Bharati Vidyapeeth

(Deemed to be University)

Pune, India

College of Engineering, Pune

B.Tech.(Computer Engineering) (2023 Course)

Program Curriculum

As Per NEP 2020 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 ambience 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, infrastructure to meet needs of 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 pursue and excel in the endeavour for creating globally recognised Computer Engineers through quality education.

MISSION OF THE DEPARTMENT

- To impart engineering knowledge and skills confirming to a dynamic curriculum.
- To develop professional, entrepreneurial & research competencies encompassing continuous intellectual growth.
- To produce qualified graduates exhibiting societal and ethical responsibilities in working environment.

PROGRAM EDUCATIONAL OBJECTIVES

The students of B.TECH. (Computer Engineering), after graduating with Bachelor of Technology degree in Computer Engineering, will able to

1. Demonstrate technical and professional competencies by applying Engineering fundamentals, computing principles and technologies.
2. Learn, practice and grow as skilled professionals/entrepreneur/researchers adapting to the evolving computing landscape.
3. Demonstrate professional attitude, ethics, understanding of social context and interpersonal skills leading to a successful career.

PROGRAM SPECIFIC OUTCOMES

1. To design, develop and implement computer programs on hardware towards solving problems.
2. To employ expertise and ethical practise through continuing intellectual growth and adapting to the working environment.

PROGRAM OUTCOMES

a. Apply the knowledge of mathematics, science, engineering fundamentals, and computing for the solution of complex engineering problems.
b. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using computer engineering foundations, principles, and technologies.
c. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
d. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
e. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
f. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
g. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
h. Apply ethical principles while committed to professional responsibilities and norms of the engineering practice.
i. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
j. Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
k. Apply the engineering and management principles to one's work, as a member and leader in a team.
l. Recognise the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

CORELATION BETWEEN GRADUATE ATTRIBUTES AND PROGRAMME OUTCOMES

Graduate Attributes/ Programme Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
Engineering Knowledge	✓											
Problem Analysis		✓										
Design/Development of Solutions			✓									
Conduct Investigations of Complex Problems				✓								
Modern Tool Usage					✓							
The Engineer and Society						✓						
Environment and Sustainability							✓					
Ethics								✓				
Individual and Teamwork									✓			
Communication										✓		
Project Management and Finance											✓	
Life-Long Learning												✓

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

B. STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAMME:

Sr. No.	Category	Credit Distribution
1	Basic Science Courses	16
2	Engineering Science Course	20
3	Core Courses and Lab	106
4	Professional Elective Courses	12
5	Project	12
6	Internship	04
7	Skill Based Courses	12
**8	Value Based Courses	02 (Optional Credit)
9	Humanity/Social	03
10.	Massive Open Online Courses (MOOC)	04 (Add on)
TOTAL		185

- **** Indicates optional credits**

C. COURSE CODE AND DEFINITION

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

Credits Per Semester

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

Minor Courses List: Total Credits: 20

Sr. No.	Semester	Minor-1 (Data Analytics)	Minor-2 (AI and Game Development)	Minor-3 (Cyber Security)	Minor-4 (Advanced Networking)	Credit
01	**III**	Data Acquisition systems	User Interface Design	Information Security	Network Architecture	**5**
02	**IV**	Optimization Methods for Analytics	Game Theory	Network Security	Advanced Routing	**5**
03	**V**	Predictive Analytics	Knowledge Management System	Ethical Hacking and Cyber forensics	Server Administration	**5**
04	**VI**	Big-data Management and Technologies	AI algorithms and Game Development	AI for Cyber Security	Advanced Computer Network and Applications	**5**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (Computer Engineering): Semester –I (2023 COURSE)

Sr. No.	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/ Or	Tut	Total
1.	BSC		Engineering Mathematics- I	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		Probability and Statistics	4	-		60	40	-	-	-	100	4	-	0	4
4.	ESC		Digital Electronics	4	2		60	40	50	-	-	150	4	1	0	5
5.	PCC		Computational Thinking and Programming	4	2		60	40	25	-	-	125	4	1	0	5
6.	HSMC		Universal Human Values	-	2		-	-	50	-	-	50	0	1	0	1
7.	SBC-I		Computer Programming	-	2		-	-	25		25	50	0	1	0	1
8.	ESC		Computer Workshop Technology	-	2	-	-	-	25	-	-	25	-	1	-	1
			Total	**18**	**12**	**1**	**300**	**200**	**225**	**0**	**25**	**750**	**18**	**6**	**1**	**25**

B. Tech. (Computer Engineering): Semester – II (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	BSC		Engineering Mathematics- II	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		Electrical Technology	3	2	-	60	40	25	-	-	125	3	1	0	4
4.	ESC		Problem Solving Paradigms	4	2	-	60	40	25	-	-	125	4	1	0	5
5.	PCC		Data Structures-I	4	2	-	60	40	25	-	-	125	4	1	0	5
6.	HSMC		Communication Skills	-	2	-	-	-	50	-	-	50	0	1	0	1
7.	SBC-II		Object Oriented Programming	-	2	-	-	-	25	-	25	50	0	1	0	1
8.	ESC		Computer Aided Drawing & Design	-	2	-	-	-	25	-	-	25	-	1	-	1
			Total	**17**	**14**	**1**	**300**	**200**	**225**	**0**	**25**	**750**	**17**	**7**	**1**	**25**

B. Tech. (Computer Engineering): Semester – III (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Data Communication	4	-	-	60	40	-	-	-	100	4	0	0	4
2.	PCC		Data Structures -II	4	2	-	60	40	25	25	-	150	4	1	0	5
3.	PCC		Discrete Mathematics	3	2	-	60	40	25	25	-	150	3	1	0	4
4.	PCC		Microprocessor and Microcontroller	3	2	-	60	40	25	-	25	150	3	1	0	4
5.	PCC		System Programming	3	2	-	60	40	25	-	25	150	3	1	0	4
6.	SBC -III		Java Programming	-	2	1	-	-	25	25	-	50	0	1	1	2
			Total	**17**	**10**	1	**300**	**200**	**125**	**75**	**50**	**750**	**17**	**5**	**1**	**23**
7.	*MOOC/Swayam NPTEL		MOOC-I	-	-	-	-	-	-	-	-	-	-	-	-	**2**
8.	**VAC		VAC- I	-	2	-	-	-	-	-	-	0	0	1	0	1

*** 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 marksheet. The student should clear the subject up to 7th Sem of his/her coursework.)**

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

B. Tech. (Computer Engineering): Semester – IV (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Software Engineering	3	-	-	60	40	-	-	-	100	3	0	0	3
2.	PCC		Operating System	3	2	-	60	40	25	-	25	150	3	1	0	4
3.	PCC		Database Management System	3	2	-	60	40	25	25	-	150	3	1	0	4
4.	PCC		Computer Network	4	2	-	60	40	25	-	25	150	4	1	0	5
5.	PCC		Web Programming	3	2	-	60	40	25	25	-	150	3	1	0	4
6.	SBC-IV		Basic Python	-	2	1	-	-	25	25	-	50	0	1	1	2
			Total	**16**	**10**	1	**300**	**200**	**125**	**75**	**50**	**750**	**16**	**5**	**1**	**22**
7.	*MOOC/Swayam NPTEL		**MOOC-II**	-	-	-	-	-	-	-	-	-	-	-	-	**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 reflect in the marksheet. The student should clear the subject up to 7th Sem of his/her course.)**

B. Tech. (Computer Engineering): Semester – V (2023 COURSE)

Sr. No.	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Theory of Computation	4	-	-	60	40	-	-	-	100	4	-	0	4
2.	PCC		Design and Analysis of Algorithm	4	2	-	60	40	25	25	-	150	4	1	0	5
3.	PCC		Data Warehousing and Mining	3	2	-	60	40	25	-	25	150	3	1	0	4
4.	PCC		Computer Graphics& Multimedia	3	2	-	60	40	25	-	25	150	3	1	0	4
5.	PCC		Computer Organization	3	2	-	60	40	25	-	-	125	3	1	0	4
6.	SBC-V		Advanced Python	-	2	1	-	-	25	25	-	50	0	1	1	2
			Total	**17**	**10**	1	**300**	**200**	**150**	**50**	**50**	**750**	**17**	**5**	1	**23**
7.	** MAC		Environmental Studies	-	-	-	-	-	-	-	-	-	-	-	-	-

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

B. Tech. (Computer Engineering): Semester – VI (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Internet of Things	3	-	-	60	40	-	-	-	100	3	0	0	3
2.	PCC		Software Testing	3	2	-	60	40	25	25	-	150	3	1	0	4
3.	PCC		Mobile Architecture and Programming	3	2	-	60	40	25	25	-	150	3	1	0	4
4.	PEC		Professional Elective I	3	2	-	60	40	25	-	25	150	3	1	0	4
5.	PCC		Compiler Design	3	2	-	60	40	50	-	-	150	3	1	0	4
6.	HSMC		**Professional Skills**	-	2	-	-	-	25	-	-	25	0	1	0	1
7.	SBC-VI		Linux/Shell Scripting	-	2	1	-	-	25	25	-	50	0	1	1	2
			Total	**15**	**12**	1	**300**	**200**	**150**	**50**	**50**	**750**	**15**	**6**	**1**	**22**
8.	**VAC		VAC- II	-	2	-	-	-		-	-	0	0	1	0	1

Professional Elective I	I Software Architecture	II Real Time Operating System	III Natural Language Processing

B. Tech. (Computer Engineering): Semester – VII (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Big Data Analytics	3	-	-	60	40	-	-	-	100	3	0	-	3
2.	PCC		Artificial Intelligence and Machine Learning	3	2	-	60	40	25	-	25	150	3	1	-	4
3.	PCC		Image Processing	3	2	-	60	40	25	25	-	150	3	1	-	4
4.	PEC		Professional Elective II	3	2	-	60	40	25	-	25	150	3	1	-	4
5.	PROJ		Project Stage -I	-	2	-	-	-	100	-	50	150	-	4	-	4
6.	*SBC		Internship	-	2	-	-	-	25	-	25	50	-	4	-	4
			Total	**12**	**10**	**-**	**240**	**160**	**200**	**25**	**125**	**750**	**12**	**11**	**0**	**23**

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

Professional Elective II	I Virtualisation and Cloud Computing	II Agile Technologies	III Cryptography and Network Security

B. Tech. (Computer Engineering): Semester – VIII (2023 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	PCC		Deep Learning	3	2	-	60	40	25	25	-	150	3	1	-	4
2.	PCC		Blockchain	3	2	-	60	40	25	-	25	150	3	1	-	4
3.	PEC		Professional Elective III	3	2	-	60	40	25	-	25	150	3	1	-	4
4.	PROJ		Project Stage-II	-	4	-	-	-	150	-	100	250	0	8	-	8
5.	SBC-VII		Advance Software Tools	-	2	-	-	-	25	25	-	50	0	1	1	2
			Total	**9**	**12**	**1**	**180**	**120**	**250**	**50**	**150**	**750**	**9**	**12**	**1**	**22**

Professional Elective III	I Data Visualisation	II Information Retrieval	III Augmented Reality–Virtual Reality

B. Tech (Computer Engineering)
Semester- I

Engineering Mathematics-I (Common for all Branches)

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory: -03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03
Practical: - 00 Hours/ Week	Internal Assessment	40 Marks	Tutorial: 01 Practical: 00
Tutorial: -01 Hours/ Week	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	100 Marks	04

Course Prerequisites: - The students should have knowledge of
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 applications in engineering.
2. Various techniques in Calculus, Explanation of functions and Infinite series.
3. Partial differentiation, maxima, minima, and its applications in engineering.

Course Outcomes: - After completion of the course 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 in finite 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.

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

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

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

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

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

Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem.
Expansion of Functions: Taylor's Series and Maclaurin's Series

Unit IV: Differential Calculus: **(06 Hrs)**

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

Unit V: Partial Differentiation and Applications: (06 Hrs)

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables, Errors and Approximations.

Unit VI: Jacobian: (06 Hrs)

Jacobians and their applications, Chain Rule, Functional Dependence.

Maxima and Minima: Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers

PBL: Project Base Learning (Topics)

1 Echelon form
2 Normal form
3 Linear and orthogonal transformation
4 Eigenvalues and eigenvectors
5 Argand diagram
6 De Moivre's theorem
7 Hyperbolic and logarithmic functions
8 Leibnitz theorem
9 Taylor's theorem
10 L Hospital rule
11 Tests for convergence
12 Euler theorem for homogeneous functions
13 Total derivative
14 Maxima and minima for two variable functions
15 Lagrange undetermined multiplier

Textbooks

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

Reference Books

1.HigherEngineeringMathematics by B.S. Grewal (Khanna Publication, Delhi),42nd Edition,2012

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

3. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition,1999,Reprint2010

4. Advanced EngineeringMathematics,7e, by Peter V. O'Neil (Thomson Learning), Edition 2007

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

Unit Test –	**Units**
Unit Test – I	**I,II,III**
Unit Test –II	**IV,V,VI**

Engineering Physics (Common for all Branches)

Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 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	00 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:- After completion of the course students will be able to:

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

Unit I: Modern Physics **(6 Hrs)**

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focusing, Electron microscopy, interaction of electron beam with the material, Wavelength and resolution, transmission electron microscope (TEM), scanning electron microscope (SEM), Separation of isotopes by Bainbridge mass spectrograph, cathode ray tube (CRT), CRT in cathode ray oscilloscope (CRO).

Unit II. 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 III: 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 dependent 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 IV: Optics – I (Interference and Diffraction) (6 Hrs)

INTERFERENCE: Interference due to thin film of uniform thickness and nonuniform thickness, 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 V: Optics – II (Polarisation and Lasers) (6 Hrs)

POLARISATION: Introduction, Double refraction and Huygens'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 VI. 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.

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

PBL: Project Based Learning (topics)

Sr. no	Topic
1.	Tesla Coil
2.	Thin film interference in soap film-formation of colors.
3.	LiFi- wireless data transfer system using light.
4.	Need of medium for propagation of sound wave.
5.	Possible effects of electromagnetic fields (emf) on human health.
6.	Design and simulation of automatic solar powered time regulated water pumping.
7.	Solar technology: an alternative source of energy for national development.
8.	Measurement and effect of environmental noise in the college
9.	Electronic eye (Laser Security) as auto-switch/security system.
10.	Electric power generation by road.
11.	Design and construction of distance measuring instrument using LASER
12.	Design and construction of remote-control devices – electronic bell, Fan etc.

13. Absorption coefficient of sound absorbing materials.

14. Velocity determination of O-ray and E-ray in double refracting materials.

15. Velocity determination of O-ray and E-ray in double refracting materials.

16. The design and construction of the hearing aid device.

17. Study of Quantum confinement effect.

18. Wind turbines - a source of electricity.

19. Measurement of gravitational constant 'g'.

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/silver/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.
16. Determination of Plank's constant.

Textbooks

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)

Unit Test –

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

Probability and Statistics (B.Tech.(Computer) Sem-I)

Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory: - 04 Hours/ Week	End Semester Examination	60 Marks	Theory: 04
Practical: - 00 Hours/ Week	Internal Assessment	40 Marks	Tutorial: 00 Practical: 00
Tutorial: - 00 Hours/ Week	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	100 Marks	04

Course Prerequisites: -

The students should have knowledge of
Basic of statistics and probability.

Course Objective

The course introduces fundamental concepts of linear statistical models and probability theory.

Course Outcomes: -

On completion of the course, the students will be able 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 ANOVA technique.

Unit I: Probability Theory: (8 Hrs)

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: Random Variable and Mathematical Expectation. (8Hrs)

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 : Theoretical Probability Distributions (8hrs)

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: Correlation (8 Hrs)

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: Linear Regression Analysis: (8 Hrs)

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. Multiple Regression and AVOVA **(8Hrs)**

Multiple regression & multiple correlation, Analysis of variance (one way, two ways with as well as without interaction).

PBL: Project Based Learning (topics)

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

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 co.
3. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines
4. Kishor S. Trivedi, "Probability, Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, Wiley India Pvt. Ltd.

Reference Books

1. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, 3 rd Edition, Wiley Publication
2. I.R. Miller, J.E. Freund, and R. Johnson.Fun “Probability and Statistics for Engineers” (4th Edition) Applied Regression Analysis - N. Draper & H. Smith

Digital Electronics

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
					Credits
Lecture:	04 Hours/Week	End Semester Examination:60 Marks		Theory	04
Practical:	02 Hours/Week	Continuous Assessment: 40 Marks		Practical:	01
Tutorials:	0Hours/Week				
		Term Work: 50 Marks			
		Total	150	Total	05

Course Overview: The Course introduces the basic concepts required to understand digital electronics circuits. The course covers the basic knowledge of digital logic levels and performs the analysis and design of various digital electronic circuits. This course will lay the foundation for further studies in areas such as microprocessor, communication, IOT etc.

Prerequisite: Physics, Mathematics

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. Design and synthesize a system with sequential circuit elements.
5. Understand characteristics and structure of Programmable Logic Devices and Memory.
6. To implement combinational logic circuits using VHDL.

Unit I Number systems and logic gates **08 Hours**

Number system: Binary system, Octal system, Hexadecimal system, Number system conversions, 1's complement and 2's complement representation, Binary and BCD arithmetic. Logic gates: AND, OR, NOT, Exclusive-OR, Universal gates: NAND, NOR gates

Unit II Logic Design Minimization **08 Hours**

Boolean Algebra, De Morgan's theorem, Standard representation of logic functions, Sum of Product (SOP) and 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 Combinational Circuits **08 Hours**

Half Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder (IC 7483), BCD adder, Code converters, Multiplexers, Demultiplexers, Decoder (IC 74138) and their use in combinational logic design, Priority Encoder, Digital Comparators.

Unit IV Sequential Circuits **08 Hours**

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 Memory and PLD **08 Hours**

Semiconductor memories: memory organization, memory expansion, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM,

SRAM, DRAM. Programmable logic devices: Architecture of PLA, designing combinational circuits using PLDs.

Unit VI Introduction to VHDL **08 Hours**

Introduction to VHDL, Library, Entity, Architecture, Modelling styles, Concurrent and sequential statements, Data types, Combinational logic implementation using VHDL.

Textbooks

M. Morris Mano and M. D. Ciletti, Digital Design, Pearson Education.
RP Jain, Modern Digital Electronics, Tata McGraw Hill Publication.
F.J. Hill and G.L. Peterson, Switching Theory and Logic Design, John Wiley

Reference Books

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

List of Assignments

1. Verify truth tables of logic gates. (AND, OR XOR, NOT, NAND, NOR).
2. Implement NAND and NOR as Universal gates.
3. Design (truth table, K-map) and implement half and full adder/ subtractor.
4. Design and implement 4-bit BCD to Excess-3 Code converters.
5. Design and implement 4-bit BCD to Gray Code converters.
6. Implement of logic functions using multiplexer IC 74151
7. Implement logic functions using 3:8 decoder IC 74138.
8. Verify truth tables of different types of flip flops.
9. Design and implement 3-bit Asynchronous Up Counter using JK flip-flop.
10. Design combinational logic circuit using VHDL.

Syllabus for Unit Tests:

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

Computational Thinking and Programming

TEACHING SCHEME		EXAMINATION SCHEME	CREDIT SCHEME	
				Credits
Lecture:	04 Hours/Week	End Semester Examination: - 60 Marks	Theory	04
Practical:	02 Hours/Week	Internal Assessment: - 40 Marks		
Tutorials:	00 Hours/Week	Practical: -00 Marks	Practical:	01
		Oral: - 00 Marks		-
		Term Work 25 Marks		-
		Total: 125	**Total: 05**	

Course Overview

The aim of this course is to make students to think in a computational manner to a point where they can derive simple algorithms and code the programs to solve some basic problems in their domain of studies.

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

1. Formulate a problem and express its solution in such a way that a computer can effectively carry it out.
2. Apply the Computational Thinking (CT) concepts on case studies/problem-based scenarios through hands-on practice of the CT processes.
3. Write algorithm and pseudo code for the identified strategy.
4. Use Abstraction and Modelling.
5. Solve given problems through scratch based graphical programming tool.
6. Demonstrate logical and algorithmic thinking.

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

1. Formulate a problem and express its solution in such a way that a computer can effectively carry it out.
2. Apply the Computational Thinking (CT) concepts on case studies/problem-based scenarios through hands-on practice of the CT processes.
3. Write algorithm and pseudo code for the identified strategy.
4. Use Abstraction and Modelling.
5. Solve given problems through scratch based graphical programming tool.
6. Demonstrate logical and algorithmic thinking.

Unit I Introduction **08 Hours**

Basics: Introduction to Computational Thinking- Data Logic - History of Computational Thinking, Applications of Computational Thinking. Problem Solving Concepts: Formal Problem Definition, Challenges in Problem Solving, Problem solving with Computers, Framework for Problem Solving. Introduction to Problem solving tools: Flowcharts, algorithm, pseudo code, Data structures.

Unit II Logical and Algorithmic Thinking **08 Hours**

Inductive Vs Deductive arguments, Logic, Boolean Logic, Symbolic Logic, Logical operators and their symbols, Propositional Logic Algorithmic Thinking: Algorithms, Intuition vs precision, defining algorithms, Algorithm constructs, Controlling algorithm execution, Complex conditionals.

Unit III Phases of Computational Thinking **08 Hours**

About Computational Thinking, Data Representation and Abstraction - Problem formulation, Devising a Solution, Decomposition, Pattern recognition, Generalisation, Evaluation.

Unit IV Overview of Programming Concepts **08 Hours**

Scratch Programming – Working of Scratch, Scratch tool, Motions and Drawing, Looks and Sound, Procedures, Variables, Making decisions, Loops, String Processing, Lists. Introduction to higher level programming languages like C, Python, C++ and its constructs.

Unit V Limits of Computation **08 Hours**

Capacity Measurement in Computers, Estimate of Physical limitations, Benchmarks, Counting the performance, impractical algorithms, Metaphysical limitations, Impossible algorithms.

Unit VI Computational Thinking in Software Development **08 Hours**

Effective Building Blocks: Basic Algorithms Constructs, Program State, Code Organization, Using Abstractions and Patterns, Effective Modelling: Objectives, Entities, Relationship, Processes, Usage and General Advice. Testing and Evaluating Programs, Anticipating Bugs, Syntax vs semantic errors, Defensive programming, Verification and validation, Testing the Parts, Testing the Whole, Debugging Case Study: Home Automation System

Textbooks

1. Computational Thinking, By Peter J. Denning and Matti Tedre, The MIT Press Essential Knowledge series .
2. Computational Thinking and Coding for Every Student, Jane Krauss, Kiki Prottsman by Corwin Publishers
3. Computational Thinking for the modern problem solver, David D riley, Kenny A Hunt, CRC Press, 2014.
4. Computational thinking a beginner's guide to problem solving and programming, Karl Beecher, BCS Learning & Development, 2017.

Reference Books

1. How to Solve it by Computer by R. G. Dromey, 1e, Pearson Education.
2. Learn to program with Scratch, Majed Marji, no starch press, 2014

List of Assignments

1. The Following problems can be solved using SCRATCH Tool: Create a function block that calculates the force needed to accelerate 2,000 kg car 3 m/s2
2. Write different procedures to draw each letter of your name. Name each procedure for the letter that it draws. Then write a script that calls these procedures so you can draw your name on the Stage
3. Write a program that prompts the user to enter five test scores between 1 and 10. The program will then count the number of scores that are greater than 7
4. The Pythagorean theorem states that if a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse (the longest side), then a2 + b2 = c2 . Write a program that gets three numbers from the user and determines whether they could represent the sides of a right triangle.
5. Create two lists for storing the items sold in a grocery store and their corresponding prices. Write

a program that asks the user to enter an item's name and then displays that item's price, if it is found in the list.
6. Write a program that prompts the user to enter the highest and lowest temperatures for the 12 months of a year. Store the input values in two lists.

List of Laboratory Exercises

1. WAP to SWAP (interchange) 2 numbers without using third variable
2. WAP to find the sum and average of values appearing at the positions divisible by 3 in the given sequence of n values
3. WAP that receives any year from the keyboard and uses a function to determine whether the year is a leap year or not.
4. WAP that uses a function that converts a lowercase character to its uppercase
5. WAP to read n numbers and count even and odd numbers.
6. WAP that uses a recursive function to convert given decimal number into its binary equivalent.
7. WAP to use the suitable function to obtain the prime factors recursively.
8. WAP that uses a function that prints the nth element of Fibonacci series using recursion method.
9. WAP that uses a function to calculate the sum of n odd integers.
10. WAP that uses a function power that calculates the power of a given number.

Project Based Learning

1. Identify any patterns in the problem.
2. Build Model for various Mathematical Formulas
3. Study the friendship link of any social networking site.
4. Using primary data source study, the voting pattens of our country.
5. Analyse how algorithms effect social media feeds
6. Visualize and Interpret performance of Athlete for any Sport
7. Modularize a given problem into sub problems.
8. Analyse the next moves of a player for Game of Chess
9. Devise a strategy to compute Result of a particular Class 10. Library Management System

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 fulfilment 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

Textbook

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)

Skill Based Course –I : Computer Programming

TEACHING SCHEME		EXAMINATION SCHEME	CREDIT SCHEME	
				Credits
Lecture:	00 Hours/Week	End Semester Examination: - -	Theory	-
Practical:	2 Hours/Week	Internal Assessment:- Marks		
			Practical:	01
		Term Work: 25 Marks		
		Oral: 25 Marks		
		Total: 50 Marks	Total	01

Course Overview

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will 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.

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

1. Demonstrate the knowledge of C programming Concepts
2. Develop C programs
3. Define Data types and use them in data processing programs.
4. Trace the execution of programs written in C language
5. Write functions and implement.
6. Analyse and interpret the concept of declarations, initialization, operations on pointers and their usage.

Unit I Introduction to C programming **06 Hours**

Introduction to program Planning tools- algorithm, flowcharts, and pseudo codes. Features of C, structure of C program, concept of variables, data types in c, Declaration and Initialization of variables, Program Statements, operator's and Expressions, assignment, arithmetic, relational, logical, increment and decrement, bitwise, precedence of operators, conditional operator, comma operator, size of operator, Expression Evaluation –precedence and Associativity, type conversions.

Unit II Input output and Control Statements **06 Hours**

Introduction to basic screen and I/O in c, Non-formatted Input and Output function printf (), scanf (), if-else, nested if-else, cascaded if-else and switch statement. C Conditional control structures: for, while do-while Unconditional control structures: break, continue, goto statement, Nested loops

Unit III Arrays and strings **06 Hours**

Introduction to Array and Its Types, Declaration and initialization of one-dimensional Array, two-dimensional array, and Multi-Dimensional Array, accessing array elements, Character Array/String, Character - Handling Library Functions, Standard Input/Output Library Functions for string (Manipulation String Array).

Unit IV Functions and User Defined Data Types and Variables **06 Hours**

Introduction to function, function prototype declaration, function definition, function Calling, call by value mechanism, passing array to function, Scope and Extent, inline function, Recursion.

Introduction to User Defined Data Types and Variables, Defining and Using a Structure: accessing members, initializing of structure, nesting of structure, array of structure, array within structure, Union, Structure Vs.Union,Enumeration types

Unit V Pointers in C **06 Hours**

Introduction to Pointer, understanding Memory addresses, & operator, Pointer Terminology: Declaration and Initialization, Indirection operation and Dereferencing, void and null pointer, Arrays of pointer, pointer arithmetic, pointer to function, Dynamic Memory allocation.

Unit VI File Handling **06 Hours**

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. Brain W.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. C Hello World Program
2. C Program to Check Whether a Number is Prime or Not
3. C Program to Swap Two Numbers without using third variable and with using third variable
4. C Program to Find the Size of int, float, double, and char

5. C Program to Add Two Complex Numbers and integer number.
6. C Program to Print Prime Numbers From 1 to N
7. C Program to Find Simple Interest and Find Compound Interest
8. C Program for Area and Perimeter Of Rectangle
9. C Program to Check Whether a Number is Positive, Negative, or Zero, Even or Odd, Reverse a Number, given number is Prime or Not.
10. C Program to Check Whether a Character is Vowel or Consonant.
11. C Program to Calculate Sum of Natural Numbers
12. C Program to Find Factorial of a Number , Print Fibonacci Series
13. C Program to Make a Simple Calculator
14. C Program to Print Simple Pyramid Pattern
15. C Program to Display Prime Numbers Between Two Intervals Using Functions
16. C Program to Calculate the Factorial of a Number Using Recursion
17. C Program to Print a 2D Array
18. C Program to Find the Largest Element in an Array
19. C Program to Find the Maximum and Minimum in an Array
20. C Program to Calculate the Average of All the Elements Present in an Array
21. C Program to Remove Duplicate Elements from a Sorted Array
22. C Program to Merge Two Arrays
23. C Program to Remove All Occurrences of an Element in an Array
24. C Program to Add Two Matrices,Multiply Two Matrices
25. C Program to Compare Two Strings
26. C Program to check if the string is palindrome or not
27. C Program to Reverse an Array or String.
28. C program to Reverse a String Using Recursion
29. C program to perform all string operation with inbuilt string function
30. How to Return a Pointer from a Function in C
31. How to Declare a Two-Dimensional Array of Pointers in C?
32. C Program to Store Student Records as Structures and Sort them by Age or ID
33. C Program to Read/Write Structure to a File
34. C Program to rename a file.

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 Engineering)
Semester- II

Engineering Mathematics-II (Common for all Branches)

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory: - 03 Hours/ Week	End Semester Examination	60Marks	Theory: 03
Practical: - 00 Hours/ Week	Internal Assessment	40Marks	Tutorial: 01 Practical: 00
Tutorial: - 01 Hours/ Week	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	100 Marks	04

Course Prerequisites: - The students should have knowledge of differential calculus

Course Objective

On completion of the course –

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

Course Outcomes: -

After completion of the course students will be able to

1. Solve differential equations by different methods.
2. Apply different laws to solve Simple Harmonic Motion, One–Dimensional Conduction of Heat.
3. Solve integral calculus and Fourier series.
4. Solve integral calculus with error functions.
5. Determine position in solid geometry.
6. Solve multiple integration problems.

Unit I: Differential Equation of First Order and First Degree: (06 Hrs)

Definition, Order and Degree of DE, Formation of DE, 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

Unit III: Fourier Series: (06 Hrs)

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis

Unit IV: Integral Calculus: (06 Hrs)

Reduction formulae, Beta and Gamma functions, Differentiation under the Integral Sign, Error functions

Unit V. Solid Geometry: **(06 Hrs)**

Cartesian, Spherical Polar and Cylindrical Coordinate Systems, Sphere, Cone and Cylinder.

Unit VI: Multiple Integrals and their Application: **(06 Hrs)**

Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values

PBL: Project Base Learning (Topics)

1 Formation of differential equation
2 Exact differential Equation
3 Linear differential equation
4 Newton's law of cooling
5 Newton's second law of motion
6 Fourier's law
7 Kirchhoff's voltage law
8 Fourier series
9 Harmonic analysis
10 Gamma and beta function
11 Reduction formulae
12 Locating position in three-dimensional space
13 Multiple integrals applications
14 Error function
15 Differentiation under integral sign

Textbooks

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

Reference Books

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

2. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill), Edition, 2008
3. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999, Reprint 2010
4. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning), Edition 2007
5. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd, Edition, 2002

Unit Test –

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

Engineering Chemistry (Common for all Branches)

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

Course Prerequisites: - The student should have
Basic knowledge of chemistry.
Basic knowledge of electrochemistry and chemistry of materials
Introductory knowledge of polymers.

Course Objective: 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 the importance of fuels and apply it for various engineering applications.
3. Explain the drawbacks of corrosion and different methods of elimination of corrosion.
4. Apply the concept 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.

Unit I: Water Technology & Green Chemistry (6 Hrs)

Introduction, sources and impurities in water, Hardness of water, types, and 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 II: Electrochemical energy and solar energy (6Hrs)

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 III: Corrosion technology and it's control (6hrs)

Introduction, Electrochemical theory of corrosion, Types of corrosion, Differential metal and differential aeration (pitting and water line) caustic embrittlement. Factors affecting the rate of corrosion, Corrosion control: Cathodic protection, sacrificial anode and impressed current methods, Metal coatings, Galvanization and tinning, Anodizing, Anodizing of aluminium, 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

Unit IV: 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 V: Nano materials (6Hrs)

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 VI: Instrumental methods of analysis (6Hrs)

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

PBL: Project Base Learning (Topics)

Sr. No	**Topics**
1	Comparison of Hardness, Alkalinity, Dissolved oxygen, Chlorides and COD of water from two different sources
2	Removal of industrial pollutants from wastewater by adsorption on activated charcoal
3	Preparation of biofuels from two natural sources
4	Two synthetic approaches for the production of H2 as a clean fuel
5	Prevention of corrosion by metal coupling

6 Construction of bio sensor in engineering applications

7 Design and simulation of automatic solar - photo voltaicpanels as renewable energysource.

8 Synthesis of Conjugated Polymers and Molecules Using Sugar Reagents and Solventless Reactions. OR Composite materials and it properties, applications and types

9 To study mechanism of lubrication

10 Electroplating- study on how different metals can be used and the practical applications

11 Prepare Ag- nanoparticles by using sol-gel method

12 Preparation of Ag nanoparticle from two natural sources

13 With the help of green chemistry principles, prepare any organic dye by using Traditional and Green pathway.

14 Prepare epoxy resins by using suitable metho

15 Measurement and effect of waste disposal from laboratories in the college

Practical (Any Eight of the Following)

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.

Textbooks

1. Engineering Chemistry, Jain P.C & Jain Monica,Dhanpat Rai & Sons, Delhi (1992)
2. Engineering Chemistry, O. G. Palanna, Tata McGraw-Hill Publication, New Delhi
3. A textbook of Engineering Chemistry, S. S. Dara, McGraw-Hill Publication, New Delhi

Reference Books

1. Engineering Chemistry- Fundamentals and applications, Shikha Agarwal,Cambridge Publishers (2015)

2. Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, (2008)
3. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler,Stanley R. Crouch,Cengage learning (2017)
4. Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie, Academic & Professional(1994)
5. Integrated design and operation of water treatment facilities, Kawamura, Susumu. John Wiley & Sons(2000)

Unit Test –

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

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: 25 Marks	
	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 – I Introduction **(06 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 – II DC Circuits **(06 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 **(06 Hrs)**

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 **(06 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 – V Electro-Mechanics **(06 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 **(06 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**

PROBLEM SOLVING PARADIGMS

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
					Credits
Lecture:	04 Hours/Week	End Semester Examination:60Marks		Theory	04
Practical:	02 Hours/Week	Continuous Assessment: 40 Marks			
Tutorials:	00 Hours/Week			Practical :	01
		Term Work:	25 Marks		
		Total	125 Marks	Total	05

Course Overview: The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will 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 Computer system

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

1. Describe the steps in problem-solving and write a pseudocode for a given problem.
2. Demonstrate the knowledge of different programming paradigms.
3. Demonstrate the concepts of Object-Oriented Paradigm
4. Develop small size programs using different programming language and Paradigm
5. Compare the strengths and weakness of different programming language specific to application context
6. Recognize the concepts of same kind from different programming languages and paradigms

Unit I Introduction to Problem Solving 08 Hours

Introduction to Computer Problem Solving: The problem-solving Aspect, Top-Down Design, implementation of Algorithms, Program Verification, The Efficiency of Algorithms, The Analysis of Algorithms, Fundamental Algorithms: General problem solving strategies: Introduction to program Planning tools- algorithm, flowcharts, and pseudo codes. Introduction to Programming Logic.

Unit II Programming Paradigm 08 Hours

Overview of Programming Paradigm: Basic elements of programming languages, compiled vs. interpreted, syntax, semantics, data types, Imperative languages and non-imperative, Scripting languages, Data-oriented languages, Object-oriented languages, Event-driven Programming

Unit III Functional Programming 08 Hours

Functional Programming: Definition of a function: domain and range, total and partial functions, strict functions, Recursion, Referential transparency

Logic Programming: Basic constructs, Facts, rules, queries, processing, goals, predicates, variables, existential queries, conjunctive queries, Definition, and semantics of a logic program. Recursive programming: Computational model of logic programming

Unit-IV Object Oriented Programming 08 Hours

Object Oriented Programming: Basic constructs, Facts, rules, queries, processing, goals, predicates, variables, existential queries, conjunctive queries, Definition, and semantics of a logic program. Recursive programming: Computational model of logic programming

Unit-V Overview of Programming Languages 08 Hours

Overview of Programming Languages: Ruby: basic concepts, interpreter, strings, control structures, conditionals, loops, (duck) typing, arrays, hashes, symbols. Prolog: structures, matching structures, equality, comparison operators, arithmetic's, lists, splitting lists, enumerating lists

Unit-VI Advanced Programming 08 Hours

Advanced Programming: Concurrent programming, serial vs. parallel programming, process communication, basic concepts, data types, atoms, variables, pattern matching, lists, tuples- Database Programming, Internet programming design principles, windows programming.

Textbooks

1. Seven Languages in Seven Weeks, Bruce A. Tate, Pragmatic Bookshelf
2. Programming Languages: Principles and Paradigms, Maurizio Gabrielli, Simone Martini, Springer.
3.Programming Languages - Principles and Paradigms, Allen B. Tucker, Robert E. Noonan: (2nd ed.) McGraw-Hill.
4. How to Solve it by Computer by R. G. Dromey, 1e, Pearson Education.Clark R. G., Comparative Programming Languages, Addison-Wesley (3rd Ed.
5. Mitchell, J. C. Concepts in Programming Languages, Cambridge University Press.
6.Sebesta, R. W., Concepts of Programming Languages, Global Edition, Addison-Wesley (11th Ed.).
7.Programming Languages: Concepts and Constructs; 2nd Edition, Ravi Sethi, Pearson Education Asia.

Reference Books

1. Programming Language Principles and Practice by KC Louden
2. Language manuals and on-line resources for programming languages, tools, and projects.

List of Laboratory Experiments

1. Write a Simple Program (as given by course coordinator) in Ruby
2. Write a simple Program (as given by course coordinator) in Prolog
3. Write a program to Implement Concept of Class and Objects.
4. Write a Program to Implement Concept of Method Overloading and Method Overriding
5. Write a program to implement Concept of Inheritance.
6. Write a program to implement Concept of Interface.

7. Write a program to implement Concept of Recursive Function.
8. Study of Database Programming Language approach.

Project Based Learning - Provisional List of Projects

Use the best programming paradigm for the following:

1. Operations on Matrix
2. Recursion
3. Referential transparency
4. The countdown problem
5. tic-tac-toe
6. Lazy evaluation strategy
7. Assume that you have a list of temperature readings from several cities in the world. Some of them are in Celsius and some in Fahrenheit. First let us convert them all to Celsius, then let us print the data neatly.
8. Implement a better password protection scheme: In the program {User, Password} pairs are sent in plain text over the net. Implement a scheme where the password is never stored, instead store the MD5 checksum of the password and transmit this over the net.
9. All users have the same rights: Implement a scheme whereby different users are restricted to which directories they may access.
10. Files are sent as atomic actions: Files are read, transmitted, and written as atomic actions. This may not work if the files become very large. Implement a scheme for sending the files in smaller chunks. Implement a scheme whereby an FTP transfer can be aborted and restarted in the case where we transfer very large files.

Syllabus for Unit Tests:

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

Data Structures-I

TEACHING SCHEME		EXAMINATION SCHEME	CREDIT SCHEME	
				Credits
Lecture:	04 Hours/Week	End Semester Examination 60 Marks	Theory	04
Practical:	02 Hours/Week	Continuous Assessment: 40 Marks		
Tutorials:	00 Hours/Week	Practical: - 00 Marks	Practical:	01
		Oral: - 00 Marks		
		Term Work :25 Marks		
		Total Marks: 125	Total	05

Course Overview

The course focuses on enabling students to understand how data is stored in computer programs using data structures and facilitate them to use and build fundamental data structures.

Prerequisite:

Programming Basics

Course Outcomes:

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

1. Compare and contrast the interfaces and internal representation of several linear abstract, data types.
2. Solve given problems using array.
3. Implement Stacks in a high-level programming language.
4. Use and Implement Queues in a high-level programming language.
5. Use and Implement lists in a high-level programming language.
6. Demonstrate the ability to analyse, design, apply and use data structures and algorithms. to solve engineering problems.

Unit I Introduction to Data structures & Arrays **08 Hours**

Need of Data structure, Classification of Data Structures, Static Data Organization, Operations on Data Structures, Abstract data Types (ADT).
Arrays: Introduction, Array Operations, representation of Arrays in Memory, Array with Functions, One- & Two-dimensional array in function, Implementation of One- & Two-Dimensional Arrays in Memory.
Applications: string handling, polynomial equation solving, sparse matrix multiplication, tic-tac-toe, and data visualization.

Unit II Stacks **08 Hours**

Stack Definition and Structure, Operations on Stacks – create stack, Push stack, Pop stack, Stack top, Empty Stack, stack count, Destroy Stack, Array and Linked Representation, Types of Notations – Prefix, Infix and Postfix, Applications of Stack: Reversing Data, Converts Decimal to Binary, Parsing, Postponement, expression Conversion, and evaluation.

Unit III Queue **08 Hours**

Queue: Introduction, Definition, ADT for queue, 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.

Unit IV Linear Lists **08 Hours**

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.

Unit V Linked Stacks and Linked Queues **08 Hours**

Introduction, Operations on Linked stacks and Linked Queues, Dynamic Memory management and Linked Stacks, Implementation of Linked Representations.

Unit VI Overview of Real time Applications of Linear Data Structures **08 Hours**

Stacks – Balancing of Symbols, Infix to Postfix, Evaluation of Postfix expression, Implementing Function Calls, Finding of Spans, undo sequence in text editor, Matching Tags in HTML and XML. Linked List – Implement Stack using Linked List. Queues – Scheduling Jobs, Simulation of real-world queues such as ticket counter or first come first served scenarios, Asynchronous Data Transfer.

Textbooks

1.Brassard & Bratley, ―Fundamentals of Algorithmics‖, Prentice Hall India/Pearson Education, ISBN 13-9788120311312.
2.Horowitz and Sahani, ―Fundamentals of Data Structures in C++‖, University Press, ISBN 10: 0716782928 ISBN 13: 9780716782926.
3.Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in C++‖, Wiley publication, ISBN-978-81-265-1260-7
4.Data Structure and Algorithmic Thinking with Python, CareerMonk Publications, Narasimha Karumanchi, 2016

Reference Books

1. Richard F Gilberg& Behrouz A Forouzan, Data Structures (A Pseudocode Approach with C), second edition, Cengage Learning, 2004
2. PAI, Data Structures, Tata McGraw-Hill Education, 2008
3. Mayank Patel, Data Structure and Algorithm With C, Edu creation Publishing, 2018
4. Thomas H. Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 2001.

List of Assignments:

1. Study assignment on programming IDE Tools.
2. Write a program to implement one dimensional array.
3.Write a program to design tic-tac-toe game
4. Write a program to perform basic operation on stack.

5. Write a program to convert and evaluate polish notations.
6. Write a program to perform basic operation on stack.
7. Write a program to implement Priority queue & Double Ended Queue.
8. Write a program to perform basic operation on circular queue.
9. Write a program to implement hashing technique.
10. Write a program to implement searching and sorting techniques.

Project Based Learning:

1. Expression Evaluation
2. Traffic Management System
3. Library Management System
4. Employee Record System
5. Dictionary
6.Calendar Application
7. Medical Store Management System
8. Cricket Score Sheet
9. Bank Management System
10. Telephone directory

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

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 aspect 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

Skill Based Course –II Object Oriented Programming

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
					Credits
Practical:	2 Hours/Week	Oral	25 Marks	Oral:	1
		Term Work	25 Marks		
		Total	50 Marks	Total	1

Course Objective:
The course focuses on making students learn and practice the use of Object-Oriented programming concepts and to solve the problems.

Prerequisite:
Programming Principles and Paradigms, "C" programming language

Course Outcomes:
On completion of the course, students will have the ability to:
1. Understand basic concepts of Object-Oriented Programming
2. Demonstrate the use of class, objects, and methods to solve real world problems.
3. Develop applications with constructor, destructors, and string handling.
4. Explore the concept of inheritance and polymorphism with the help of real time applications.
5. Develop OOP applications using file Handling and Exception handling.
6. Design the graphical user interface by using AWT.

Unit I: Introduction to Object Oriented Programming 04 Hours
Basic Concept of OOP, Need for OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP. Difference between C, C++, Java,its Characteristics, Structure of program, Tokens, Keywords, Identifiers and Constants, Data Types, Declaration of variables, Dynamic initialization of variables, Control Structures.

Unit II: Classes, Objects and Methods 04 Hours
Creating a Class, Access Modifiers, Encapsulation, Methods: Adding a Method to Class, returning a Value, adding a Method That Takes 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.

Unit III: Constructors, Destructors and String Handling 04 Hours
Use of Constructor, Characteristics of Constructors, Types of Constructors, Constructor Overloading, Constructor with Default Arguments, Symbolic Constants, Garbage Collection, Destructors and Finalizers.
String Handling: String: Immutable String, String Comparison, String Concatenation, Substring, Methods of String class, String Buffer class, StringBuilder class, Creating Immutable class.

Unit IV: Inheritance and Polymorphism 04 Hours

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.

Unit V: Exception Handling 04 Hours

Introduction to exception handling, predefined and user defined exceptions.
Use of try, catch, throw, throws and finally keywords,
Introduction to threads, life cycle of a thread.

Unit VI: Package, Interfaces, and Introduction to AWT 04 Hours

Introduction to package: Types of packages, User define packages, Use of package keyword, Importing packages.
Interfaces: Define and implement interface, use of interfaces to support multiple inheritance.
Introduction to AWT, a small application to demonstrate use of controls – label, button, check box, text, radio button, Dialog Box, scroll bar, List, Menu bars, AWT classes, Working with color,fonts.

Textbooks

1. HerbertSchildt, "The Complete Reference C++", 4thEdition, Mc Graw Hill, 2003.
2.Stanley.B.Lippmann, Josee Lajoie, Barbara.E.Moo, "C++ Primer", 5th Edition, Pearson Education
3. Scott Meyers:"Effective C++",Third Edition, Addison-Wesley
4. E. Balaguruswamy, "Object Oriented Programming Using C++ and Java", Tata McGrawHill

Reference Books

1.Steven Holzner et al. "Java 2 Programming", Black Book, Dreamtech Press, 2009.
2.Ken Arnold, James Gosling, David Holmes, "The Java Programming Language", 3e, Sun Microsystems.

List of Assignments-

1.Write a program to implement the concept of class and object.
2.Write a program to implement different types of inheritance concept.
3. Demonstrate the use of following keyword in Java.
   a) final b) super c) this d) static
4. Write a program to differentiate between method overloading and method overriding.
5. Write a program to understand the use of String class and string buffer class.
6.Write a program to demonstrate Multiple inheritance using interface and create a user defined package in java.
7.Write a program using try, catch, throw and finally of exception handling.
8. Write a program to implement the concept of Package.
9. Write a program to implement Frame and different graphics objects.
10. Write a program to use different controls of AWT classes.

Project Based Learning - Provisional List of Projects

1. Billing Application
2. Traffic Management System
3. Library Management System
4. Employee Record System
5. Security System
6. Calendar Application
7. Medical Store Management System
8. Cricket Score Sheet
9. Bank Management System
10. Telecom Billing System

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