Bharati Vidyapeeth

(Deemed to be University) Pune, India

College of Engineering, Pune

B.Tech. Computer Science & Engineering

(2023 Course)

Program Curriculum

As Per NEP Guidelines

VISION OF UNIVERSITY:

Social Transformation through Dynamic Education

MISSION OF UNIVERSITY:

- To make available quality education in different areas of knowledge to the students as per their choice and inclination.
- To offer education to the students in a conducive ambiance created by enriched infrastructure! and academic facilities in its campuses.
- To bring education within the reach of rural, tribal and girl students by providing them substantive fee concessions and subsidized hostel and mess facilities.
- To make available quality education to the students of rural, tribal and other deprived sections of the population

VISION OF THE INSTITUTE:

To be World Class Institute for Social Transformation Through Dynamic Education.

MISSION OF THE INSTITUTE:

- To provide quality technical education with advanced equipment, qualified faculty members, and infrastructure to meet needs of the profession and society.
- To provide an environment conducive to innovation, creativity, research, and entrepreneurial leadership.
- To practice and promote professional ethics, transparency and accountability for social community, economic and environmental conditions.

VISION OF THE DEPARTMENT

To be focused on innovative and quality education in computer science and engineering thatprepares professionals for development of society.

MISSION OF THE DEPARTMENT

- To provide academic environment for the development of skilled professionals
- To cultivate research culture that contributes to the sustainable development of thesociety.
- To enhance academic and industry collaborations for global exposure.

PROGRAM EDUCATIONAL OBJECTIVES

The students of B.TECH. (Computer Science and Engineering), after graduating will able to,

1. Demonstrate technical and professional competencies by applying EngineeringFundamentals, knowledge of computing and technologies.
2. Exhibit effective personality, good communication and team building skills
3. Adopt to the latest trends in the field of computer science and engineering.

PROGRAM SPECIFIC OUTCOMES

1. To design, develop and implement computer programs on hardware towards solvingproblems.
2. To employ expertise and ethical practice through continuing intellectual growth andadapting to the working environment.

PROGRAM OUTCOMES

1 Apply the knowledge of mathematics, science, engineering, and computing to provide a solution of complex engineering problems.

2 Identify, analyse complex engineering problems to derive conclusions using computerscience and engineering knowledge.

3 Outline resolutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration, societal, andenvironmental considerations.

4 Use existing research knowledge and research techniques including design of experiments, data analysis, and synthesis to provide valid inferences.

5 Create, select, and apply appropriate techniques, resources, and modern engineering andIT tools.

6 Apply inferences obtained by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the subsequent responsibilities relevant to the professionalengineering practice.

7 Recognize the impact of the professional engineering solutions in societal and environmental contexts to demonstrate the knowledge for sustainable development.

8 Apply ethical principles and execute professional ethics and responsibilities and normsof the engineering practice.

9 Work effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary surroundings.

10 Talk effectively on complex engineering activities with the engineering community such as being able to comprehend and write effective reports and design documentation,make effective presentations.

11 Prove knowledge and understanding of the engineering and management principles andapply these to one's work, as a member and leader in a team.

12 Recognise the need for and have the preparation and ability to engage in independent and life-long learning in context of technological change.

A. DEFINITION OF CREDITS:

1 Hour Lecture (L) per week	1 credit
1 Hour Tutorial (T) per week	1 credit
1 Hour Practical (P) per week	0.5 credits
2 Hours Practical (Lab)/week	1 credit

B. STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAMME:

Sr.No.	Category	Breakup of Credits
1	Basic Science Courses	16
2	Engineering Science Course	13
2	Core Courses and Lab	99
4	Professional Elective Courses	17
5	Project	09
6	Internship	06
7	Skill based Courses	16
**8	Value based Courses	08(Optional Credit)
9	Humanity/Social	06
TOTL		180

- **** Indicates optional credits**

C. COURSE CODE AND DEFINITION

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
TW	Term Work
O	Oral
SEE	Semester End Examination
ESC	Engineering Science Courses
BSC	Basic Science Courses
CC	Core Courses
PEC	Professional Elective courses
VAC	Value added Courses
SBC	Skill Based Courses
HSMC	Humanities/Social and management Courses
PROJ	Project
MAC	Mandatory Credit Course

Semester wise Credits

Sr. No.	Semester	Credits
1	I	25
2	II	25
3	III	20
4	IV	20
5	V	23
6	VI	22
7	VII	23
8	VIII	22

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester –I (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	BSC		Engineering Mathematics- I	3	-	1	60	40	-	-	-	100	3	0	1	4
2.	BSC		Engineering Chemistry	3	2	-	60	40	50	-	-	150	3	1	0	4
3.	ESC		Digital Electronics	4	2	-	60	40	25		-	150	4	1	0	5
4.	ESC		Probability and Statistics	4	2	-	60	40	25	-	-	125	4	1	0	5
5.	PCC		Programming and Problem Solving	4	2	-	60	40	25	-	25	150	4	1	0	5
6.	HSMC		CommunicationSkills	-	2	-	-	-	50	-	-	50	0	1	0	1
7.	SBC		Skill Base Course -I (Computer-Aided Drawing & Design)	-	2	-	-	-	25	25	-	50	0	1	0	1
			Total	**18**	**12**	**1**	**300**	**200**	**200**	**25**	**25**	**750**	**18**	**6**	**1**	**25**

*** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – II (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	BSC		Engineering Mathematics- II	3	-	1	60	40	-	-	-	100	3	0	1	4
2.	BSC		Engineering Physics	3	2	-	60	40	50	-	-	150	3	1	0	4
3.	ESC		Electrical Technology	4	2	-	60	40	25	-	-	125	4	1	0	5
4.	ESC		Discrete Mathematical Structures	4	-	1	60	40	25	-	-	125	4	0	1	5
5.	PCC		Linear Data Structures	4	2	-	60	40	25	-	25	150	4	1	0	5
6.	HSMC		Universal Human Values	-	2	-	-	-	50	-	-	50	0	1	0	1
7.	SBC		Skill Base Course-II (Computer Workshop Technology)	-	2	-	-	-	25	25	-	50	0	1	0	1
			Total	**18**	**10**	**2**	**300**	**200**	**175**	**25**	**25**	**750**	**18**	**5**	**2**	**25**

*** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – III (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	IA	TW	PR	OR	Total	L	P/O	T	Total
1.	PCC		Database Systems	3	2	-	60	40	25	25	-	150	3	1	0	4
2.	PCC		Non-Linear Data Structures	3	2	-	60	40	25	25	-	150	3	1	0	4
3.	PCC		Software Engineering	3	-	1	60	40	25	-	-	125	3	-	1	4
4	Interdisciplinary		Machine Organization and Microprocessors	3	-	-	60	40	-	-	-	100	3	-	0	3
5.	PCC		Object Oriented Methodology	3	2	-	60	40	25	-	-	125	3	1	-	4
6.	SBC -III		Skill Base Course-III (Computer Skill Lab- I) Web Programming	-	2	-	-	-	25	25	-	50	0	1	0	1
			Total	**15**	**8**	**1**	**300**	**200**	**125**	**75**	**-**	**700**	**15**	**4**	**1**	**20**
7.	Audit Course-I		Indian Knowledge System	2	-	-	-	100	-	-	-	-	-	-	-	2
8.	*Value Added Course		VAC- I	2	-	-	-	100	-	-	-	-	-	-	-	2

***Indicate this is mandatory but the credits will not be considered in SGPA/CGPA.(As and when the students complete the course and submit the certificate, it should be reflected in the mark sheet. The student should clear the subject up to 7th Sem of his/her coursework.)**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – IV (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	L	P/O	T	Total
1.	PCC		Theory of Computing	3	-	1	60	40	25	-	-	125	3	0	1	4
2.	PCC		System Programming and Operating Systems	3	2		60	40	25		25	150	3	1	-	4
3.	Interdisciplinary		Computer Organization and Architecture	3	-	-	60	40	-	-	-	100	3	0	0	3
4.	PCC		Computer Graphics and Multimedia	3	2	-	60	40	25	-		125	3	1	0	4
5.	PCC		Computer Networks	3	2	-	60	40	25	25		150	3	1	-	4
6.	SBC -IV		Skill Base Course-IV (Python)	-	2	-	-	-	25	25		50	0	1	0	1
			Total	**15**	**8**	**1**	**300**	**200**	**125**	**75**	**25**	**700**	**15**	**4**	**1**	**20**
7.	*MOOC/Swayam NPTEL		MOOC-I	-	-	-	-	-	-	-	-	-	-	-	-	2
8	*Social Activity			-	-	-	-	-	-	-	-	-	-	-	-	2

*** Indicate this is mandatory but the credits will not be considered in SGPA/CGPA.(As and when the students complete the course and submit the certificate, it should bereflected in the mark sheet. The student should clear the subject up to 7th Sem of his/her coursework.)**

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COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – V (NEP 2020 COURSE)

Sr. No.	Category	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
				L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1	PCC		Software Testing and QualityAssurance	3	2	-	60	40	25	-	-	125	3	1	0	4
2	PCC		Design and Analysis of Algorithms	4	2	-	60	40	25	-	50	175	4	1	0	5
3	PCC		Design Thinking	3	-	-	60	40	-	-	-	100	3	0	0	3
4	PCC		Human Machine Interaction	3	2	-	60	40	25	-	25	150	3	1	0	4
5	PCC		Artificial Intelligence	3	2	-	60	40	25	-	25	150	3	1	0	4
6	SBC		Skill Base Course-V (ComputerSkill Lab- III)	-	4	-	-	-	25	25	-	50	0	2	0	2
			Total	**16**	**12**	**0**	**300**	**200**	**125**	**25**	**100**	**750**	**16**	**6**	**0**	**22**
8	**MAC		Environmental Studies	-	-	-	-	-	-	-	-	-	-	-	-	-

**** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

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COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – VI (NEP 2020 COURSE)

Sr. No.	Category	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
				L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1.	PCC		Business Intelligence Systems	3	2	-	60	40	25	-	25	150	3	1	0	4
2.	PCC		Cryptography and Network Security	4	-	-	60	40	-	-	-	100	4	0	0	4
3.	PCC		Natural Language Processing	4	2	-	60	40	25	-	50	175	4	1	0	5
4.	PCC		Big Data Analytics	3	-	-	60	40	-	-	-	100	3	0	0	3
5.	PCC		Data Visualization and Reporting	3	2	-	60	40	25	25	-	150	3	1	0	4
6.	SBC		Skill Base Course-VI (ComputerSkill Lab- IV)	-	4	-	-	-	25	25	-	50	0	2	0	2
7.	HSMC		Professional Skills	-	2	-	-	-	25	-	-	25	0	1	0	1
			Total	**17**	**12**	**0**	**300**	**200**	**125**	**50**	**75**	**750**	**17**	**6**	**0**	**23**
8.	**VAC		VAC - II	-	2	-	-	-	-	-	-	-	0	1	0	1

**** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – VII (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Machine Learning	3	2	-	60	40	25	-	25	150	3	1	0	4
2.	PCC		Internet of Things	3	2	-	60	40	25	25	-	150	3	1	0	4
3.	PEC		Elective - I	3	2	-	60	40	25	-	25	150	3	1	0	4
4.	PCC		Optimization Techniques	3	-	-	60	40	-	-	-	100	3	0	0	3
5.	*Internship		Internship	-	-	-	-	-	50	50	-	100	0	4	0	4
6.	Project		Project Stage - I	-	2	-	-	-	50	50	-	100	0	4	0	4
			Total	**13**	**12**	**-**	**240**	**160**	**175**	**125**	**50**	**750**	**12**	**11**	**0**	**23**

***Internship will be for 60 days. It should be done after VI Semester Examination is over.**

****** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

Elective I	Deep learning	Game Theory	Semantic Web	Text Mining

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – VIII (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Augmented and Virtual Reality	3	2	-	60	40	25	25	-	150	3	1	0	4
2.	PCC		Blockchain and Digital Currency	3	2	-	60	40	25	25	-	150	3	1	0	4
3.	PEC		Elective - II	3	2	-	60	40	25	-	25	150	3	1	0	4
5.	SBC		Skill Base Course-VII (Computer Skill Lab- V)	-	4	-	-	-	25	25	-	50	0	2	0	2
6.	Project		Project Stage - II	-	4	-	-	-	150	100		250	0	8	0	8
			Total	**09**	**14**	**0**	**180**	**120**	**200**	**225**	**25**	**750**	**09**	**13**	**0**	**22**

**** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

Elective -II	Pattern Recognition	Industrial IoT	Knowledge Management System	Information Retrieval

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Minor Degree Course: Blockchain (NEP 2020 COURSE)

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	TH	PR/OR	Tut	Total
1		**Sem III** Introduction to Block chain	3	2	-	60	40	25	25	-	150	3	1	-	4
2		**Sem IV** Decentralize & Blockchain Technologies	3	2	-	60	40	25	-	25	150	3	1	-	4
3		**Sem V** Smart Contract & Cryptocurrency	3	2	-	60	40	25	-	25	150	3	1	-	4
4		**Sem VI** Blockchain Solutions	3	2	-	60	40	25	25	-	150	3	1	-	4
5		**Sem VII** Project	-	8	-	-	-	50	50	-	100	-	4	-	4
		Total	**12**	**16**	**-**	**240**	**160**	**150**	**100**	**50**	**700**	**12**	**8**	**-**	**20**

Engineering Mathematics -I

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS:
Theory: 03 Hours / Week	End Semester Examination:60 Marks	Theory: 04
Tutorial: 01 Hours / Week	Internal Assessment: 40 Marks	
		Total: 04

Course Pre-requisites: The students should have knowledge of

1 Algebra of matrices and its Determinants, Maxima and Minima of single variable functions.

Course Objective: On completion of the course -

1. Fundamental theorems, concepts in Matrices, Demoivr's theorem and its applicationsin engineering.
2. Various techniques in Calculus, Explanation of functions and Infinite series.
3. Partial differentiation, maxima, minima and its applications in engineering.

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

1 Understand rank of matrix and apply it to solve system of linear equations

2 Understand the DeMoiver's theorem, hyperbolic functions and apply it in engineering problems.

3 Understand the Leibnitz's rule and apply it to find nth derivative of a function.

4 Understand fundamental concepts of convergence, divergence of infinite series and its tests.

5 Understand the concept of partial differentiation and apply it to find total derivative.

6 Evaluate the maxima and minima of any two variables functions.

Course Content:

Unit-I **Matrices** **(06 Hrs)**

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence,Linear and Orthogonal Transformations. Eigen values, Eigen Vectors.

Unit-II **Complex Numbers and Applications:** **(06 Hrs)**

Definition, Cartesian, Polar and Exponential Forms ,Argand‟s Diagram, De'Moivre's theorem and its application to find roots of algebraicequations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

Unit-III **Differential Calculus :** **(06 Hrs)**

Differential Calculus, Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem.

Expansion of Functions: Taylor's Series and Maclaurin's Series

Unit-IV	**Differential Calculus:** Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits. **Infinite Series** : Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence	**(06 Hrs)**
Unit-V	**Partial Differentiation and Applications:** Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, TotalDerivatives, Change of Independent Variables. Errors and Approximations.	**(06 Hrs)**
Unit-VI	**Jacobian:** Jacobians and their applications, Chain Rule, Functional Dependence. **Maxima and Minima:** Maxima and Minima of Functions of two variables, Lagrange's method ofundetermined multipliers.	**(06 Hrs)**

Internal Assessment :Consist of Unit test 20 marks, PBL-20 marks

Unit Test -1 Unit No: I, II, III

Unit Test -2 Unit No: IV, V, VI

Reference Books:

1 Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar(Pune Vidyarthi Griha Prakashan, Pune), 7th Edition, 1988,Reprint 2010.

2 Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition ,2012.

3 Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill),Edition ,2008.

4 Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition,1999,Reprint 2010.

5 Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning),Edition 2007.

Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd ,Edition, 2002.

Programme – Engineering Chemistry for all branches (First year)

Designation of Course	**Engineering Chemistry**		
Teaching Scheme	**Examination Scheme**	**Marks**	**Credits Allotted**
Theory:- 03 Hours/ Week	University Examination	60	Theory: 03
Practical: 02 Hours/ Week	Internal Examination	40	Tutorial : 00
Tutorial :- 00 Hours/Week	TW	50	O/P/TW: 01
	Total	150	04

Course Prerequisites:-

The student should have

- Basic knowledge of chemistry.
- Basic knowledge of electrochemistry and chemistry of materials
- Introductory knowledge of polymers.

Course Objectives:-

The student should acquire the knowledge of

1. To develop the interest among the students regarding chemistry and their applications in engineering.
2. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field.
3. The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the Engineering field

Course Outcomes:-

After completion of the course students will be able to

1. **Understand** the different methods of analysis of water, different environmental pollutants and importance of green chemistry
2. **Understand** and **apply** the importance of fuels for various engineering applications.
3. **Explain** the drawbacks of corrosion and different methods of elimination of corrosion
4. **Apply** the knowledge of polymer to study advanced materials**.**
5. **Apply** the basic concept of chemistry to explain the chemical properties and processes of materials of nanoscale
6. **Understand** the instrumental analysis helpful for various engineering applications

Course Contents

Unit 1 **Water Technology & Green Chemistry** (6 Hrs.)

Introduction, sources and impurities in water, Hardness of water, types, determination of hardness using EDTA titration, softening of hard water by ion- exchange process. Numerical problems on hardness of water. Major environmental pollutants, Basic principles of green chemistry. Atom economy, Synthesis of adipic acid, Industrial applications of green chemistry, Numerical problems on Atom economy.

Unit 2 **Electrochemical energy and solar energy** (6 Hrs.)

Fuels: Introduction, Definition, importance of fuels, calorific value, types, fluidized bed catalytic cracking, knocking (Petrol engine), mechanism and its ill effects, biodiesel, power alcohol, octane and cetane number.Solar Energy: Introduction, construction, working and applications of photovoltaic cell.

Unit 3 **Corrosion technology and it's control** (6 Hrs.)

Introduction, Electrochemical theory of corrosion, Types of corrosion, Differential metal and differential aeration (pitting and water line) caustic embritlement. Factors affecting the rate of corrosion, Corrosion control: Cathodic protection, sacrificial anode and impressed current methods, Metal coatings, Galvanization and tinning, Anodizing, Anodizing of aluminum, Organic coatings: Paint and varnishes.Metal finishing: Introduction, Technological importance. Principles of electroplating. Electroplating of chromium. Electro less plating: Introduction, electro less plating of nickel & copper on PCB with applications.j

Unit 4 **Engineering Materials and Technology** (6 Hrs.)

Polymers: Introduction, classification, Synthesis and applications of Polyurethane, polycarbonates, Conducting Polymers: Synthesis & Mechanism of conduction in poly aniline.Composites: Introduction, constitution, classification. Types: fiber glass, hybrid and reinforced Composites with applications.

Unit 5 **Nano materials** (6 Hrs.)

Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nano materials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nano scale materials: Fullerenes, Carbon nano tubes and graphenes – properties and applications.

Unit 6 **Instrumental methods of analysis** (6 Hrs.)

Introduction, Theory, Instrumentation and applications of colorimetry, pHmetry, conductometry. Introduction to spectroscopy, principles and applications of UV/Vis. Spectroscopy

Experiments:

Experiments No	Name of Experiment
1	Determination of Hardness of water sample by EDTA method.
2	To determine strength of acid by pH – metric Titration.

3 To measure the strength of acid by conductometric titration

4 Measurement of Surface tension of a given liquid by Stalgmometer.

5 To determine alkalinity water sample.

6 Estimation of the given amount of copper in the given solution by colorimetry

7 Synthesis of conducting polyaniline from aniline by oxidative polymerization

8 Determination of iron content in the given solution by Mohr's method

9 To determine the strength of given acid solution by titrating it against base solution using indicator

10 Determination of reaction rate, order and molecularity of hydrolysis of ethyl acetate

11 Verification of Beer-Lambert's Law.

12 Determination Of Viscosity Of Liquids By Ostwald's Viscometer

13 Determination Of Chloride Content Of Water By Argentometry

14 Estimation of copper from brass by iodometry

15 To study set up of Daniel cell.

Text Books/ References::

1 Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992. Jain P.C & Jain Monica.

2 Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi. O. G. Palanna.

3 A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi. S. S. Dara.

4 Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, 2008.

5 Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie
Academic & Professional, 1994.

6 Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015. Shikha Agarwal.

7 Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie.

Syllabus of Unit Test -

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV, V, VI

Digital Electronics

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week	Internal Assessment	40 Marks		
		Term work	25 Marks	Practical	01
		Total	125 Marks	Total	05

Course Objective:

- To present the Digital fundamentals, Boolean algebra and its applications in digital systems
- To familiarize with the design of various combinational digital circuits using logic gates
- To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits
- To understand the various semiconductor memories and related technology

Prerequisite:

Mathematics and Elementary Physics

Course Outcomes: On completion of the course, students will have the ability to:

1. Comprehend different number systems and Boolean algebraic principles.
2. Apply logic design minimization techniques to simplify Boolean expressions
3. Analyse and design combinational logic circuits.
4. Demonstrate the operations of systems with sequential circuit elements.
5. Comprehend characteristics and structure of Programmable Logic Devices and Memory.
6. Draw ASM charts for sequential circuit design.

Unit I **08 Hours**

Digital systems: Number Systems: Introduction to Number Systems-Decimal, Binary, Octal, Hexadecimal, Conversion of number system, Representation of Negative Numbers, 1's complement and 2's complement.

Binary Arithmetic: Binary addition, Binary subtraction, Subtraction using 1's complement and 2's complement, Binary multiplication, and division.

Digital Codes: BCD code, Excess-3 code, Gray code and ASCII code.

Logic Gates: Logical Operators, Logic Gates-Basic Gates, Universal Gates, realization of other gates using universal gates.

Unit II **08 Hours**

Logic Design Minimization: Boolean algebra, De Morgan's Theorems, Standard representation of logic functions, Sum of Product (SOP) form, Product of Sum (POS) form, Simplification of logical functions, Minimization of SOP and POS forms using Karnaugh-Maps up to 4 variables Don't care condition, Quine-McCluskey Method.

Unit III **08 Hours**

Combinational Circuits: Binary and BCD arithmetic, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder (IC 7483), BCD adder, Code converters Multiplexers, De multiplexer, Decoder (IC 74138) and their use in combinational logic design, Priority Encoder, Digital Comparators, Parity generators and Checker(IC 74180), ALU

Unit IV **08 Hours**

Sequential Circuits: Flip- flop: SR, JK, D, T flip flops, Truth Tables and Excitation tables, Conversion from one type to another type of Flip Flop.

Registers: Buffer register, Shift register.

Counters: Asynchronous counters, Synchronous counters, Modulus counters

Unit V **08 Hours**

FSM and ASM charts: Introduction to FSM, Moore and Mealy State machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization, ASM chart notations, ASM block, State diagram, ASM chart for sequential circuits, Multiplexer Controller.

Unit VI **08 Hours**

Memory and PLD: Semiconductor memories: memory organization, memory expansion, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.

Programmable logic devices: Study of PROM, PAL, PLAs. Architecture of PLA, Designing combinational circuits using PLDs.

Textbooks:

1. M. Morris Mano and M. D. Ciletti, Digital Design, Pearson Education.
2. RP Jain, Modern Digital Electronics, Tata McGraw Hill Publication.
3. F.J. Hill and G.L. Peterson, Switching Theory and Logic Design, John Wiley
4. J.F.Wakerly “Digital Design: Principles and Practices”, 3rd edition, 4th reprint, Pearson Education, 2

Reference Books:

1. David J. Comer, Digital Logic & State Machine Design, Oxford University Press.
2. Digital Integrated Electronics- H. Taub&D.Shilling, McGraw Hill.

List of Assignments:

Six assignments to be given by the course coordinator (Theory)-one from each unit

Project Based Learning

1. Survey report of basic gates ICs 7432, 4011, 4050, 4070,4071,4010
2. Implement combinational logic Circuit of given Boolean Equation.
3. Implement Half Adder and Half Subtractor.
4. Implement Full Adder using two Half Adders
5. Build 4-bit parallel Adder / Subtractor using IC.
6. Build Code Converters: Binary to Gray
7. Build Code Converters: Excess 3 to Binary)
8. Implement Two Bit Magnitude Comparator using IC 7485
9. Implement given combinational logic using MUX
10. Implement 7 segment decoder driver using IC 7447.
11. Build a Decade counter and Up-Down Counter.
12. Build a Shift Registers: SISO and SIPO
13. Implement the Johnson Counter and Ring Counter.
14. Survey Report on Static I/O and transfer Characteristic of TTL and CMOS.
15. Implement given Boolean Function using PLA.(Function and Equation will be given by Subject Teacher)

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Verify truth tables of logic gates. (AND, OR, XOR, NOT, NAND, NOR). Simplify the given Boolean expression using K-map and implement using gates
2. State De-Morgan's theorem and write Boolean laws. Implement NAND and NOR as Universal gates.
3. Design (truth table, K-map) and implement half and full adder/ subtractor.
4. Design (truth table, K-map) and implement 4-bit BCD to Excess-3 Code converters.
5. Study of magnitude Comparator using IC 7485
6. Implement of logic functions using multiplexer IC 74151 (Verification, cascading & logic function implementation)
7. Implement logic functions using 3:8 decoder IC 74138.
8. Verify truth tables of different types of flip flops.
9. Design (State diagram, state table & K map) and implement 3 bit Up and Down Asynchronous and Synchronous Counter using JK flip-flop
10. Design and implement modulo 'n' counter with IC 7490.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Probability and Statistics

Teaching scheme		Examination scheme		Credit scheme	
Hours/Week			**Marks**	**Credits**	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory:**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work:	**25 Marks**	**Practical:**	**1**
		Total:	**125 Marks**	**Total:**	**5**

Course Objectives:

- Probability theory and expected value.
- Probability distribution and its applications.
- Multiple regression and ANOVA.

Course Outcomes: On completion of the course, students will have the ability to:

1. Apply Bayes theorem to find probability.
2. Compute mathematical expectations.
3. Identify various theoretical distributions.
4. Use correlation coefficient to interpret numerical data.
5. Use regression to estimate the dependent variable.
6. Apply concept of graph in optimization.

Unit I **08 Hours**

Probability Theory: Definition of probability: classical, empirical, and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities

Unit II **08 Hours**

Random Variable and Mathematical Expectation. Definition of random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs, Examples

Unit III **08 Hours**

Theoretical Probability Distributions: Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions, Importance of normal distribution

Unit IV **08 Hours**

Correlation: Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation,

Coefficient, Properties of Karl Pearson's correlation coefficient, Properties of Spearman's rank correlation coefficient, Probable errors, Examples...

Unit V **08 Hours**

Linear Regression Analysis: Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient

Unit VI **08 Hours**

Multiple Regression and AVOVA: Multiple regression & multiple correlation, Analysis of variance (one way, two way with as well as without interaction)

Textbooks

1.S. C. Gupta, "Fundamentals of Statistics", 46th Edition, Himalaya Publishing House.

2.G. V. Kumbhojkar, "Probability and Random Processes", 14th Edition, C. Jamnadas and company.

3.Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines

Kishor S. Trivedi, "Probability, Statistics with Reliability, Queuing and Computer Science

Applications", 2nd Edition, Wiley India Pvt. Ltd.

5.Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction to Probability And Statistics, 3rd

Edition, Wiley Publication

6.I.R. Miller, J.E. Freund and R. Johnson. Fun "Probability and Statistics for Engineers" (4th Edition)

Project Based Learning

Students are expected prepare report on any one topic, write its definition, applications and analyse the hypothetical data. Also, write pseudo code for it, wherever applicable.

1. Bayes theorem
2. Additive and multiplicative law of probability
3. Mathematical expectation
4. Joint and marginal probability distribution
5. Theoretical probability distribution
6. Coefficient of correlation
7. Regression estimates
8. Simple regression model
9. Multiple regression model
10. One way ANOVA
11. Two way ANOVA
12. Correlation
13. Multiple correlation

Note: - *Students in a group of 3 to 4 shall complete any one project from the above list.

List of Laboratory Experiments (The course co-ordinator may frame 8-10 experiments)

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Programming and Problem Solving

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week	Internal Assessment	40 Marks		
		Term Work	25 Marks	Practical	01
		Practical	25 Marks		
		Total	150 Marks	Total	05

Course Objective:

The course is designed to provide complete knowledge of C language. Students will be able to develop logics whichwill help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Prerequisite:

Basic knowledge of mathematics.

Course Outcomes: On completion of the course, students will have the ability to:

1. Describe the steps in problem-solvingand write a pseudocode for a given problem.
2. Identify the suitable control structure and write a C code for the same.
3. Write the C code for a given algorithm.
4. Illustrate use of pointers and functions
5. Write programs that perform operations using derived data types.
6. Validate the logic building and code formulation by designing code capable of passing various test cases

Unit I **08 Hours**

Introduction to Computer Problem Solving: The problem solving Aspect, Top Down Design,Implementation of Algorithms, Program Verification, The Efficiency of Algorithms, TheAnalysis of Algorithms, Fundamental Algorithms:

General problem solving strategies: Introduction to program Planning tools- algorithm, flowcharts, and pseudo codes. Introduction to Programming Logic.

Unit II **08 Hours**

Control structures: Features of C, basic concepts, structure of C program, program, declarations, variables, data types, expressions, operators assignment, arithmetic, relational, logical, increment and decrement, precedence of operators, type conversions, scanf and printf functions if-else, nested if-else, ladder if-else and switch statement. C Conditional control structures: for, while do-while Unconditional control structures: break, continue, goto statement.

Unit III **08 Hours**

Arrays and strings: Declaration initialization of one dimensional Array, two dimensional array, accessing array elements, Character Array/String, Character - Handling Library Functions, Standard Input/Output Library Functions for string.

Unit IV **08 Hours**

Functions and structures: What is a Function , Benefits of a Function , Function Terminology , Array of Structures, How does Function Works , Scope and Lifetime of Variables in function ,Storage Classes of Variables , Call by value and call by reference ,Recursion ,Overview of Structures , Defining and Using a Structure , Structures within a Structure.

Unit V **08 Hours**

Pointers: Declaring and Initializing Pointers, Function and Pointer Parameters, PointerArithmetic, Pointer and Arrays, Two Dimensional Arrays and Pointers.

Unit VI **08 Hours**

Files : FILE , Opening and Closing of Files , Writing and Reading in Text Format, Writing and Reading in Binary Format, Command Line Arguments

Textbooks:

1. Let Us C by YashavantKanetkar, 13e, BPB Publication.
2. BrainW. Kernighan& Dennis Ritchie, C Programming Language, 2nd edition, PHI.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill.
4. How to Solve it by Computer by R. G. Dromey, 1e, Pearson Education.

Reference Books:

1. C: The Complete Reference by Herbert Schildt.

List of Assignments:

1. Write a pseudocode and draw a flowchart for a given problem.
2. Justify the selection of appropriate control structure
3. Write a function to check whether the string is palindrome.
4. List and explain the working of standard string I/O functions.
5. Define a dynamic array to store the student record.
6. List and explain the different modes of opening file.

Project Based Learning

1. Calendar using C
2. Snake Game
3. Cricket score display
4. Quiz game
5. Phone-book application
6. Election System
7. Simple Result system
8. Typing Tutor
9. Bill Calculator
10. Grade Calculator
11. CGPA Calculator
12. Digital Clock
13. Contact Management System
14. IP finder
15. Bank Management System.
16. Departmental Store Management.
17. Hangman Game Project.
18. Library Management System

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Describe the problem-solving steps.
2. Write a pseudocode and draw a flowchart.
3. Use mathematical operators and basic data types.
4. Demonstrate use of control structures.
5. Demonstrate use of logical operators.
6. Solve the real time problem using single and two dimensional array.
7. Perform the operations on string.
8. Solve the problems using recursive and non-recursive functions.
9. Solve the problems using dynamic memory allocations.
10. Perform the operations on files.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Communication Skills (Common for all Branches)

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00
Practical :- 02 Hours/ Week	Internal Assessment	00	Tutorial: 00 Practical: 01
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Total	50 Marks	01

Course Prerequisites:- Students should have knowledge of Basic English grammar
Students should have basic information of sound system of English language.

Course Objective The course objective of Communication Skills puts the following class teaching objectives, considering English Language skills as a wheel rolling aspects in today's world, the focus is on honing the skills such as LSRW and presentation skills. It also puts emphasis on technical and professional writing skills. Honing the presentation skills among students through appropriate activities, this will help them in their business ventures.

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

1. Understand and construct the error free sentences of English language and do implementation of it in the spoken and written business communication
2. Understand and apply the sounds of English language for correct pronunciation
3. Understand and develop the ability to enhance sound vocabulary for effective communication
4. Understand communication process and principles to do applications in business communication
5. Understand the techniques of writing skills and apply them in appropriate context and domain
6. Create effective business presentation and do effective implementation of it through activities

Unit I:English grammar (4 Hrs)

Application of Basic Grammar: Articles, Prepositions, Tenses, Subject-verb agreement, Use of phrases & Clauses in sentences, Common errors

Unit II. Phonetics/study of sounds in English (4 Hrs)

Introduction to phonetics, study of speech organs, study of phonetic script, transcriptions of words, articulation of different sound in English, reducing MTI, stress and intonation

Unit III: Vocabulary Enrichment (4 Hrs)

Ways of word formation, Foreign phrases, One word substitutions, Synonyms & antonyms, Words often confused, Indian English words, Usage of idioms &phrases.GRAS-PT formula

Unit IV: Communication Skills (4 Hrs)

Introduction, forms and function of communication process, non-verbal codes in communication, Importance of listening skills, Listening V/s hearing, Types of listening, Barriers to communication and listening, Importance of LSRW skills in communication

Unit V: Technical Writing Skills (4 Hrs)

The mechanics and principles of written communication, Technical Communication, Need and Importance, technical report writing;, email writing, , notice, agenda, minutes of meeting writing. Use of technology in technical writing

Unit VI.Presentation skills (4Hrs)

Designing effective presentation, understanding theme, developing content and layout of presentation, use of tone and language, technological tools for effective presentation.

Reference Books:

1. Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition,
2. Spoken English- A manual of Speech and Phonetics by R. K. Bansal, J. B. Harrison published by Orient Blackswan.
3. Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press.
4. Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd.

Recommended web-links for enhancing English language and business communication

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

http://www.englishlearner.com/tests/test.html

http://www.hodu.com/default.html

http://www.communicationskills.co.in/index.html

COMPUTER AIDED DRAWING & DESIGN

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT CHEME	
Practical:	**2 Hours/Week**	**Term Work:**	**25 Marks**	**Practical:**	**1**
		Oral:	**-**		
Total	**2 Hours/Week**		**25 Marks**	**Total:**	**1**

Prerequisite:
Basics of programming skill

Course Objective:

1. To have the knowledge of Orthographic and Isometric projections
2. To understand the basic principles of Engineering drawing
3. To have the knowledge of different AutoCAD commands
4. To understand the algorithm for generating different entities on the screen

Course Outcomes: On completion of the course, students will have the ability to:

1. Prepare and understand drawings
2. Use the principles of orthographic projections
3. Use the principles of Isometric projections
4. Able to draw simple drawing using AutoCAD
5. Generate the line by highlighting the pixels
6. Fill the polygon

Unit I **04 Hours**

Orthographic Projection

Dimensioning and conventions strictly as per SP 46:2003 (Revised). Orthographic projection of right regular solids such as cube and prism. Orthographic projection of simple machine blocks

Unit II **04 Hours**

Isometric Projections

Introduction, Isometric axes, Lines & planes, Isometric scale, Isometric projection and Isometric view, Conversion of Isometric to Orthographic Projections

Unit III **04 Hours**

Introduction to AutoCAD

Getting Started with AutoCAD. Line, polyline, Circle, arc Rectangle, polygon Ellipse, Elliptical arc, spline, Xline, Ray, Points Measure, Divide, Region Wipeout, Helix, Donut

Unit IV **04 Hours**

AutoCAD Modify Tools and Dimensioning

Move, copy, Rotate, scale Stretch, fillet, chamfer Erase, offset, explode Array, polar Array, path array Trim, extend, mirror. Annotations Dimensions, dimension setting Linear dimension, Aligned dimension Angular dimensions, arc length, Radius Diameter

Unit V **04 Hours**

Line Drawing Algorithm

The Digital Difference Analyser (DDA) algorithm to draw lines on a screen. Interpolation points based on the difference between the start and end points. Bresenham Line Drawing Algorithm. Numerical examples.

Unit VI **04 Hours**

Flood Fill Algorithm

Concept of seed point, four connected approaches and eight connected. Boundary colour and fill colour. Filling of different polygon.

Textbooks:

1. **"**Elementary Engineering Drawing" by Bhatt, N.D., Charotar publishing Co.
2. "Engineering Graphics" by K.L. Narayana and P.Kannaiah, SCITECH PUBLICATIONS (INDIA) PVT.LTD. October 2008
3. "Engineering Graphics with AutoCAD", D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), PHI Learning Private Limited, New Delhi.
4. "Engineering Drawing: With an Introduction to CAD," Jolhe, Dhananjay (2006), Tata Mc Graw Hill, India

List of Laboratory Exercise:

1. Drawing to half imperial size sheet with instruments. Drawing illustrating basic concepts of Orthographic projections and dimensioning.
2. From the given three views draw isometric
3. Introduction to AutoCAD. Student should get familiarise with the GUI of the software.
4. Commands for drawing basic entities
5. AutoCAD Modify Tools and Dimensioning
6. Digital Difference Analyser (DDA) algorithm
7. Bresenham Line Drawing Algorithm
8. Flood Fill Algorithm

B.Tech (Computer Science & Engineering)Semester- II

ENGINEERING MATHEMATICS -II

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS:
Theory: 03 Hours / Week	End Semester Examination:60 Marks	Theory: 04
Tutorial: 01 Hours / Week	Internal Assessment: 40 Marks	
		Total: 04

Course Pre-requisites: The students should have knowledge of

1 Student should have Basic Knowledge of differential calculus

Course Objective: On completion of the course -

This course help student to develop an ability for differential equations to model the complex physical systems.

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

1 To solve differential equations by different methods

2 Apply different laws to solve Simple Harmonic Motion, One– Dimensional Conduction of Heat, Chemical engineering problems.

3 To solve integral calculus and Fourier series

4 To solve integral calculus with error functions

5 Determine position in solid geometry

6 Solve multiple integration problems

Course Content:

Unit-I **Differential Equation** **(06 Hrs)**

Definition, Order and Degree of DE, Formation of DE. Partial Differential Equations, Classification of higher order PDEs. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types.

Unit-II **Applications of Differential Equations** **(06 Hrs)**

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff‟s Law of Electrical Circuits, Motion under Gravity,Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems. Solution of Higher order ODE with constant and variable coefficients and its applications to boundary and initial value problems.

Unit-III **Fourier Series and Integral Calculus** **(06 Hrs)**

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis. duction formulae, Beta and Gamma functions

Unit-IV	**Integral Calculus and Curve Tracing** Differentiation Under the Integral Sign, Error functions. Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves.	**(06 Hrs)**
Unit-V	**Solid Geometry** Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.	**(06 Hrs)**
Unit-VI	**Multiple Integrals and their Application** Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values	**(06 Hrs)**

Internal Assessment :Consist of Unit test 20 marks, PBL-20 marks

Unit Test -1 Unit No: I, II, III

Unit Test -2 Unit No: IV, V, VI

Reference Books:

1 Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune), 7th Edition, 1988,Reprint 2010.

2 Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition ,2012.

3 Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill),Edition ,2008.

4 Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999,Reprint 2010.

5 Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning),Edition 2007.

Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd ,Edition, 2002.

Engineering Physics (Common for all Branches)

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory:- 3 Hours/ Week	End Semester Examination	60 Marks	Theory: 03
Practical :- 02 Hours/ Week	Internal Assessment	40 Marks	Tutorial: 00 Practical: 01
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	-- Marks	
	Total	150 Marks	04

Course Prerequisites:- Students are expected to have a basic understanding of physics and calculus.

Course Objective To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the engineers.

Course Outcomes :-

1. Interpret the properties of charged particles to develop modern instruments such as electron microscopy.
2. Relate the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for non destructive testing.
3. Solve quantum physics problems to micro level phenomena and solid state physics.
4. Appraise the wave nature of light and apply it to measure stress, pressure and dimension etc.
5. Develop competency and understanding of the principles and applications of lasers and fiber optics.
6. Explain properties of solid matter and connect to applications in the field of engineering.

Course Contents

Unit 1 Modern Physics (6Hrs.)

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Electron microscopy, interaction of electron beam with the material, Wavelength and resolution, TEM, SEM and EDS, Separation of isotopes by Bainbridge mass spectrograph, CRT, CRT in CRO.

Unit 2 Architectural Acoustics (6Hrs.)

Elementary acoustics, Reverberation and reverberation time, Sabine's formula (without Derivation), Intensity level, Sound intensity level, Loudness, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies, introduction to ultrasonics, Production of ultrasonics by magnetostriction and piezoelectric methods, applications (thickness measurement, flaw detection).

Unit 3 Quantum mechanics (6Hrs.)

Dual nature of matter, concept of wave packet, group and phase velocity and relation between them, physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, concept of tunnelling at potential barrier (no derivation-only conceptual discussion).

Unit 4 Optics – I (Interference and Diffraction) (6 Hrs.)

INTERFERENCE:
Interference due to thin film of uniform thickness and nonuniform thickness, Newton's rings, Engineering applications of interference (optical flatness, non-reflecting coatings).
DIFFRACTION: Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima.

Unit 5 Optics – II (Polarisation and Lasers) (6Hrs.)

POLARISATION:
Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism.
LASERS: Lasers introduction, Characteristics of Lasers, Working principle and components of He-Ne Laser, Nd -YAG Laser, Semiconductor diode Laser, Applications in the field optical fiber (Principle, Acceptance angle and acceptance cone, Numerical aperture, Types of optical fibers, Fiber optic communication).

Unit 6 Solid State Physics (6Hrs.)

Origin of band gap, Energy bands in solids, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Formation and band structure of p-n junction, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.
Introductions of nanoparticles, properties of nanoparticles (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticles (Physical and chemical), quantum dots – wide band semiconductors, direct/indirect band gap semiconductors.

Practical (Any Eight of the Following)

1. Determination of radius of planoconvex lens/wavelength of light/Flatness testing by Newton's rings
2. Determination of wavelength of light using diffraction grating
3. Determination of frequency of ac voltage by CRO.
4. Determination of refractive index for O-ray and E-ray
5. Determination of divergence of a laser beam
6. Particle size by semiconductor laser
7. Determination of wavelength of laser by diffraction grating
8. To study Hall effect and determine the Hall voltage
9. Calculation of conductivity by four probe method
10. Study of solar cell characteristics and calculation of fill factor
11. Determination of band gap of semiconductor
12. Synthesis of metal oxide nanoparticles (ZnO/ZnS/Gold)
13. Measurement of average SPL across spherical wavefront and behaviour with the distance
14. Determination of velocity of sound in liquid by ultrasonic interferometer
15. Study of B-H curve of a sample.

Text Books

1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018)
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)

3. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017)

Reference Books

1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)
2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017)
3. Principles of Physics, John W. Jewett, Cengage publishing (2013)
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004)
5. Principles of Solid State Physics, H. V. Keer, New Age International (1993)
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014)
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997)

Electrical Technology

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 03 Hrs / Week	**End Semester Examination:** 60 Marks	**Theory:**03 Credits
Practical: 02 Hrs / Week	**Internal Assessment:** 40 Marks	**Practical:**01 credit
	TW: 25Marks	
	Total :125	**Total:**04 Credits

Course Pre-requisites:

The students should have basic knowledge of: Mathematics, Physics and Chemistry.

Course Objectives:

1. The course introduces fundamental concepts of DC and AC circuits, electromagnetism, transformer, electrical wiring,illumination, and Tariff system.

Course Outcomes: After learning this course the students will be able to

1. Apply knowledge of basic concepts of work, power, energy for energy conversion and calculate current in electrical network using Kirchoff's laws.

2. Analysed response of electrical DC circuit using network theorems.

3. Define and understand basic terms of single phase A.C. circuit and supply systems.

4. Define and understand basic terms of three phase A.C. circuit and measurement of three phase power.

5. Discuss and apply fundamental concepts of magnetic circuit and electro-mechanics for operation of single-phase transformer.

6. Explain layout of distribution system, illumination, types of wiring, earthing system, and Tariff system.

UNIT – IIntroduction **(08 Hrs)**

Concept of EMF, Potential difference, voltage, current, resistance. Fundamental linear, passive, and active elements, voltage sources and current sources, ideal and practical sources, concept of dependent and independent sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Batteries: Principle, types, construction and working.

UNIT – IIDC Circuits **(08 Hrs)**

Current-voltage relations of the electric network by mathematical equations to analyze the network (Superposition theorem, Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem), Simplifications of networks using series-parallel, Star/Delta transformation.

UNIT – III Single phase AC Circuit **(08Hrs)**

Sinusoidal AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, resonance, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, and apparent power, power factor. (Simple numerical problems).

UNIT – IV Three phase AC circuit **(08 Hrs)**

Three phase system-its necessity and advantages, meaning of phase sequence, line and phase voltage/current relations, star and delta connections, balanced supply and balanced load, three phase power and its measurement (simple numerical problems).

UNIT – VElectro-Mechanics **(08 Hrs)**

Electricity and Magnetism, magnetic field and Faraday's law, self and mutual inductance, Magnetic circuit, Magnetic material and B-H Curve, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, efficiency and regulation, Determination of efficiency & regulation by direct load test.

UNIT – VI Electrical Wiring and Components **(08 Hrs)**

Basic layout of the distribution system, Types of wiring system & wiring accessories, Types of lamps (Incandescent, Fluorescent, Sodium Vapour, LED),Necessity of earthing, Types of earthing, Tariff –introduction and types.

Term Work:

The term work shall consist of record of minimum eight experiments.

1. Familiarization of electrical Elements, sources, measuring devices related to electrical circuits.
2. Study of residential electricity bill.
3. Verification of Superposition theorem
4. Verification of Thevenin's theorem
5. Verification of Norton's theorem
6. Verification of Kirchoff's laws
7. Verification of Maximum power transfer theorem
8. Study of R-L, R-C series, and parallel circuit.
9. Study of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$
10. Verification of relation in between voltage and current in three phase balanced star and delta connected loads.
11. Demonstration of measurement of electrical quantities in DC and AC systems.
12. Determination of efficiency & regulation of single-phase transformer by direct load test.

Project based learning: Student shall demonstrate minimum one concept based on syllabus topic.

1. Demonstration of conversion of energy.
2. Study and understand practical specifications of transformer.
3. Study and understand practical specifications of battery and demonstrate its application.
4. Demonstration of phenomenon of electromagnetic induction.
5. Demonstration of electromagnetism, electro mechanics and their applications by using professional software tool.
6. Development of practical kits for understanding different theorems related to electrical circuits. (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem, Superposition theorem etc.)

7. Demonstration of illumination system.
8. Demonstration of distribution system.
9. Study and understand safety practices in electrical system.
10. Study and understand electrical earthing system.
11. Study and understand electrical wiring.

Textbooks:

1. Electric Machinery, (Sixth Edition) A.E. Fitzgerald, KingselyJr Charles, D. Umans Stephen, Tata McGraw Hill.
2. A Textbook of Electrical Technology, (vol. I& II),B. L. Theraja, Chand and Company Ltd., New Delhi.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (SecondEdition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
2. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
3. Engineering Circuit Analysis, William H. Hayt& Jack E. Kemmerly, McGraw-Hill Book Company Inc.
4. Fundamentals of Electrical and Electronics Engineering,Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.
5. Edward Hughes – "Electrical Technology"- Seventh Edition, Pearson Education Publication
6. H. Cotton – "Elements of Electrical Technology", C.B.S. Publications
7. John Omalley Shawn – "Basic circuits analysis" McGraw Hill Publications
8. Vincent Del Toro – "Principles of Electrical Engineering", PHI Publications

Syllabus for Unit Test:

Unit Test -1	**UNIT – I, UNIT – II, UNIT - III**
Unit Test -2	**UNIT – IV, UNIT – V, UNIT - VI**

Discrete Mathematical Structures

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week				
		Internal Assessment	40 Marks	Tutorial	00
		Term Work	25 Marks	Practical	01
		Oral	25 Marks		
		Total	150 Marks	Total	05

Course Objective:

The objective is to provide a mathematical foundation and skills those are required in further study of Computer Science and Engineering. The course Discrete Mathematical Structures deals with discrete objects, countable sets. It helps to develop logical thinking and a wide variety of real-world applications to computer science. It is a very good tool for improving reasoning and problem-solving capabilities.

Prerequisite:

Basic knowledge of Elementary Linear Algebra, Numerical Mathematical Computation, Programming basics.

Course Outcomes: On completion of the course, students will have the ability to:

1. Demonstrate the ability to write the sentences in the symbolic logic and evaluate a proof technique.
2. Apply the basic principles of set theory to analyse the data relationship and prove basic properties of set.
3. Analyse the properties of relations and functions to determine their properties.
4. Apply the knowledge of Boolean algebra for building basic electronic and digital circuits.
5. Solve problems of combinatorics and recurrence relations.
6. Model problems in Computer Science using graphs and trees.

Unit I **06 Hours**

Mathematical Logic: Propositional Logic, Predicate logic, First order logic, Rules of inference, Introduction to proof techniques, resolution, Mathematical induction, Methods of proofs.

Unit II **06 Hours**

Set Theory: Types of sets, Sets operations and laws, Algebra of Sets, Multisets,Application of the principle of inclusion and exclusion.

Number Theory: Modular arithmetic, prime numbers, and properties, GCD, Chinese remainder theorem, Extended Euclidean algorithm.

Unit III **06 Hours**

Relations: Basic definition, properties and types of relations, relations and digraphs, paths in relations and digraphs, equivalence and partially ordered relations, Transitive closure and Warshall's algorithm.

Functions: Types of functions, Identity functions, Composition of functions, Mathematical functions, Pigeonhole principle.

Unit IV **06 Hours**

Algebraic Structures: Isomorphism and Homomorphism, Groups, Algebraic Structures with Binary Operations, rings, Cyclicgroups, codes.

Lattice: Posets andHasse Diagrams, Lattice as an algebraic system, Properties of lattices. Group Codes: The Communication Model and Basic notion of Error Correction, Generation of Group codes, Parity Check, Error Recovery

Unit V

Combinatorics and Recurrence Relations: **06 Hours**

Combinatorics: Permutations, Sumrule, Product rule, Combinatorial proofs.

Recurrence Relations: Linear Recurrence relation, Second order RR with constantcoefficients, Applications of Recurrence Relation.

Unit VI **06 Hours**

Concepts of Graphs and Trees: Definition, Degree, Types, Operations on graphs, Paths, Circuits, Connectedness, Planar graphs and their properties, Eulerian and Hamiltonian graphs.

Trees: Basic properties of trees, Binary trees, Application: Minimum Spanning Tree, Shortest Path.

Textbooks:

1. J.P. Tremblay and Manohar: Discrete mathematical structures with application to Computer Science, McGraw hill- New Delhi.
2. Kolman and R.C. Busby: Discrete mathematical structures for computer science Prentice Hall, New-Delhi.
3. Malik and M. K. Sen: Discrete Mathematics, Cengage Learning India Pvt. Ltd.
4. R.M. Somasundaram: Discrete Mathematical Structures, Prentice Hall India Learning Private Limited.
5. C.L.Liu, Elements of Discrete Mathematics, second edition, McGraw-Hill Book Company.

Reference Books:

1. Kenneth H. Rosen: Discrete Mathematics and its applications Eighth Edition McGraw Hill Education.

2. Stanat and McAlister: Discrete Mathematics for Computer Science, PHI.

List of Assignments:

The following are some sample assignments. The course co-ordinator will frame one assignment on each unit for internal assessment.

1. Given a fact or a statement prove or disprove using suitable technique.
2. Write the given English language sentences represent in the Symbolic logic.
3. Given the statement forms Infer the validity of the statement form.
4. Draw a Hasse diagram and find chains and antichains.
5. Find the number of ways for any event or given sample space.
6. Given a problem represent in a graph and compute the optimal solution.
7. Given a communication network find the path between the given nodes.

Project Based Learning

1. Discrete Mathematics in Railway Planning using graph theory and linear algebra.
2. Object transformations using linear algebra.
3. Discrete mathematics in cryptography.
4. In Google maps to determine fastest driving routes and times.
5. In image processing
6. In relation database using sets.
7. In cyber security using graph theory.
8. Shortest path between two cities using a transportation system.
9. Data compression system with the help of Huffman coding.
10. Find the shortest tour that visits each of a group of cities only once and then ends in the starting city using graphs.

List of laboratory Exercise:

1. Perform set Operations.
2. Compute a power set of a given set.
3. List various properties of Relation and construct a program to evaluate it with a program.
4. Apply Warshall's algorithm to compute a Transitive Closure of a given relation entered by the user.(Use any suitable programming language).
5. Solve a programming problem based on application of Eulerian and Hamiltonian Graph.
6. Develop a program using RSA algorithm

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Linear Data Structures

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week	Internal Assessment	40 Marks		
		Term Work	25 Marks	Practical	01
		Practical	25 Marks		
		Total	150 Marks	Total	05

Course Objective:

The objective of the course is to provide the students in-depth knowledge of different Linear Data structures and their use to solve the programming problems.

Prerequisite: Basic knowledge of computer

Course Outcomes: On completion of the course, students will have the ability to:

1. Use appropriate data structure to solve a particular problem
2. Demonstrate the use of linked list and compare it with array.
3. Demonstrate the use of stack as an ADT.
4. Perform the operations on queue.
5. Apply the searching and sorting algorithms
6. Demonstrate the use of Files and different File Organizations

Unit I **08 Hours**

Introduction to Data structures: Introduction to algorithm, Algorithm analysis, Big O Notations, Need of Data structure, Classification of Data Structures, Operations on Data Structures. **Arrays:** Introduction, Array Operations, representation of Arrays in Memory, One- & Two-dimensional array in function, Implementation of One- & Two-Dimensional Arrays in Memory, Abstract Data Types.

Unit II **08 Hours**

Linear Lists: Introduction, Singly linked list, Circularly Linked List, Doubly Linked lists, Basic operations, - Insertion, Deletion, retrieval, traversal, create List, insert node, delete node, List Search, Empty list, Destroy list, Applications of Linked List

Unit III **08 Hours**

Stacks: Stack Structure, Operations on Stacks – create stack, Push stack, Pop stack, Array and Linked Representation, operations (For both array and Linked representation),Types of Notations, Applications of Stack: Reversing Data, Converts Decimal to Binary, Parsing, Postponement.

Unit IV **08 Hours**

Queue: Introduction, Definition, Storage Methods Queue Operations- Enqueue, Dequeue, Queue front, Queue rear, Queue Example, Create Queue, priority Queue, Circular Queue, Application of Queue: Categorising Data, Queue. Simulation, Array and Linked representation of queue (operations on array and Linked representation.

Unit V **08 Hours**

Implementation &Application: Searching: Linear Search, Binary Search, Hashing: Introduction. Hash Tables, Hash Functions, Collision, Applications Sorting – Selection Sort, Bubble Sort, Insertion Sort, Merge Quick Sort, Shell Sort

Unit VI **08 Hours**

Files and Organization: Introduction, Data Hierarch, FileAttributes, Text and Binary Files, Basic File Operations, File Organization, Sequential Organization, Relative File Organization, Indexed Sequential File `Organization.

Textbooks:

1. Richard F Gilberg&Behrouz A Forouzan, Data Structures (A PseudocodeApproach with C), second edition, Cengage Learning, 2004.
2. PAI, Data Structures, Tata McGraw-Hill Education, 2008
3. Data Structures Using C, ReemaThareja, OXFORD University Press

Reference Books:

1. Mayank Patel, Data Structure and Algorithm With C, Educreation Publishing, 2018
2. Thomas H. Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 2001.

List of Assignments:

1. Write an algorithm for a given problem and analyse it's complexity
2. Describe representation of a linked list in the memory and Write a pseudocode to perform deletion operation on list.
3. Illustrate the use of stack to solve the Tower of Hanoi problem.
4. Write a pseudocode to perform operations on priority queue.
5. Compare bubble sort and selection sort
6. Describe the sequential file organization.

Project Based Learning

1. Expression Evaluation
2. Traffic Management System
3. Library Management System for a small library in a department
4. Employee Record System
5. Dictionary
6. Calendar Application
7. Medical Store Management System
8. Cricket Score Sheet
9. Bank Management System that handles only savings account
10. Ticket booking system for bus

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Use of array and operations on Array.
2. Operations on singly and doubly linked list.
3. Polynomial operations using linked list.
4. Create stack and demonstrate it's use.
5. Develop a priority queue and perform the operations.
6. Demonstrate the use of different file organizations.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Universal Human Values (Common for all Branches)

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00
Practical :- 02 Hours/ Week	Internal Assessment	00	Tutorial: 00 Practical: 01
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	00 Marks	
	Total	50 Marks	01

Course Prerequisites:- During the Induction Program, students would get an initial exposure to human values through Universal Human Values. This exposure is to be augmented by this compulsory full semester foundation course.

Course Objective Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence Strengthening of self-reflection. Development of commitment and courage to act

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

1. Create more awareness of themselves, and their surroundings (family, society, nature);
2. Understand the Human being is coexisting with self and body and able to recognize its different needs and fulfilment.
3. Develop more responsible life with human relationships, while keeping in mind the human nature
4. Understand to imbibe sensitive approach towards society and understand the dimensions of harmony in the society
5. Understand the recycle structure of the nature and able to recognize the participation.
6. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit I: Introductions, Aspirations and Concerns (4Hrs)

Getting to know each other, Self-exploration, Individual academic, career Expectations of family, peers, society, and nation fixing one's goals Basic human aspirations Need for a holistic perspective, Role of UHV

Unit II. Self-Management, Health (4Hrs)

Self-confidence, peer pressure, time management, anger, stress Personality development, Self-improvement Harmony in the human being. Health issues, healthy diet, healthy lifestyle Hostel life Harmony of the self and Body Mental and physical health.

Unit III: Relationships (4Hrs)

Home sickness, gratitude towards parents, teachers and others Ragging and interaction Competition and cooperation Peer pressure. Harmony in relationship Feelings of trust, respect, gratitude, glory, love

Unit IV: Society (4 Hrs)

Participation in society. Harmony in the society Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals .Visualizing a universal harmonious order in society- Undivided Society, Universal Order-from family to world family

Unit V: Natural Environment (4 Hrs)

Participation in nature Harmony in nature/existence Understanding the harmony in the Nature

Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature

Unit VI. Self-evaluation Strategy **(4 Hrs)**

Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers. At the level of society: as mutually enriching institutions and organizations review role of education Need for a holistic perspective

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3. The Story of Stuff (Book).
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 5. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
5. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering India - by Dharampal
6. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi 11. India Wins Freedom - Maulana Abdul Kalam Azad
7. Vivekananda - Romain Rolland (English)

Computer Workshop Technology

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Practical:	**2 Hours/Week**	**Term Work:**	**25 Marks**	**Practical:**	**1**
		Oral:	**-**		
Total	**2 Hours/Week**		**25 Marks**	**Total:**	**1**

Course Objective:
To acquire the knowledge of basic manufacturing processes used in computer engineering technology

Prerequisite:
Basics of Engineering materials. Basics of computer and laptop.

Course Outcomes: On completion of the course, students will have the ability to:
1. Understand the basics parts used in the computer and laptop.
2. Understand fundamental concepts of assembly of electronics components (PCB).
3. Understand the various joining processes
4. Develop plastic moulding component used in computer engineering.
5. Developing the component used in computer engineering by use of 3D printing technology.
6. Understand the knowledge of making fasteners used for computer and laptop.

Unit I **04 Hours**

Assembly of Computer: Introduction to hardware peripherals like RAM, ROM, keyboard, Mouse, processors, etc. Generation of processors. Working of SMPS. Study of various ports. Steps and precautions to assemble computer, Tools used in computer hardware

Unit II **06 Hours**

Printed Circuit Boards Assembly (PCB): Study of joining processes, Resistance welding and Soldering processes, why and how flux, tip tinner, solder wick, and post-soldering cleaners are used in the hand soldering process. Laser welding, orbital welding. Advantages and disadvantages of welding processes.

Unit III **06 Hours**

CPU Cabinet Manufacturing Process: Introduction to machines in sheet metal Industry: shearing machine, bending machine, circular profile cutting machines. Different types of sheet metal folds. Rivets and its different parts, selection of rivet heads, types of rivets and its uses. Punching, blanking, shearing, bending, and piercing.

Unit IV **02 Hours**

Plastic Molding Process: Introduction to plastic molding. Types of plastics. Types of plastic molding. Exercise on plastic molding machine ,manufacturing of plastic moulded job.

Unit V **02 Hours**

3D Printing Technology: Introduction to Additive Manufacturing, Need for Additive Manufacturing, Generic AM process, Classification of AM Processes, 3D Printing process. Steps in AM process, Advantages of AM, Major Applications

Unit VI **04 Hours**

Study of Machining Processes: Introduction to machining processes, Different types of turning and grinding operations, by using turning operations making of simple fastener used in computer engineering.

Textbooks:

1. Khanna O.P. and Lal. M., " Production Technology", Dhanpatrai Publications (P) Ltd., New Delhi.
2. Jain R.K., "Production Technology", Khanna Publishers, Delhi
3. The Complete Reference PC Hardware, Craig Zacker, John Rourke

Reference Books:

1. Choudhary Hajra S. k., Choudhary Hajra A. k. "Elements of Workshop Technology Vol 2 Machine Tools, Publisher: Media Publishers & Promoters, India.
2. Rajput R. K ., "Manufacturing Technology", Laxmi Publications (P)Ltd, New Delhi..

List of Laboratory Exercise:

1. Practical on introduction to hardware and different tools used in workshop technology for computer engineering.
2. Experiment and demonstration of soldering processes on electronics components such as PCB assembly.
3. Practical on resistance welding processes.
4. Practical demonstration on shearing machine, bending machine, circular profile cutting machines used in sheet metal operations for manufacturing of cabinet used in computer.
5. Practical demonstration on Punching, blanking, shearing, bending, and piercing.
6. Practical demonstration on plastic molding machine.
7. Practical demonstration on 3 D printing machine
8. Practical demonstration on making fastener for computer by machining processes .
9. Industrial visit to the manufacturing industry.

B.Tech (Computer Science & Engineering) Semester- III

Database Systems

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	**03 Hours/Week**	**End Semester Examination** :	**60 Marks**	**Lecture:**	**03**
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical:**	**01**
		Term Work:	**25 Marks**		
		Practical:	**25 Marks**		
		Total:	**150 Marks**	**Total:**	**04**

Course Objective:

1. The Objective Of The Course Is To Present An Introduction To Database Management System As A Subject In Its Own Right.
2. To Understand The Fundamental Concepts Of Relational Database Management System..
3. To Provide A Strong Formal Foundation In Relational Database Concepts, Database Concepts Technology And Practice &To Introduce The Concepts Of Query Processing.
4. To Present SQL And Procedural Interfaces To SQL Comprehensively.
5. To Introduce The Concepts Of Transaction Processing And To Present The Issues And Techniques Relating To Concurrency And Recovery In Multi-User Database Environments.
6. To Introduce The Recent Trends In Database Technology.

Prerequisite:

Discrete Mathematics, Data Structures And Programming Languages.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Understand Fundamental Elements Of Database Management Systems.
2. Describe The Fundamental Elements Of Relational Database Management Systems And Design ER Models To Represent Simple Database Application Scenarios.
3. Apply Normalization On Database Design To Eliminate Anomalies.
4. Create SQL Queries To Interact With Database.
5. Analyze Database Transactions And Can Control Them By Applying ACID Properties.
6. Apply Recent Trends In Database Technology.

Unit I : Introduction To Databases **06 Hours**

Basic Concepts, Advantages Of DBMS Over File Processing Systems, Data Abstraction, Database Languages, Data Models, Data Independence, Components Of A DBMS, Overall Structure Of DBMS, Multi-User DBMS Architecture, System Catalogs, Data Modeling: Basic Concepts, Entity, Attributes, Relationships, Constraints, Keys.

Unit II: Relational Model **06 Hours**

Components Of ER Model, Conventions, Converting ER Diagrams Into Tables Relational Model: Basic Concepts, Attributes And Domains, Codd's Rules. Relational Integrity: Nulls, Entity, Referential Integrities, Enterprise Constraints, Views, Schema Diagram.

Unit III: Relational Databases Design **06 Hours**

Purpose Of Normalization, Data Redundancy And Update Anomalies, Functional Dependencies. The Process Of Normalization: 1NF, 2NF, 3NF, BCNF. Introduction To Query Processing: Overview, Measures Of Query Cost, Selection And Join Operations, Evaluation Of Expressions Introduction To Query Optimization: Estimation, Transformation Of Relational Expression, Triggers.

Unit IV: Introduction To SQL **06 Hours**

Characteristics And Advantages SQL Data Types, Literals, DDL, DML, SQL Operators Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updation Using Views, Indexes, Nulls SQL DML Queries: SELECT Query And Clauses, Set Operations, Tuple Variables, Set Comparison, Ordering Of Tuples , Aggregate Functions, Nested Queries, Database Modification Using SQL Insert, Update, Delete Queries, Stored Procedure.

Unit V: Transaction Management **06 Hours**

Basic Concept Of A Transaction, Properties Of Transactions, Database Architecture, Concept Of Schedule, Serial Schedule. Serializability: Conflict And View, Cascaded Aborts Recoverable And Non-Recoverable Schedules. Concurrency Control: Need Locking Methods Dead Locks, Timestamping Methods. Optimistic Techniques, Multi-Version Concurrency Control. Different Crash Recovery Methods: Shadow-Paging, Log-Based Recovery: Deferred And Immediate, Check Points.

Unit VI: Database Architectures **06 Hours**

Centralized And Client-Server Architectures, 2 Tier And 3 Tier Architecture, Introduction To Parallel Databases, Key Elements Of Parallel Database Processing, Architecture Of Parallel Databases, Introduction To Distributed Databases, Architecture Of Distributed Databases, Distributed Database Design.
Emerging Database Technologies: Introduction, No SQL Databases- Internet Databases, Cloud Databases, Mobile Databases, XML Databases.

Textbooks:

1. Silberschatz A., Korth H., Sudarshan S. “Database System Concepts”, 6th Edition, Tata Mcgraw Hill Publishers
2. G. K. Gupta “Database Management Systems” , Tata Mcgraw Hill

Reference Books:

1. Rab P., Coronel C. “Database Systems Design, Implementation And Management”, 5th Edition, Thomson Course Technology, 2002
2. Elmasri R., Navathe S. “ Fundamentals Of Database Systems”, 4th Edition, Pearson Education, 2003
3. Date C. “ An Introduction To Database Systems”, 7th Edition, Pearson Education, 2002
4. Ramkrishna R., Gehrke J. “ Database Management Systems”, 3rd Edition, Mcgraw Hill

List Of Assignments:

1. Define Database. Explain Importance Of Data Models In Detail
2. Write A Short Note On Following:

A) Relational Algebra And Calculus
B) Integrity Constraints

3. Define Normalization. Explain All Normal Forms In Detail
4. Explain DDL, DML And DCL In Detail.
5. Explain ACID Properties Of TCL In Detail.
6. Explain NOSQL And Database Analysis Tools In Detail.

List Of Laboratory Exercises:

1. Draw E-R Diagram And Extended ER Diagram (As Given By Course Coordinator) On Given System.
2. Demonstrate Queries On Relational Algebra(As Given By Course Coordinator).
3. To Discuss Normalization And Build Normalized Schema (As Given By Course Coordinator)On Given System.
4. Write A SQL Statement ((As Given By Course Coordinator) On DDL,DML And DCL.
5. Demonstrate Queries On Joins(As Given By Course Coordinator).
6. Demonstrate Queries On Aggregate Functions(As Given By Course Coordinator).

7. Use WEKA Tool To Derive Analytical Model For The Given Dataset.
8. Case Study On NOSQL Database: Mongodb.

Project Based Learning:
1. Inventory Management System.
2. Online Jewelry Shopping System
3. Library Management System
4. Online Examination System
5. Hospital Management System
6. Railway Reservation System
7. Payroll Management System
8. Cooking Recipe Portal
9. Art Gallery Management System
10. Student Database Management System
11. Restaurant Management Database System
12. Electric Bill System Database
13. Online Examination System
14. Event Management System
15.Attendance Management System

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Non-Linear Data Structures

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	03 Hours/Week	End Semester Examination :	60 Marks	Theory	03
Practical:	02 Hours/Week	Internal Assessment:	40 Marks		
		Term work:	25 Marks	Practical	01
		Practical:	25 Marks		
		Total:	150 Marks	Total	04

Course Objective:
The Objective Of The Course Is To Provide The Students The Knowledge Of Different Non-Linear Data Structures And How To Use These To Solve Real World Problems.

Prerequisite:
Basic Knowledge Of Algorithm, Programming Fundamentals, Data Types, ADT, Linear Data Structure.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Identify And Analyze Appropriate Algorithms On The Graph To Solve Real World Problems.
2. Demonstrate The Use Of Trees And Binary Search Trees To Solve The Real World Problem.
3. Compare The Different Types Of Trees Like AVL Trees, Btree, B+ Tree, Red Black Tree And Select An Appropriate One To Solve A Particular One
4. Perform Insertion And Deletion Operation On Heap.
5. Apply Appropriate Hash Function For A Search Process.
6. Implement The Concept Of Dictionaries And Text Processing.

Unit I: Graphs **06 Hours**
Introduction To Non-Linear Data Structure, Graphs, Representation Of Graph, AND/OR Graphs, ADT For Graph, Traversing A Graph, Dijkstra's Algorithm, Minimum Spanning Trees.

Unit II: Trees **06 Hours**
Introduction, Binary Trees, Binary Tree Representation, Tree Traversal Algorithms, Threaded Binary Tree, Binary Search Tree, Operations On Binary Search Tree, Huffman's Algorithm.

Unit III: Special Forms Of Trees **06 Hours**
AVL Trees, M-Way Search Trees, B Trees, B+ Trees, Red Black Tree, 2-3 Trees, Splay Trees, Applications Of Trees.

Unit IV: Heaps **06 Hours**
Heaps As Priority Queues, Heap Implementation, Insertion And Deletion Operations, Binary Heaps, Binomial And Fibonacci Heaps, Heapsort, Heaps In Huffman Coding.

Unit V: Hashing **06 Hours**
Introduction, Hash Functions, Collision Resolution Strategies,
Types Of Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit VI: Dictionaries & Text Processing **06 Hours**
Definition, Dictionary Abstract Data Type, Implementation Of Dictionaries, Text

Processing: String -+Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Suffix Tries, The Huffman Coding Algorithm.

Textbooks:

1. Mark Allen Weiss, Data Structures And Algorithm Analysis In C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.
3. Fundamentals Of Data Structures In C By Horowitz, Sahni& Anderson-Freed, 2e Universal Press

Reference Books:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, And C. Stein, Introduction To Algorithms, MIT Press, 3/E, 2009.
2.A. M. Tenenbaum, Y. Langsam, And M. J. Augenstein, Data Structures Using C And C++,Prentice Hall, 3/E.

List Of Assignments:

The Following Are Some Sample Assignments. The Course Co-Ordinator Will Frame One Assignment On Each Unit For Internal Assessment.

1. Apply The Shortest Path Algorithm On The Given Graph.
2. Apply The Appropriate Algorithm And Find The Solution For The Problem.
3. Generate Huffman Code
4. Write A Pseudocode For Tree Traversal Operation
5. Explain The Concept Of Linear Probing
6. Explain The Steps In Text Processing

Project Based Learning

1. Hashing For Cryptography
2. Payroll System
3. Network Route Identifier
4. Path Finder
5. Telephone Directory
6. Library Management System
7. Document Indexing
8. Data Compressor
9. Railway Reservation System
10. Supermarket Stock Management

List Of Laboratory Exercises:

1. Apply Graph Traversal Technique.
2. Demonstrate Use Of Dijkstra's Algorithm.
3. Perform Operations On Binary Search Trees.
4 Perform On Tree Traversal Algorithms.
5. Applications And Demonstration On Different Types Of Trees.
6. Perform The Operations On Heaps.
7. Apply Hash Function To Solve The Real Time Problem.
8. Demonstrate Use Of Dictionaries And Concept Of Text Processing.
9. Mini Project

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Software Engineering

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03 Hours/Week	End Semester Examination :	60 Marks	Lecture	03
Tutorial:	01 Hour/Week	Internal Assessment:	40 Marks		01
		Term work:	25 Marks		
		Total	125Marks	Total	04

Course Objective:

The Main Purpose Of This Course Is To Impart Knowledge On The Basic Principles Of The Software Development Life Cycle.

Prerequisite: Programming Paradigms, Basic Mathematical Ability

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Understand The Basic Concepts Of Software Engineering Lifecycle.
2. Analyze And Categorize The Requirements Of Software Systems.
3. Design The Software Qualitatively.
4. Implement The Software With The Standard Guidelines.
5. Validate The Software With Standard Testing Techniques.
6. Implement Troubleshooting Of Software Application.

Unit I: Introduction **06 Hours**

Software And Software Engineering: The Nature Of Software, The Software Process, Software Myths, Process Models: A Generic Process Model, Prescriptive Process Models, Specialized Process Models, The Unified Process, Agile Development: Agility, Agility And The Cost Of Change, Agile Process, Agile Process Models.

Unit II: Requirement Engineering And Modelling **06 Hours**

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Building The Use Case, Building Analysis Model, Negotiating Requirements And Validating Requirements. Drafting The Software Requirement Specification.

Requirement Analysis And Modelling: Domain Analysis, Object Oriented Analysis, Scenario Based Modelling, Class Based Modelling, Behavior Modelling. CASE Tools.

Unit III: Software Project Management **06 Hours**

Introduction To Software Project Management, Selection Of A Project Approach, Project Estimation Techniques, Project Planning And Project Scheduling, Project Organization And Team Structures, Risk Management, Resource Allocation, Project Monitoring And Control, Software Configuration Management, Software Quality Management, CASE Tool.

Unit IV: Design **06 Hours**

Design Concepts: The Design Process, Design Model - Data Design Model, Architecture Design Model, Transform And Transaction Flow, Interface Design Flow, Component Level And Deployment Level Design Elements.

Design Concepts – Abstraction, Architecture, Patterns, Modularity, Functional Independence, Refinement, Refactoring, Object-Oriented Design Concepts. CASE Tools In Software Design.

Unit V: Coding And Testing **06 Hours**

Coding Approach, Coding Standards, Error, Bug, Defects.

Software Testing Life Cycle, Software Testing Principles, Verification And Validation, Types Of Testing, White Box Testing Techniques, Black Box Testing

Techniques, Testing Oo Applications, Website Testing. Case Tool.

06 Hours

Unit VI: Implementation And Maintenance

Software Maintenance-Software Supportability.
Reengineering-Business Process Reengineering- Software Reengineering- Reverse Engineering, Restructuring, Forward Engineering- Economics Of Reengineering.

Textbooks:

1. Roger S, "Software Engineering – A Practitioner's Approach", Seventh Edition, Pressman, 2010.
2. Pearson Edu, "Software Engineering By Ian Sommerville", 9th Edition, 2010.

Reference Books:

1. Van Vliet, "Software Engineering: Principles And Practices"–, 2008.
2. Richard Fairley, "Software Engineering Concepts", 2008..

List Of Assignments:

1. Presentation On One Topic Related To This Syllabus
2. Conducting Six Multiple Choice Question Online Test On Each Unit
3. Prepare A Report Based On the Understanding by Viewing The NPTEL Videos Of This Subject.
   i. Perform The Following Assignments:
   ii. Suggest Which SDLC Model Will Be Used to Develop ATM Software? Justify?
   iii. Develop Requirement Specification for an ATM Software.
   iv. Design The Class Diagram and Use Case Diagram for ATM Software.
   v. Discuss On Automated Software Testing. Create Test Cases for Functionality of ATM Software Using a Test Tool (Test Link).
   vi. Discuss and Prepare IEEE Quality Document for ATM Software.
   vii. Prepare Gantt Chart Using MS Project CASE Tool For A Small Project.

Project Based Learning:

1. ATM System
2. Online Banking System
3. Airline Reservation System
4. Railway Reservation System
5. Library Management System
6. College Management System
7. Hospital Management System
8. Traffic Monitoring System
9. Hotel Management System
10. Bus Ticket Reservation System
11. Online Shopping System

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Machine Organization and Microprocessor

Teaching Scheme		Examination Scheme		Credit Scheme	
Hours/Week			Marks		Credits
Theory:	03 Hours/Week	End Semester Examination	60 Marks	Theory:	03
		Internal Assessment:	40 Marks		
		Total:	100 Marks	Total:	03

Course Objective:
The Course Would Provide Students with an Understanding of the Architecture and Programmer's Model of Advanced Processor and Provide Practical Exposure On Microprocessor. Students Will Learn The Basic Operations And The System Level Features Of Advanced Processor To Apply The Assembly Language Programming To Develop Small Real Life Embedded Application.

Prerequisite:
The Students Should Have Basic Knowledge Digital Electronics And Logic Design.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:
1. Understand Instruction Set And Assembly Language Programming.
2. Remember The Architecture And Features Of Microprocessor.
3. Analyze Different Processor Modes.
4. Apply Exceptions And Interrupt Mechanism In Application.
5. Identify And Analyze The Tools Used To Design And Debug Microprocessor Based Systems.
6. Create Systems Using Microprocessor And Microcontroller For Real Time Applications.

Unit I: Introduction to 80386 Architecture **06 Hours**
Brief History of Intel Processors, 80386 Features and Architecture, Operating Modes, Addressing Modes, Data Types.
Applications Instruction Set- Data Movement Instructions, Binary Arithmetic Instructions, Decimal Arithmetic Instructions, Logical Instructions, Control Transfer Instructions, String And Character Transfer Instructions .

Unit II: Systems Architecture and Memory Management **06 Hours**
System Registers (Flag Registers, Memory Management Registers, Control Registers, Debug Register, Test Registers), System Instructions.
Memory Management- Global Descriptor Table, Local Descriptor Table, Interrupt Descriptor Table, Segment Translation, Page Translation, Combining Segment And Page Translation.

Unit III: Protection and Multitasking **06 Hours**
Protection- Need of Protection, Overview of 80386DX Protection Mechanisms, Segment Level Protection, Page Level Protection, Combining Segment and Page Level Protection. Multitasking- Task State Segment, TSS Descriptor, Task Register, Task Gate Descriptor, Task Switching, Task Linking, Task Address Space.

Unit IV: Input-Output, Exceptions And Interrupts **06 Hours**
Input-Output- I/O Addressing, I/O Instructions, Protection and I/O Exceptions And Interrupts- Identifying Interrupts, Enabling And Disabling Interrupts, Priority Among Simultaneous Interrupts And Exceptions, Interrupt Descriptor Table (IDT), IDT Descriptors, Interrupt Tasks And Interrupt Procedures, Error Code, And Exception Conditions.

Unit V: Initialization of 80386, Debugging **06 Hours**
Initialization- Processor State After Reset, Software Initialization for Real

Address Mode, Switching to Protected Mode, Software Initialization For Protected Mode, Initialization Example, TLB Testing Debugging- Debugging Features Of The Architecture, Debug Registers, Debug Exceptions, Breakpoint Exception.

Unit VI: Virtual 8086 Mode and Introduction To Microcontrollers **06 Hours**

Virtual 8086 Mode- Executing 8086 Code, Structure of V86 Stack, Entering and Leaving Virtual 8086 Mode. Architecture Of Typical Microcontroller, Difference Between Microprocessor And Microcontroller, Characteristics Of 8 Bit And 16 Bit Microcontrollers, Application Of Microcontrollers.

Textbooks:

1. Douglas Hall, "Microprocessors & Interfacing", Mcgraw Hill, Revised Second Edition, 2006 ISBN 0-07-100462-9
2. A.Ray, K.Bhurchandi, "Advanced Microprocessors And Peripherals: Arch, Programming & Interfacing", Tata Mcgraw Hill,2004 ISBN 0-07-463841-6
3. James Turley, "Advanced 80386 Programming Techniques", Mcgraw-Hill, ISBN: 10: 0078813425, 13: 978-0078813429.
4. Intel 80386 Programmer's Reference Manual 1986, Intel Corporation, Order No.: 231630-011, December 1995.
5. Intel 80386 Hardware Reference Manual 1986, Intel Corporation, Order No.: 231732-001, 1986

Reference Books:

1. Chris H. Pappas, William H. Murray, ―80386 Microprocessor Handbooks‖, Mcgraw-Hill Osborne Media, ISBN-10: 0078812429, 13: 978-0078812422..
2. Walter A. Triebel, ―The 80386Dx Microprocessor: Hardware‖, Software, And Interfacing, Pearson Education, ISBN: 0137877307, 9780137877300.
3. Brey, Barry B, ―8086/8088, 80286, 80386 And 80486 Assembly Language Programming‖, Prentice Hall, ISBN: 13: 9780023142475.
4. Introduction To 64 Bit Intel Assembly Language Programming For Linux, 2nd Edition, Ray Seyfarth, ISBN10: 1478119209, ISBN-13: 9781478119203, 2012.
5. Mohammad Rafiquzzaman, ―Microprocessors: Theory And Applications: Intel And Motorola", Prentice Hall, ISBN:-10:0966498011, 13:978:0966498011.
6. Assembly Language Step-By-Step: Programming With Linux, 3rd Edition, Jeff Duntemann, Wiley ISBN:-10 0470497025, ISBN-13: 978-0470497029, 2009.

Project Based Learning

1. Auto Controlled Lights.
2. Gate Controller, Automated
3. A Basic 16-Bit Calculator
4. Temperature Sensor
5. Create A Text-Based Adventure Game with Multiple Choices and Outcomes.
6. Build A Memory Game Where the Player Has to Match Pairs of Numbers or Symbols.
7. Design A Digital Clock That Displays Hours, Minutes, And Seconds.
8. Timing Events with A Timer/Counter and an Interrupt Service Routine
9. Number Converter.

List Of Laboratory Exercises:

1. Write X86/64 ALP To Count Number Of Positive And Negative Numbers From The Array.
2. Write An ALP To Accept Five 64 Bit Hexadecimal Numbers From User And Store Them In An Array And Display The Accepted Numbers.
3. Write X86/64 ALP To Perform Non-Overlapped Block Transfer (With And Without String Specific Instructions). Block Containing Data Can Be Defined In The Data Segment.
4. Write X86/64 ALP To Perform Overlapped Block Transfer (With And Without String Specific

Instructions). Block Containing Data Can Be Defined In The Data Segment.

5. Write X86/64 ALP To Perform Multiplication Of Two 8-Bit Hexadecimal Numbers. Use Successive Addition And Add And Shift Method. (Use Of 64-Bit Registers Is Expected).
6. Write X86/64 ALP To Convert 4-Digit Hex Number Into Its Equivalent BCD Number And 5-Digit BCD Number Into Its Equivalent HEX Number. Make Your Program User Friendly To Accept The Choice From User For: (A) HEX To BCD B) BCD To HEX (C) EXIT. Display Proper Strings To Prompt The User While Accepting The Input And Displaying The Result. (Wherever Necessary, Use 64-Bit Registers).
7. Write X86 Assembly Language Program (ALP) To Implement The Following OS Commands I. TYPE Ii. COPY And Iii. DELETE Using File Operations. Users Are Supposed To Provide Command Line Arguments In All Cases.
8. Write X86 ALP To Find, A) Number Of Blank Spaces B) Number Of Lines C) Occurrence Of A Particular Character. Accept The Data From The Text File. The Text File Has To Be Accessed During Program_1 Execution And Write FAR PROCEDURES In Program_2 For The Rest Of The Processing. Use Of PUBLIC And EXTERN Directives Is Mandatory.
9. Write X86 Program To Sort The List Of Integers In Ascending/Descending Order. Read The Input From The Text File And Write The Sorted Data Back To The Same Text File Using Bubble Sort.
10. Write X86/64 ALP To Switch From Real Mode To Protected Mode And Display The Values Of GDTR, LDTR, IDTR, TR And MSW Registers Also Identify CPU Type Using CPUID Instruction.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Object Oriented Methodology

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	03 Hours/Week	End Semester Examination:	60 Marks	Theory :	03
Practical:	02 Hours/Week	Internal Assessment	40 Marks	Practical:	01
		Term Work	25 Marks		
		Total	125 Marks	Total :	04

Course Objective:

1. To Teach Fundamentals Of Object-Oriented Concepts And Programming.
2. To Apply The Concepts Of Object-Oriented Paradigm.
3. To Develop Object-Oriented Programming Skills.
4. To Design And Implement Applications For Real Life Problems By Using Object-Oriented Programming.

Prerequisite:

Paradigms of Programming.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Understand The Basics Of Object-Oriented Programming With Java.
2. Learn The Concept Of Class, Objects, Methods For Real Time Problems.
3. Analyze Constructor, Garbage Collector And Methods Of String Class.
4. Explore The Concept Of Inheritance And Polymorphism With The Help Of Real Time Applications.
5. Apply The Concept Of Exception Handling And Understand The Concept Of Multithreading.
6. Design The Graphical User Interface By Using Applets AWT And SWING.

Unit I: Introduction **06 Hours**

Overview Of Oop, Object Oriented Programming Paradigms, Features Of Object Oriented Programming, Difference Between Java, C And C++, Structure Of Java Program, Difference Between Jdk, Jre And Jvm, Internal Details Of Jvm,
Basics Of Java Language-Variable, Arrays And Reserve / Keywords Present In Java, Primitive Data Types, Java Operators, Decision Making And Branching Statements In Java.

Unit II: Classes, Objects And Methods **06 Hours**

Creating A Class, Visibility/Access Modifiers, Encapsulation, Methods: Adding A Method To Class, Returning A Value, Adding A Method With Parameters,' This' Keyword, Method Overloading, Object Creation, Using Object As A Parameters, Returning Object, Array Of Objects, Memory Allocation: 'New', Static Data Members, Static Methods.
Packages- Defining A Package, Classpath, Importing Packages
Stream Based I/O (Java.Io) – The Stream Classes-Byte Streams And Character Streams, Reading Console Input And Writing Console Output, Enumerations, Autoboxing, Generics.

Unit III: Constructors, Destructors And String Handling: **06 Hours**

Use Of Constructor, Characteristics Of Constructors, Types Of Constructor, Constructor Overloading, Constructor With Default Arguments, Symbolic Constants, Garbage Collection, Destructors And Finalizers.

String Handling: Immutable String, String Comparison, String Concatenation, Substring, Methods Of String Class, String Buffer Class, Stringbuilder Class, Creating Immutable Class, To String Method.

06 Hours

Unit IV: Inheritance And Polymorphism

Use Of Inheritance, Types Of Inheritance In Java, Role Of Constructors In Inheritance, Polymorphism In OOP, Types Of Polymorphism, Static And Dynamic Polymorphism, Overriding Super Class Methods. Use Of "Super" Keyword. Interfaces, Implementing Interfaces.

Interfaces- Defining An Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables In Interfaces And Extending Interfaces.

Unit V: Exception Handling And Multithreaded Programming **06 Hours**

Exception Handling: Try And Catch Block, Catch Block, Nested Try, Finally Block, Throw Keyword, Exception Propagation, Throws Keyword, Exception Handling With Method Overriding, Custom Exception

Introduction To Threads: Life Cycle Of A Thread, Thread States, Thread Properties, Methods In Threads And Runnable, Setting Priority Of Threads, Synchronization And Inter Thread Communication Life Cycle Of A Thread.

Unit VI: Designing Graphical User Interfaces In Java **06 Hours**

Applet And Its Use, Design Patterns Using Applet And Japplet. Run Applet Application By Browser And Applet Tool. Applet Architecture. Parameters To Applet Life Cycle.

Basics Of Components Using Containers, Layout Managers And User Defined Layout. Border Layout, Flow Layout, Grid Layout, Grid Bag Layout, Box Layout. Awt Components, Adding A Menu To Window, Extending Gui Features Using Swing, Components Designing Gui, Advanced Swing Components Like Progress, Jslider, Jradio Button, Jtree, Jtable, Jtoggle Button, Etc.

Textbooks:

1. E. Balaguruswamy, "Object Oriented Programming Using C++ And Java", Tata Mcgrawhill
2. Steven Holzner Et Al. "Java 2 Programming", Black Book, Dreamtech Press, 2009.

Reference Books"

Java The Complete Reference, Herbert Schildt, Mcgraw Hill Education (India) Pvt. Ltd. 9th Edition, 2014, ISBN: 978-0-07-180856-9 (E-Book).

1. Object-Oriented Design Using Java, Dale Skrien, Mcgraw-Hill Publishing, 2008, Isbn - 0077423097, 9780077423094.
2. Mitsunori Ogihara, "Fundamentals Of Java Programming", Springer; 2018, Isbn 978-3-319-89490-4.
3. Brahma Dathan Sarnath Ramnath, "Object-Oriented Analysis, Design And Implementation An Integrated Approach", Springer; 2nd Ed. 2015, Issn 1863-7310 Issn 2197-1781 (Electronic) Undergraduate Topics In Computer Science Isbn 978-3-319-24278-1, Isbn 978-3-319-24280-4.
4. T. Budd (2009), An Introduction To Object Oriented Programming, 3rd Edition, Pearson Education, India.
5. J. Nino, F. A. Hosch (2002), An Introduction To Programming And Oo Design Using Java, John Wiley & Sons, New Jersey.
6. Y. Daniel Liang (2010), Introduction To Java Programming, 7th Edition, Pearson Education, India.

Project Based Learning:

1. Smart City Project
2. Currency Converter
3. Online Exam Project In Java
4. Moving Balls Mini Project Using Java Applet
5. Text Editor In Java Using Awt Controls.
6. Album Manager Project In Java
7. Vehicle Management System In Java
8. Music Player Project In Java
9. Student Management System Project In Java
10. Simple Calculator Project In Java
11. Image To Pdf Convertor In Java
12. Simple Chat System
13. Online Quiz Project
14. Pong Game In Java
15. Tokenize Implementation.

List Of Laboratory Exercises:

1. Write A Program That Checks Whether A Given String Is A Palindrome Or Not.
2. Write A Program That Describes A Class Person. It Should Have Instance Variables To Record Name, Age And Salary. Create A Person Object. Set And Display Its Instance Variables.
3. Write A Program That Creates A Class Circle With Instance Variables For The Centre And The Radius. Initialize And Display Its Variables.
4. Write A Program That Counts The Number Of Objects Created By Using Static Variable.
5. Write A Program To Demonstrate The Constructors In Java.
6. Write A Program To Demonstrate The Constructor Overloading.
7. Write A Program To Display The Use Of This Keyword.
8. Write A Program To Implement Class And Inheritance Concept.
9. Write An Application That Creates An Interface' And Implement It.
10. Write A Program That Can Count The Number Of Instances Created For The Class.
11. Write A Program To Implement The Concept Of Multithreaded Programming.
12. Create An Abstract Class Shape. Let Rectangle And Triangle Inherit This Shape Class. Add Necessary Functions.
13. Write An Application That Shows The Usage Of Try, Catch, Throws And Finally.
14. Write An Applet That Displays ―Hello World (Background Colour-Black, Text Colour-Blue And Your Name In The Status Window).
15. Develop Mini Project Using Applet And Swings.

Syllabus For Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

CSE Skill Lab – I (Web Programming)

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	0 Hrs	University Examination:	-		
Practical:	2 Hrs	Internal Assessment:	-	Lecture	-
		Term Work	25	Practical	1
		Practical	25		
		Total	50	Total	1

Course Objective: The Objective Of This Course Is To Impart Students With The Knowledge To Setup The Development Environment, Design And Develop Dynamic Database Driven Web Applications Using PHP.

Prerequisite:
Basics Of HTML

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Create PHP Programs That Use Various Php Library Functions,
2. Design Interactive Forms Using PHP.
3. Implement Various Operations On Arrays And Control Structures In PHP
4. Create Database And Demonstrate The Manipulation Of Files, Directories And Relational Data.
5. Implement Cookies And Session
6. Develop Dynamic Web Content.

Unit I : Introduction To Dynamic Web Content &Environment: **Hours**

Overview Of HTTP & HTML, Request/Response Procedure, Advantage Of PHP, MySQL, JavaScript, CSS & HTML 5, The Apache Web Server, Overview Of Open Source. Basics Of WAMP, MAMP, LAMP, Installation, Accessing Document Root, Working Remotely, Using FTP, Using IDE. **6 Hours**

Unit II : Introduction To PHP, Expression & Control Flow:: **6 Hours**

Incorporating PHP Within HTML, Structure Of PHP – Comments, Basic Syntax, Variables, Operators, Assignments, Multiline Commands, Constants, Echo & Print Commands, Functions, Variable Scope. Expressions: TRUE Or FALSE, Literals & Variables. Operators: Precedence, Associativity, Relational Operators. Conditionals – If, Else, Else if, Switch Operator. Looping: While, Do-While, Breaking Out Of Loop, Continue Statement

Unit III : PHP Functions, Objects &Array **6 Hours**

PHP Functions: Defining, Returning A Value, Returning An Array, Do Not Pass Arguments By Reference, Returning Global Variables, Include Statement: Include Once, Require &Require Once.
PHP Objects: Declaring A Class, Creating An Object, Accessing Objects, Constructors, PHP Destructors, Writing Methods, Declaring Properties & Constants, Inheritance.
Arrays: Basic Access, Foreach As Loop, Multidimensional Arrays, Using Array Functions.

Unit IV: PHP In Action & Introduction To MySQL **6 Hours**

Using printf, Date And Time Functions, File Handling, System Calls. Introduction To MySQL: Basics, Database Terms, Accessing MySQL Via Command Line, MySQL Commands, Data Types, Indexes, MySQL Functions, Accessing MySQL Via Phpmyadmin, Primary Keys, Relationships, Select Queries, Backup File, Dumping Data In CSV Format.

Unit V : Cookies, Sessions, Authentications And Accessing **6 Hours**

Using Cookies In PHP, HTTP Authentication, Using Sessions. Accessing: Querying A Mysql Database With PHP – The Process, Create Login File, Connecting To Database, Practical Example, Preventing Hacking Attempts: Using Placeholders, HTML Injection. Building Forms, Retrieving Submitted Data.

Unit VI: Exploring Javascript **6 Hours**

Javascript And HTML Text – Using Within A Document Head, Older & Nonstandard Browsers, Including Javascripts, Debugging Javascript Errors, Using Variables, Semicolon, Variables, Operators, Variable Typing, Functions, Global Variables, Local Variables, Document Object Model.

Textbooks:

1. Learning PHP, Mysql &Javascript, Robin Nixon, OREILLY, 4thediton, 2015.
2. Head First PHP & Mysql-Lynn Beighley& Michael Morrison-O'Reilly.
3. PHP: A Beginner's Guide-Vikramvaswani- Mcgraw-Hill Education.

Reference Books:

1. The Complete Reference PHP – Steven Holzner, Tata Mcgraw-Hill.
2. The Joy Of PHP Programming: A Beginner's Guide – Alan Forbes, Beakcheck LLC,6th Edition.

List Of Laboratory Exercises:

1. Write A PHP Function To Count Total Number Of Vowels From The String. Accept A String Using HTML Form.
2. Write A PHP Script To Print Fibonacci Series.
3. Create A Student Registration Form Using Text Box, Check Box, Radio Button, Select, Submit Button. Display The User Inserted Value In New PHP Page.
4. Write A Program To Perform The Following Operations On An Associative Array.
    a) Display Elements Of An Array Along With Their Keys.
    b) Display Size Of Array.
    c) Delete An Element From An Array From The Given Index.
5. Write A Program To Insert A Roll No And Student Name In A Database (Use Postgresql Data To Create
6. Write PHP Script To Demonstrate Passing Variables With Cookies.
7. Implement Admin Login/Logout Functionality And Cookie Wherever Required.
8. Write A PHP Script To Connect MYSQL Server From Your Web Application. Write A PHP Script To Create And Drop Database.
9. Create Database Using Phpmyadmin. Write A Program To Read Input Data From Table And Display The Information In Tabular Form.
10. Develop PHP Application Using Forms And Database.

Project Based Learning:

1. Design Personal Website Using Html And Css
2. Login Page With User Credentials And Data Base
3. Drawing Palette Based Web Page
4. Student Registration Form With Data Base Connectivity
5. Dummy Social Networking Website
6. Image Editing Using We Page
7. Animation Based Website8. Simple Game Website
9. Ecommerce Website With Data Base Connectivity
10. Any Complete Web Project With Real Time Database Connectivity
11. Login Authentication
12. Design Survey Form
13. Quiz Game

14. Implement Employee Management System
15. Social Media Dashboard
16. Search Application
17. E-Commerce Website
18. Develop Freelance Platform
19. Hospital Management System

B.Tech
(Computer Science & Engineering)Semester- IV

Theory of Computing

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	03 Hours/Week	End Semester Examination:	60 Marks	Theory:	03
Tutorial:	01 Hours/Week	Internal Assessment:	40 Marks	Tutorial:	01
		Term Work:	25 Marks		
		Total:	125 Marks	Total:	04

Course Objective:

This Course Introduces Some Fundamental Concepts In Automata Theory And Formal Languages Including Grammar, Finite Automaton, Regular Expression, Formal Language, Pushdown Automaton And Turing Machine. This Subject Not Only Forms The Basic Models Of Computation, It Also Includes The Foundation Of Many Branches Of Computer Science, E.G. Compilers, Software Engineering, Concurrent Systems, Etc.

Prerequisite:
Discrete Mathematics

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Demonstrate Advanced Knowledge Of Formal Computation And Its Relationship To Languages
2. Classify The Relationships Between Language Classes And Regular Expression
3. Design Grammars And Recognizers For Different Formal Languages
4. Identify The Equivalence Of Languages Described By Pushdown Automata
5. Evaluate The Language Acceptability By Turing Machine
6. Understand The Basics Of Compiler

Unit I: Preliminaries And Finite State Machines

Introduction To Theory Of Computation- Automata, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability Of A String And Language, Non-Deterministic Finite Automaton (NFA), Equivalence Of DFA And NFA, NFA With E-Transition, Equivalence Of NFA's With And Without E-Transition, Finite Automata With Output- Moore Machine, Mealy Machine, Equivalence Of Moore And Mealy Machine, Minimization Of Finite Automata. **06 Hours**

Unit II: Regular Languages

Definition And Examples. Conversion Of RE To FA, FA To RE, Algebraic Laws, Pumping Lemma For Regular Languages And Applications. Closure Properties Of Regular Languages Union, Concatenation, Complement, Intersection And Kleene Closure. Decidability- Decision Properties. **06 Hours**

Unit III: Context Free Grammar (CFG)

Definition, Derivations, Languages, Derivation Trees And Ambiguity, Regular Grammars-Right Linear And Left Linear Grammars, Conversion Of FA Into CFG And Regular Grammar Into FA, Simplification Of CFG, Normal Forms- Chomsky Normal Form (CNF), Greibach Normal Form (GNF),Chomsky Hierarchy, Programming Problems Based On The Properties Of Cfgs. **06 Hours**

Unit IV: Push Down Automata (PDA)

Introduction, Pushdown Automata (PDA), Transition Diagrams, Functions And Tables, Deterministic Push- Down Automata (DPDA) - Definition, Nondeterministic Pushdown Automata (NPDA), Equivalence Of Context Free Grammars And PDA, Properties Of Context Free Languages. Introduction To Post Machines (Pms). **06 Hours**

Unit V: Turing Machines

The Turing Machine Model And Definition Of TM, Language Acceptability Of Turing Machines, Techniques For Turing Machine Construction, Modifications Of Turing Machine, Composite And Iterative Turing Machines, Multi Tape Turing Machine, Multi Stack And Multi Track Turing Machine, Universal Turing Machine, Linear Bounded Automata, Church's Thesis, Halting Problem. **06 Hours**

Unit VI: Applications

Applications Of Regular Expressions, Lexical Analyzer, Text Editor, And Searching Using RE, Context Free Grammar, Basics Of Parsing Techniques, Application Of Leftmost And Rightmost Derivations During Parsing, Primitive Recursive Functions, Recursive And Recursively Enumerable Languages, Introduction To Natural Language Processing. **06 Hours**

Textbooks:

1. Vivek Kulkarni "Theory Computation" Oxford Higher Education
2. Theory Of Computer Science (Automata, Language & Computation) K. L. P. Mishra & N. Chandrasekaran, PHI Second Edition.
3. E.V. Krishnamurthy, "Theory Of Computer Science", EWP Publication.

Reference Books:

1. Hopcroft Ullman, "Introduction To Automata Theory, Languages &Computations, Narosa.
2. Daniel A. Cohen, "Introduction To Computer Theory", Wiley Publication.
3. Automata Theory, Languages, And Computation, John E. Hopcroft Cornell University, Rajeev Motwani Stanford University, Jeffrey D. Ullman Stanford University,3rd Edition.

List Of Assignments:

1. Study Of JFLAP Tool For Constructing FA.
2. Construct Regular Expressions Defined Over The Alphabet Σ= {A, B}, Which Denote The Given Languages.
3. Translate The Following Mealy Machine Into Its Equivalent Moore Machine.
4. Write A Context-Free Grammar (CFG) Which Generates The Language L Denoted By:(A+ B)*Bbb(A+ B)*.
5. Construct A PDA That Accepts The Language Defined By The Following Regular Grammar.
6. Design A TM To Recognize An Arbitrary String Divisible By 4, From Σ= {0, 1, 2}.

Project Based Learning:

1. Develop A Tool To Illustrate The Algorithm For Converting An Arbitrary NFA To A DFA .
2. Develop A Tool To Draw A Transition Diagram For Any Given DFA.
3. Approximation Algorithms
4. Greedy Algorithms.
5. Enumeration Of Finite Automata
6. Enumeration Of PDA
7. Enumeration Of Turing Machines
8. Ambiguous Grammars
9. Disambiguation Of Grammars
10. Enumeration Of Context-Free Languages
11. . Enumeration Of Turing Machines
12. . Universal Turing Machines.
13. Randomized Turing Machines
14. NP Complete Algorithm
15. Problem Solvability Using Reduction
16. Design Of TM To Emulate A Finite Automata
17. . Design Of TM To Emulate A PDA
18. Complexity Analysis Of Encryption Algorithms Using TM.
19. . Design Of TM To Perform Sorting

20. Design TM To Perform Searching.

Syllabus for Unit Test

Unit Test I	Unit No. I, II, III
Unit Test II	Unit No. IV, V, VI

System Programming and Operating System

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03 Hours/Week	End Semester Examination:	60 Marks	Lecture:	03
Practical:	02 Hours/Week	Internal Assessment:	40 Marks	Practical:	01
		Term Work:	25 Marks		
		Oral:	25 Marks		
		Total:	150 Marks	Total	04

Course Objectives:

- To Help The Students Understand Functioning Of Various System Programs And Compiler, Loaders And Linkers.
- To Help Students For Different Concepts Of Operating System And Management With File System.

Prerequisite:

Knowledge Of Microprocessor Concepts And Assembly Language And Concept Of System Software, Application Software, Knowledge Of Input Output Devices And Its Usage.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Understand Basic System Software And Its Functionality.
2. Identify And Analyze The Working Of Assemblers, Loaders And Linkers.
3. Compare And Evaluate Different Scheduling Algorithms.
4. Identify The Mechanism To Deal With Deadlock And Concurrency Issues.
5. Analyze Memory Management Policies And Virtual Memory.
6. Apply Different File Management Techniques

Unit I: Introduction To Systems Programming **06 Hours**

Need Of System Programming, Software Hierarchy, Types Of Software: System Software And Application Software, Machine Structure. Components Of System Software: Text Editors, Assembler, Macros, Compiler, Interpreter, Loader, Linker, Debugger, Device Drivers, Operating System.
Elements Of Assembly Language Programming, Structure Of An Assembler, Design Of Single And Two Pass Assemblers.

Unit II: Introduction To OS **06 Hours**

Architecture, Goals & Structures Of O.S, Basic Functions, Interaction Of O. S. & Hardware Architecture, System Calls, Batch, Multiprogramming. Multitasking, Time Sharing, Parallel, Distributed & Real -Time O.S.

Unit III: Process Management **06 Hours**

Process Concept, Process States, Process Control, Threads, Scheduling: Types Of Scheduling: Pre-Emptive, Nonredemptive, Scheduling Algorithms: FCFS, SJF, RR, Case Study On Unix /Linux OS.

Unit IV: Concurrency Control **06 Hours**

Concurrency: Interprocess Communication, Mutual Exclusion, Semaphores, Classical Problems Of Synchronization: Readers-Writers, Producer Consumer, And Dining Philosopher Problem. Deadlock: Principles Of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Case Study Related To Unit Contents.

Unit V: Memory Management **06 Hours**

Basics Of Memory Management, Swapping, Memory Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement, Page Replacement Algorithms – Optimal FIFO, LRU, LRU Approximation, Allocation Of

Frames, Case Study Related To Unit Contents.

Unit VI: File Management **06 Hours**

Concepts, File Organization, File Directories, File Sharing, Record Blocking, Allocation Methods, Free Space Management, Comparative Study Of Traditional OS And Modern OS. Examples Of Modern Operating System.
Emerging Trends And Technologies Of OS

Textbooks:

1. System Programming By John J. Donovan, TATA Mcgraw-HILL Edition.

Reference Books:

1. Operating System Concepts, 9th Edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
2. Operating Systems 5th Edition, William Stallings, Pearson Education India.
3. D. M. Dhamdere : "Systems Programming And Operating System", Tata Mcgraw Hill.

List Of Assignments:

1. Explain With Example Elements Of Assembly Language Programming.
2. Explain In Detail The Design Of Single And Two Pass Assembler.
3. What Is Operating System? Explain Types Of OS.
4. Explain Concept Of Process In Detail.
5. Explain Process Scheduling Algorithms. (FCFS, SJF, RR,)
6. Explain Interprocess Communication.
7. What Are The Different Classical Problems Of Synchronization.
8. Write A Note On Memory Management.
9. Explain Various Page Replacement Algorithms.
10. Give Examples Of Modern OS.

Project Based Learning:

1. Develop Heap Memory Manager In C
2. Design The Processes And Thread Management With Deadlock's, Synchronization
3. Design Preemptive Priority Scheduling Algorithm Implementation In Any Language.
4. Java Program To Analyze Page Fault For A Given Page Frame Using NRU With Paging.
5. The Project On Simulating The Multiprogramming Of A Specific Operating System And Dealing With CPU Scheduling And Job Scheduling.
6. Design The Project That Computes FCFS, SSTF, And SCAN Disk-Scheduling Algorithms
7. Operating Systems Mini-Project To Explore The Different Algorithms Of Main Memory Page Replacement
8. Develop Any One Project On One Or Two Pass Assemblers.
9. Design A Simple Language And Develop A Compiler For The Three-Address Code Generation And Evaluation Using Lex And Yacc.
10. Construct A Parser That Recognizes A Specific Language.

List Of Laboratory Exercises:

1. Design One Pass Assembler
2. Design Two Pass Assembler
3. Write A Program To Create Dynamic Link Library For Any Mathematical Operation And Write An Application Program To Test It
4. Write A Program Using Lex Specifications To Implement Lexical Analysis Phase Of Compiler To Count No. Of Words, Lines And Characters Of Given Input File.
5. Write A Program To Solve Classical Problem Of Synchronization Using Mutex And Semaphore.
6. Implement UNIX System Calls Like Ps, Fork, Join, Exec Family, And Wait For Process Management.
7. Implementation Of Various Scheduling Algorithm.

8. Implementation Of Banker's Algorithm.
9. Find Out The Page Fault Of Any Given String.
10. Implementation Of Various Page Replacement Algorithm.
11. Study Assignment On Process Scheduling Algorithms For Latest OS.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Computer Organization & Architecture

Teaching Scheme		Examination Scheme		Credit Scheme	
Hours/Week		Marks		Credits	
Lecture:	03	University Examination:	60	Lecture	03
		Internal Assessment:	40		
		Total	100 Marks	Total	03

Course Objective:

To Understand The Design Of Various Functional Units Of Computer System And To Explain Key Skills Of Constructing Cost-Effective Computer Systems.

Prerequisite:

Students Should Have Basic Knowledge Of Digital Electronics And Computer System.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Identify Various Components Of A Computer And Their Interconnection.
2. Explain The Functions & Organization Of Various Blocks Of CPU.
3. Understand CPU Instruction Characteristics, Enhancement Features Of CPU.
4. Describe An Assortment Of Memory Types (With Their Characteristics) Used In Computer Systems And Basic Principle Of Interfacing Input And Output Devices.
5. Describe The I/O Organization And Interconnections.
6. Infer Parallel Processing And Multiprocessor Configuration.

Unit I: Structure Of Computer

Organization, Functions & Types Of Computer Units- CPU (Typical Organization, Functions, Types), Memory (Types & Their Uses In Computer), IO (Types & Functions) & System Bus (Address, Data & Control, Typical Control Lines, Multiple-Bus Hierarchies); Von Neumann & Harvard Architecture; Instruction Cycle **06 Hours**

Data Representation: Signed Number Representation, Fixed And Floating-Point Representations, Character Representation.

Unit II: Computer Arithmetic

Integer Addition And Subtraction, Ripple Carry Adder, Carry Look-Ahead Adder, Etc. Multiplication – Shift-And-Add, Booth Multiplier, Carry Save Multiplier, Etc. Division Restoring And Non- Restoring Techniques, Floating Point Arithmetic, IEEE 754 Format. **06 Hours**

Processor: Single Bus Organization Of CPU; ALU (ALU Signals, Functions & Types); Register (Types & Functions Of User Visible, Control & Status Registers Such As General Purpose, Address Registers, Data Registers, Flags, PC, MAR, MBR, IR) & Control Unit (Control Signals & Typical Organization Of Hard Wired & Microprogrammed CU). Micro Operations (Fetch, Indirect, Execute, Interrupt) And Control Signals For These Micro-Operations.

Unit III: Instruction Set Architecture Of A CPU

Elements Of Machine Instruction; Instruction Representation (Opcode& Mnemonics, Assembly Language Elements), Instruction Format & 0-1-2-3 Address Formats, Types Of Operands, Addressing Modes; Instruction Types Based On Operations (Functions & Examples Of Each), RTL Interpretation Of Instructions, Exceptions; Instruction Pipelining(Operation & Speed Up) Complex Instruction Set Computer (CISC) , Reduced Instruction Set Computer (RISC), Key Characteristics Of RISC& CISC, CISC Vs RISC. **06 Hours**

Interrupt: Its Purpose, Types, Classes & Interrupt Handling (ISR, Multiple Interrupts)

Unit IV: Memory System Design

Semiconductor Memory Technologies. **06 Hours**

Memory Organization: Memory Interleaving, Concept Of Hierarchical Memory Organization, Cache Memory, Cache Size Vs. Block Size, Mapping Functions, Replacement Algorithms, Write Policies.

Unit V: INPUT OUTPUT

I/O Interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.**06 Hours**
Multiprocessors: Characteristics Of Multiprocessors, Interconnection Structures, Inter Processor Arbitration, Inter Processor Communication And Synchronization, Cache Coherence.

Programs And Processes – Role Of Interrupts In Process State Transitions, I/O Device Interfaces – SCSI, USB

Unit VI: Pipelining

Basic Concepts Of Pipelining, Throughput And Speedup, Pipeline Hazards. **06 Hours**

Parallel Processors: Introduction To Parallel Processors, Concurrent Access To Memory And Cache Coherency

Textbooks:

1. Computer System Architecture M. M. Mano: 3rd Ed., Prentice Hall Of India, New Delhi, 1993.
2. Computer Organization And Design: The Hardware/Software Interface, David A. Patterson And John L. Hennessy.
3. Computer Organization And Embedded Systems, Carl Hamacher.

Reference Books:

1. Computer Architecture And Organization, John P. Hayes.
2. Computer Organization And Architecture: Designing For Performance, William Stallings

List Of Assignments:

1. Booth's Algorithm For Multiplication
2. Restoring And Non-Restoring Division
3. Fixed Point And Floating-Point Representation
4. Programmer's Model Of 80386
5. Hardwired And Micro-Programmed Design Approaches.
6. Characteristics Of Memory System
7. Cache Organization And Address Mapping
8. Virtual Memory And Replacement Algorithms
9. Calculating Throughput And Speed In Pipelining
10. Multiprocessor Architecture

Project Based Learning:

1. Automatic Night Lamp With Morning Alarm
2. Traffic Light With Sensor + 7segment
3. Multi Pattern Running Lights.
4. Washing Machine
5. Simple Lock Using Keypad And 7 Segment.
6. Electronic Quiz Table
7. Electronic Digital Clock
8. Temperature Controller

9. Plant Irrigation System
10. Car Parking Management
11. Customer Counter For Supermarket
12. Electronic Queue Management System In Food Stall
13. Safety Box
14. Shop Lot Automatic Door With 7segment Display
15. Bank Queue Management System
16. Water Level Controller
17. Automatic Home System
18. Commuter System
19. Automatic Room Light Control
20. Elevator Control System

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Computer Graphics and Multimedia

Teaching Scheme		Examination Scheme		Credit Scheme	
					Credits
Lecture:	**03 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Lecture :**	**03**
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical:**	**01**
		Term Work:	**25 Marks**		
		Total	**125 Marks**	**Total:**	**04**

Course Objectives:

1. To Introduce The Principles Of Computer Graphics And The Components Of A Graphics System.
2. To Introduce Basic Algorithms For Drawing Line, Circle And Curves.
3. To Develop Understanding Of The Basic Principles Of 2D And 3D Computer Graphics And How To Transform The Shapes To Fit Them As Per The Picture Definition.
4. To Introduce Multimedia Architecture And Hardware.
5. To Introduce Multimedia File Formats.

Prerequisite:

Knowledge Of C Programming Language, Linear Algebra.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Identify The Basic Terminology Of Computer Graphics And Apply Scan Conversion Of Points, Lines, Circle For Problem Solving.
2. Create Effective Programs Using Concepts Of Polygon, Fill Polygon, Curves, Fractals.
3. Analyze Techniques Of Geometrical Transforms Objects In 2 Dimensional.
4. Evaluate The Core Concepts Of Computer Graphics, Including Transformation In Three Dimensions, And Projection.
5. Understand The Concepts Of Multimedia
6. Analyze The Concepts Of Hypermedia

Unit I: Introduction To Computer Graphics And Devices

Introduction To Computer Graphics, Applications Of Computer Graphics **06 Hours**

Graphic Devices : CRT, Raster Scan & Random Scan Displays, Color CRT, Beam Penetration CRT, The Shadow -Mask CRT, Direct View Storage Tube, Tablets, Display Processor, Display File Structure, Graphic Mode Commands

Graphics Output Primitives:

Point And Lines,

Line Drawing Algorithms: DDA Line Drawing Algorithm, Bresenham Line Drawing Algorithm,

Circle Drawing: DDA, Midpoint, Bresenham Circle Drawing Algorithm,

Unit II: Polygons

Polygons And Its Types, Inside Test, **06 Hours**

Polygon Filling Methods: Seed Fill – Flood Fill And Boundary Fill, Scan-Line Fill Algorithms; Character Generation, Antialiasing**.**

Curves And Fractals

Curves: Introduction, Interpolation And Approximation, Spline Interpolation Methods , Bezier Curves, B-Splines.

Fractals: Introduction, Classification, Fractal Dimension, Fractal Dimension And Surfaces, Hilbert Curve, Koch Curve.

Unit III: Two-Dimensional Graphics 2D Transformations

Translation, Scaling, Rotation, Reflection And Shearing, Matrix **06 Hours**
Representation And Homogeneous Coordinate System, Composite Transformations.

Windowing: Concept Of Window And Viewport, Viewing Transformations

Line Clipping: Cohen Sutherland Method Of Line Clipping

Polygon Clipping: Sutherland Hodgeman Method For Convex And Concave Polygon Clipping.

Unit IV: Three-Dimensional Graphic 3D Transformation

Translation, Scaling, Rotation About X, Y, Z & Arbitrary Axis, And Reflection About XY, YZ, XZ & Arbitrary Plane. **06 Hours**

Projections: Types Of Projections- Parallel, Perspective

Parallel: Oblique – Cavalier, Cabinet, Orthographic – Isometric, Diametric, Trimetric

Perspective: Vanishing Points As 1 Point, 2 Point And 3 Point

Unit V: Multimedia System Design & Multimedia File Handling

Multimedia Basics, Multimedia Applications, Multimedia System Architecture, Evolving Technologies For
Multimedia, Defining Objects For Multimedia Systems, Multimedia Data Interface Standards. Compression And Decompression, Data And File Format Standards, Multimedia I/O Technologies, Digital Voice And Audio, Video Image And Animation, Full Motion Video, Storage And Retrieval Technologies.

Unit VI: Hypermedia

Multimedia Authoring And User Interface-Hypermedia Messaging -
Mobile Messaging – Hypermedia Message Component – Creating Hypermedia Message – Integrated Multimedia Message Standards– Integrated Document Management – Distributed Multimedia Systems.

Textbooks:

1. Donald Hearn And Pauline Baker M, Computer Graphics", Prentice Hall, New Delhi, Second Edition.
2. Andleigh, P. K And Kiranthakrar, Multimedia Systems And Design, PHI, 2015.

Reference Books:

1. Foley, Vandam, Feiner And Hughes, Computer Graphics: Principles And Practice, 2nd Edition, Pearson Education, 2003.
2. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvinsung, And AK Peters, Fundamentals Of Computer Graphics, CRC Press, 2010.

List Of Assignments:

1. Study On Any Latest Data Generating Device In Computer Graphics .
2. Describe In Detail Any One Color Model Process.
3. Using The Determinant To Calculate The Signed Areas, Determine Whether The Point $\boldsymbol{P}$=[23]T Is In The Triangle Formed By The Points $\boldsymbol{S}$=[22]T, $\boldsymbol{T}$=[51]T And $\boldsymbol{R}$=[35]T. Show All Of Your Work.
4. Elaborate In Detail The Any One Curve Generation Methods.
5. Describe How Multimedia System Architecture Process Is Used In Real Time.

Project Based Learning:

1. Helicopter Game
2. Sinking Ship
3. Scientific Calculator
4. Traditional Wall Clock

5. Tower Of Hanoi Game
6. Windmill
7. Steam Engine
8. Traffic Signal
9. Aquarium
10. Prepare A Powerpoint Presentation
11. Mobile App For Online Shopping
12. Arrival And Departure Of The Train With Announcement And Signal
13. Mobile Application For Online Tour Guidance App
14. Create A Small Video On The Given Topic
15. Story Tell Mobile App

List Of Laboratory Exercises:

1. Study Of Fundamental Graphics Functions.
2. Implementation Of Line Drawing Algorithms: DDA Algorithm, Bresenham's Algorithm.
3. Implementation Of Circle Drawing Algorithms: Bresenham's Algorithm, Mid-Point Algorithm. Programs On 2D And 3D Transformations.
4. Write A Program To Implement Cohen Sutherland Line Clipping Algorithm.
5. Write A Program To Implement Sutherland Hodgeman Polygon Clipping Algorithm.
6. Write A Program To Implement DDA Curve
7. Write A Program To Implement Bezier Curve
8. Write A Program To Implement Fractal

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

COMPUTER NETWORKS

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03 Hours/Week	End Semester Examination:	60 Marks	Lecture	03
Practical:	02 Hours/Week	Internal Assessment:	40 Marks	Practical	01
		Term Work	25 Marks		
		Practical	25 Marks		
		Total	150 Marks	Total	04

Course Objective:

1. To Understand The Fundamental Concepts Of Networking And Technologies
2. To Learn Different Techniques For Framing, Error Control, Flow Control And Routing
3. To Learn Different Layer Protocols In The Network Layer
4. To Understand Modern Network Architectures With Respect To Design And Performance.

Prerequisite:

Computer Systems Workshop Technology

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Understand Fundamental Concepts Of Computer Networks, Architectures, Protocols And Technologies
2. Remember The Working And Functions Of Data Link Layer
3. Analyze The Working Of Different Routing Protocols And Mechanisms
4. Implement Client-Server Applications Using Sockets
5. Illustrate Role Of Application Layer With Its Protocols, Client-Server Architectures
6. Apply Concepts Of Network Security.

Unit I : Basics Of Computer Networks **06 Hours**

Introduction To Computer Network, Types Of Computer Network,Ad-Hoc Network, Network Architectures: Client-Server; Peer To Peer; Distributed And SDN, OSI Model, TCP/IP Model, Topologies: Star And Hierarchical; Design Issues For Layers, Transmission Mediums: Cat5, 5e, 6, OFC And Radio Spectrum, Network Devices: Bridge, Switch, Router, Brouter And Access Point.

Unit II : Data Link Layer **06 Hours**

Design Issues, Error Detection And Correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols - HDLC, The Data Link Layer In The Internet. The Medium Access Sublayer: Channel Allocations Problem, Multiple Access Protocols, Ethernet, Data Link Layer Switching, Wireless LAN, Broadband Wireless, Bluetooth.

Unit III : **Network Layer** **06 Hours**

Switching Techniques, IP Protocol, Ipv4 And Ipv6 Addressing Schemes, Subnetting, Address Mapping – ARP, RARP, BOOTP And DHCP–Delivery ,Routing Protocols: Distance Vector, Link State, Path Vector, Routing In Internet: RIP ,OSPF, BGP.

Unit IV : Transport Layer **06 Hours**

Transport Service, Transport Layer Protocols For Flow Control, Elements Of Transport Protocols, Multiplexing, Congestion Control, Example Protocols: Udp, Tcp.

Unit V : Application Layer **06 Hours**

Domain Name System (Dns), Hyper Text Transfer Protocol (Http), Email: Smtp,

Mime, Pop3, Webmail, Ftp, Telnet, Dynamic Host Control Protocol (Dhcp), Www, Http, Snmp.

Unit VI : Network Security **06 Hours**

Network Security: Electronic Mail, Directory Services And Network Management, Basic Concepts Of Cryptography.

Textbooks:

1. Fourauzan B.,"Data Communications And Networking", 5 Th Edition, Tata Mcgraw-Hill, Publications, ISBN:0–07 – 058408 – 7
2. Andrew S. Tanenbaum, Computer Networks, 5th Edition, Pearson India, 2012.

Reference Books:

1. Kurose, Ross, “Computer Networking A Top Down Approach Featuring The Internet”, Pearson, ISBN-10: 0132856204
2. L. Peterson And B. Davie, “Computer Networks: A Systems Approach”, 5th Edition, Morgan-Kaufmann, 2012.
3. Douglas E. Comer & M.S Narayanan,”Computer Network & Internet”, Pearson Education

List Of Assignments:

1. Study Of LAN Environment.
2. Explain OSI Model In Detail.
3. Explain Error Detection And Correction Methods With Example.
4. Study The Concept Of Subnetting At Network Layer.
5. Discuss Switching Techniques In Detail.
6. Explain Multiplexing Methods In Detail.
7. Assignment On Application Layer
8. Assignment On Bandwidth Utilization Techniques.

List Of Laboratory Exercises:

1. Setup A Wired LAN Using Switch, Router And Then IP Switch Of Minimum Four Computers, Configuration Machine Using IP Addresses, Testing Using PING Utility Using Network Simulation Tool Cisco Packet Tracer.
2. Write A Program For Error Detection And Correction For 7/8 Bits ASCII Codes Using Hamming Codes And CRC.
3. Write A Program To Simulate Go Back N And Selective Repeat Modes Of Sliding Window Protocol In Peer To Peer Mode.
4. Write A Program To Demonstrate Subnetting And Find The Subnet Masks
5. Configure RIP/OSPF/BGP Using Packet Tracer
6. Write A Program For DNS Lookup. Given An IP Address Input, It Should Return URL And Vice-Versa
7. Write A Program Using TCP Socket For Wired Network.
8. Write A Program Using UDP Sockets To Enable File Transfer (Script, Text, Audio And Video One File Each) Between Two Machines
9. Use Network Simulator NS2 To Implement: Monitoring Traffic For The Given Topology
10. Study Of Installation And Configuration Of DHCP Server

Project Based Learning:

1. Chat Application
2. Multiuser Chat Application
3. Network Monitoring System
4. Intruder Detection System
5. Computing Shortest Path Between Nodes
6. Client-Server Based Instant Messenger
7. File Transfer Protocol

8. Network Security Protocol With Cryptography
9. Peer To Peer Resource Monitoring System
10. Distance-Vector-Routing-And-Flow-Control-Simulator
11. Link State Routing Protocol To Find Suitable Path For Transmission.
12. Analyse Following Packet Formats Captured Through Wireshark For Wired Network

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Skill Lab IV (Python Programming)

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	-	End Semester Exam:	-	Lecture	00
Practical:	02 Hours/Week	Internal Assessment:	-	Practical	01
		Term Work	25 Marks		
		Practical	25 Marks		
		Total	50 Marks	Total	01

Course Objective:

1. To Teach Students Basic Of Python Programming.
2. To Learn Control Statements And Data Structures In Python.
3. To Understand And Demonstrate Use Of Functions And Classes In Python.
4. To Learn File Handling And Different Packages In Python For Real Time Datasets.
5. To Learn Implementation Of Classes, Inheritance, Polymorphism In Python.
6. To Learn Networking And GUI In Python.

Prerequisite:

Basic Use Of Computer And Fundamentals Of Programming Language.

Course Outcomes: On Completion Of The Course, Students Will :

1. Understand Basics Of Python Language.
2. Apply Functions Using Looping Structures.
3. Create And Manipulate File Operations In Python. Apply Different Packages In Python On Real Time Datasets.
4. Understand Concepts Of Classes And Objects.
5. Implementation Of Inheritance And Polymorphism.
6. Design GUI And Create Networking Interface Between Client And Server.

Unit I: Introduction To Python Programming **04 Hours**

Python Interpreter, Variables, Operators (Arithmetic, Bitwise, Logical, Assignment), Data Types (List, Tuple, Dictionary And Set) And Their Important Methods, String Operations And Slicing.

Unit II: Control Flow Statements And Functions **04 Hours**

Control Flow Statements: Control Flow Statements, Looping Structures Using Pass, Continue, Break Statements.
Functions: Defining Functions And Arguments, Passing Parameters To A Function, Lambda Function.

Unit-III: File Handling And Data Science Packages **04 Hours**

File Handling: Concept Of Files, File Opening In Various Modes And Closing Of A File, Different Access Modes, Reading From A File, Writing Onto A File, Important File Handling Functions E.G Open(), Close(), Read(), Readline() Etc.
Data Science Packages: Numpy, Pandas And Matplotlib Etc.

Unit-IV: Oops Concepts **04 Hours**

OOPS In Python: Features Of Object-Oriented Programming System (OOPS), Classes And Objects, Encapsulation, Abstraction, Inheritance, Polymorphism, Constructors And Destructors .
Classes And Objects: Creating A Class, The Self-Variable, Types Of

Variables, Namespaces, Types Of Methods, Instance Methods, Class Methods, Static Methods, Passing Members Of One Class To Another Class, Inner Classes.

Unit-V: Inheritance And Polymorphism **04 Hours**

Inheritance In Python, Types Of Inheritance- Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Constructors In Inheritance, Overriding Super Class Constructors, Super() Method, Method Resolution Order (Mro), Polymorphism, Duck Typing, Operator Overloading, Method Overloading, Method Overriding. Abstract Classes And Interfaces: Abstract Class, Abstract Method, Interfaces In Python, Abstract Classes Vs. Interface.

Unit VI: Networking And GUI **04 Hours**

Networking:Protocols,Server:
Client Architecture, TCP/IP And UDP Communication.
Graphical User Interface: Creating A GUI In Python, Widget Classes, Working With Fonts And Colours, Working With Frames, Layout Manager, Event Handling.
Textbooks:

1. Starting Out With Python Plus Myprogramminglab With Pearson Etext 3rd Edition , Tony Gaddis
2. Introduction To Python Programming, Chapman And Hall/CRC 1 Edition By Gowrishankar, Veena
3. Fundamentals Of Python Programming By Richard L. Halterman

Reference Books:

1. Python Crash Course By Eric Matthes
2. Learning Python By Mark Lutz

List Of Experiments:

1. Develop A Program To Read The Student Details Like Name, PRN, Marks In Three Subjects. Display The Student Details, Total Marks And Percentage With Suitable Messages.
2. Develop A Program To Read The Name And Year Of Birth Of A Person. Display If The Person Is A Senior Citizen.
3. Develop A Program To Generate Fibonacci Sequence Of Length N. Take Use Input For N.
4. Write A Program To Print Factorial Of A Number.
5. Accept A Multi Digit Number From User And Find Put The Frequency Of Each Digit With Suitable Message.
6. Create Data Structures Such As List, Tuple, Dictionary And Set In Python And Perform Important Functions On These Data Structures.
7. Implement A Python Program To Show File Operations.
8. Demonstrate Use Of Various Python Packages Such As Numpy, Pandas And Matplotlib.
9. Wrte A Program To Python Program To Implement Concepts Of OOP Such As:
   A) Abstract Methods And Classes
   B) Interfaces
   C) Types Of Methods
10. Write A Program To Python Program To Implement Concepts Of OOP Such As
    A) Inheritance
    B) Polymorphism
11. Write A Python Program To Create Server-Client And Exchange Basic Information
12. Write A GUI Program In Python To Design Application That Demonstrates
    A) Different Fonts And Colors
    B) Different Layout Managers
    C) Event Handling

B.Tech
(Computer Science & Engineering)
Minor Degree Course-Blockchain
Semester- III

INTRODUCTION TO BLOCK CHAIN

Teaching Scheme		Examination Scheme	Marks	Credit Scheme	Credits
Lecture:	**03 Hours/Week**	**University Examination:**	**60 Marks**	**Lecture**	**03**
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**01**
		Term Work:	**25 Marks**		
		Oral:	**25 Marks**		
		Total	**150 Marks**	**Total**	**04**

Course Objective:

To Understand The Mechanism Of Blockchain And Cryptocurrency.
To Understand The Functionality Of Current Implementation Of Blockchain Technology.
To Understand The Required Cryptographic Background.
To Explore The Applications Of Blockchain To Cryptocurrencies And Understanding Limitations Of Current Blockchain.
An Exposure Towards Recent Research

Prerequisite:

Computer Networks; Operating Systems; Cryptography And Network Security.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

- Remember Fundamental Concepts Related To Blockchain Technology.
- Understand The Principles Of How Blockchain Achieves Decentralization And Immutability.
- Apply Blockchain Concepts To Real-World Scenarios.
- Analyze Different Consensus Mechanisms And Their Suitability For Specific Use Cases.
- Evaluate The Ethical Considerations And Challenges Associated With Blockchain Technology.
- Create A Simple Blockchain Application Or Prototype.

Unit I: Introduction **06 Hours**

Need For Distributed Record Keeping, Modeling Faults And Adversaries, Byzantine Generals Problem, Consensus Algorithms And Their Scalability Problems, Nakamoto's Concept With Blockchain Based Cryptocurrency, Technologies Borrowed In Blockchain – Hash Pointers, Consensus, Byzantine Fault-Tolerant Distributed Computing, Digital Cash Etc.

Unit II : Basic Distributed Computing & Crypto Primitives **06 Hours**

Atomic Broadcast, Consensus, Byzantine Models Of Fault Tolerance, Hash Functions, Puzzle Friendly Hash, Collison Resistant Hash, Digital Signatures, Public Key Crypto, Verifiable Random Functions, Zero-Knowledge Systems

Unit-III: Bitcoin Basics **06 Hours**

Bitcoin Blockchain, Challenges And Solutions, Proof Of Work, Proof Of Stake, Alternatives To Bitcoin Consensus, Bitcoin Scripting Language And Their

Unit-IV: Ethereum Basics **06 Hours**

Ethereum And Smart Contracts, The Turing Completeness Of Smart Contract Languages And Verification Challenges, Using Smart Contracts To Enforce Legal Contracts, Comparing Bitcoin Scripting Vs. Ethereum Smart Contracts, Writing Smart Contracts Using Solidity & Javascript

Unit V: Privacy, Security Issues In Blockchain **06 Hours**

Pseudo-Anonymity Vs. Anonymity, Zcash And Zk-SNARKS For Anonymity

Preservation, Attacks On Blockchains: Sybil Attacks, Selfish Mining, 51% Attacks Advent Of Algorand; Sharding Based Consensus Algorithms To Prevent These Attacks

Unit VI: Case Studies **06 Hours**

Block Chain In Financial Service, Supply Chain Management And Government Services

Textbooks:

1. Artemis Caro, "Blockchain: The Beginners Guide To Understanding The Technology Behind Bitcoin & Crypto Currency".
2. Ambadas, Arshad Sarfarz Ariff, Sham "Blockchain For Enterprise Application Developers", Wiley
3. Andreas M. Antonpoulos, "Mastering Bitcoin: Programming The Open Blockchain" , O'Reilly

Reference Books:

1. Blockchain: A Practical Guide To Developing Business, Law, And Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2. Blockchain: Blueprint For A New Economy, Melanie Swan, O'Reilly
3. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, And Smart Contracts Explained", Packt Publishing.
4. Josh Thompson, 'Blockchain: The Blockchain For Beginnings, Guild To Blockchain Technology And Blockchain Programming', Create Space Independent Publishing Platform, 2017.

List Of Practicals:

1. Installation Of Metamask And Study Spending Ether Per Transaction.
2. Create Your Own Wallet Using Metamask For Crypto Transactions
3. Write A Smart Contract On A Test Network, For Bank Account Of A Customer For Following Operations:
   - Deposit Money
   - Withdraw Money
   - Show Balance
4. Write A Program In Solidity To Create Student Data. Use The Following Constructs:
   - Structures
   - Arrays
   - Fallback
   - Deploy This As Smart Contract On Ethereum And Observe The Transaction Fee And Gas Values
5. Write A Survey Report On Types Of Blockchains And Its Real Time Use Cases
6. Write A Program To Create A Business Network Using Hyperledger
7. **Mini Project -** Develop A Blockchain Based Application Dapp (De-Centralized App) For E-Voting System.

Project Based Learning

1. Trusted Crowdfunding Platform Using A Smart Contract.
2. Exact Shipment Location Data.
3. Peer To Peer Ridesharing.
4. A Fake Product Identification System.
5. Transparent And Genuine Charity Application.
6. Blockchain-Based Voting System.
7. Anti-Money Laundering System Using Blockchain

Syllabus For Unit Tests:

Unit Test -1 Unit – I,
Unit – II,
Unit - III

Unit Test -2

Unit – IV, Unit – V, Unit - VI

B.Tech
(Computer Science & Engineering)
Minor Degree Course-Blockchain
Semester- IV

DECENTRALIZE & BLOCKCHAIN TECHNOLOGIES

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	3 Hrs	University Examination:	60	Lecture	3
Practical:	2 Hrs	Internal Assessment:	40	Practical	1
		Term Work:	25		
		Practical:	25		
		Total	150	Total	4

Course Objective: After Completion Of The Course, Students Will Have Adequate Background, Conceptual Clarity And KnowledgeRelated To:

1. Evaluate The Potential Impact Of Blockchain Technology On A Specific Industry.
2. Compare And Contrast The Features And Security Implications Of Different Consensus Algorithms Used In Blockchain
3. Design And Develop A Basic Decentralized Application That Demonstrates A Real-World Use Case For Decentralized Applications.

Prerequisite:
Basics Of Blockchain Technology

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Analyze The Strengths And Weaknesses Of Different Decentralized Systems
2. Evaluate The Potential Impact Of Decentralized Applications On Specific Industries Or Societal Issues.
3. Analyze The Trade-Offs And Suitability Of Different Consensus Algorithms For Various Scenarios.
4. Compare And Contrast Hyperledger Fabric With Other Platforms Based On Specific Criteria.
5. Develop And Evaluate Mitigation Strategies For Specific Blockchain Security Threats.
6. Design And Defend A Proposal For Utilizing Blockchain Technology In A Chosen Application Area.

Unit I : Decentralized Systems **Hours**

Introduction To Decentralization, Core Principles Of Decentralization, Types Of Decentralized Systems, Disintermediation And Its Impact, Frameworks And Ecosystems Or Decentralized System. **6 Hours**

Unit Ii : Decentralized Applications **6 Hours**

Introduction To Decentralized Applications, Dapp Development Environment And Tools, Dapp Use Cases, Blockchain Mining And Dapps, Communication Protocols (Whisper, Swarm), Blockchain Forks And Implications For Dapps.

Unit III : Securing Blockchains: Consensus And Fault Tolerance **6 Hours**

Introduction To Consensus, Consensus Approaches And Elements, Consensus Algorithms: Proof Of Work, Byzantine General Problem, Proof Of Stake, Proof Of Elapsed Time, Proof Of Activity, Proof Of Burn.Comparing And Contrasting Consensus Algorithms.

Unit Iv: Hyperledgers **6 Hours**

Introduction To Permissioned Blockchains, Hyperledger Ecosystem Overview, Deep Dive Into Hyperledger Projects, Hyperledger Tools And Libraries, Building With Hyperledger, Blockchain-As-A-Service (Baas) And Hyperledger Cello, Future Of Hyperledger And Permissioned Blockchains.

Unit V : Advanced Blockchain Security: Attacks, Solutions, And Best Practices **6 Hours**

Blockchain Security Fundamentals, Pseudonymity Vs. Anonymity, Privacy-Enhancing Technologies, Common Dvent Of Algorand ,And Sharding Based Consensus Algorithms To Prevent The Attacks.

Unit VI: Blockchain For The Real World **6 Hours**

Selecting Blockchain Technology, Business Need Identification And Goal Setting, Blockchain Applications Across Industries: Internet Of Things (Iot), Medical Record Management:, Domain Name Service (DNS), Future Of Blockchain Technology.

Textbooks:

1. J.H. Huiwitz, M.Kaufman, A.Bowles, " Cognitive Computing & Big Data Analystics",Wiley Publication

Reference Books:

1. A. Reyana, C.Martin, J.Chen, E.Soler, M.Diaz, "On Blockchain And Its Integration With Iot Challenges & Opportunities" Paper In Future Generation Computer Systems, Vol. 88, Nov. 2018, Pp.173-190.
2. H.F.Atlam, Muhammad A.A.,A.G. Alzaharani, G. Wills, "A Review Of Blockchain In Internet Of Things And AI",Paper In Big Data And Cognitive Computing, Vol.4, Issue 28, Oct.2020.

List Of Laboratory Exercises:

1. Decentralized Application Analysis
2. Develop A Simple Web Application That Allows Users To Track Their Carbon Footprint Through Connected Devices Or Manual Input.
3. Design A Secure And Transparent Voting System Using Blockchain For Student Elections Or Decision-Making Within Clubs Or Organizations.
4. Develop A Prototype Platform For Patients To Securely Store And Share Their Medical Records Using Blockchain Technology.
5. Decentralized Supply Chain Management For Local Produce:
6. Design A Peer-To-Peer Energy Trading Platform Using Blockchain Technology
7. Design A Platform For Decentralized Educational Credentials & Skill Verification

Project Based Learning:

1. Cryptocurrency Wallet Simulator
2. Nft Minting And Marketplace
3. Supply Chain Transparency Game
4. Personal Carbon Footprint Tracker
5. Decentralized Voting System Simulator
6. Peer-To-Peer Energy Trading Platform
7. Decentralized Identity Management System
8. Healthcare Data Sharing Platform
9. Decentralized Autonomous Organization (Dao) For Charity Fundraising
10. Decentralized Social Media Platform
11. Interoperable Blockchain Bridge

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

B.Tech
(Computer Science & Engineering)
Minor Degree Course-Blockchain
Semester- V

Smart Contracts & Cryptocurrency

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03 Hours/Week	University Examination:	60 Marks	Lecture	03
Practical:	02 Hours/Week	Internal Assessment:	40 Marks	Practical	01
		Term Work:	25 Marks		
		Practical:	25 Marks		
		Total	125 Marks	Total	04

Course Objective:

To Understand The Mechanism Of Blockchain Smart Contracts And Cryptocurrency.

To Understand The Functionality Of Current Implementation Of Blockchain Technology.

To Understand The Required Cryptographic Background.

To Explore The Applications Of Blockchain To Cryptocurrencies And Understanding Limitations Of Current Blockchain.

An Exposure Towards Recent Research

Prerequisite:

Computer Networks; Operating Systems; Cryptography And Network Security.

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Recall Key Concepts In Cryptocurrency And Smart Contracts.
2. Understand The Principles Underlying Blockchain Technology And The Function Of Smart Contracts.
3. Apply Knowledge Of Smart Contracts To Solve Real-World Scenarios.
4. Analyze The Security Features And Potential Vulnerabilities Of Existing Smart Contracts.
5. Evaluate The Impact Of Decentralized Finance (Defi) On Traditional Financial Systems.
6. Create A Decentralized Application (Dapp) Using Smart Contracts.

Unit I: Introduction To Cryptocurrency And Blockchain Basics **06 Hours**

Overview Of Cryptocurrencies, Evolution Of Blockchain Technology, Understanding Bitcoin, Basics Of Blockchain Consensus Mechanisms

Unit II: Altcoins, Tokenization, And Cryptocurrency Ecosystem **06 Hours**

Introduction To Altcoins (E.G., Ethereum, Litecoin), Tokenization And Its Applications, Initial Coin Offerings (Icos) And Security Token Offerings (Stos), Cryptocurrency Wallets And Exchanges

Unit-III: Smart Contracts Development With Ethereum **06 Hours**

Introduction To Smart Contracts, Ethereum And Solidity Programming Language, Writing And Deploying Smart Contracts, Ethereum Ecosystem And Decentralized, Applications (Dapps)

Unit-IV: Smart Contract Security And Auditing **06 Hours**

Common Vulnerabilities In Smart Contracts, Best Practices For Secure Smart Contract Development, Auditing And Testing Smart Contracts

Unit-V: Decentralized Finance (Defi) And Non-Fungible Tokens (Nfts) **06 Hours**

Overview Of Defi, Decentralized Exchanges (DEX), Yield Farming, Lending, And Borrowing In Defi, Understanding Non-Fungible Tokens (Nfts)

Unit VI: Cryptocurrency Regulations, Future Trends **06 Hours**

Legal And Regulatory Considerations In Cryptocurrency, Future Trends In Cryptocurrency And Blockchaincase Study And Project: Application Of Smart

Contracts And Cryptocurrency Concept

Textbooks:

1. Mastering Ethereum: Building Smart Contracts And Dapps" By Andreas M. Antonopoulos And Gavin Wood
2. Smart Contracts: The Essential Guide To Using Blockchain Smart Contracts For Cryptocurrency Exchange" By Jeff Reed
3. Solidity Programming Essentials: A Beginner's Guide To Build Smart Contracts For Ethereum And Blockchain" By Ritesh Modi

Reference Books:

Blockchain: A Practical Guide To Developing Business, Law, And Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.

Building Ethereum Dapps: Decentralized Applications On The Ethereum Blockchain" By Roberto Infante

Token Economy: How The Web3 Reinvents The Internet" By Shermin Voshmgir

List Of Practicals:

1. Installation Of Metamask And Study Spending Ether Per Transaction.
2. Create Your Own Wallet Using Metamask For Crypto Transactions
3. Write A Smart Contract On A Test Network, For Bank Account Of A Customer For Following Operations:
   - Deposit Money
   - Withdraw Money
   - Show Balance
4. Write A Program In Solidity To Create Student Data. Use The Following Constructs:
   - Structures
   - Arrays
   - Fallback
   - Deploy This As Smart Contract On Ethereum And Observe The Transaction Fee And Gas Values
5. Write A Survey Report On Types Of Blockchains And Its Real Time Use Cases
6. Write A Program To Create A Business Network Using Hyperledger
7. **Mini Project -** Develop A Blockchain Based Application Dapp (De-Centralized App) For E-Voting System.

Project Based Learning

1. Trusted Crowdfunding Platform Using A Smart Contract.
2. Exact Shipment Location Data.
3. Peer To Peer Ridesharing.
4. A Fake Product Identification System.
5. Transparent And Genuine Charity Application.
6. Blockchain-Based Voting System.
7. Anti-Money Laundering System Using Blockchain

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

B.Tech
(Computer Science & Engineering)
Minor Degree Course-
Blockchain
Semester- VI

Blockchain Solutions

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	3 Hrs	University Examination:	60	Lecture	3
Practical:	2 Hrs	Internal Assessment:	40	Practical	1
		Term Work:	25		
		Oral:	25		
		Total	125	Total	4

Course Objective:

1. Understand The Fundamental Concepts Of Blockchain Technology
2. Evaluate The Suitability Of Various Blockchain Platforms For Enterprise Applications
3. Learn How To Design And Architect Blockchain Solutions For Enterprise Use Cases
4. Understand The Funding Sources, Costs, And Cost Models Associated With Enterprise Blockchain Projects
5. Investigate Blockchain As A Service (Baas) Offerings And Providers
6. Address Legal Concerns, Compliance Requirements, And Security Considerations Associated With Enterprise Blockchain Adoption

Prerequisite:

Decentralize & Blockchain Technologies

Course Outcomes: On Completion Of The Course, Students Will Have The Ability To:

1. Define Blockchain Technology And Articulate Its Significance In Decentralized Systems
2. Compare And Contrast Different Enterprise Blockchain Platforms, Including Hyperledger Project, Hyperledger Fabric, R3 Corda, Quorum, And Ethereum
3. Identify Key Technology Focus Areas In Blockchain Development And Understand Their Relevance In Enterprise Applications
4. Assess The Economic Implications Of Blockchain Technology On Various Industries And Business Models
5. Deploy And Manage Blockchain Solutions Using Cloud Platforms Such As Amazon Web Services (AWS) And IBM Cloud
6. Explore Industry-Specific Use Cases For Blockchain Technology, Including Financial Services, Logistics, Government, And Healthcare

Unit I : Introduction **Hours**

Three Definitions Of Blockchain, Blockchain Vs Traditional Database, Permissionless Blcokchain, Blockchain Principle, Blockchain Transaction Basics **6**

Unit II: Enterprise Blockchains **Hours**

Comparing Enterprise Blockchain, Hyperledger Project, Hyperledger Fabric, R3 Corda, Introducing Quorum, Ethereum, **6**

Unit III: Architecting Your Enterprise Blockchains **Hours**

Blockchain Technology Focus Areas, Architecting Blockchain Solutions, Blockchain Decision Tree, Bloackchain Structure And Components, Enterprise Blockchain Architecture, Enterprise Blockchain Adoption Challenge, Enterprise Blockchain Design Principles, Hyperledger Fabric, R3 Corda, Ethereum, Quorum **6**

Unit IV: Enterprise Blockchains Consensus And Economics **Hours**

Blockchain Consensus Methods, Blockchain Consensus Evaluation, Introduction To Enterprise Blockchains Economics, Blockchain Funding And Costs, Enterprise Blockchain Cost Models, **6**

Unit V: Deploying Your Blockchain On Baas **Hours**

Blockchain As A Service, Baas Providers, Amazon Web Service Option, Deploying Hyperledger On AWS, IBM Cloud Blockchain Platforms, **6**

Unit VI: Enterprise Blockchain Usecase And Blockchain Governance, Risk And Compliance (GRC) **Hours**

Merits Of Blockchain Acceptance, Financial Sector Use Case, Logistics Use Case, Government Use Cases, Healthcare Use Cases , Governance, Risk And Compliance (GRC), Personally Identifying Information (PII), Common Compliance Requirement**,** Payment Card Industry Data Security Standard, Smart Contract Legal Concerns, Smart Contract Legal Concerns, Financial Sector Compliance, Auditing And Logging 6

Textbooks:

1. Joseph Holbrook, "Architecting Enterprise Blockchains" Wily Publication.

Reference Books:

1. Sathvik Vishwnath "Architecting Blockchain Solutions" Bpb Publication.

List Of Assignments:

1. Exploring Key Concepts In Blockchain Technology.
2. Comparative Analysis Of Enterprise Blockchain Platforms.
3. Comprehensive Study On Enterprise Blockchain Technologies.
4. Exploring Blockchain Consensus Methods And Enterprise Blockchain Economics.
5. Exploring Blockchain As A Service (Baas) And Cloud Deployment Options.
6. Exploring Blockchain Applications And Regulatory Considerations.

List Of Laboratory Exercises :

1. Case Study On Permissionless Blockchain And Blockchain Transactions.
2. Provide Recommendations For Organizations Seeking To Implement Blockchain Solutions Based On Their Specific Requirements And Use Cases.
3. Provide Comprehensive Overviews Of Hyperledger Fabric, R3 Corda, Ethereum, And Quorum, Including Their Features, Architecture, Consensus Mechanisms, Use Cases, And Adoption Trends.
4. Research And Identify Different Consensus Methods Used In Blockchain Networks, Such As Proof Of Work (Pow), Proof Of Stake (Pos), Practical Byzantine Fault Tolerance (PBFT), And Delegated Proof Of Stake (Dpos).
5. Provide A Step-By-Step Guide On Deploying A Hyperledger Fabric Network On AWS.
6. Research And Identify The Merits And Advantages Of Blockchain Acceptance In Various Industries, Such As Transparency, Efficiency, Security, And Trust.

Project Based Learning:

1. Create A Simple Smart Contract For A Specific Use Case, Such As Token Creation Or Decentralized Finance (Defi) And Deploy And Test The Smart Contract On The Ethereum Blockchain Using A Test Network.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

B.Tech
(Computer Science & Engineering)
Minor Degree Course-
Blockchain
Semester- VII

PROJECT

Teaching Scheme		Examination Scheme		Credit Scheme	
Hours/Week			Marks		Credits
		University Examination:	NA		
Practical:	8 Hrs	Internal Assessment:	NA		
		Term work	50	Term work	2
		Oral	50	Practical	2
		Total	100	Total	4

Course Objective:

To develop problem solving abilities using mathematics.

- To apply algorithmic strategies while solving problems.
- To develop time and space efficient algorithms.
- To develop software engineering documents and testing plans.
- To use algorithmic solutions using distributed, Embedded, concurrent and parallel environments.

Prerequisite:

Basics of Software engineering, Software testing and knowledge of core computer engineering subjects.

Course Outcomes:

On completion of the course, students will have the ability to:

1. Review and understand how previous experiences had an impact on affective states and intellectual performance
2. Identify and define the problem.
3. Decide critically to solve the problem.
4. Demonstrate the ability to synthesize complex information from a variety of sources in decision-making.
5. Predict and develop a group process and desired outcomes.
6. Plan and perform collaboratively towards a common purpose.

1. The project will be undertaken preferably by a group of at least3- 4 students who will jointly work and implement the project over the academic year. The work will involve the design of a system or subsystem in the area of Computer Engineering.

2. If the project is chosen a hardware project it will involve the designing a system or subsystem or upgrading an existing system. The design must be implemented into a working model with necessary software interfacing and a user manual.

3. If the project is chosen in the pure Software Application it must involve the detail Software Design Specifications, Data Structure Layout, File Design, Testing with complete documentation and user interface, with life cycle testing and as an executable package.

4. The group will select a project with the approval of the guide (Staff members assigned) and submit the name of the project with a synopsis of 2 or 3 pages in the month of August in the academic year. A preliminary study report by the group must be submitted and certified at the end of seventh Semester.

5. It is expected that at least one research paper is published by each group with guide.The project report stage-I will contain the details.

Problem definition and requirement specification, acceptance test procedure (ATP).

a) System definition, requirement analysis.

b) System design with UML.

c) Documentation and references.

Documentation will use UML approach with Presentation, Category, Use Case, Class Diagrams, etc