structures	Lists, Tuples
		Dictionaries
		Comprehensions

UNIT III

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing.

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

Unit	Module	Micro content
Functions and Modules	Functions	Defining, Calling and Passing Arguments to functions
		Types of Arguments
		Scope and life time of variables
		Global and Local Variables
	Modules and Python Packages	Creating Modules
		Import statements, from and name spacing
		Introduction to PIP
		Installing packages using PIP
		Packages and their usage.

UNIT IV

Object Oriented Programming in Python: Definition, advantages of OOPs, OOPs principles, Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, and Data hiding.

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

Unit	Module	Micro content

Object Oriented Programming and Exception Handling	Object Oriented Programming	Advantages of OOP, self-variable
		Methods, constructors, inheritance, Data hiding and Overriding Methods
	Error and Exceptions	Difference between error and exceptions
		Handling Exception, Raising exception
		User defined Exception

UNIT V

Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Testing: Why testing is required? Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Unit	**Module**	**Micro content**
GUI and Programming Testing	Standard Library	OS Interface, Pattern Matching
		Internet Access, Dates and Times
		Data Compression
		Multithreading, GUI and Turtle Graphics
	Testing	Why Testing is required.
		Basic Concepts of Testing, Unit Testing
		Writing Test cases, Running Test Cases

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I- Year II- Semester	Name of the Course	L	T	P	C
ES1202	Basics of Electrical and 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

- Apply concepts of KVL/KCL in solving DC circuits.(Apply, Find, Solve)
- Choose correct machine for a specific application. (Understand, Apply)
- Illustrate working principles of DC and AC Machines. (Understand, Apply)
- Describe working principles of diodes and transistors. (Understand, Apply)
- 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
AVG	3	2										1

Micro-Syllabus of Basics of 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 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 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**
2.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.
2.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
3.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]
3.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
4.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_{γ},. Reverse breakdown phenomena, Zener diode characteristics
4.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**
5.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
5.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

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

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

Detailed Syllabus

CALL based activity. English course books selected for classroom teaching will be used for practice in thecomputer-based language labs. Watching and listening to Video clips.
Listening Activity: Selected speeches of eminent personalities, audio texts, dialogues and discussions
Speaking: JAM, Oral Presentations, Group Discussions
Writing: Different types of reports
Project: Power point presentation of 5 min on a specific topic
Pair work, Role play, conversational practice and Individual speaking activities based on following essays from ***University of Success***.
1. "How to Get Yourself Organized" by Michael LeBeouf
2. "How to Turn Your Desires into Gold" by Napoleon Hill
3. "How to Look Like a Winner How to Increase Your Value" by OgMandino
4. "How to Swap a Losing Strategy" by Auren Uris and Jack Tarrant
5. "How to Bounce Back from Failure" by OgMandino
6. "How to Prevent Your Success from Turning into Ashes" by Allan Fromme
7. "How to Have a Happy Life" by Louis Binstock
8. "How to Keep the Flame of Success Shining Brightly" by Howard Whitman

Any ten Supplementary Language Activities from ***UN Global Goals***document

1. "Developing children's understanding of the Global Goals" by Carol Read
2. "End poverty in all its forms everywhere" by SylwiaZabor-Zakowska
3. "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" by Linda Ruas
   4. 'Ensure healthy lives and promote well-being for all at all ages" by Carmen Flores
5. "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by Daniel Xerri
6. "Achieve gender equality and empower all women and girls" by Jemma Prior and Tessa Woodward

7. “Ensure availability and sustainable management of water and sanitation for all” by Wei KeongToo
8. “Ensure access to affordable, reliable, sustainable and modern energy for all” by Phil Wade
9. “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all” by Nik Peachey
10. “Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation” by MaluSciamarelli
11. “Reduce inequality within and among countries” by Alan Maley
12. “Make cities and human settlements inclusive, safe, resilient and sustainable” by David Brennan
13. “Ensure sustainable consumption and production patterns” by Laszlo Katona and Nora Tartsay
14. “Take urgent action to combat climate change and its impacts” by Maria Theologidou
15. “Conserve and sustainably use the oceans, seas and marine resources for sustainable development” by Jill Hadfield and Charlie Hadfield
16. “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” by ChrysaPapalazarou
17. “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels” by Rebeca
    Duriga
18. “Strengthen the means of implementation and revitalise the global partnership for sustainable development” by Jennifer Verschoor and Anna Maria Menezes
19. “Content and the Sustainable Development Goals: going beyond language learning” by AdrianTennant
20. “Using extensive reading creatively to raise awareness of issues of equality and justice” by SueLeather
21. “Storytelling for a better world” by David Heathfield
22. “Using the Sustainable Development Goals in the EAP classroom” by Averil Bolster and PeterLevrai

Text Books

1. Alan Maley and Nik Peachy. *Integrating global issues in the creative English Classroom: Withreference to the United Nations Sustainable Development Goals.* British Council Teaching English, 2018 (Public Domain UN Document)

2. *University of Success* by OgMandino, Jaico, 2015 (Reprint).

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.
5. Chaturvedi, P. D. and ChaturvediMukesh. *The Art and Science of Business Communication:Skills, Concepts, Cases and Applications.* 4Ed. Pearson, 2017.

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://l	

Course Outcomes

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

CO1. prioritize information from reading texts after selecting relevant and useful points and paraphrase short academic texts using suitable strategies and conventions (L3)

CO2. make formal structured presentations on academic topics using PPT slides with relevant graphical elements (L3)

CO3. participate in group discussions using appropriate conventions and language strategies (L3)

CO4. prepare a CV with a cover letter to seek internship/ job (L2)

CO5. collaborate with a partner to make presentations and Project Reports (L2)

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

I- Year II- Semester	Name of the Course	L	T	P	C
BS1201L	Applied Physics 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. Verification of laws of vibrations in stretched strings – Sonometer.
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:

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

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

I- Year II- Semester	Name of the Course	L	T	P	C
MC1201	Constitution OF INDIA	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 organisation

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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I- Year II- Semester	Name of the Course	L	T	P	C
ES1201L	Python Programming Lab	0	0	3	1.5

Course Objectives:

- Experiment with scripting language
- Evaluate expression evaluation, control statements
- Use Data structures
- Model Functions, Modules and packages
- Outline OOP through Python and Exception Handling
- Select required Python Standard Library and Testing

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is an even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
c) Write a program using for loop that loops over a sequence. What is sequence?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.
b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices
c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

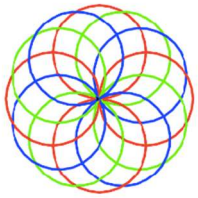
a) Install packages requests, flask and explore them. using (pip)
b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

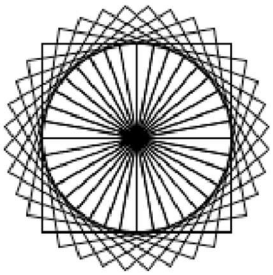
Exercise - 13 OOP

a) Class variables and instance variable and illustration of the self variable
   i) Robot
   ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle





Exercise - 15 - Testing

a)Write a test-case to check the function even_numbers which return True on passing a list of all even numbers

b)Write a test-case to check the function reverse_string which returns the reversed string

Exercise - 16 - Advanced

a) Build any one classical data structure.
b) Write a program to solve knapsack problem.

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.

CO6: Use of python standard library for problem solving and Identifies the necessity of testing software.

CO – PO Mapping:

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	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	-	-
CO6	-	2	2	3	3	-	-	-	2	-	-	-

I- Year II- Semester	Name of the Course	L	T	P	C
ES1202L	Engineering Graphics & Design	1	0	3	1.5

Course Objectives:

- Expose the students to use Drafting packages for generating Engineering curves and conventions followed in Preparation of engineering drawings.
- Make the students to understand the concepts of orthographic projections of Lines and Plane Surfaces.
- To understand the concepts of orthographic projections of Regular Solids.
- Develop the ability of understanding sectional views and Development of Solid Surfaces.
- Enable them to use computer aided drafting packages for Conversion of Isometric view to Orthographic Projection and vice versa.

UNIT-I: INTRODUCTION TO AUTOCAD:

Basic commands, Customization, ISO and ANSI standards for coordinate dimensioning, Annotations, layering, 2D drawings of various mechanical components, 2D drawings of various electrical and electronic circuits. Creation of engineering models- floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; (Experiments should be Planned According to respective Core Branch Applications)

UNIT-II: THEORY OF PROJECTION:

Principles of Orthographic Projections-Convention: Projections of Points, Projections of Lines inclined to both planes, Projections of planes inclined to one Plane & Projections of planes inclined to both Planes

UNIT III: PROJECTIONS OF REGULAR SOLIDS:

Projections of Solids –with the axis perpendicular to one of the principal planes, with the axis Inclined to one of the principal planes, Projections of Solids –with the axis Inclined to Both the principal planes

UNIT IV: DEVELOPMENT OF SURFACES & SECTIONAL ORTHOGRAPHIC VIEWS

Development of surfaces of Right Regular Solids – Prism, Pyramid, Cylinder and, Cone. Draw the sectional orthographic views of geometrical solids

UNIT V: ISOMETRIC PROJECTIONS

Conversion of isometric views to orthographic views, drawing of isometric views - simple Solids, Conversion of orthographic views to isometric views of simple Drawings

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Graphics with Autocad by Kulkarni D.M , PHI Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers

2. Engineering Graphics for Degree by K.C. John, PHI Publishers

3. Engineering Graphics by PI Varghese, McGrawHill Publishers

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan) ISBN: 9789386551870, 938655187X RUPAPUBLICATIONS

Websites

1 .https://www.autodesk.com.au/campaigns/autocad-tutorials

2. https://nptel.ac.in/courses/112104172

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

CO1: Prepare engineering drawings as per BIS conventions Understand level, KL2}

CO2: Produce computer generated of orthographic projections of Lines and Plane surfaces using CAD software {Apply level, KL3}

CO3: Use the knowledge of orthographic projections of Solids to represent engineering information/concepts and present the same in the form of drawings {Apply level, KL3}

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications {Apply level, KL3}

CO5: Develop isometric drawings of simple objects reading the orthographic projections of those objects {Analyze level, KL4}

CO-PO 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**	**PSO 2**
CO1	2	1	1	–	3	–	–	–	–	2	–	1	–	1
CO2	2	1	1	–	3	–	–	–	–	2	–	1	–	1
CO3	2	2	2	–	3	–	–	–	–	2	–	1	–	1
CO4	2	2	2	–	3	–	–	–	–	2	–	1	–	1
CO5	2	2	2	–	3	–	–	–	–	2	–	1	–	1
													–	1

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II- Year I- Semester	Name of the Course	L	T	P	C
BS1201	Probability and Statistics	3	0	0	3

Prerequisites: Basic Mathematics on Calculus and Set theory

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: 10 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: 12hrs

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: 14 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**

Learning Resources
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'S	STATEMENT	PO's
CO1	**Classify** the concepts of data science and its importance (L4) or (L2) (**Understand, Analyze)**	PO1, PO2
CO2	**Interpret** the association of characteristics and through correlation and regression tools (L4)**Analyze**	PO1, PO2
CO3	**Understand** the concepts of probability and their applications, **apply** discrete and continuous probability distributions (L3) **Understand, Apply**	PO1, PO2
CO4	**Design** the components of a classical hypothesis test (L6) **Understand, Design, create**	PO1, PO2
CO5	**Infer** the statistical inferential methods based on small and large sampling tests (L4) **Understand, Analyze**	PO1, PO2

CO-PO mapping Matrix

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations **(High: 3, Medium: 2,Low: 1)**														
	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	2	2												
CO 2	2	3												
CO 3	2	2												
CO 4	2	2												
CO 5	2	3												

Micro-Syllabus of Probability and Statistics
II B.Tech I Semester

UNIT-I:Descriptive statistics and methods for data science: 10 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	3
		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	2
		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: 12 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.	4
		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: 14 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	**6**
		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	**6**
		chi-square test	
		F test	

***

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

Prerequisites: Familiarity of concepts of sets, relations ,functions, permutations and combinations

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 – I: 12 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, Indirect Method of Proof.

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

Unit – II: Set Theory & Relations: 12 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- III:Algebraic Structures and Number Theory: 12hrs

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 – IV: Combinatorics & Recurrence Relations 12 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 – V: Graph Theory **12 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, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring , Chromatic Number, Spanning Trees, BFS and DFS algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Learning Resources
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, 2011
e- Resources & other digital material
1. https://nptel.ac.in/courses/106/103/106103205/ 2. https://nptel.ac.in/courses/106/106/106106183/

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

CO1: Apply mathematical logic to solve problems **(Knowledge, Understand, and Apply)**

CO2: Understandsets,relations,functions and discrete structures. **(Understand, Apply and create)**

CO3: Understand algebraic structures and apply number theory to perform modulo arithmetic and computer arithmetic. ((**(Understand, Apply, and create)**

CO4: Formulate problems andsolverecurrence relations **(Understand, Apply)**

CO5: Analyzeand solve real world problems using graphs and trees .(**(Understand and analyze)**

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	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

(Common to CSE and IT)

II B.Tech I Semester

Unit-1: 12 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	3
		Consistency of premises	
		Indirect method of proof	
	Predicate calculus	Predicate Logic-II	3
		Variables ,Quantifiers, Free and Bound Variables	
		Inference Theory for Predicate logic-II	

Unit-2: **12 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**
1. Set theory and Relations	Set theory	Introduction, Operations on Binary Sets	2
		Principle of Inclusion and Exclusion.	
	Relations	Properties of Binary Relations	6
		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: **12 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**
3. *Algebraic Structures & Number Theory*	Algebraic structures	Algebraic Systems, Examples, General Properties,	5
		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 (12 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	8
		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 graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix	**3**
		Paths and circuits	**3**
	Graph theory	Eulerian and Hamiltonian Graphs	
		Chromatic Number	**2**
		Spanning Trees,BFS and DFS	**4**

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, 2011

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II- Year I- Semester	Name of the Course	L	T	P	C
ES2101	Digital Circuits and Logic Design	3	0	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 MUX and 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 14 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-2: Minimization Methods of Boolean functions 11 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-3: Combinational Circuits 14 Hours

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, Programmable logic devices.

Unit-4: Sequential Circuits 12 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-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.

Note: Case Studies / Small Projects of Digital 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 BOOKS:

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

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

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

CO1: Distinguish the analog and digital systems, apply positional notations, number systems, computer codes in digital systems. **(Remember, Understand, and Apply)**

CO2: Uunderstand the Boolean Algebra theorems, simplify and design logic circuits. **(Understand, Apply, Analyze and valuate)**

CO3: Implement combinational logic circuit design and modular combinational circuits using encoders, decoders, multiplexers and demultiplexers. (**Apply, Analyze, valuate, and create)**

CO4: Understand the basic elements of sequential logic circuits. **(Understand, Apply, Analyze)**

CO5: Design and analyze sequential circuits. **(Apply, Analyze and create)**

CO-PO mapping Table with justification

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

Micro-Syllabus of Digital Logic Design(Common to ECE, CSE and IT)

II B.Tech I Semester

Unit-1: Number Systems and Boolean Algebra 14 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	3
		Binary, Octal, Decimal, Hexadecimal.	
		Number base Conversions	
	Complement of number system and subtraction using complement method	1's, 2's Compliments	3
		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	2
	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	2
		logic gates, Universal Gates and justification of all logic gates	

Unit-2: Minimization Methods of Boolean functions 11 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
2. Minimization Methods of Boolean functions	Minimization of logic expressions by algebraic method	Boolean function	3
		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 14 Hours

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, 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	2
		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	2
	Multiplexers, Demultiplexers, Decoders, Encoders and Code Converters	Multiplexers, Demultiplexers	1
		Decoders, Encoders, Priority encodes	1
		Function realization using Multiplexers and Decoders	3
		Code Converters	1
	Implementation of Higher-Order Device Using Lower Order devices	Multiplexers, Demultiplexers, Decoders, Encoders	1
	Programmable logic devices	PROM,PAL,PLA	2

Unit-4: Sequential Circuits **12 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. Sequential Circuits Fundamentals	Analysis of Sequential Circuits	Basic Architectural Distinctions between Combinational and Sequential circuits	1
		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	3
		Excitation Table of all Flip Flops, Timing and Triggering Consideration	2

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**

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 BOOKS:

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

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

Pre Requisites: MFCS, Programming in C

Course Objectives:

- To make students learn the basic concepts of Data Structures and Algorithms.
- To solve problems using data structures such as linear lists, stacks, queues.
- To explore advanced data structures such as balanced search trees.
- To be familiar with Graphs and their applications.
- To analyze various sorting techniques.

UNIT-I: Linear Lists **12 hrs**

Introduction to Data Structures, Definition, Need & Types of Data Structures
Algorithms: Introduction, Time complexity and Space complexity, Performance and Analysis
Linear lists (Arrays) – Introduction, Operations, Searching.
Sorting - Insertion Sort, Quick Sort, Merge Sort and Radix Sort.

UNIT-II: Stack & Queue **10 hrs**

Stacks: Introduction, Operations, implementation, Applications.
Queues: Introduction, Operations, implementation, Applications, Circular Queue

Unit – III: Linked Lists **10 hrs**

Single Linked List: Introduction, Representation, Operations, Applications.
Circular Lists: Introduction, Representation, Operations.
Double linked lists – Representation, operations.

UNIT-IV: TREES **8 hrs**

Trees: Introduction, Terminology, Representation of Trees
Binary Trees: Properties, Representations, Traversals, Types of Trees
Binary Search Trees: Definition, Operations.

UNIT-V: GRAPHS **12 hrs**

Graphs: Introduction, Definition, Representation, Degree of vertex, Types of graphs, Elementary Graph Operations, Graph Traversals – Depth First Search, Breadth First Search, Spanning trees- Prim's algorithm, Krushkal's algorithm.

Text Books:

1. Data structures, Algorithms and Applications in C, S. Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd, Second Edition.
3. Data Structures, Schaum's Outline, Seymour Lipschutz, Kindle Edition

Reference Books

1. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press.

2. Classical Data Structures, Second Edition, Debasis Samanta, PHI

e- Resources & other digital material

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

Course Outcomes:

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

CO1: Implement various operations on linear lists.(L2)
CO2: Apply data structure strategies like stacks and queues for exploring complex data structures.(L3)
CO3: Identify performance and trade-offs of static and dynamic data structures.(L3)
CO4: Incorporate data structures into the applications such as binary trees, binary search trees.(L3)
CO5: Identify appropriate data structure algorithms for graphs.(L3)

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	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

MICRO SYLLABUS

UNIT-I: Linear Lists (12 hrs)

Introduction to Data Structures, Definition, Need & Types of Data Structures
Algorithms: Introduction, Time complexity and Space complexity, Performance and Analysis
Linear lists (Arrays) – Introduction, Operations, Searching.
Sorting - Insertion Sort, Quick Sort, Merge Sort and Radix Sort.

Unit	Module	Micro content	No of hrs
Introduction to Data Structures	Introduction	Definition, Need & Types of Data Structures	1
	Algorithm Performance Analysis	Introduction, Time complexity and Space	3

		complexity, Performance and Analysis, Asymptotic Notations - Big Oh(O), Small Oh(o) and Theta Notation (θ), necessary examples.	
Linear Lists	Arrays	Introduction, operations: insert, delete, min, max,	1
	Searching	Binary Search, Fibonacci Search.	2
	Sorting	Insertion Sort, Quick Sort, Merge Sort and Radix Sort.	5

UNIT-II: Stack & Queue (10 hrs)

Stacks: Introduction, Operations, implementation, Applications.
Queues: Introduction, Operations, implementation, Applications, Circular Queue

Unit	Module	Micro content	No of hrs
Stacks	Stack operations	Introduction, Operations – push, pop, underflow, overflow, peek and implementation	2
		Applications – Infix to Postfix Conversion, Postfix evaluation.	2
Queues	Queue operations	Introduction, Operations – enqueue, dequeue, underflow, overflow and implementation	2
		Applications – Circular Queue (operations)	2
		Hot Potato Problem Simulation	2

Unit – III: Linked Lists (10 hrs)

Single Linked List: Introduction, Representation, Operations, Applications.

Circular Lists: Introduction, Representation, Operations.

Double linked lists – Representation, operations.

Unit	Module	Micro content	No of hrs
Single Linked List	Single Linked List operations	Introduction, Differences between arrays & linked lists. Representation, Operations – insert,	4

		delete, concat, count and search	
		Applications – Polynomial representation, addition, multiplication.	2
Circular Linked List	Circular Linked List operations	Introduction, Representation and implementation	2
Double Linked List	Double Linked List operations	Representation, Operations – insert, delete and search.	2

UNIT-IV: TREES (8 hrs)

Trees: Introduction, Terminology, Representation of Trees
Binary Trees: Properties, Representations, Traversals, Types of Trees
Binary Search Trees: Definition, Operations.

Unit	Module	Micro content	No of hrs
Trees	Trees Introduction	Introduction, Terminology, Representation of Trees	2
Binary Trees	Binary Tree Operations	Properties, Representations, Traversal – Inorder Traversal, Preorder Traversal, Postorder Traversal (Recursive and Non Recursive)	2
		Types of trees – complete binary tree, Full binary tree, Thread Binary Trees, Expression Tree.	1
Binary Search Trees	Binary Search Tree Operations	Definition, Operations – insertion, deletion and findmin, findmax, count, leaf and Searching.	3

UNIT-V: GRAPHS (12 hrs)

Graphs: Introduction, Definition, Representation, Degree of vertex, Types of graphs, Elementary Graph Operations, Graph Traversals – Depth First Search, Breadth First Search, Spanning trees-Prim's algorithm, Krushkal's algorithm.

Unit	Module	Micro content	No of hrs
Graphs	Graphs Introduction	Introduction to graphs, Definition, Types of	2

		graphs, Degree of vertex	
		Representation - Adjacency matrix &Adjacency list	3
	Elementary Graph Operations	Add Vertex, Add Edge, Delete Vertex, Delete Edge, Find Vertex and Find Edge.	1
	Graph Traversals	Depth First Search, Breadth First Search.	3
	Spanning Trees	Prim's algorithm, Krushkal's algorithm.	3

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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 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 and multithreading.
4. To impart the knowledge on collection framework.
5. To make the students to develop GUI applications network based applications.

Unit – I: Introduction to OOPS Concepts, Classes and Strings 12 Hours

IntroductiontoObjectOrientedProgramming, Java buzzwords, JavaProgrammingBasics, 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 multidimensionalarrays. **Strings**-Exploring the String class, String buffer class, String builder class, Command-line arguments.

Unit – II: Inheritance, Interfaces, Packages And Exception Handling 15 Hours

Inheritance: Single, Multi-level, hierarchical, Usage of Super, Method overriding, Final keyword Abstract class, Polymorphism. **Interfaces**: Creating, Implementing, Extending interfaces, Inner classes. **Packages:** creating packages and Importing packages, Member Access, CLASSPATH. **Exception Handling:** Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, creating user defined exceptions, Assertions.Unit – III: Multi-Threading And I/O Streams (14 hrs)

Unit – III: Multi-Threading And I/O Strea13 Hours
Multithreading : Concepts of Multithreading, differences between process and thread, thread life cycle, creating threads using Runnable interface andThread class, Synchronization, thread priorities, inter thread communication, daemon threads, thread groups.

Stream I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading data from files and writing data to files, Random access file operations, Object Serialization, exploring java.nio

Unit – IV: Collection Frame Work Classes 12 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, Hashtable, Properties, Stack, Vector.

Unit – V: GUI Programming and Networking 12 Hours

GUI Programming with Swing: Introduction, limitations of AWT, JFrame and Jcomponent, Icons and Labels, TextFields, Buttons – The Jbutton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees,and Tables. **Event Handling**- event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

Introduction to Networking: Basics of Networking, Networking classes and Interfaces, Networking with URLs, Exploring java.net package.

TEXT BOOKS

1. 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", NageswarRao, WileyPublishers.
3. "Thinking in Java", Bruce Eckel, PearsonEducation
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen,Pearson.

e- Resources & other digital material

1. Programming in Java:https://nptel.ac.in/courses/106/105/106105191/

Course Outcomes:

CO-1: Understandobject-oriented programming concepts for problem solving.
{**Understand level**, **KL2**}
CO-2: Buildclass hierarchy and packages for real world problems.
{Apply level, KL3}

CO-3: Developthread safe Java programs with appropriate Exception handling.

{Apply level, KL3}

CO-4: Implement various data structures using java collections.
{ Apply level, KL3}
CO-5: Design GUI and network based applications using swings and multithreading. **{ Apply level, KL3}**

CO-PO mapping Table with justification

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	-	-	2	-	-	-	-	-	2	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	2	-	-	-	-	2
CO3	-	-	2	2	-	-	-	-	2	-	-	-	-	2
CO4	-	-	-	2	-	-	-	-	2	-	-	-	-	2
CO5	-	-	2	-	-	-	-	-	2	-	-		-	-

Micro-Syllabus of Java Programming

(Common to CSE and IT)

II B.Tech I Semester

Unit – I:Introduction to OOPS Concepts, Classes and Strings 12 Hours

IntroductiontoObjectOrientedProgramming, Java buzzwords, JavaProgrammingBasics, 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 multidimensionalarrays. **Strings**-Exploring the String class, String buffer class, String builder class, Command-line arguments.

Unit	Module	Micro content	No of hrs
OOP	Introduction to OOP	Introduction to ObjectOrientedProgramming	1
		Java buzzwords	1
		JavaProgrammingBasics, Sample programs	1
		Data types and operators Control statements.(If, switch and looping satements-while,do-while,for, for-each)	1
Class	Classes concepts and strings	Classes, Objects, Methods, Constructors	1
		This Keyword	1
		static keyword	1
		Method Overloading	1
		Constructor Overloading	1
		Access modifiers-Nomodifier,private,protechted,public Command-line arguments	1
		arrays-One Dimensional and multidimensionalarrays	1
		String class, String buffer class, String builder class	1

Unit – II: Inheritance, Interfaces, Packages And Exception Handling
15 Hours

Inheritance: Single, Multi-level, hierarchical, Usage of Super, Method overriding, Final keyword Abstract class, Polymorphism. **Interfaces:** Creating, Implementing, Extending interfaces, Inner classes. **Packages:** creating packages and Importing packages, Member Access, CLASSPATH. **Exception Handling:** Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, creating user defined exceptions, Assertions.

Unit	Module	Micro content	No of hrs
Inheritance	Types of inheritance	Single, Multi-level, hierarchial	2
		Usage of Super	1
		Final keyword	1
		Final keyword	1
		Polymorphism	1
	Interfaces	Creating, Implementing, Extending interfaces	**1**
		Inner classes	1
Packages	Creating and importing packages	creating packages and Importing packages, Member Access, CLASSPATH.	2
Exception Handling	Exception Handling and Assertions	Types of exceptions usage of try, catch, throw, throws and finally keywords	3
		creating user defined exceptions	1
		Assertions	1

Unit– III: Multi-Threading And I/O Streams **13 Hours**

Multithreading : Concepts of Multithreading, differences between process and thread, thread life cycle, creating threads using Runnable interface andThread class, Synchronization, thread priorities, inter thread communication, daemon threads, thread groups.

Stream I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading data from files and writing data to files, Random access file operations, Object Serialization, exploring java.nio

Unit	Module	Micro content	No of hrs

Threads	Creating multiple threads	Concepts of Multithreading, differences between process and thread, thread life cycle	1
		Creating threads using Runnable interface	1
		Creating threads using Thread class	1
		Synchronization thread priorities	1
		inter thread communication	1
Stream I/O		daemon threads, thread groups	1
	File handling using stream I/O class	Reading data from files and writing data to files using Byte streams	2
		Reading data from files and writing data to files using Character streams	2
		Random access file operations	1
		Object Serialization	1
		exploring java.nio	1

Unit – IV: Collection Frame Work Classes **12 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, Hashtable, Properties, Stack, Vector.

Unit	**Module**	**Micro content**	**No of hrs**
collections	Java collection classes	Collections overview, Collection Interfaces	1
		Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque	4
		Accessing a Collection via an Iterator, Using an Iterator	1
		The For-Each alternative	1
		Map Interfaces and Classes	1
		Comparators	1
		The Legacy Classes and Interfaces- Dictionary	1
		Hashtable, Properties	1
		Stack, Vector	1

Unit – V: GUI Programming and Networking **12 Hours**

GUI Programming with Swing: Introduction, limitations of AWT, JFrame and JComponent, Icons and Labels, TextFields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees,and Tables. **Event Handling-** event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

Introduction to Networking: Basics of Networking, Networking classes and Interfaces, Networking with URLs, exploring java.net package.

Unit	**Module**	**Micro content**	**No of hrs**
GUI programming	GUI programming using swings	Introduction, limitations of AWT, JFrame and JComponent	1
		Icons and Labels, TextFields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees,and Tables	4
	Event Handling	event delegation model, sources of event, Event Listeners	
		adapter classes	1
		inner classes	1
Networking	Introduction to networking	Basics of Networking	1
		Networking classes and Interfaces	1
		Networking with URLs	1
		exploring java.net package	2

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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

Learning Objectives:

The objective of this laboratory is to teach students various data structures and to explain them algorithms for performing various operations on these data structures. This lab complements the Algorithms and Data Structures course. Students will gain practical knowledge by writing and executing programs in C using various data structures such as arrays, linked lists, stacks, queues, trees, graphs, and search trees.

CourseOutcomes: Upon completion of this laboratory, the student will be able to

- **Identify** appropriate list for solving general data structure problems .(L3)
- **Incorporate** data structures into the applications such as binary trees, binary search trees (L3)
- **Choose** appropriate algorithm for solving graph related problems (L3).

SEARCHING AND SORTING (2 Exercises) [CO – 1]

1. Write a C program to Implement the following searching techniques using linear list(arrays)
    a. Binary Search
    b. Fibonacci Search
2. Write a C program to implement the following sorting techniques using arrays
    a. Selection sort
    b. Insertion sort
    c. Quick Sort
    d. Merge Sort
    e. Radix Sort

STACK & QUEUE (2 Exercises) [CO – 1]

3. Write a C program to
    a. Implement stack using arrays.
    b. Convert infix expression to postfix expression
    c. Evaluation of postfix expression.

4. Write a C program to implement
    a. Queue using arrays
    b. Round Robin Algorithm.
    c. Simulation : Hot Potato

LINKED LISTS (3 Exercises) [CO – 1]

5. Write a C program to implement Singly Linked List.
6. Write a C program to implement Circular Linked List.
7. Write a C program to implement Doubly Linked List.
8. Implement C code for polynomial representation, addition, subtraction & multiplication.

TREES (5 Exercises) [CO – 2]

9. Write a C program to implement Binary trees.
10. Write a C program to implement tree traversal techniques (Both Recursive and Non Recursive).
11. Write a C program to implement Binary Search trees.
12. Write a C program to implement Complete Binary Search tree.
13. Write a C program to implement Huffman Coding.

GRAPHS (2 Exercises) **[CO – 3]**

14. Write a C program to implement graphs.
15. Write a C program to implement graphs traversal techniques (both recursive and non-recursive)
    a. Breadth First Search
    b. Depth First Search

ADDITIONAL EXERCISES:

The below list of problem statements can be solved in either www.hackerrank.com or www.hackerearth.com, and must submit the solution

SEARCHING AND SORTING (Any 2 additional problems from below list of 6 problems)

1. Sherlock and Numbers / Ice cream Parlour (Binary Search)
2. The Exam / The Missing Numbers (Fibonacci Search)
3. Monk and Nice Strings / Insertion Sort (Insertion Sort)
4. K- Palindrome / Quick Sort (Quick Sort)
5. Pebbles Game (Merge Sort)
6. Monk and Sorting Algorithm (Radix Sort)

STACK & QUEUE (Any 2 additional problems from below list of 4 problems)

1. Stack Operations / Maximum Elements (Stack Operations)
2. Balanced Brackets / Balanced Brackets (Stack)
3. Robin Robin, Round Robin (Queue)
4. Double Ended Queue (Queue)

LINKED LIST (Any 2 additional problems from below list of 4 problems)

1. Insert At Begin, Insert At End, Insert At Position, Delete a Node (Linked List Operations)
2. Remove Friends (Single Linked List)
3. Cycle Detection (Circular Linked List)
4. Reversing a Double Linked List (Double Linked List)

TREES (Any 2 additional problems from below list of 3 problems)

1. Mirror Image, Nodes in a Tree (Binary Tree)
2. Level Order traversal. (Binary Tree Traversal)
3. Monk Watching Fight, Distinct Count (Binary Search Tree)

GRAPHS (Any 2 additional problems from below list of 3 problems)

1. Build a graph, Monk at Graph Factory (Graph representation)
2. Monk and the islands, Zeta and Thanos (Breadth First Search Tree Traversal)
3. Words and Trees, Water Supply (Depth First Search Tree Traversal)

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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 OOP concepts.
2. To write programs using exception handling
3. To introduce multithreaded programs.
4. To implement data structures using collection framework
5. To design GUI applications and client-server applications.

Note:

1. Mandatory to follow test driven development with Eclipse IDE empowered JUnit testing framework and code coverage plugin.
2. 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:

- First 100 units - Rs. 1 perunit
- 101-200units - Rs. 2.50 perunit
- 201 -500 units - Rs. 4 perunit
- >501 units - Rs. 6 perunit

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

- First 100 units - Rs. 2 perunit
- 101-200units - Rs. 4.50 perunit
- 201 -500 units - Rs. 6 perunit
- >501 units - Rs. 7 perunit

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 annualInterestRate 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 to validate user information using regular expressions. [CO1]

9. 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% ofBP for staff club fund. Generate pay slips for the employees with their gross and net salary. [CO1]

10. 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 givenshape.[CO1]

11.
Developajavaapplicationtoimplementcurrencyconverter(DollartoINR,EUROtoINR,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]

12. Write a Java Program to Handle Arithmetic Exceptions and InputMisMatchExceptions. [CO2]

13. 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]

14. 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]

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

16. 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]

17. Develop Rational number class in Java. Use JavaDoc comments for documentation. Your implementation should use efficient representation for a rational number, i.e. (500 / 1000) should be represented as (½). [CO1]

18. You are given lines. In each line there are zero or more integers. You need to answer a few queries where you need to tell the number located in position of line. Take your input from System.in. **Input Format:** The first line has an integer . In each of the next lines there will be an integer denoting number of integers on that line and then there will be space-separated integers. In the next line there will be an integer denoting number of queries. Each query will consist of two integers and . **Constraints** Each number will fit in signed integer. Total number of integers in lines will not cross . **Output Format** In each line, output the number located in position of line. If there is no such position, just print "ERROR!".(ArrayList)[CO4]

19. A string containing only parentheses is balanced if the following is true: 1. if it is an empty string 2. if A and B are correct, AB is correct, 3. if A is correct, (A) and {A} and [A] are also correct. Examples of some correctly balanced strings are: "{}()", "[{()}]", "({()})" Examples of some unbalanced strings are: "{}(", "({)}", "[[", "}{" etc. Given a string, determine if it is balanced or not. **Input Format** There will be multiple lines in the input file, each having a single non-empty string. You should read input till end-of-file. The part of the code that handles input operation is lready provided in the editor. **Output Format** For each case, print 'true' if the string is balanced, 'false' otherwise.[CO4]

20. Comparators are used to compare two objects. In this challenge, you'll create a comparator and use it to sort an array. The *Player* class is provided for you in your editor. It has 2 fields: name a String and a score integer. Given an array of *Player* objects, write a comparator that sorts them in order of decreasing score; if or more players have the same score, sort those players alphabetically by name. To do this, you must create a *Checker* class that implements the *Comparator* interface, then write an *int compare(Player a, Player b)* method implementing

the Comparator.compare(T o1, T 2) method. **Input Format** Input from stdin is handled by the locked stub code in the *Solution* class. The first line contains an integer, , denoting the number of players. Each of the subsequent lines contains a player's and , respectively. **Constraints** 0<score<1000,rplayers can have the same name. Player names consist of lowercase English letters. **Output Format** You are not responsible for printing any output to stdout. The locked stub code in *Solution* will create *Checker* object, use it to sort the *Player* array, and print each sorted element.[CO4]

21. Write a Java program to build a Calculator in Swings/ [CO5]

22. Write a Java program to implement JMenu to draw all basic shapes using Graphics. [CO5]

23.Write a Java program to implement JTable and JTree. [CO5]

24. Write a Java program to implement JTabbedPane. [CO5]

25. 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. [CO5]

Course Outcomes:

CO1: Able to solving real world problems using OOP concepts.
CO2: Able to handle exceptions.
CO3: Able to develop multithreaded programs.
CO4: Able to create various data structures using java collections.
CO5: Able to develop GUI applications and client server applications.

CO-PO mapping Table with justification

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	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
MC2101	Essence of Indian Traditional 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: 10 Hrs

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.
- analyze 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.
- analyze 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
- Analyze 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.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 I- Semester	Name of the Course	L	T	P	C
MC2102	Employability Skills-I	3	0	0	0

Components

1. Verbal Ability
2. Quantitative Ability
3. Reasoning Ability
4. Soft Skills

Unit-1: Basic Mathematics

Number System, LCM & HCF, Percentages, Profit and Loss & Discount, Simple Interest & Compound Interest, Ratios and Proportions, Partnership, Chain Rule, Time and Work & Pipes and Cisterns, Ratios and Proportions, Partnership, Chain Rule, Time and Work & Pipes and Cisterns, Time, Speed and Distance, Problems on Trains, Boats and Streams, Races and games

Unit-2: - Advanced Mathematics

Averages, Alligation and Mixtures, Logarithms, Indices & Surds, Progressions(AP,GP & HP), Linear Equations in one & two variables, Quadratic Equations, Problems on Numbers, Problems on Ages, Permutations &Combinations, Probability, Elementary Statistics, DI(Tabulation, Bar& Line Graph, Pi Chart/Circle Chart, Line Graph)

Unit-3 – Reasoning Ability

Part-1-Basic Reasoning

Number Series, Letter Series, Number Analogy, Letter Analogy, Word Analogy, Number Odd Man out, Letter Odd Man Out, Word Odd Man Out, Coding and Decoding, Directions.

Part-2-Non-Verbal Reasoning

Series, Analogy, Classification, Embedded figures, Paper Cutting, Paper Folding, Mirror Image, Water Image, Dot situations, Formation of figure analysis, Quant and Reasoning.

Unit-4 – Verbal Ability

i) Vocabulary: Synonyms & Antonyms, Spellings & Confusable words, Idioms & phrases, Phrasal Verbs, One Word Substitutes

ii) Verbal Reasoning : Odd Man Out, Analogies

iii) Comprehension : Reading Comprehension, Cloze Test, Text Completion

Unit-5 – Soft Skills

Speaking: Describing Self, Describing Places, People, Events and Things, Describing Experience, Tech Talk, Group Discussions, Presentation skills, Just and Minute

Reference Books

1. Quantitative Aptitude for Competitive Examination by Dr R S Agarwal
2. Fast Track Objective Arithmetic Paperback – 2018 by Rajesh Verma
3. Teach Yourself Quantitative Aptitude, by Arun Sharma
4. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khattar
5. Quantitative Aptitude for all Competitive Exam by Abhijit Gupta
6. Quantitative Aptitude Quantum CAT by Sarvesh K. Verma
7. Modern Approach to Verbal and Non-Verbal Reasoning by Dr R S Agarwal
8. How to Prepare for Data Interpretation by Arun Sharma
9. Analytical Reasoning by M K Pandey
10. Logical Reasoning Data Interpretation by Nishit K. Sinha
11. How to prepare for Verbal Ability and Reading Comprehension – Arun Sharma and Meenakshi Upadhyay
12. Word Power Made Easy by Norman Lewis
13. Random House Roget's Thesaurus ---- By Random House
14. Cambridge Complete PET Students Book ----Emma Heyderman and Peter May
15. The Verbal Reasoning Test Workbook----- By Mike Bryon
16. Master the GRE (Peterson's) ---- By Margaret Moran
17. How to Prepare for Verbal Ability and Reading Comprehension for CAT ----- By Arun Sharma
18. ABC of Common Grammatical Errors ----- By Nigel D. Turton
19. English Collocations in Use: Advanced ---- By Felicity O'Dell and Michael McCarthy
20. Writing Remedies ----By Edmond H Weiss
21. Objective English for Competitive Examination ---B y Edgar Thorpe, Showick Thorpe, Pearson Education India.
22. Contemporary English Grammar Structures and Composition ----- By David Green (2010), MacMillan Publishers, New Delhi.2010.
23. The study of Language ---- George Yule, Cambridge University Press UK.
24. Contemporary English Teaching ---- Dr. Ram Nath Sharma

II- Year II- Semester	Name of the Course	L	T	P	C
PC2201	Advanced Data Structures	3	0	0	3

Course Objectives:

1. To impart the knowledge on sets and various hashing techniques.
2. To help the students to learn Priority Queues and its applications.
3. To demonstrate the students about the operations of Efficient Binary Search Trees.
4. To make the student to understand various shortest path algorithms in graphs.
5. To make the students to learn the use of Digital Search Structures and pattern matching algorithms.

UNIT-I **12 Hours**

Hashing: Introduction to Static Hashing, Hash Tables, Hash Functions, Different Hash Functions, Secure Hash Functions, Collision Resolution Techniques-Linear probing, Quadratic probing, Double hashing, Rehashing, Chaining, Dynamic Hashing-Motivation, Dynamic hashing using Directories, Directory less Dynamic hashing.

UNIT-II **12 Hours**

Priority Queues (Heaps): Introduction, Binary Heaps-Model and Simple Implementation, Basic Heap Operations, Other Heap Operations, Applications of Priority Queues, Binomial Heaps/Queues, Binomial Heap Structure and Implementation, Binomial Queue Operations.

UNIT-III **14 Hours**

Efficient Search Trees: Binary Search Trees, Optimal Binary Search Trees, Self-balancing Binary Search Trees, AVL Trees- Operations on AVL Trees, Red-Black Trees-Properties and Representation of Red-Black Trees, Operations on Red-Black Trees, Applications of Red-Black Trees. B-tree : Searching for an Element in a B-Tree, Inserting a New Element in a B-Tree, Deleting an Element from a B Tree, B+ Trees - Searching a B+ Tree, Inserting a New Element in a B+ Tree, Deleting an Element from a B+ Tree.

UNIT-4 **10 Hours**

Graph Algorithms- Elementary Graph Operations: Connected components, Bi-connected components. Minimum cost spanning tree: Sollin's algorithm. Shortest paths and Transitive Closure: single source shortest path, all pair's shortest path, transitive closure, Bellman Ford algorithm.

UNIT-V **12 Hours**

Digital Search Structures- Introduction to Digital Search Tree, Operations on Digital Search Trees: Insertion, Searching, and Deletion, Binary Tries and Patricia: Binary Tries, Compressed

Binary Trie, Patricia and Suffix Trees.

Pattern Matching- Pattern matching algorithms: Brute force Algorithm, the Boyer –Moore algorithm, the Knuth- Morris-Pratt algorithm.

Text Books:

1. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2017.
2. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, Second Edition, 2008.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
3. Data Structures and Algorithm Analysis in C,Mark Allen Weiss, Second Edition, Pearson.

Course Outcomes:

CO1: Able to implement sets functions and various hashing technique. techniques. **(Remember, Understand and Apply)**

CO2: Able to use priority queue principle in the context of solution for the given specific problem. **(Understand and Apply)**

CO3: Able to implement operations on efficient binary search trees. **(Remember, Understand and Apply)**

CO4: Able to implement various shortest path algorithms in graphs. **(Apply, Analyze and Evaluate)**

CO5: Able to understand various digital search trees and implement pattern matching algorithms. **(Apply, Analyze and Evaluate)**

CO-PO mapping Table with justification

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

Micro Syllabus of Advanced Data Structures

II B.Tech II Semester

UNIT-I **12 Hours**

Sets: Representation of Disjoint Sets- Introduction, simple find algorithm, simple union algorithm, Collapsing find algorithm, weighted union algorithm.

Hashing: Introduction to Static Hashing, Hash Tables, Hash Functions, Different Hash Functions, Secure Hash Functions, Collision Resolution Techniques-Linear probing, Quadratic probing, Double hashing, Rehashing, Chaining, Dynamic Hashing-Motivation, Dynamic hashing using Directories, Directory less Dynamic hashing.

Unit	Module	Micro content	# hrs
Sets	Sets and its Functions	Introduction, representation and basic set operations	1
		Simple Union, Simple find	1
		Weighted Union, Collapsing find	1
Hashing	Hashing and Collision Resolution Techniques	Introduction to Static Hashing, Hash Tables	1
		Hash function : Division method Digit folding Mid square method	2
		Linear, quadratic probing	1
		Double, rehashing	1
		Separate chaining	2
		Dynamic hashing using directories	1
		Directory less Dynamic hashing	1

UNIT II **12 Hours**

Priority Queues (Heaps): Introduction, Binary Heaps-Model and Simple Implementation, Basic Heap Operations, Other Heap Operations, Applications of Priority Queues, Single–Double-Ended Priority Queue, Binomial Heaps/Queues, Binomial Heap Structure and Implementation, Binomial Queue Operations.

Unit	Module	Micro content	# hrs
Priority Queues	Binary Heap	Model and Simple Implementation, Min/Max Heap	2

		Basic Heap Operations Explanation	2
		Heap Operations Explanation	2
		Applications of Priority Queues : Selection problem	1
		Single–Double-Ended Priority Queue	2
	Binomial Heaps/Queues	Binomial Heaps/Queues : Definition, Structure	1
		Binomial Heaps/Queues : Insertion	1
		Binomial Heaps/Queues : Deletion and Analysis	1

UNIT III **16 Hours**

Efficient Search Trees: Binary Search Trees, Optimal Binary Search Trees, Self-balancing Binary Search Trees, AVL Trees- Operations on AVL Trees, Red-Black Trees-Properties and Representation of Red-Black Trees, Operations on Red-Black Trees, Applications of Red-Black Trees. B-tree : Searching for an Element in a B-Tree, Inserting a New Element in a B-Tree, Deleting an Element from a B Tree, B+ Trees - Searching a B+ Tree, Inserting a New Element in a B+ Tree, Deleting an Element from a B+ Tree.

Unit	Module	Micro content	# hrs
Efficient Search Trees	Binary Search Trees	Definition, Searching a binary search tree, Insertion into Binary search tree	1
		Deletion into Binary search tree	1
		Implementation BST	1
	AVl Trees	AVL tree definition and structure, Various examples, Need for rotations	1
		Rotations explanation with examples	2
		Implementation of AVL Trees	2
	Red Black Trees	Red Black Trees : Properties and Representation,	1
		Red Black Operation and Applications	2
	B Trees	B-tree : Searching for an Element in a B-Tree, Inserting a New Element in a B-Tree	1
		Deleting an Element from a B Tree	1

	B+ Trees	B+ Trees – Representation and Searching a B+ Tree, Insertion	3
		B+ Trees deletion	

UNIT IV **10 Hours**

Graph Algorithms- Elementary Graph Operations: Connected components, Bi-connected components. Minimum cost spanning tree: Sollin's algorithm. Shortest paths and Transitive Closure: single source shortest path, all pairs shortest path, transitive closure, Bellman Ford algorithm.

Unit	Module	Micro content	# hrs
Graph Algorithms	Elementary Graph Operations	Introduction and Connected Components	1
		Biconnected Components	1
	Minimum cost spanning	Prims Vs Kruskals, Sollins Algorithm explanation	1
		Sollins Algorithm Implementation	1
	Shortest path and Transitive closure	Single Source shortest path explanation and Implementation	2
		All pairs shortest path explanation and Implementation	2
		Transtive closure	1
		Bellman Ford Algorithm	1

UNIT-V **10 Hours**

Digital Search Structures- Introduction to Digital Search Tree, Operations on Digital Search Trees: Insertion, Searching, and Deletion, Binary Tries and Patricia: Binary Tries, Compressed Binary Trie, Patricia and Suffix Trees.

Pattern Matching- Pattern matching algorithms: Brute force Algorithm, the Boyer –Moore algorithm, the Knuth- Morris-Pratt algorithm.

Unit	Module	Micro content	# hrs
Digital Search Structures	Digital Search Structures	Introduction to Digital Search Tree, Operations on Digital Search Trees	1
		Binary Tries and Operations, Various examples	1
		Compressed Trie, Compact Representation and Various examples	1

		Patricia and Suffix Trees	1
	Pattern Matching	Pattern matching algorithms Introduction and Brute force Algorithm	1
		Brute force Algorithm Implementation	1
		Boyer –Moore algorithm Explanation and Implementation	2
		Knuth- Morris-Pratt algorithm Explanation and Implementation	2

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2202	Software Engineering	3	0	0	3

Prerequisites: No Strong Technical Prerequisites needed, but
1. Basic Programming Skills

2. Zeal to learn about Real World Software Engineering Products and their development process

COURSE OBJECTIVES:

1. To understand the software life cycle models.
2. To understand the software requirements and SRS document.
3. To understand the importance of modelling and modelling 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: (14Hrs)

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: (12Hrs)

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 SchedulingandMiscellaneous Plans.

UNIT-3
Requirement Engineering: (10 Hrs)

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

UNIT-4
Software Design: (14 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☹14Hrs)

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- UgrasenSuman, Cengage Learning Publications.
2. Fundamentals of Software Engineering-Rajib Mall, PHI, New Delhi.

REFERENCE BOOKS:

1. An Integrated Approach to S/w Engineering- PankajJalote, 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.

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

CO1: Define and develop a s/w project from requirement gathering to implementation.

CO2: Obtain knowledge about principles and practices of software engineering.

CO3: Focus on the fundamentals of modelling 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 Table with justification

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. An Integrated Approach to S/w Engineering- PankajJalote, 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.

Learning Resources
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- PankajJalote, 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 & other digital material
1. Coursera Online Learning Material 2. Lecture Notes and Teaching Material supplied Via Byndr Accounts 3. Open Access e-Resources like **SWAYAM by nptel** etc
e-books
1. Directory of Open Access Books (DOAB) **2.** AICTE Open Library

MICRO SYLLABUS SOFTWARE ENGINEERING
II B.Tech II Semester

UNIT-I **14Hours**

Introduction to Software Engineering: 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	No of hrs
I	**Introduction to Software Engineering**	Software	1
		Software Classifications & Characteristics	
		Emergency of Software Engineering	1
		Software Engineering Challenges	
		Software Process model	1
		Elements & characteristics of Process model	
		Process Classification	1
		Software Development	
	Software Processes	Perspective Process models	4

	Process Models	Agile Process models	5
		RUP process model	1

UNIT-II **12 Hours**

Project Management & Planning: 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**	**No of hrs**
II	**Project Management & Planning**	Project Management essentials	1
		Project Success and failures	1
		Project Life cycle	1
		Project team structure and organization	1
		Software Configuration Management	1
		Project Planning activities	1
		Metrics & Measurements	1
		Project Size Estimation	1
		Effort Estimation Techniques	1
		Staffing & Personnel Planning	1
		Project Scheduling	1
		Miscellaneous Planning	1

UNIT-III **10Hours**

Requirement Engineering: 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**	**No of hrs**
III	**Requirement Engineering**	Software Requirements	1
		Requirement Engineering Process	1
		Requirement Elicitation	1
		Requirement Analysis	2
		Requirements Specification	2

		Requirement Validation	1
		Requirement Management	2

UNIT-IV **14 Hours**

Software Design: 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**	**No of hrs**
IV	**Software Design**	Software Design Process	2
		Characteristics of a Good Design	
		Design Principles	
		Modular Design	1
		Software Architecture	1
		Design Methodologies	1
		Structured Design Methodology	2
		Transaction Analysis	1
		Logical Design	2
	Coding	Coding Principles	1
		Coding Process	1
		Coding Verifications & Documentations	2

UNIT-V **14 Hours**

Software Testing: 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**	**No of hrs**
V	**Software Testing**	Testing Fundamentals	1
		Test Planning	
		Black Box Testing	1
		White Box Testing	1
		Levels of Testing	1
		Debugging Approaches	

		Quality Concept	1
		Software Development	1
	Quality of Software	Quality Factors	1
		Verification & Validation	2
		Quality Assurance Activities	1
		Quality Standards	1
	Maintenance	Software Maintenance	1
		Maintenance Process Models	1
		Reengineering	1

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:Introduction to Operating System Concepts 10Hours

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: Process Management 12Hours

Process concept, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithm's and their evaluation, Operations on Processes, Interprocess Communication.

Threads –Overview, User and Kernel threads, Multi-threading Models

UNIT – III: Concurrency 12Hours

Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, 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: Memory Management 12Hours

Logical vs physical address space, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.

Virtual Memory Management: Virtual memory overview, Demand Paging, Page-Replacement & its algorithms, Allocation of Frames, Thrashing

UNIT – V: File system Interface 10Hours

The concept of a file, Access Methods, Directory structure, file sharing, protection.

File System implementation- File system structure, Allocation methods, 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

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 Mc Graw Hill Education.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education

e- Resources & other digital material

https://en.wikipedia.org/wiki/Operating_system

https://www.tutorialspoint.com/operating_system/

Course Outcomes:

CO1: Understand the structure and functionalities of Operating System **(Understand)**

CO2:Demonstratethe concept of Process, Threads and CPU Scheduling Algorithms. **(Apply)**

CO3: Use the principles of Concurrency to solve Synchronization problems. **(Apply)**

CO4: Demonstratevarious methods for handling Deadlocks. **(Apply)**

CO5: Infervarious Memory Management Techniques.**(Understand)**

CO-PO mapping Table with justification

Mapping	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	-	-
CO2	3	3	3	1	2
CO3	2	2	3	-	2
CO4	2	2	3	-	2
CO5	3	3	3	-	2

Micro-Syllabus of Operating Systems

II B.Tech II Semester

Unit – I:Introduction to Operating System Concepts 10 Hours

Operating Systems basic Concepts- definition, goals of operating system, Dual Mode operation of Operating System, Computer System Organization, **Functions of Operating Systems**-Process Management, Memory Management, File Management, I/O Management, Protection and Security,

Types of Operating Systems-Difference between Windows and Unix OS, Serial Processing, Batch Processing, Multi Programming, Time Sharing, Realtime OS and Distributed OS; Operating Systems services, System calls, Types of System calls,

Operating System Structures- Simple Structure, Layered Approach, Microkernel Approach, Modules Approach; Distributed Systems, **Special purpose systems**-Embedded Systems and Handheld systems

Unit	Module	Micro content	No of hrs
Introduction to Operating System Concepts	Operating Systems basic Concepts	definition, goals of operating system	2
		Dual Mode operation of Operating System, Computer System Organization	
	Functions of Operating Systems	Process Management	2
		Memory Management	
		File Management	
		I/O Management, Protection and Security,	
	Types of Operating Systems	Difference between Windows and Unix OS, Serial Processing	3
		Batch Processing, Multi Programming, Time Sharing	
		Realtime OS and Distributed OS	
		Operating Systems services, System calls, Types of System calls	
	Operating System Structures	Simple Structure, Layered Approach	3
		Microkernel Approach, Modules Approach	
		Distributed Systems, **Special purpose systems**-Embedded Systems and Handheld systems	

Unit – II: Process Management (12hrs)

Process concept, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers-Long term, Short term and Medium term; Scheduling Criteria, Scheduling algorithm's - FCFS, SJF, Priority, Round Robin, Multilevel Queue, Multilevel Feedback Queue; Evaluation of Scheduling algorithms-Deterministic Modeling, Queuing Modeling, Simulations

and Implementation;Operations on Processes, Interprocess Communication-Shared Memory & Message Passing

Threads - Overview, User and Kernel threads, Multi-threading Models: One-to-one model, Many-to-one model and many-to-many model

Unit	Module	Micro content	No of hrs
Process Management	Process concept	Process State Diagram	1
		Process control block	1
	Process Scheduling	Scheduling Queues	2
		Schedulers-Long term, Short term and Medium term	
		Scheduling Criteria	
	Scheduling algorithm's	FCFS	4
		SJF	
		Priority	
		Round Robin	
		Multilevel Queue	
		Multilevel Feedback Queue	
	Evaluation of Scheduling algorithms	Deterministic Modeling	1
		Queuing Modeling	
		Simulations and Implementation, Operations on Processes	
	Interprocess Communication	Shared Memory	1
		Message Passing	
	Threads	Overview, User and Kernel threads:	1
		Multi-threading Models :One-to-one model, Many-to-one model and many-to-many model	1

Unit – III: Concurrency (12hrs)

Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores-Binary&Counting, Solution to Producer Consumer Problem; Monitors-Structure,Solution to Producer Consumer Problem;Classic Problems of Synchronization: Dining Philosophers Problem, Readers Writers Problem, Bounded Buffer Problem

Principles of deadlock - System Model, Deadlock Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit	Module	Micro content	No of hrs
Concurrency	Process Synchronization	The Critical- Section Problem	2
		Peterson's Solution	
		Synchronization Hardware,	
	Semaphores-	Binary&Counting,	2
		Solution to Producer Consumer Problem	

	Monitors	Structure,Solution to Producer Consumer Problem;	2
	Classic Problems of Synchronization:	Dining Philosophers Problem	2
		Readers Writers Problem	
		Bounded Buffer Problem	
	Principles of deadlock	System Model, Deadlock Characterization	2
	Methods for Handling Deadlocks	Deadlock Prevention	2
		Detection and Avoidance	
		Recovery form Deadlock	

Unit – IV: Memory Management (12 hrs)

Logical vs physical address space, Swapping, Contiguous Memory Allocation-Equal Size Fixed partition, unequal size partition, Dynamic partition;Paging, Structure of the Page Table-Hierarchical, Hashed, and Inverted; Segmentation.

Virtual Memory Management:

Virtual memory overview, Demand Paging, Page-Replacement & its algorithms: -FIFO, Optimal, LRU Allocation of Frames, Thrashing.

Unit	**Module**	**Micro content**	**No of hrs**
Memory Management	Memory Management	Logical vs physical address space, Swapping	1
	Contiguous Memory Allocation	Equal Size Fixed partition	3
		unequal size partition	
		Dynamic partition	
	Paging	Structure of the Page Table	3
		Hierarchical, Hashed, and Inverted; Segmentation.	
	Virtual Memory Management	Virtual memory overview, Demand Paging,	3
	Page-Replacement & its algorithms:	FIFO, Optimal, LRU Allocation of Frames, Thrashing.	2

Unit – V: File system Interface (10hrs)

The concept of a file, Access Methods: Sequential Access, Direct Access, Index &Relative Access; Directory Structure-Single level, Two-level, Tree-structured, Acyclic graph, General Graph; file sharing, protection.

File System implementation- File system structure, Allocation methods: Sequenced, Linked and Indexed; Free-space management.

Mass-storage structure- Overview of Mass-storage structure, Disk scheduling: FCFS, SSTF, SCAN, CSCAN, LOOK & CLOOK algorithms; Swap space management

Unit	**Module**	**Micro content**	**No of hrs**
		Sequential Access, Direct Access, Index &Relative Access	3

File system Interface	concept of a file, Access Methods	Directory Structure-Single level, Two-level	
		Tree-structured, Acyclic graph, General Graph	
		file sharing, protection.	
	File System implementation	File system structure	4
		Allocation methods: Sequenced, Linked and Indexed; Free-space management.	
	Mass-storage structure	Overview of Mass-storage structure	3
		Disk scheduling: FCFS, SSTF, SCAN, CSCAN, LOOK & CLOOK algorithms	
		Swap space management	

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2204	Data Base Management Systems	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

Syllabus

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 (14 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 (14 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 (10 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 (12 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

Learning Resources
Text Books:
1. Data base System Concepts,5/e, Silberschatz, Korth, TMH 2. Introduction to Database Systems, CJ Date, Pearson
Reference Books
4. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition 5. Fundamentals of Database Systems, ElmasriNavate Pearson Education

Course Outcomes:

CO1	To **understand** the basics of database systems and applications{ Understand level, KL2}
CO2	To **construct** logical design of database and information retrieval {Apply level, KL3}
CO3	To **demonstrate** relational model practically (Structured Query Language) {Apply level, KL3}
CO4	To **demonstrate** and relate normalization for database design {Apply level, KL3}
CO5	To **outline** the necessity of transaction management, recovery management, file organization & indexing { Understand level, KL2}

CO-PO Mapping Matrix:

Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**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

II B.Tech II Semester

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	Module	Micro content	No of hrs
Unit-I: Introduction	**Introduction to Database**	Definitions of data, database and information	3
		history of data	
		Importance of databases over file systems	
		Applications of Database	2
		Purpose of Database	
		View of Data	
		Data Independence	
		Data Models	1
		Users of Database, DBA, Query Processor, Storage Manager	2
	Database Architecture	2-Tier	1
		3-Tier	1

UNIT-II: Conceptual Design & Relational Query Languages (14 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 CalculusSafety Expressions

Unit	Module	Micro content	No of hrs
Unit-II: Conceptual Design & Relational Query Languages	**ER Model**	Entity, Relation, Notations	**6**
		Types of attributes	
		Mapping Constraints	
		Features of ER Diagram	
		Weak Entity Set	
		Examples of Conceptual Design	
	Relational Algebra	Selection, Projection	**4**
		Set Operations, Rename	
		Cartesian-Product, Join	

		Outer Join	
		Examples	
	Relational Calculus	Tuple Relational Calculus	4
		Domain Relational Calculus	
		Examples	
		Safety Expressions	

Unit-III: SQL & PL/SQL (14 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	**Module**	**Micro content**	**No of hrs**
	SQL Commands	DDL	3
		DML	
		TCL	
		DCL	
Unit-III: **SQL & PL/SQL**	**Types of Constraints:**	Tuple level integrity constraints (Primary key &Alternate key),	4
		Domain level integrity constraints (Not Null & Check)	
		Referential Integrity (Foreign key)	
	SQL	SQL queries: with various types of operators (relational, logical, etc.) with predefined functions	4
		Joins	
		Set operations, group operations	
		Nested queries, correlated queries	
	PL/SQL:	Exceptional handling (predefined & user defined)	3
		Cursor	
		Procedures	
		Functions	
		Packages	
		Triggers	

Unit-IV: Database Design (10 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	Module	Micro content	No of hrs
Unit-IV: Database Design	**Database Design:**	Normalization, Purpose of Normalization,	8
		Functional Dependency,	
		Closure,	
		1NF, 2NF,	
		3NF,	
		BCNF,	
		MVFD, 4NF,	
		Join Dependency, 5NF	
	NoSQL	Why NoSQL?,	2
		Importance of NoSQL,	
		Overview of NoSQL tools	

Unit-V: Transaction, Data Recovery & Storage Management (12 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 I

Unit	Module	Micro content	No of hrs
IV **Transaction, Data Recovery & Storage Management**	**Transaction Management**	ACID Properties of Transactions,	5
		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	3
		Ideal storage	
		Log, Log records	
		log based recovery techniques	
		Shadow Paging	
		ARIES	
		Types of File Organizations	4

	File Organization & Indexing:	Primary Indexing	
		Secondary Indexing	
		Multi-level Indexing	
		Hash Indexing	
		Tree Indexing	

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2205	Computer Organization	3	0	0	3

Course Objectives:

- To understand basic structures of computers and to understand various machine instructions.
- To understand basic structures of computers and to understand various machine instructions.
- To analyse ALU & I/O organization of a computer.
- To understand various memory systems.
- To analyse functionalities done by processing unit and also learn micro programmed control.

Unit – I: Basic Structure of a Computer and Machine Instructions.

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

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:**

Adder, Subtracter, 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

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

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.

Learning Resources
Text Books:

1.Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill. 2.Computer Architecture and Organization by William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003
Reference Books
6. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill. 7. Computer System Architecture by M Morris Mano, Prentice Hall of India, 2001
e- Resources & other digital material

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Able to **understand** basic structures of computers and to **understand** various machine instructions. **{Understand level, KL2}**
CO2	Ableto **learn and use** the addressing modes and types of instructions. **{Apply level, KL3}**
CO3	Able to analyze I/O organization of a computer. **{Apply level, KL3}**
CO4	Able to **understand** various memory systems. **{ Apply level, KL3}**
CO5	Able to **analyze** functionalities done by processing unit and also learn micro programmed control. **{Apply level, KL3}**

CO-PO-PSO Mapping:

Course Outcome	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
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

Unit – I: Basic Structure of a Computer and Machine Instructions.

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

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**

Adder, Subtracter, 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

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

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
PC2201L	Advanced Data Structures Lab	0	0	3	1.5

Prerequisites: Prior knowledge of programming language(s) and basic Data Structures and Algorithms

Course Objectives:

1. To impart knowledge on disjoint set algorithms and Dictionaries using various hashing techniques.
2. To help the students to implement Priority Queues and its applications.
3. To help students to implement various operations on Binary search tree and AVL tree.
4. To make students to implement variety of shortest path algorithms.
5. To make the student to develop algorithms for pattern matching problems.

List of experiments:

Week 1: Write a program to implement Functions of Dictionary using Hashing Techniques

i. Division method
ii. Digit folding
iii. Mid square method

Week 2: Write a program to implement Collision Resolution Techniques in Hash Table.

i. Linear Probing
ii. Quadratic Probing
iii. Double Hashing

Week 3: Write a program to implement separate chaining technique in hashing.

Week 4: Write a program to implement binary heap operations.

Week 5: Write a program to implement BST operations.

Week 6: Write a program to implement AVL tree operations.

Week 7: Write a program to find the shortest path from a single source.

Week 8: Write a program to find the shortest path between all pair of vertices.

Week 9: Write a program to implement Sollin's algorithm.

Week 10: Write a program to implement Brute force pattern matching algorithm.

Week 11: Write a program to implement Boyer-Moore pattern matching algorithm.

Week 12: Write a program to implement Knuth-Morris pattern matching algorithm.

Course Outcomes:

At the end of the course student will be able to:

1. Able to implement disjoint set algorithms and Dictionaries using various hashing techniques.
2. Able to build code for various problems using priority queue principle.
3. Able to implement basic operations of BST tree and AVL tree.
4. Able to construct code for variety of shortest path algorithms
5. Able to develop algorithms for pattern matching problems

CO-PO mapping Table with justification

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	1	2	-	-	-	-	-	-	-	-	-	3	2
C02	3	2	1	-	-	-	-	-	-	-	-	-	3	2
C03	3	2	2	-	-	-	-	-	-	-	-	-	3	2
C04	3	2	3	-	-	-	-	-	-	-	-	-	3	2
C05	3	2	2	-	-	-	-	-	-	-	-	-	3	2

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II- Year II- Semester	Name of the Course	L	T	P	C
PC2202L	Data Base 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

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation **[CO3]**
11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL **[CO3]**
12. Write a PL/SQL block using SQL and Control Structures in PL/SQL **[CO3]**
13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types **[CO3]**
14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS **[CO4]**
15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. **[CO4]**
16. 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 Table with justification

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
PR2201	Socially Relevant Projects	0	0	0	1

PREAMBLE:

VVIT conforming to the standards, procedures initiated and steered by the AICTE, NBA, NAAC and other statutory bodies, gives utmost importance to the ***Promotion of social science research***. In this regard, students are encouraged to pursue projects in socially relevant domains by taking challenging problems that when solved will increase in the sophistry of the mankind in society. The to-be-engineers-of-society are urged to conduct cutting edge projects in various fields of social sciences that have theoretical, conceptual, methodological and policy implications which prop up the society at large. These socially relevant projects are made as mandatory practical course in the B.Tech Curriculum of every stream and a nice guidance will be given by the processors to inculcate the philanthropic culture in the engineering posterity.

DOMAIN OF SOCIAL SCIENCES:

Following are the domains in which VVIT encourages students to pursue data, requirements analysis through implantation of a model of the project.

- Environment
- Energy
- Materials
- Computing
- Telecommunications
- Defense
- Healthcare
- Agriculture and other interesting areas that are even tangentially connected to the society.

GUIDELINES:

Every student must do the socially relevant project either individually or team as per the guidelines in the **Anexure** given.

ASSESSMENT:

The Project review panel of individual departments and Institute will assess the quality of projects based on the

- ➔ Quality of Literature survey
- ➔ Novelty in the topic relevance to the society and specialization
- ➔ Understanding of the topic
- ➔ Quality of Report and Oral Presentation
- ➔ Efficiency in implementation
- ➔ Scalability, Portability and ability to fuse the project with other systems

A sum of 1.5 Credits will be awarded for those who successfully complete the project and even promoted to present the project in social projects expositions etc. competitions.

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II- Year II- Semester	Name of the Course	L	T	P	C
MC2201	Professional Ethics and Human Values	2	0	0	0

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others.
- To create awareness on assessment of safety and risk

Unit I: HUMAN VALUES:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others –Living Peacefully –Caring –Sharing –Honesty -Courage-Cooperation–Commitment – Empathy –Self Confidence Character –Spirituality.

LEARNING OUTCOMES:

1. learn about morals, values & work ethics.
2. learn to respect others and develop civic virtue.
3. develop commitment
4. learn how to live peacefully

Unit II: ENGINEERING ETHICS:

Senses of 'Engineering Ethics-Variety of moral issued –Types of inquiry –Moral dilemmas – Moral autonomy –Kohlberg's theory-Gilligan's theory-Consensus and controversy –Models of professional roles-Theories about right action-Self interest -Customs and religion –Uses of Ethical theories –Valuing time –Co operation –Commitment.

LEARNING OUTCOMES:

1. learn about the ethical responsibilities of the engineers.
2. create awareness about the customs and religions.
3. learn time management
4. learn about the different professional roles.

Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering As Social Experimentation –Framing the problem –Determining the facts –Codes of Ethics –Clarifying Concepts –Application issues –Common Ground -General Principles – Utilitarian thinking respect for persons

.

LEARNING OUTCOMES:

1. demonstrate knowledge to become a social experimenter.
2. provide depth knowledge on framing of the problem and determining the facts.
3. provide depth knowledge on codes of ethics.
4. develop utilitarian thinking

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK:

Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety-Intellectual Property rights(IPR).

LEARNING OUTCOMES:

1. create awareness about safety, risk & risk benefit analysis.
2. engineer's design practices for providing safety.
3. provide knowledge on Intellectual Property Rights.

UINIT V: GLOBAL ISSUES

Globalization –Cross culture issues-Environmental Ethics –Computer Ethics –Computers as the instrument of Unethical behavior –Computers as the object of Unethical acts –Autonomous Computers-Computer codes of Ethics –Weapons Development -Ethics and Research –Analyzing Ethical Problems in research.

LEARNING OUTCOMES:

1. develop knowledge about global issues.
2. create awareness on computer and environmental ethics
3. analyze ethical problems in research.
4. give a picture on weapons development.

COURSE OUTCOMES

Students will be able to:

CO1. identify and analyze an ethical issue in the subject matter under investigation or in a relevant field in a real-world situation or practice

CO2. articulate what makes a particular course of action ethically defensible and assess their own ethical values and the social context of problems

CO3. identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects

CO4. demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work

CO5. integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

Text Books:

1. "Engineering Ethics includes Human Values" byM.Govindarajan, S.Natarajan anad, V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger –Tata McGraw-Hill– 2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-LaxmiPublications.
6. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
7. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3101	Unix and Shell Programming	3	0	0	3

Prerequisites: Working knowledge of any OS and basic Programming skills

Course Objectives:

1. Introduce Unix Operating System and its features while exploring file system and security
2. Learn UNIX Filters related to text processing, communication and search utilities
3. Learn programming filters and interactive shell scripting
4. Learn shell programming constructs writing advanced scripts
5. Learn kernel programming on file operations and managing processes

UNIT - I **10 Hours**

Introduction Unix OS, File Systems, Security and File Permissions, Introduction to Shells.

UNIT - II **10 Hours**

Filters, Communications, Regular Expressions, global regular expression and print(grep)

UNIT - III **10 Hours**

Stream editor(sed), Programming filter (awk), Interactive shell programming

UNIT - IV **10 Hours**

Shell Programming concepts, Advanced Shell Programming

UNIT - V **08 Hours**

Introduction System calls and Signals, File I/O, Files & Directories, Process control

Learning Resources
Text Books
1.Unix and Shell Programming, Behrouz A, Forouzan and Richard F.Gilberg, Cengage Learning, 2003. 2.Advanced Programming in Unix Environment, W.Richard Stevens, Stephen A Rago, 3rd Edition, Addison-Wesley Professional, 2013.
Reference Books
1. UNIX and shell programming by B.M. Harwani, OXFORD university press. 2. Unix essentials by Sumitabha Das 3. Unix Shell Programming, Stephen G.Kochan, Patrick Wood, 3/e, Pearson
e- Resources & other digital material
1.Coursera Online Learning Material 2.Lecture Notes and Teaching Material supplied Via MS Teams STM Course Channel 3.Open Access e-Resources like **SWAYAM by nptel** etc
e-books
1. Directory of Open Access Books (DOAB) **2.** AICTE Open Library
Online links for Unix
www.unix.org www.linuxfoundation.org www.itsfoss.com

Course Outcomes:

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

CO1: Infer the importance of Unix operating system by learning salient features and using basic utilities **(Understand)**

CO2: implement programming and non-programming filters aptly **(Apply)**

CO3: create shell scripts using the syntactic constructs of shell for producing the desired effects. **(Create)**

CO4: create advanced shell scripts for string and array processing. **(Create)**

CO5: develop functions using system calls for file and process control. **(Create)**

CO-PO mapping Table with justification

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

Micro Syllabus:

UNIT I : Introduction Unix OS, File Systems, Security and File Permissions, Introduction to Shells.		
Unit	**Module**	**Micro Content**
UNIT I	Introduction to Unix Operating System	Why Unix, Computer Systems, Unix Environment
		Unix Structure, Accessing Unix
		Command basics, common commands,
		other useful commands
	File Systems	File names, file types, regular files, directories
		File system implementation
		Operations unique to directories
		Operations unique to regular files
		Operations common to both files and directories
	Security and Permissions	Users and groups, security levels
		Changing permissions
		User masks, changing ownership and group
	Introduction to Shells	Unix session, standard streams, redirection
		Pipes, tee command, command execution, command line editing
		Quotes, command substitution, job control, aliases
		Variables, predefined variables, options, shell/environment customization
UNIT – II: Filters, Communications, Regular Expressions, global regular expression and print(grep)		
Unit	**Module**	**Micro Content**
	Filters	Filters and Pipes, concatenating pipes,

		displaying beginning and ending of files, cut, paste, sorting,
		Translating characters, files with duplicate lines, count characters, words or lines, comparing files
	Communications	User communication, Electronic mail
		Remote access
		File transfer
	Regular Expressions & grep	Atoms, operators
		Grep operation, grep family,
		examples, searching for file content
UNIT – III : Stream editor(sed), Programming filter (awk), Interactive shell programming		
Unit	**Module**	**Micro Content**
UNIT III	Sed	Scripts, operation, addresses, commands-1
		Commands-part 2
		Applications, grep and sed
	Awk	Awk execution, fields and records, scripts
		Awk operation, patterns, actions
		Associative arrays, string functions, math functions, User-defined functions
		Using system commands in awk, applications
		awk and grep, sed and awk
	Interactive shells	Shell features, two special files, variables, output, input,
		exit status of a command, eval, environmental variables, options,
		Command history and execution process
UNIT - IV : Shell Programming, Advanced Shell Programming		
Unit	**Module**	**Micro Content**
UNIT IV	Shell programming	Basic script concepts, expressions
		Decisions: making selections, repetition
		Special parameters and variables
		Changing positional parameters
		Argument validation
		Debugging scripts
		Script examples
	Advanced shell programming	Variable evaluation and substitution
		String manipulation
		Here document , functions,
		arrays, signals
		Built-in commands, scripting techniques,
		shell environment and script, script examples

UNIT V : Introduction System calls and Signals, File I/O, Files & Directories, Process control

Unit	Module	Micro Content
UNIT V	Introduction System calls and Signals	System call and library functions, signals
	File I/O	Introduction to file I/O
		creat, open,close
		lseek, read,write
		dup dup2, fcntl,ioctl
	Files and directories	File types, stat,lstat, fstat,
		File size, system calls operating on file/directories
	Process control	Intro to unix processes, process identifiers, fork(), vfork(), exit()
		Wait, waitpid,exec

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III- Year I- Semester	Name of the Course	L	T	P	C
HS3101	Managerial Economics and Financial Analysis	3	0	0	3

Course Objective: The objective of this course is to inculcate basic knowledge to students relating to concepts of Managerial Economics and Accounting to make them effective business decision makers.

Other course educational objectives of this course:

1. To equip the students with the basic inputs of managerial economics and demand concepts.
2. To understand the concepts of production and cost for various business decision.
3. To understand the different types of market, market structures & pricing strategies and their applications in business decision making and to know the different forms of Business organization and the concept of Business Cycles.
4. To understand the fundamental of accounting and analysis of accounting statements for managerial decision making.
5. To understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT – I Introduction to Managerial Economics and demand Analysis: 10 Hrs

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting.

UNIT - II Theory of Production and Cost Analysis: 13 Hrs

Production Function – Isoquant and Isocost, MRTS, Least Cost Combination of Inputs - Laws of Returns to scale - Internal and External Economies of Scale, Cost Analysis: Cost concepts, Cost & output relationship in short run & long run - Break-even Analysis (BEA)-Determination of Break-Even Point - Significance and limitations.

UNIT – III Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles: 12 Hrs

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – Business Cycles: Phases of Business Cycles.

UNIT – IV Introduction to Financial Accounting & Analysis: 13 Hrs

Financial Accounting and analysis: Accounting –significance -- Book Keeping-Double entry system –Journal- Ledger- Trial Balance- Final Accounts with simple adjustments.

Financial Statement Analysis through ratios: Ratio-analysis of financial statement using different ratios (Liquidity -Profitability- Solvency -Activity ratios).

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).

Text Books:

1. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.

2. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.

3. Prof. J.V. Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

Reference Books:

1. V. Maheswari : Managerial Economics, Sultan Chand.

2. Suma Damodaran : Managerial Economics, Oxford 2011.

3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.

4. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.

5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.

6. Maheswari: Financial Accounting, Vikas Publications.

7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

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

CO1: To equipped with the knowledge of estimating the Demand and demand elasticities for a product.

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

CO3: To understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.

CO4: To prepare Financial Statements and the usage of various Accounting tools for analysis.

CO5: To evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	-	-	-	-	-	1	-	_	1	-	_	-

CO 2	-	-	-	-	-	1	-	2	1	2	2	2
CO 3	-	-	-	-	-	1	-	-	1	-	-	-
CO 4	-	-	-	-	-	1	-	2	1	2	2	-
CO 5	-	-	-	-	-	1	-	2	1	2	3	3

Micro Syllabus for Managerial Economics and Financial Analysis

UNIT – I Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting.

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
	Concept of Managerial economics	Nature & scope of Managerial Economics
		Importance of Managerial Economics
		Difference between Economics & Managerial Economics
	relationship with other subjects	Linkage with other Disciplines
	Basic Economic tools of Managerial economics	Opportunity cost Principle, Incremental principle, Time perspective principle, Discounting Principle, Eqi marginal 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
	Demand fore casting	types of demand forecasting

UNIT - II Theory of Production and Cost Analysis:
Production Function – Isoquant and Isocost, MRTS, Least Cost Combination of Inputs - Laws of Returns to scale - Internal and External Economies of Scale, Cost Analysis: Cost concepts, Cost & output relationship in short run & long run - Break-even Analysis (BEA)-Determination of Break-Even Point - Significance and limitations.

Unit II	Theory of Production	Production function, Production process, importance of production, assumptions
	Isoquant and Isocost	Meaning and Types, properties

	MRTS, Least Cost Combination of Inputs	Schedule of Marginal rate of technical substitution, combination of different inputs
	Laws of Returns to scale	Schedule and graph
	Economies of scale	Internal and external
	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 – III Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – Business Cycles: Phases of Business Cycles.

Unit III	Market Structures	Meaning, definitions, types of market
	Perfect Competition	Features, price output determination under perfect competition
	Monopoly	Features, price output determination under perfect competition
	Monopolistic competition	Features, price output determination under perfect competition
	Oligopoly	Features
	Pricing	Methods of pricing and internet pricing
	Type of business organization: Sole trader	Features, Advantages & disadvantages, suitability
	Partnership	Features, Advantages & disadvantages, suitability
	Joint stock company	Features, Advantages & disadvantages, suitability
	Business cycle	Phases of business cycle

UNIT – IV Introduction to Financial Accounting & Analysis:

Financial Accounting and analysis: Accounting –significance -- Book Keeping-Double entry system –Journal- Ledger- Trial Balance- Final Accounts with simple adjustments.

Financial Statement Analysis through ratios: Ratio-analysis of financial statement using different ratios (Liquidity -Profitability- Solvency -Activity ratios).

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

	Financial Statement Analysis through ratios	Ratio Analysis, uses and types of ratios, significance, analysis of financial statements using Liquidity -Profitability- Solvency -Activity ratios

UNIT - V Capital and Capital Budgeting:

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

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3102	Advanced Java Programming	3	0	0	3

Course Objectives:

- Implementation of JDBC
- Understanding Java Beans
- Develop web application using Servlets and JSP
- Understands MVC in web development

UNIT-I: 10 hrs

JDBC: JDBC Connectivity, Types of JDBC drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database.

Introduction to Web: DNS, Role of DNS, DNS root servers, Internet and Intranet, Evolution: web 1.0, 2.0, 3.0, HTTP Request and HTTP Response, Website design principles, planning

Introduction to HTML

UNIT-II: 10 hrs

Applet Context– signed applet – object serialization- shallow and deep copying

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

Unit – III: 12 hrs

Servlets: Web servers, Tomcat web server installation steps, introduction to servlets, Lifecycle of a Servlet, Simple servlet, the Servlet API, Reading Servlet parameters, the javax.servlet.http package, Handling Http Request & Responses, Using Cookies-Session Tracking.

Java Server Pages: Introduction to JSP, The Problem with Servlet, the Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC architecture.

UNIT-IV: 10 hrs

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing data between JSP pages, Requests and Users, Passing Control and Date between Pages, Sharing Session and Application Data.

UNIT-V: 8 hrs

Introduction to Spring Framework: Introduction to Spring framework, Dependency Injection and Inversion of Control, Spring modules, Spring with MVC.

Introduction to struts framework.

OUTCOMES:

- Implementation of JDBC
- Understanding Java Beans
- Develop web application using Servlets and JSP
- Understands MVC in web development

Text Books:

1. Internet and World wide web- How to program, Dietel and Nieto, Pearson.
2. The Complete Reference, Java 2, 3ed, Patrik Naughton, Herbert Schildt, TMH.

3. Java Server Pages, Hans Bergstan, Oreilly

Reference Books

1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly
2. Murach's, Beginning Java JDK5, Murach, SPD.
3. An introduction to Web Design and Programming, Wang Thomson

e- Resources & other digital material

1.AbhayRedkar, JSF Developer, ―Struts2 Framework for beginners", Udemy.https://www.udemy.com/struts-2-framework-for-beginners/

2. Prof. I. Sengupta. (14th, May, 2017), Department of Computer Science & Engineering, I.I.T.,Kharagpur, ―Internet Technologies", NPTEL videos.

Course Outcomes:

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

CO1: Implement JDBC Connectivity (L3)
CO2: Understands benefit of Java Beans (L2)
CO3: Implements Web Application using Servlets & JSP (L3)
CO4: Understands MVC in web development using spring and Struts (L2)

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSPO1	PSPO2
CO-1	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-2	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-3	2	-	2	-	2	-	-	-	-	-	-	-	2	1
CO-4	2	-	1	-	2	-	-	-	-	-	-	-	1	1

MICRO SYLLABUS

UNIT-I: 10 hrs

JDBC: JDBC Connectivity, Types of JDBC drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database.

Introduction to Web: DNS, Role of DNS, DNS root servers, Internet and Intranet, Evolution: web 1.0, 2.0, 3.0, HTTP Request and HTTP Response, Website design principles, planning

Introduction to HTML

Unit	Module	Micro content	No of hrs
I	Introduction to JDBC	Need and Objecive of JDBC	1
	Data base Connection	Types of Drivers, JDBC API, Application Development, Prepared and Callable Statements	3
	Introduction to Web	Introduction, Role and DNS server	1
		Internet & Intranet	1
		Web evolution	1
		HTTP Request & Response	1
		Website Design principles	1
		Introduction to HTML	1

Applet Context– signed applet – object serialization- shallow and deep copying

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

Unit	Module	Micro content	No of hrs
II	Basics	Applet context, signed applet	1
		Object serialization.	1
		Shallow and deep copying	1
	Java Beans	Introduction, Advantages of Beans	1
		Bean properties	2
		Bean Persistence and Customizers	2
		Bean API	2

Unit – III: 12 hrs

Servlets: Web servers, Tomcat web server installation steps, introduction to servlets, Lifecycle of a Servlet, Simple servlet, the Servlet API, Reading Servlet parameters, the javax.servlet.http package, Handling Http Request & Responses, Using Cookies-Session Tracking.

Java Server Pages: Introduction to JSP, The Problem with Servlet, the Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC architecture.

Unit	Module	Micro content	No of hrs
III	Servlets	Web servers, Tomcat web server installation steps	2
		Introduction to servlets, Lifecycle of a Servlet, Simple servlet.	2
		Servlet API, Reading Servlet parameters	2
		Handling Http Request & Responses	2
		Using Cookies-Session Tracking.	2
	Java Server Pages	Introduction to JSP, The Problem with Servlet, the Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC architecture.	2

UNIT-IV: 10 hrs

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing data between JSP pages, Requests and Users, Passing Control and Date between Pages, Sharing Session and Application Data.

Unit	Module	Micro content	No of hrs
IV	JSP	Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects	2
		Conditional Processing, Displaying Values Using an Expression to Set an Attribute	2
		Declaring Variables and Methods, Error Handling and Debugging	2
		Sharing data between JSP pages, Requests and Users	2
		Passing Control and Date between Pages, Sharing Session and Application Data.	2

Introduction to Spring Framework: Introduction to Spring framework, Dependency Injection and Inversion of Control, Spring modules , Spring with MVC.

Introduction to struts framework

Unit	Module	Micro content	No of hrs
V	Spring Framework	Introduction to Spring framework, Dependency Injection and Inversion of Control	2
		Spring modules	2
		Spring with MVC	2
	Struts	Introduction to struts framework	2

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3103	Artificial Intelligence	3	0	0	3

Course 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 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

UNIT-I: 12 hrs

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.
Introduction to Prolog : Introduction To Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages

UNIT-II: Problem Solving 12 hrs

Problem Solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

Unit –III: Logic concepts 8hrs

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-IV: Knowledge Representation 12 hrs

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-V: Expert system and applications 8 hrs

Expert system and applications: Introduction phases in building expert systems, expert system vs traditional systems
Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory,Fuzzy Logic.

Text Books:

1) Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
2) Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

3) Introduction to Prolog Programming By Carl Townsend.

Reference Books

1)Artificial Intelligence- Deepak Khemani, TMH, 2013
2) Introduction to Artificial Intelligence, Patterson, PHI
3) Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA
4)"PROLOG Programming For Artificial Intelligence" -By Ivan Bratko(Addison-Wesley)
5) "Programming with PROLOG" –By Klocksin and Mellish.

e- Resources & other digital material

1) https://nptel.ac.in/courses/106/105/106105077/

2) http://aima.cs.berkeley.edu/

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.

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	PSO 3	PSO 4
CO -1	2	1										2		2		
CO -2		2	2		3									1		2
CO -3		2														2
CO -4												2	1			
CO -5	1	2			3								1			

MICRO SYLLABUS

UNIT-I: Introduction(12 hrs)

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.
Introduction to Prolog : Introduction To Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages

Unit	Module	Micro content	No of hrs
Introduction	Introduction	History, Intelligent Systems, Foundations of AI, Applications, Tic-tac-toe game playing, Development of AI languages,Current trends	4
	Introduction to PROLOG	Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages	8

UNIT-II: Problem Solving(12 hrs)

Problem Solving: state-space search and control strategies: Introduction, C, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

Unit	Module	Micro content	No of hrs
Problem Solving	State-space search and control strategies	Introduction,General problem solving, Exhaustive searches, Heuristic search techniques, Iterative deepening A*, Constraint satisfaction	6
	Problem reduction and game playing	Introduction, Problem reduction game playing, Alpha -beta pruning, Two-player perfect information games	6

Unit –III: Logic concepts(8hrs)

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	Module	Micro content	No of hrs
Logic Concepts	Propositional Calculus	Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic tableau system in propositional logic Resolution refutation in proportional logic ,Predicate logic.	8

UNIT-IV: Knowledge Representation(12 hrs)

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	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	6
	Advanced knowledge representation techniques	Introduction, Conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.	6

UNIT-V: Expert system and applications (8 hrs)

Expert system and applications: Introduction phases in building expert systems, expert system vs traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory,Fuzzy Logic.

Introduction to Prolog : Introduction To Prolog: Syntax andNumeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and LocalVariables, Iteration and Recursion, Property Lists and Arrays,Miscellaneous Topics, LISP and Other AI Programming Languages

Unit	Module	Micro content	No of hrs
Expert system and applications	Expert Systems	Introduction phases in building expert systems, expert system vs traditional systems	2
	Uncertainty measure	Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory,Fuzzy Logic.	6

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3104	Design and Analysis of Algorithms	3	0	0	3

Course Objectives:

1. To provide an introduction to formalisms to understand, analyze 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 **14 Hours**

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 Hours**

The Greedy Method: The General Method, Knapsack Problem, Job Sequencing With Deadlines Problem, Single Source Shortest Path Problem, Optimal Merge Patterns Problem.

UNIT - III **12 Hours**

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 Hours**

Backtracking: The General Method, The N-Queens Problem, Sum of Subsets Problem, Graph Coloring Problem, Hamiltonian Cycles Problem.

UNIT - V **14 Hours**

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.

Text Books:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, " Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.

Reference Books:

1. Harsh Bhasin, " Algorithms Design & Analysis", Oxford University Press.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

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 mapping Matrix:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
C01	3	3	3	2	--	--	--	--	--	--	--	--	3	1
C02	3	3	3	2	--	--	--	--	--	--	--	--	3	1
C03	3	3	3	2	--	--	--	--	--	--	--	--	3	1
C04	3	3	3	2	--	--	--	--	--	--	--	--	3	1
CO5	3	3	3	2								--	3	1

Micro Syllabus of Design and Analysis of Algorithms

III B. Tech I Semester

UNIT I: Introduction: Algorithm Definition, Algorithm Specification, Performance Analysis, Performance Measurement, Asymptotic notation.
Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort.

Unit	Module	Micro Content
UNIT I	Algorithm Analysis	Definition of Algorithm, Properties of algorithm
		Algorithm Specification – Pseudo code Conventions
		Performance Analysis – time and space complexity
		Performance Measurement – step count and frequency count
		Asymptotic Notations – Big Oh, Omega, Theta
	Divide and Conquer	General Method
		Binary Search – Procedure, Example, Algorithm and Computing Time Complexity
		Finding the Maximum and Minimum - Procedure, Example, Algorithm and Computing Time Complexity

		Quick Sort - Procedure, Example, Algorithm and Computing Time Complexity

UNIT – II: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing With Deadlines Problem, Single Source Shortest Path Problem, Optimal Merge Patterns Problem.

Unit	Module	Micro Content
UNIT II	Greedy Method	General Method
		Knapsack Problem - Description, Example, Algorithm.
		Job Sequencing With Deadlines Problem - Description, Example.
		Single Source Shortest Path Problem - Description, Example, Algorithm.
		Optimal Merge Patterns Problem - Description, Example, Algorithm.

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
UNIT III	Dynamic Programming	The General Method
		0/1 Knapsack Problem - Description, Example.
		Single Source Shortest Path – General Weights - Description, Example, Algorithm.
		All Pairs-Shortest Paths Problem - Description, Example, Algorithm.
		Travelling Salesperson Problem - Description, Example.
		String Editing Problem - Description, Example.

UNIT – IV: Backtracking: The General Method, The N-Queens Problem, Sum of Subsets Problem, Graph Coloring Problem, Hamiltonian cycles Problem.

Unit	Module	Micro Content
UNIT IV	Backtracking	The General Method
		The N-Queens Problem - Description, State Space Tree, Algorithm.
		Sum of Subsets Problem - Description, Example, State Space Tree, Algorithm.
		Graph Coloring Problem - Description, Example, State Space Tree, Algorithm.
		Hamiltonian Cycles Problem - Description, Example, State Space Tree, Algorithm.

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
UNIT V	Branch and Bound	The General Method
		FIFO Branch and Bound
		LC Branch and Bound

		0/1 Knapsack Problem - Description, Example.
		Travelling Salesperson Problem - Description, Example.
	NP-Hard and NP-Complete problems	Basics Concepts
		Cook's Theorem

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III- Year I- Semester	Name of the Course	L	T	P	C
PC3101L	Unix and Shell Programming Lab	0	0	3	1.5

Course Objectives:

1. Learn UNIX Filters related to text processing, communication and search utilities
2. Learn programming filters and interactive shell scripting
3. Learn shell programming constructs writing advanced scripts
4. Learn kernel programming on file operations and managing processes

List of Shell Scripts:

1. Create a script that, given a user name, finds the home directory of the user using the /etc/passwd file.

Preparation:

- None

Script:

- **Script Name:** `findHomeDirectory.scr`
- **Arguments:** One, The user name.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that there is only one argument.
- **Body Section:** Create a script that, given the name of a user (as the only argument), prints the absolute pathname of the user's home directory

Testing the Script:

- Test the script with two or more arguments.
- Test the script with no arguments.
- Test the script with one argument.

Testing the Effect of the Script:

- Verify the script by using your user name.

2. Write a script that creates a file out of the /etc/passwd file.

Preparation:

- None

Script:

- **Script Name:** `newEtcPasswd.scr`
- **Arguments:** One, The name of the file.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that there is only one argument.
- **Body Section:** Create a script that makes a file out of the information in the /etc/passwd file using the following format.

User Name	User Id	Group ID	Home Directory
- - - - - - - -	- - - - - -	- - - - - - -	- - - - - - - - - - - -
ram	234	23	/etc/usr/student/ram
-	-	-	-

Testing the Script:

- Test the script with two or more arguments.
- Test the script with no arguments.
- Test the script with one argument that is not the name of a file.
- Test the script with one argument that is the name of a file.

Testing the Effect of the Script:

- Verify the file was created and contains the correct information and format.

3. In a C Program, there is only one comment format. All comments must start with an open comment token, /*, and end with a close comment token, */. C++ programs use the C tokens for comments that span several lines. Single-line comments start with two slashes (//). In either case, the start token can be anywhere on the line.

Write a script to change every single-line comment in a C++ source file that uses C program start and end comment tokens to a single-line comment starting with a C++ single-line token. The comment itself is to be unchanged.

Preparation:

- Create at least five C++ source files in your home directory. The files do not have to be real C++ source files; they can contain only a few lines of comments, some with C program tokens and some with C++ single-line tokens. Each program should have at least one multiple comment and at least one single-line comment that uses the C program tokens. Use one or more blank lines between comments. The name of the files should have C++ extension (.c++), such as file1.c++.

Script:

- **Script Name:** `commentType.scr`
- **Arguments:** None
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that there is no argument.
- **Body Section:** Create a script that finds all files with extension (.c++) under your directory and change only the lines with comments. The name of the files should be preserved. If a file has the name file1.c++, the name still should be file1.c++ after the change.

Testing the Script:

- Test the script with one or two arguments.
- Test the script with no arguments.

Testing the Effect of the Script:

- Check to see if the comments are changed in the files.

4. Write a script to backup and archive a list of files.

Preparation:

- Create a file and type in it the list of files (in your home directory) that you want to back and archive
- Create a directory in which you will store the backed-up files and archive file.

Script

- **Script Name:** backup.scr
- **Arguments:** A filename and a directory. The filename holds the list of the files that should be backed-up. The directory is where the backed-up files should be stored.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly two arguments are entered.
  - **ii.** Check that the first argument is the name of a file exists
  - **iii.** Check that the second argument is the name of the directory that exists

- **Body Section:** Create backup files for files listed in the first argument. The backup files should have the same name as the original file with the extension `bak`. They should be copied to the directory given as the second argument.

Testing the Script:

- Test the script with no arguments
- Test the script with one argument
- Test the script with three arguments
- Test the script with two arguments in which the first one is not the name of the file
- Test the script with two arguments in which the second one is the name of a file rather than a directory.
- Test the script with name of the file and the name of the directory you created in the preparation section.

Testing the Effect of the Script:

- Check the contents of the directory to be sure that the files are copied

5. Write a script that finds all soft links to a specific file.

Preparation:

- Create a file and type some junk in it.
- Make at least five soft links to this file using completely arbitrary names..

Script:

- **Script Name: `softLinkFinder.scr`**
- **Arguments:** A filename. The file for which we want to find the soft links.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly one argument is entered.
  - **ii.** Check that only argument is the name of a file and that the specified file exists.
- **Body Section:** Use ls -l and grep command to find all the soft links attached to $1 positional parameter. Note that a file of type soft link is distinguished by lower case l. Be sure to find the soft links to the file defined in $1 and not other files.

Testing the Script:

- Test the script with no arguments
- Test the script with one argument
- Test the script with one argument that is not a file
- Test the script with one valid argument.

Testing the Effect of the Script:

- Check to make sure all the soft links you created are included in the list of soft links.

6. Create a script that simulates the ls -l command but prints only three columns of our choice.

Preparation:

- None

Script:

- **Script Name: `ls.scr`**

- **Arguments:** Three numeric arguments defining the column number of the ls -l output to be printed in the order we specify.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly three arguments are entered.
  - **ii.** Ensure that all three arguments are numeric
  - **iii.** Ensure that each argument is less than or equal to the actual number of columns in the ls -l command output.

- **Body Section:** Creates a new command that shows the output of the ls -l command to be printed in three columns in the order we like.

Testing the Script:

- Test the script with no arguments.
- Test the script with one argument.
- Test the script with two arguments.
- Test the script with three arguments, one of them nonnumeric.
- Test the script with three arguments, two of them nonnumeric.
- Test the script with three arguments, one of them too large.
- Test the script with three arguments,1 4 5
- Test the script with three arguments,3 7 1

Testing the Effect of the Script:

- None

7. Create a script that sends contents of a message file to everybody who logged in..

Preparation:

- Create a file of a short friendly message and mention that this is a test message that should be discarded by the receiver

Script:

- **Script Name:** `message.scr`
- **Arguments:** One argument, a message file.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly one argument is entered.
  - **ii.** Ensure that the argument is a readable filename.
- **Body Section:** Create a script that uses awk to create a temporary file containing the usernames of those users who are logged into the system at this moment. Then send the message contained in the first argument to every logged-in user. Note that a user who has logged in more than once should receive only one message.

Testing the Script:

- Test the script with no arguments.
- Test the script with two arguments.
- Test the script with one argument that is not a readable file.
- Test the script with one valid argument.

Testing the Effect of the Script:

- You should include yourself in the recipient list. Check to see if you have received the message.

8. Create a script that can be executed only from a specific terminal. This is done for security purposes. For example, a superuser may write scripts that can only be executed from his or her office and nowhere else.

Preparation:

- None

Script:

- **Script Name:** `security.scr`
- **Arguments:** None.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that no argument is entered.
- **Body Section:** Create a script that prints a friendly message. However, the script can be executed only for one terminal. You can use the name of the terminal you are using when you write the script. If somebody uses the script from a terminal that is not authorized, the script is to exit immediately. Hint: Use the tty command to show your current terminal.

Testing the Script:

- Test the script with one argument.
- Test the script from right terminal.
- Log into the system using another terminal and test the script.

Testing the Effect of the Script:

- None

9. Create a script that finds each line in a file that contains a specified string.

Preparation:

- Create a file of at least 20 lines and insert a double quoted string, such as "hello," in several lines.

Script:

- **Script Name:** `search.scr`
- **Arguments:** Two arguments, the first is the string to be found; the second is the name of the file.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly two arguments are entered.
  - **ii.** Ensure that the second argument is the name of the file that exists and is not empty.
- **Body Section:** Create a script that uses grep and loops to find the line numbers in which the string is found. Note that grep should be applied to each line, not the whole file. The script should print the result in the following format:

Line Number : [Line contents]

Testing the Script:

- Test the script with no arguments.
- Test the script with one argument.
- Test the script with two argument but the second one is not a file.
- Test the script with two correct arguments.

Testing the Effect of the Script:

- Compare the results of your script with a printout of the file.

10. Create a script that compiles all C source files in your home directory and create executable files.

Preparation:

- Create at least five C source files in your home directory. The files do not have to be real C source files; at a minimum they should contain a comment line that contain a unique program name such as the following example:

  /* .....file1.c .....*/

  The name of the files should have a C source file extension (.c), such as file1.c.

Script:

- **Script Name:** `compile.scr`
- **Arguments:** Two arguments, the first is the string to be found; the second is the name of the file.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that there is no argument
- **Body Section:** Create a script that finds all files with extension (**.**c) under your home directory and compiles them one by one. Each executable file should have the same name as the source file except that the extension should be (**.**exe). For example, if the source filename is file1.c, the executable filename should be file1.exe. Use the following command to compile:

  cc -o executable_filename source_filename

Testing the Script:

- Test the script with one or two arguments.
- Test the script with no arguments.

Testing the Effect of the Script:

- Verify that executable files were created under your home directory.

11. Create a script that finds all files in subdirectories that have the same filename.

Preparation:

- Make several directories, at different levels, under your home directory. For example, make ~/A, ~/B, ~/C, ~/A/AA, ~/A/BB, ~/A/AA/AAA, and so on until you have at least 15 directories. Copy a small junk file named file1 under some of these directories; do not change its name. Copy another small junk file named file2 under some other directories. Copy a third junk file under several directories. Be sure that some directories get a combination of file1 and file2 or file1 and file3. In at least three of the directories, create a junk file with a unique name.

Script:

- **Script Name:** `duplicateName.scr`
- **Arguments:** None
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that there is no argument.
- **Body Section:** Create a script that uses find and awk commands to create a list of files that are duplicated; use the full pathname for the duplicated filenames. Hint:

Use a basename command and an array in awk. The output should look like the following example:

file1: ~/A/file1 ~/A/AA/file1 ~/A/B/BB/BBB/file1
file2: ~/B/file2 ~/C/file2

Testing the Script:

- Test the script with one argument.
- Test the script with no arguments.

Testing the Effect of the Script:

- Use a recursive long list command to list the complete contents of your home directory. Verify the output of your script against the list command output.

12. Create a script that search for multiple occurrences of the specified string in each line.

Preparation:

- Create a file of at least 20 lines and insert a double quoted string, such as "hello," in several lines.
- Include two or three occurrences of the string in some lines.

Script:

- **Script Name: `search.scr`**
- **Arguments:** Two arguments, the first is the string to be found; the second is the name of the file.
- **Validation:** The minimum validation requirements are :
  - **i.** Ensure that exactly two arguments are entered.
  - **ii.** Ensure that the second argument is the name of the file that exists and is not empty.
- **Body Section:** Create a script that uses grep and loops to find the line numbers in which the string is found. Note that grep should be applied to each line, not the whole file. The script should print the result in the following format:

Line Number : [Line contents]

Testing the Script:

- Test the script with no arguments.
- Test the script with one argument.
- Test the script with two argument but the second one is not a file.
- Test the script with two correct arguments.

Testing the Effect of the Script:

- Compare the results of your script with a printout of the file.

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

CO1: **Develop** scripts compatible with different shells available under UNIX environment **(Apply)**

CO2: **Develop** scripts for automating the tasks of programmer during deployment and maintenance **(Apply)**

CO3: **Develop** scripts to automate task using programmable filters **(Apply)**

III- Year I- Semester	Name of the Course	L	T	P	C
PC3102L	Advanced Java Programming Lab	0	0	3	1.5

Course Objectives:

- Implementation of JDBC
- Understanding Java Beans
- Develop web application using Servlets and JSP
- Understands MVC in web development

1. Design Employee Database for company or Organization (Employee Personal Details, Department, Salary (basic, DA, HRA.,) Details) and develop JDBC based java application for following tasks:
1. Insert Records into respective table
2. Select records of particular table of database
3. Delete Records from table.
Connect GUI application to database and perform SQL commands via JDBC API

2. Write a program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.

3. Write a program for Java Bean with Simple property by using SimpleBeanInfo class.

4. Write a program for Java Bean with Indexed Property by using SimpleBeanInfo class.

5. Write a program to develop a Enterprise Java Bean of "Session Bean" type.

6. Create Application for Datagram server and Client interaction as per given below.
i] Datagram server to send a message to client.
ii]Datagram client to receive the message sent by the server.

7. Write a client server program using TCP where client sends 10 numbers to server program and server program responds with the numbers in ascending order to respective client.

8. Verify installation and setting of Web container/Web Server/Tomcat and prepare an installation report, which contains setting of class path, server port, starting and shutting down of server.

9. Develop web Application to display a greeting message in the browser by using Servlet interface.

10. Create a simple Sign in and Signup web application using HTTPServlet class

11. Create Servlet for registering a new user and displaying the number of visits made by the existing user using cookies

12. Create JSP to output, "Welcome to JSP world. The time now is: system current time. Use a scriptlet for the complete string, including the HTML tags

13. Create a simple JSP application for online poll application that prompts the user to answer a question and display the results in bar graph representation

14. Create a simple web application for online poll application that prompts the user to answer a question and display the results in bar graph representation and use spring framework in development

OUTCOMES:

- Implementation of JDBC
- Understanding Java Beans
- Develop web application using Servlets and JSP
- Understands MVC in web development

Text Books:

1. Internet and World wide web- How to program, Dietel and Nieto, Pearson.
2. The Complete Reference, Java 2, 3ed, Patrik Naughton, Herbert Schildt, TMH.
3. Java Server Pages, Hans Bergstan, Oreilly

Reference Books

1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly
2. Murach's, Beginning Java JDK5, Murach, SPD.
3. An introduction to Web Design and Programming, Wang Thomson

e- Resources & other digital material

1.AbhayRedkar, JSF Developer, ―Struts2 Framework for beginners", Udemy.https://www.udemy.com/struts-2-framework-for-beginners/

2. Prof. I. Sengupta. (14th, May, 2017), Department of Computer Science & Engineering, I.I.T.,Kharagpur, ―Internet Technologies", NPTEL videos.

Course Outcomes:

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

CO1: Implement JDBC Connectivity (L3)
CO2: Understands benefit of Java Beans (L2)
CO3: Implements Web Application using Servlets & JSP (L3)
CO4: Understands MVC in web development using spring and Struts (L2)

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSPO1	PSPO2
CO-1	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-2	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-3	2	-	2	-	2	-	-	-	-	-	-	-	2	1
CO-4	2	-	1	-	2	-	-	-	-	-	-	-	1	1

III- Year I- Semester	Name of the Course	L	T	P	C
PC3103	Artificial Intelligence Lab	0	0	3	1.5

Course Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of machine learning.

Experiments:

1) Study of Prolog.

2) Write simple fact for the statements using PROLOG.

3) Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing

4) Write a program to solve the Monkey Banana problem.

5) Write a program in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts

6) Write a program to implement factorial, Fibonacci of a given number

7) Write a program to solve 4-Queen and 8-puzzle problem.

8) Write a program to solve travelling salesman problem.

9) Write a program to solve water jug problem using LISP

10) Implementation of A* Algorithm using LISP /PROLOG

11) Implementation of Hill Climbing Algorithm using LISP /PROLOG

12) Implementation of Towers of Hanoi Problem using LISP

Course Outcomes:

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

CO1: Identify problems that are amenable to solution by AI methods.

CO2: Recognize appropriate AI methods to solve a given problem.

CO3: Discuss a given problem in the language /framework of different AI methods.

CO4: Develop basic AI algorithms

CO-PO mapping Table with justification

Mapping	PO1	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2	PS03	PS04
CO1						3	3		2	1			3			
CO2						3	3		2					2		
CO3						1		2					3	2		1
CO4						1			1		1			2	1	1

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III- Year II- Semester	Name of the Course	L	T	P	C
PC3201	Data Warehousing and Data Mining	3	0	0	3

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.

MICRO SYLLABUS

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:

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSPO 1	PSPO 2
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

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III- Year II- Semester	Name of the Course	L	T	P	C
PC3202	Computer Networks	3	0	0	3

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 and Medium Access Control Protocols
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 12 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 10 Hrs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Control Protocols, Sliding Window Protocols, HDLC, PPP, Channel Allocation problem, Multiple Access Protocols, IEEE standards for Local Area Networks, WLAN, Bluetooth

UNIT– III: Network Layer 10 Hrs

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and super netting.

UNIT-IV: Transport Layer 8 Hrs

Transport Layer Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols

UNIT – V: Application Layer 8 Hrs

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:

1. 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: To explain OSI and TCP/IP reference models and Example networks, characteristics of transmission media and classify multiplexing techniques (L2)

CO2: To summarize various Error Control, Flow Control techniques and Medium Access Control Protocols (L2)

CO3: To compute optimal path using Routing Algorithms. (L3)

CO4: To explain the concepts of reliable unreliable transmission (L2)

CO5: To illustrate the working of various application layer protocols (L3)

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	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 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	1

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,	1
	Error Detection and Correction	VRC, LRC, CRC, Checksum, Single Bit Correction : Hamming Codes	1
	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	3
	Example Data Link Control Protocols	HDLC, PPP	1
	Channel Allocation Problem	Static Channel Allocation, Dynamic Channel Allocation	1
	Multiple Access Protocols	Aloha, CSMA, Collision Free Protocols,	1
	IEEE standards LAN Protocols	IEEE-802.3,802.4,802.5	2
	IEEE WLAN Protocols	IEEE 802.11, Bluetooth	1

UNIT-III: Network Layer

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and supernetting.

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	2
	IP Headers	IPV4 and IPV6	2
	IP Addresses	Classful IP Addressing, Classless IP Addressing, Types of IP Addresses, Subnetting and Super netting	3

UNIT-IV: Transport Layer

Transport Layer Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols,

Unit	Module	Micro content	No of hrs
Transport Layer	Design Issues	Design Issues, Process Addressing, Service Primitives	1
	TCP Phases	Connection Establishment, Connection Termination, Data Transfer	2
	Protocols	TCP, UDP, RTP	3

UNIT-V: Application Layer

Design Issues, DNS, WWW, HTTP/HTTPS, E-mail, FTP,

Unit	Module	Micro content	No of hrs
Application Layer	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
	FTP	Communication over control Connection, Communication Over Data Connection, Anonymous FTP	1

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III- Year II- Semester	Name of the Course	L	T	P	C
PC3203	Theory of Computation	3	0	0	3

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 and DFA

Finite Automata Conversions: Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines, Applications and Limitations of Automata.

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

Regular 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, Applications of PDA.

Turing Machine (TM): Design of Turing Machine, Deterministic TM, Non-deterministic TM, Church's Thesis, Decidability Problems, Halting problems, Post's Correspondence Problems of Turing Machine, P and NP problems.

UNIT-IV: Machine Independent Phases **14 hrs**

Lexical Analysis: Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

Syntax Analysis: Parsing definition, types of parsing, Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non- Recursive predictive parsing, Bottom-up parsers- Operator Precedence Parsing, Shift Reduce Parsing- LR parsers, Comparison of Top down approaches with bottom up approaches, Error recovery in parsing.

Semantic Analysis: Syntax Directed Translation, SDT schemes, 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, abstract syntax trees. Types and declarations, type Checking

Code Optimization: Semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms

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 Youtube 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:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	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

MICRO SYLLABUS

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 and DFA

Finite Automata Conversions: Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines, Applications and Limitations of Automata.

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 and DFA	5
	Finite Automata Conversions	Conversion from NFA Є to NFA, NFA to DFA, Minimization of DFA, Moore and Mealy Machines, Applications and Limitations of Automata.	7

UNIT-II: Regular Expressions, Regular 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

Regular 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 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	**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, Applications of PDA.

Turing Machine (TM): Design of Turing Machine, Deterministic TM, Non-deterministic TM, Church's Thesis, Decidability Problems, Halting problems, Post's Correspondence Problems of Turing Machine, P and NP problems.

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, Applications of PDA	6
	Turing Machine (TM)	Design of Turing Machine, Deterministic TM, Non-deterministic TM, Church's Thesis, Decidability Problems, Halting problems, Post's Correspondence Problems of Turing Machine, P and NP problems.	6

UNIT-IV: Machine Independent Phases 14 hrs

Lexical Analysis: Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

Syntax Analysis: Parsing definition, types of parsing, Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non- Recursive predictive parsing, Bottom-up parsers- Operator Precedence Parsing, Shift Reduce Parsing- LR parsers, Comparison of Top down approaches with bottom up approaches, Error recovery in parsing.

Semantic Analysis: Syntax Directed Translation, SDT schemes, 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**	Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.	4
	Syntax Analysis	Parsing definition, types of parsing, Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non- Recursive predictive parsing,	3
		Bottom-up parsers- Operator Precedence Parsing, Shift Reduce Parsing- LR parsers, Comparison of Top down approaches with bottom up approaches, Error recovery in parsing.	4
	Semantic Analysis	Syntax Directed Translation, SDT schemes, 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, abstract syntax trees. Types and declarations, type Checking

Code Optimization: Semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms

Unit	Module	Micro content	No of hrs
	Intermediate Code Generation	Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking	3

Unit-V Machine Dependent Phases	**Code Optimization**	Semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.	5
	Code generation	Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.	3
	Runtime Environment	storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms	3

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III- Year II- Semester	Name of the Course	L	T	P	C
PC3204	Web Technologies	3	0	0	3

Course Objectives:

- Creating web pages using HTML5 and CSS
- Implementing Interactive web interfaces with client side technologies.
- Create and validate XML documents.
- Understanding Server Side Scripting.
- Interactive Server side Scripting for an application

UNIT-I: 10 hrs

HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Html styles, Elements, Attributes, Heading, Layouts, Html media, Iframes Images, Hypertext Links, Lists, Tables, Forms, GET and POST method, HTML 5, Dynamic HTML.

CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution, CSS3

UNIT-II: 12 hrs

Javascript - Introduction to Javascript, Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions.

Introduction to Angular JS: ARRAY, Objects, Strings, Angular JS Form Validation & Form Submission.

Introduction to Node.js: Advantages, Node.js Process Model, Node JS Modules, Node JS File system, Node JS URL module, Node JS Events

Unit – III: 8 hrs

Working with XML: Document type Definition (DTD), XML schemas, XSLT, Document object model, Parsers - DOM and SAX.

AJAX A New Approach: Introduction to AJAX, Basics of AJAX, XML Http Request Object, AJAX UI tags, Integrating PHP and AJAX

UNIT-IV: 9 hrs

PHP Programming: XAMPP, LAMP and WAMP servers. Introduction to PHP, Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions

UNIT-V: 11 hrs

File Operations: including and requiring Files, File Handling – Reading from file, Copying Files, Deleting a File, Updating a File and Uploading Files.

My SQL: Creating Database, Data Types, Basic Operations on tables (Create, Select, Delete and Update)

Working with Database & Forms: Querying a My SQL Database with PHP, Get and Post Methods, Query strings, HTML form handling.

Maintaining User State: Cookies and Sessions

OUTCOMES:

- Static web pages using HTML5 and CSS
- Interactive web interfaces with client side technologies.
- Create and validate XML documents.
- Understand Server Side Scripting.
- Interactive Server side Scripting for an application

Text Books:

1. HTML5 Black Book Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery , Dreamtech Press (2011).
2. Robin Nixon, Learning PHP, My SQL, Java Script & CSS‖, 2nd Edition, O'REILLY (2012).

Reference Books

1. H. M. Deitel and P. J. Deitel, Internet & World Wide Web How to Program, 5th Edition, Prentice Hall, 2008

e- Resources & other digital material

1. http://php.net/manual/en/book.mysql.php

Course Outcomes:

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

CO1: Design and create static web pages using HTML5 and CSS (L3)
CO2: Create interactive web interfaces with client side technologies.
CO3: Create and validate XML documents.
CO4: Understand Server Side Scripting.
CO5: Design and Create Interactive Server side Scripting for an application

CO-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	PSPO 1	PSPO 2
CO -1	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO -2	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO -3	2	-	2	-	2	-	-	-	-	-	-	-	2	1
CO -4	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO -5	2	-	2	-	2	-	-	-	-	-	-	-	1	1

MICRO SYLLABUS

UNIT-I: **10 hrs**

HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Html styles, Elements, Attributes, Heading, Layouts, Html media, Iframes, Images, Hypertext Links, Lists, Tables, Forms, GET and POST method, HTML 5, Dynamic HTML.

CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution, CSS3

Unit	Module	Micro content	No of hrs
I	HTML	Standard HTML Document Structure, Basic Text Markup	1
		Html styles, Elements, Attributes, Heading, Layouts, Html media	1
		Iframes, Images, Hypertext Links	1
		Lists, Tables	1

		Forms, GET and POST method, HTML 5, Dynamic HTML	1
	CSS	Levels of Style Sheets	1
		Style Specification Formats	1
		Selector Forms	1
		The Box Model	1
		Conflict Resolution, CSS3	1

UNIT-II: **12 hrs**

Javascript - Introduction to Javascript, Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions.

Introduction to Angular JS: ARRAY, Objects, Strings, Angular JS Form Validation & Form Submission.

Introduction to Node.js: Advantages, Node.js Process Model, Node JS Modules, Node JS File system, Node JS URL module, Node JS Events

Unit	Module	Micro content	No of hrs
II	JavaScript	Introduction to Javascript, Objects, Primitives Operations and Expressions	3
		Control Statements, Arrays, Functions	2
		Constructors, Pattern Matching using Regular Expressions	2
	Angular JS	Introduction to Angular JS, ARRAY, Objects, Strings	2
		Angular JS Form Validation & Form Submission	1
	Node.js	Introduction to Node.js, Advantages, Node.js Process Model, Node JS Modules	1
		Node JS File system, Node JS URL module, Node JS Events	1

Unit – III: **8 hrs**

Working with XML: Document type Definition (DTD), XML schemas, XSLT, Document object model, Parsers - DOM and SAX.

AJAX A New Approach: Introduction to AJAX, Basics of AJAX, XML Http Request Object, AJAX UI tags, Integrating PHP and AJAX

Unit	Module	Micro content	No of hrs
III	XML	Document type Definition (DTD), XML schemas	2
		XSLT, Document object model	1
		Parsers - DOM and SAX.	2
	AJAX	Introduction to AJAX, Basics of AJAX.	1
		XML Http Request Object, AJAX UI tags	1
		Integrating PHP and AJAX	1

UNIT-IV: **9 hrs**

PHP Programming: XAMPP, LAMP and WAMP servers. Introduction to PHP, Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions

Unit	Module	Micro content	No of hrs
IV	PHP	XAMPP, LAMP and WAMP servers	2
		Introduction to PHP, Creating PHP script	2
		Working with variables and constants	1
		Data types, Operators. Controlling program flow	2
		Arrays	1
		functions	1

UNIT-V: **11 hrs**

File Operations: including and requiring Files, File Handling – Reading from file, Copying Files, Deleting a File, Updating a File and Uploading Files.

My SQL: Creating Database, Data Types, Basic Operations on tables (Create, Select, Delete and Update)

Working with Database & Forms: Querying a My SQL Database with PHP, Get and Post Methods, Query strings, HTML form handling.

Maintaining User State: Cookies and Sessions

Unit	Module	Micro content	No of hrs
V	File Operations	Including and requiring Files, File Handling – Reading from file, Copying Files, Deleting a File, Updating a File and Uploading Files	3
	Database & Form Handling	Creating Database, Data Types, Basic Operations on tables	2
		Querying a My SQL Database with PHP, Get and Post Methods, Query strings	2
		HTML form handling	2
	User State	Cookies and Sessions	2

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Professional Electives – I

III- Year II- Semester	Name of the Course	L	T	P	C
PE3201-1	Professional Elective-I Computer Graphics	3	0	0	3

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 Cincepts: 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:

- Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition Pearson Education,2004.
- F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

Reference Books:

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

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III- Year II- Semester	Name of the Course	L	T	P	C
PE3201-2	Professional Elective-I No-SQL	3	0	0	3

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, NoSQL Database Environment, NoSQL Options, When to use No-SQL?, Introduction to No-SQL development

UNIT-II: Column-Oriented Databases **12 hrs**

Column family, key and keyspace, Apache HBASE

Unit – III: Key Value Databases **12 hrs**

What is key value store?, Key value databases, DynamoDB

UNIT-IV: Document based Databases **12 hrs**

What is document?, Document Databases, MangoDB

UNIT-V: Graph Databases **12 hrs**

What is Graph Database?, Graph Databases, Neo4J

Text Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , Author: Sadalage, P. & Fowler, Publication: Pearson Education

2. NoSQL Databases A Complete Guide - 2020 Edition, Author: Gerardus Blokdyk, Publisher : 5starcooks

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.

2. NoSQL For Dummies, Author: Adam Fowler, Publisher: A wiley Brand

e- Resources & other digital material

1. https://www.guru99.com/hbase-tutorials.html
2. https://docs.mongodb.com/manual/tutorial/
3. https://dynobase.dev/dynamodb/
4.https://neo4j.com/developer/graph-db-vs-nosql/

Course Outcomes:

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

CO1: Outlines the importance of NoSQL and types of NoSQL Databases. (L1)
CO2: Demonstrates the working environment of Column-oriented databases. (L3)
CO3: Demonstrates the working environment of Key Value Databases. (L3)
CO4: Demonstrates the working environment of Document based Databases. (L3)
CO5: Demonstrates the working environment of Graph Databases.(L3)

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSPO1	PSPO2
CO-1	2	1	-	3	-	-	-	-	-	-	-	-	3	-
CO-2	1	-	3	-	1	-	-	-	-	-	-	-	-	1
CO-3	1	-	3	-	1	-	-	-	-	-	-	-	-	1
CO-4	1	-	3	-	1	-	-	-	-	-	-	-	-	1
CO-5	1	-	3	-	1	-	-	-	-	-	-	-	-	1

MICRO SYLLABUS

UNIT-I: Introduction to No-SQL (12 hrs)

What is No-SQL?, NoSQL Overview, NoSQL Database Environment, NoSQL Options, When to use No-SQL?, Introduction to No-SQL development

Unit	Module	Micro content	No of hrs
Introduction to No-SQL	Introduction	• Introduction to NoSQL • What is NoSQL • NoSQL Overview • NoSQL Database Environment • NoSQL Options	4
	When to use No-SQL?	• Benefits to using NoSQL DB • Backend Management • Drawbacks to Using NoSQL DB • NoSQL vs. SQL	4
	Introduction to No-SQL development	• Data Models • Distribution Models • Consistency • Categories of NoSQL • NoSQL Scalability	4

UNIT-II: Column-Oriented Databases (12 hrs)

Column family, key and keyspace, Apache HBASE

Unit	Module	Micro content	No of hrs

Column-Oriented Databases	Column-Oriented Databases	• Column family • Key and Key Space • Overview of various models (Apache Hbase, Cassandra etc.)	3
	Apache HBASE	• Architecture of HBASE • Features, Consistency, Transactions, Availability • Query Features, • Scaling, Suitable Use Cases, • Event Logging, • Content Management Systems, • Blogging Platforms, • Counters, • When Not to Use	9

Unit – III: Key Value Databases (12 hrs)

What is key value store?, Key value databases, DynamoDB

Unit	Module	Micro content	No of hrs
Key Value Databases	Key Value Databases	• What is key value store? • Key value databases • Major & Minor keys • Overview of various models (DynamoDB, Redis etc.)	2
	DynamoDB	• What Is a Key-Value Store • Key Value Store Features, • Consistency, Transactions, • Query Features, • Structure of Data, Scaling, • Suitable Use Cases, • Storing Session Information, • When Not to Use, • Relationships among Data, • Multi operation Transactions, • Query by Data, • Operations by Sets	10

UNIT-IV: Document based Databases (12 hrs)

What is document?, Document Databases, MangoDB

Unit	Module	Micro content	No of hrs

Document based Databases	Document based Databases	• What is document • Attributes • Metadata • Formats • XML • JSON and BSON • Overview of various models (MongoDB, CouchDB etc.)	4
	MongoDB	• Features, • Consistency, • Transactions, • Availability, • Query Features, • Scaling, Suitable Use Cases, • Content Management Systems, Blogging Platforms, • Web Analytics or Real-Time Analytics, • E-Commerce Applications, • When Not to Use, • Queries against Varying Aggregate Structure	8

UNIT-V: Graph Databases (12 hrs)

What is Graph Database?, Graph Databases, Neo4J

Unit	Module	Micro content	No of hrs
Graph Databases	Graph Databases	• Edges • Nodes • Relationship • Overview of various models (Neo4J, InfoGrid etc.)	3
	Neo4J	• Database development tools and programming languages, • Graph Databases, • Features, • Consistency, • Transactions, • Availability, • Query Features, • Scaling, Suitable Use Cases, • Location-Based Services, • Recommendation Engines, • When Not to Use	9

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III- Year II- Semester	Name of the Course	L	T	P	C
PE3201-3	Professional Elective-I Full Stack Development	3	0	0	3

Course Objectives:

1. To learn Client side application development
2. To focus on contemporary technologies like React & Angular JS
3. To understand data access through NodeJS.

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: ReactJS: Introduction, Templating using JSX, Components, State and Props, Lifecycle of Components, Forms and User Input, Using ReactJS with jQuery, React Routing, Communicate Between Components, Rendering List and Portals, Error Handling. C.R.U.D. with Firebase, Introduction to Redux, React with Redux

Unit-3: Angular JS: Introduction, MVC Architecture, setting up the environment, Expressions, Modules, Data binding, Controllers, Scope, Filters and Services, HTTP, Forms, Events and Validations. API and Routing.

Unit-4: Node JS: Overview, Node js - Basics and Setup, Node js Console, Node js Command Utilities, Node js Modules, Node js Concepts, Node js Events, Node js with Express js, Node js Database Access

Unit-5: **Java Micro services**: Basics, Architecture, Need of micro services, Merits and Demerits, Differences between MSA Vs SOA, Creating a simple micro service, Deploying and Testing. Java micro services with spring.

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:

1) https://www.youtube.com/watch?v=w7ejDZ8SWv8
2) https://www.youtube.com/watch?v=dGcsHMXbSOA

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

- Understand Client side design of the web.
- Implement components and props through React.
- Interpret the differences between React and AngularJS
- Use NodeJs for data availability
- Understand essential Java micro services.

Micro Syllabus of Full Stack Development

III B. Tech II Semester

Unit-1: Introduction to HTML 5, syntax, attributes, events, SVG, Web storage, Introduction to Canvas, dio & 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 ckgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font 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

Unit-2: ReactJS: Introduction, Templating using JSX, Components, State and Props, Lifecycle of Components, rms and User Input, Using ReactJS with jQuery, React Routing, Communicate Between Components, Rendering t and Portals, Error Handling. C.R.U.D. with Firebase, Introduction to Redux, React with Redux

Unit No.	Topic	Sub Topic
II	Introduction to React Elements	Introduction, Templating using JSX
		Components
		State and Props
		Lifecycle of Components
	User Interface	Forms and User Input
		Using ReactJS with jQuery
	Communication & Error Handling	React Routing
		Communicate Between Components
		Rendering List and Portals
		Error Handling
	Data Handling	C.R.U.D. with Firebase
		Introduction to Redux, React with Redux

Unit-3: Angular JS: Introduction, MVC Architecture, setting up the environment, Expressions, Modules, Data ding, Controllers, Scope, Filters and Services, HTTP, Forms, Events and Validations. API and Routing.

Unit No.	Topic	Sub Topic
III	Introduction	Introduction, MVC Architecture
		setting up the environment,
		Expressions
	Data and Modules Handling	Modules, Data binding
		Controllers
		Scope, Filters and Services
	User Interface & Validations	Http
		Forms and Events
		Validations

		API and Routing

Unit-4: Node JS: Overview, Node js - Basics and Setup, Node js Console, Node js Command Utilities, Node js odules, Node js Concepts, Node js Events, Node js with Express js, Node js Database Access

Unit No.	Topic	Sub Topic
IV	Overview	Overview, Node js - Basics and Setup
		Node js Console
		Node js Command Utilities
	Modules & Events	Node js Modules
		Node js Concepts, Node js Events
	Data Access	Node js with Express js
		Node js Database Access
	Setup & Utilities	Overview, Node js - Basics and Setup
		Node js Console
		Node js Command Utilities

Unit-5: **Java Micro services**: Basics, Architecture, Need of micro services, Merits and Demerits, Differences ween MSA Vs SOA, Creating a simple micro service, Deploying and Testing. Java micro services with spring.

Unit No.	Topic	Sub Topic
V	**Overview of Micro Services**	Basics, Architecture
		Need of micro services
		Merits and Demerits
		Differences between MSA Vs SOA
	Application Deployment	Creating a simple micro service
		Deploying and Testing
		Java micro services with spring.

III- Year II- Semester	Name of the Course	L	T	P	C
PE3201-4	Professional Elective-I Software Testing Methodologies	3	0	0	3

Course Objectives:

1. Describe the principles and procedures for designing test cases.
2. Provide supports to debugging methods.
3. Acts as the reference for software testing techniques and strategies

Contents

UNIT - I **10 Hours**

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT - II **10 Hours**

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing, **Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and **Interfaces Testing**, Domain and Interface Testing, Domains and Testability.

UNIT - III **10 Hours**

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection**. Syntax Testing**: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **Logic Based Testing**: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications

UNIT - IV **10 Hours**

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips, Graph Matrices and Application: -Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT - V **08 Hours**

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analysing Results, Batch Tests, Rapid Test Script Wizard.

Learning Resources
Text Books
1.Software testing techniques – Boris Beizer, Dreamtech, second edition. 2.Software Testing- Yogesh Singh, Camebridge
Reference Books
1.The Craft of software testing – Brian Marick, Pearson Education. 2.Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).

3.Software Testing, N.Chauhan, Oxford University Press. 4.Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press. 5.Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999. 6.Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press 7.Win Runner in simple steps by Hakeem Shittu, 2007Genixpress. 8.Foundations of Software Testing, D.Graham& Others, Cengage Learning.
e- Resources & other digital material
1.Coursera Online Learning Material 2.Lecture Notes and Teaching Material supplied Via MS Teams STM Course Channel 3.Open Access e-Resources like **SWAYAM by nptel** etc
e-books
1.Directory of Open Access Books (DOAB) 2.AICTE Open Library
Online links for FOSS Testing Tools
http://docs.seleniumhq.org/ http://www.autoitscript.com/site/ www.hp.com/go/LoadRunner jmeter.apache.org/ http://portswigger.net/burp/ http://www.acunetix.com/ http://wiki.eclipse.org/SWTBot/UsersGuide http://docs.seleniumhq.org/ http://www.autoitscript.com/site/

Course Outcomes:

CO1	To **infer** the rationale of Software Testing and **apply** Path Testing (Understand & apply) (L2)
CO2	To **perform** transaction flow, domain and interface analysis by **applying** apt testing techniques **(Apply & Analyse) (**L3)
CO3	To **perform** syntax and logic analysis of given software by **applying** apt testing technique **(Apply & Analyse)(**L3)
CO4	To **perform** state and transition analysis by **applying** apt testing technique (**Apply & Analyse**) (L2)
CO5	To **implement** automation testing tools for software testing of relevant products (**Create**) (L4)

CO-PO mapping Table with justification

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

Micro Syllabus of Software Testing Methodologies

UNIT I : Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and **Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing

Unit	Module	Micro Content
UNIT I	Introduction	Purpose of Testing, Dichotomies
		Model for testing, consequences of bugs
		Taxonomy of bugs
		Flow graphs
	Path testing	Flow graphs
		Path testing basics
		Path predicates
		Achievable paths
		Path sensitizing
		Path instrumentation
		Applications of path testing

UNIT – II: Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing**: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing, **Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and **Interfaces Testing**, Domains and Testability.

Unit	Module	Micro Content
UNIT-II	Transaction Flow Testing	Transaction flows
		Transaction flow testing techniques
	Dataflow Testing	Basics of Dataflow Testing
		Strategies in dataflow testing
		Applications
	Domain Testing	Domains and Paths
		Nice and Ugly Domains
		Domain Testing & Testability
		Interface Testing

UNIT – III : Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. **Syntax Testing**: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **Logic Based Testing**: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

Unit	Module	Micro Content
UNIT III	Path Expressions	Paths, Path Products
		Path Expressions
		Reduction procedure
		Applications
		Regular Expressions
		Flow Anomaly Detection
	Syntax Testing	Why, What and How
		A Grammar for formats
		Test Case Generation
		Implementation and Application

		Testability Tips.
	Logic-based Testing	Overview
		Decision Tables
		Path Expressions
		KV Charts, and Specifications

UNIT - IV : State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips, Graph Matrices and Application: -Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

Unit	Module	Micro Content
UNIT IV	Transition Testing	State, State Graphs
		Good & Bad states Graphs
		State Transition Testing
		Testability Tips
	Graph Matrices	Overview
		Graph Matrix
		Power of a Matrix
		Node Reduction Algorithm

UNIT V : Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analysing Results, Batch Tests, Rapid Test Script Wizard.

Unit	Module	Micro Content
UNIT V	Introduction to Software Testing Automation Tools	Introduction
		Automation Testing concepts
		Overview of tools (Selenium, WinRunner, Jmeter, LoadRunner etc.)
	WinRunner	Using WinRunner
		Mapping the GUI
		Recording Test, working with Test
		Enhancing Test, Checkpoints
		Test Script Language, Putting it all together
		Running and Debugging Tests, Analysing Results, Batch Tests
		Rapid Test Script Wizard

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III- Year II- Semester	Name of the Course	L	T	P	C
PE-3201-5	Professional Elective-I Distributed Systems	3	0	0	3

Course Objectives:

1.To give an introduction to the fundamentals of distributed computer systems.

2. To create an awareness of the major technical challenges in distributed systems design and implementation

3. To explain the characteristics of Interprocess Communication and get a practical exposure on it.And to provide students with mechanisms such as client/server communication, remote procedure call (RPC/RMI), multicasting.

4. Get exposure to current research issues in the field of distributed systems

5. To provide experience in the implementation of typical algorithms used in distributed systems.

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems,Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT-II

Interprocess Communication: Introduction, The API for the Internet Protocols- The

Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III

Distributed Objects and Remote Invocation: Introduction, Communication between

Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems:

Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

UNIT-V

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

TEXT BOOKS:

1. Ajay D Kshemkalyani, Mukesh Sighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

Course Outcomes:

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

CO1: Able to understand the nature of distributed systems and the common design problems, issues in the descriptive models.
CO2: Able to acquire knowledge on the characteristics of protocols for inter-process communication in a distributed environment and to support communication patterns.
CO3: Able to describe the features and applications of programming models in distributed systems. Able to describe the operating system supports the middleware layer in providing invocations upon shared resources.
CO4: Able to understand the distributed file systems architectures and implementations, how a set of processes can coordinate their actions.
CO5: Able to understand the mechanisms for concurrency control and the role of replication in distributed environment.
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CO-PO-PSO Mapping Matrix:

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

MICRO SYLLABUS

Unit-1(17 hrs)

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems,Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model

Unit-1	Module	Micro content	No of hrs
Characterization of Distributed Systems	Introduction	Definition	1
	Examples of Distributed systems	Internet,Intranet,Mobile Networks	1
	Resource Sharing	World wide web	1
	Design Challenges of Distributed Systems	Heterogenity,	2
		Openness,	
		transparency,	
		Scalability	
		,Concureency,	
		Failure Handling	
		,Security.	
System Models2	System Model Introduction	Properties of Disributed Systems	2
	Architectural Model	Introduction,	2
		Software Layer	
		,Middleware Layer,	
	System Architecture	Introduction,	3
		Client-server Model,	
		Peer to peer Model,	
		variations of Client server model,	
		Mobile code,	
		Mobile Agent,	
		Thin client, Network Computer ,Design requirements of DA	
Fundamental Models	Interaction Model	Communication Channels,Computer Clock,Variations ,Event Ordering	2
	Failure Model	Omission failure,Arbitary Failure,Timining failure	2
	Security Model	Protecting Objects,Properties of secure channel	1

Unit-2(12 hrs)

Interprocess Communication: Introduction, The API for the Internet Protocols- The

Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

Unit-2	Module	Micro content	No of hrs
Inter-Process Communication	Charecteristics of Interprocess communication	Sockets,UDP Datagram Communication,Java API for UDP Datagrams,TCP Stream Communication	3
	External Data Representation and Marshalling	CORBA Common Data Representation(CDR)	2
		Java object serialization	2
	Client-Server Communication	RPC Exchange Protocols,HTTP	2
	Multicast Communication	Charateristics of Multi-cast Communication,IP Multicast Communication, Reliability and Ordering of Multicast	3

Unit-3(9 hrs)

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

Unit-3	Module	Micro content	No of hrs
Distributed Objects and Remote Invocation	Introduction	Middleware Layer	1
		Object Model,Distributed Object Model	1
	Design Issues of RMI	Issues,Implementation Of RMI,Distributed Garbage Collection	2
	Remote Proceedure Call	Client server RPC Program,strength and weekness of RPC	2
	JAVA RMI	Example Programs of JAVA RMI,RMI Registry	3

Unit-4(19 hrs)

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems:

Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

Unit-4	Module	Micro content	No of hrs

Operating System Support	Introduction	The Operating System Layer	2
	Processes	Protection	1
		Address Space, Creation of a New Process, Threads.	1
	Threads	Thread Programming,	2
		Thread Synchronization	
Distributed File systems	File systems Modules	Requirements of DFS	1
	File Service Architecture	Responsibilities of Various Modules	2
	Peer To Peer Systems	Peer to Peer Middleware,	4
		Functional and Non-Functional Requirements	
	Napster and its legacy	Distributed Computation	2
	Routing Overlays	Distribution of data in Routingg Overlays	2

UNIT-5(19 hrs)

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Transactions &Replications: Introduction, System Model and Group Communication,Concurrency Control in Distributed Transactions, Distributed Dead Locks,Transaction Recovery:Replication-Introduction, Passive (Primary) Replication, Active Replication.

Unit-5	**Module**	**Micro content**	**No of hrs**
Coordination and Agreement	Introduction	Failure Assumptions,Failure Detection	2
	Distributed Mutual Exclusion	Essential Requirements,	2
		Performance Evaluation,	
		Central server Algorithm,	
		Ring Based Algorithm,	
		Ricart and Agrawalas Algorithm,	
		Multicast Synchronization,	
		Maekawas voting Algorithm	
	Election	A Ring Based Election	2
		,Bully Algorithm	
	Multi cast Communication	Introduction,	3
		System model,	
		Basic Multicast,	
		Reliable multicast,	
		Implementation of FIFO ordering over basic multicast	
	Introduction	Introduction to Replication	1

Distributed Transactions Replications	System Model	State machine	1
	Group Communication	Services provided for Groups	1
	Concurrency Control in Distributed Systems	Locking,	2
		Timestamp ordering Concurency Control	
	Distributed Deadlocks	Edge-chasing Algorithm(Deadlock Detection)	1
	Transaction Recovery	Probes travel Downhill	2
		Recovery Manager-Logging,	
	Fault Tolerance Services	Passive fault Tolerance	2
		Active fault tolerance	

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PROFESSIONAL ELECTIVE – II MOOCS-PE3202

III- Year II- Semester	Name of the Course	L	T	P	C
	Web Technologies Lab	0	0	3	1.5

Course Objectives:

- Creating web pages using HTML5 and CSS
- Implementing Interactive web interfaces with client side technologies.
- Create and validate XML documents.
- Understanding Server Side Scripting.
- Interactive Server side Scripting for an application

1) Design the following static web pages required for an online book store web site:

(a) **HOME PAGE:**

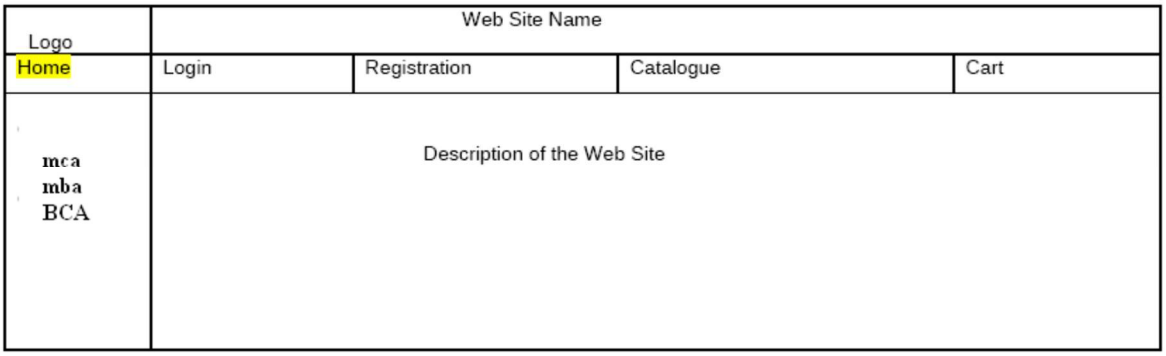
The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

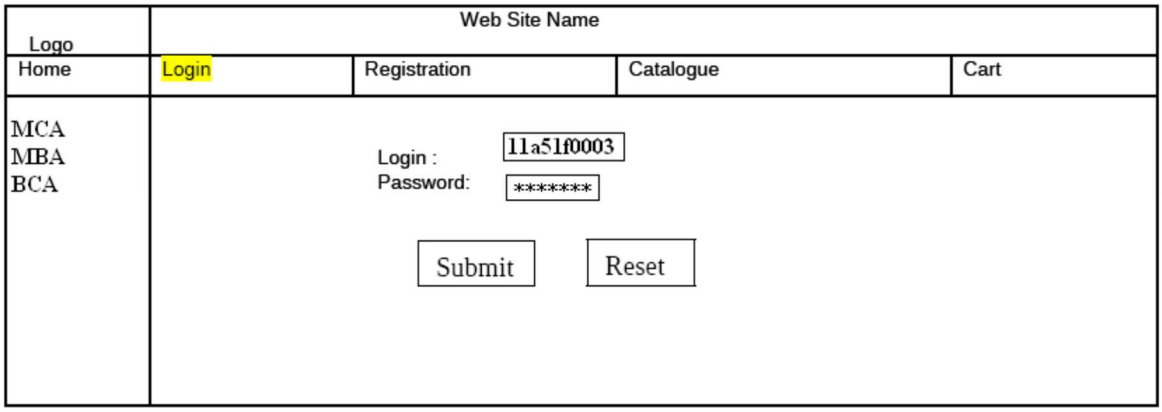
Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.



(b) **LOGIN PAGE:**



(c) **CATOLOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.

3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

(d). **REGISTRATION PAGE:**
Create a "*registration form* "with the following fields
1) Name (Text field) 2) Password (password field)
3) E-mail id (text field) 4) Phone number (text field)
5) Sex (radio button) 6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

2) Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles

3) Design a dynamic web page with validation using JavaScript

4) Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
a. Factorial of that number
b. Fibonacci series up to that number
c. Prime numbers up to that number
d. Is it palindrome or not

5) Write JavaScript programs on Event Handling
a. Validation of registration form
b. Open a Window from the current window
c. Change color of background at each click of button or refresh of a page
d. Display calendar for the month and year selected from combo box
e. On Mouse over event

6) Write an XML file which will display the Book information which includes the following:

1) Title of the book 2) Author Name 3) ISBN number
4) Publisher name 5) Edition 6) Price
a) Write a Document Type Definition (DTD) to validate the above XML file.
b) Write a XML Schema Definition (XSD) to validate the above XML file.

7) Create Web pages using AJAX.

8) User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ''.
Use init-parameters to do this

9) Example PHP program for registering users of a website and login.

10) Install a database (Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

11) Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

Text Books:

1. HTML5 Black Book Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery , Dreamtech Press (2011).
2. Robin Nixon, Learning PHP, My SQL, Java Script & CSS‖, 2nd Edition, O'REILLY (2012).

Reference Books

1. H. M. Deitel and P. J. Deitel, Internet & World Wide Web How to Program, 5th Edition, Prentice Hall, 2008

e- Resources & other digital material

1. http://php.net/manual/en/book.mysql.php

Course Outcomes:

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

CO1: Design and create static web pages using HTML5 and CSS (L3)
CO2: Create interactive web interfaces with client side technologies.
CO3: Create and validate XML documents.
CO4: Understand Server Side Scripting.
CO5: Design and Create Interactive Server side Scripting for an application

CO-PO-PSO Mapping Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSPO1	PSPO2
CO-1	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-2	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-3	2	-	2	-	2	-	-	-	-	-	-	-	2	1
CO-4	2	-	1	-	2	-	-	-	-	-	-	-	1	1
CO-5	2	-	2	-	2	-	-	-	-	-	-	-	1	1

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III- Year II- Semester	Name of the Course	L	T	P	C
	Data Mining Lab	0	0	3	1.5

OBJECTIVES:

- Practical exposure on implementation of well known data mining algoriyhms.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms.
- Handling a small data mining project for a given practical domain.

System/Software Requirements:

- **Intel based desktop PC**
- **WEKA TOOL**

1.Create an **arff** file for student data set.

2.Create a **csv** file for employee data set

3.Demonstration of preprocessing on dataset student.arff

4.Demonstration of preprocessing on dataset labor.arff

5.Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

6.Demonstration of Association rule process on dataset test.arff using apriori algorithm

7.Demonstration of classification rule process on dataset student.arff using j48 & id3 algorithms.

8.Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm

9.Demonstration of clustering rule process on dataset iris.arff using simple k-means

10.Demonstration of clustering rule process on dataset student.arff using simple k- means.

OUTCOMES:

- The data mining process and important issues around data cleaning, pre-processing
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification.

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III- Year II- Semester	Name of the Course	L	T	P	C
MC3201	Employability Skills-II	3	0	0	0

Components

5. Verbal Ability
6. Quantitative Ability
7. Reasoning Ability
8. Soft Skills

UNIT-1: Geometry

Properties of Triangles, Quadrilaterals, polygons and circles,Areas of different two dimensional figures (Triangles, Quadrilaterals, circles) Surface areas &Volumes of three dimensional figures &Coordinate Geometry

UNIT-2:

Logical Venn Diagrams, Blood Relations, Symbols and Notations, Clocks, Calendars, Ranking and Group ordering, Crypto-arithmetic, Cubes and Dice, Counting Figures, Finding missing terms

UNIT-3:

Part-1- Analytical Reasoning

Linear arrangements, Circular Arrangements, Queue arrangements, Time and Sequence, Problems on Miscellaneous models.

Part – 2 –Logical Reasoning

Syllogism, Logical Connectives, Statements and Assumptions, Statements and Arguments, Statements and Conclusions, statements and courses of an action, Cause and Effect, Assertions and Reason, Input and Output, Decision Making.

Unit-4 – Verbal Ability

iv) Grammar: Sentence structure and components, nouns, Subject-Verb Agreement, verb-tense, articles, prepositions and conjunctions, adjectives, synthesis of sentences, errors, corrections and improvements

v) Writing skills : Basic mechanics of writing, sentence ordering, passage ordering, thematic writing, report writing.

Unit-5 – Soft Skills

Career Options , Goal Setting, Corporate awareness, Personality Development: Positive Attitude, Team Work, Body Language and Time Management. Resume, Mock Interviews

Reference Books

25. Quantitative Aptitude for Competitive Examination by Dr R S Agarwal
26. Fast Track Objective Arithmetic Paperback – 2018 by Rajesh Verma
27. Teach Yourself Quantitative Aptitude, by Arun Sharma
28. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khattar
29. Quantitative Aptitude for all Competitive Exam by Abhijit Gupta
30. Quantitative Aptitude Quantum CAT by Sarvesh K. Verma
31. Modern Approach to Verbal and Non-Verbal Reasoning by Dr R S Agarwal
32. How to Prepare for Data Interpretation by Arun Sharma
33. Analytical Reasoning by M K Pandey
34. Logical Reasoning Data Interpretation by Nishit K. Sinha
35. How to prepare for Verbal Ability and Reading Comprehension – Arun Sharma and Meenakshi Upadhyay
36. Word Power Made Easy by Norman Lewis
37. Random House Roget's Thesaurus ---- By Random House
38. Cambridge Complete PET Students Book ----Emma Heyderman and Peter May
39. The Verbal Reasoning Test Workbook----- By Mike Bryon
40. Master the GRE (Peterson's) ---- By Margaret Moran
41. How to Prepare for Verbal Ability and Reading Comprehension for CAT ----- By Arun Sharma
42. ABC of Common Grammatical Errors ----- By Nigel D. Turton
43. English Collocations in Use: Advanced ---- By Felicity O'Dell and Michael McCarthy
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