SYLLABUS OF COMPUTER SCIENCE & ENGINEERING

STUDY AND EVALUATION SCHEME FOR ALL ENGINEERING AND TECHNOLOGY BRANCHES (Listed in Annexure -1)

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1	Mathematics-I	2	1	-	3	40	-	**40**	60	3	-	-	**60**	100
1.2	Applied Physics-I	3	-	2	4	40	60	**100**	60	3	40	3	**100**	200
1.3	Applied Chemistry **OR** Introduction to IT Systems	3 2	- -	2 4	4	40	60	**100**	60	3	40	3	**100**	200
1.4	Communication Skills in English **OR** Fundamentals of Electrical & Electronics Engineering	3	-	2	4	40	60	**100**	60	3	40	3	**100**	200
1.5	Engineering Graphics **OR** Engineering Workshop Practice	-	-	4	2	- -	40 60	**40** **60**	60 -	3 -	- 40	- 3	**60** **40**	100
1.6	Sports & Yoga	-	-	2	1	-	50	**50**	-	-	-	-	**-**	50
	# Student Centered Activities (SCA)	-	-	10	-	-	50	**50**	-	-	-	-	**-**	50
	TOTAL				**18**									**900**

Note :-The Institutional authority may select alternative subjects, as indicated at Sr. No. 1.3, 1.4 and 1.5 based on the need of the respective branches offered at their institute. The alternative subjects once selected in first semester will not be selected in second semester.

Students centered activities will comprise of co-curricular activities like extension lecture, games, hobby, clubs, e.g., photography etc., seminars, declamation contents, education field visit, library, NCC,NSS, Cultural Activities and self-study etc. The Lecture allotted to SCA can also be utilized for the course completion of other subjects.

1- Each Period will be 60 minutes duration.

2- Each Session will be 16 weeks.

3- Effective teaching will be at least 14 weeks.

STUDY AND EVALUATION SCHEME FOR ALL ENGINEERING AND TECHNOLOGY BRANCHES (Listed in Annexure -1)

SECOND SEMESTER:

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	Mathematics -II	3	1	-	4	40	-	**40**	60	3	-	-	**60**	100
2.2	Applied Physics-II	3	-	2	4	40	60	**100**	60	3	40	3	**100**	200
2.3	Applied Chemistry **OR** Introduction to IT Systems	3 2	- -	2 4	4	40	60	**100**	60	3	40	3	**100**	200
2.4	Fundamentals of Electrical & Electronics Engineering **OR** Communication Skills in English	3	-	2	4	40	60	**100**	60	3	40	3	**100**	200
2.5	Engineering Mechanics	2	1	2	4	40	60	**100**	60	3	40	3	**100**	200
2.6	Engineering Graphics **OR** Engineering Workshop Practice			4	2	- -	40 60	**40** **60**	60 -	3 -	- 40	- 3	**60** **40**	100
2.7	(Q) Environmental Sciences	3	-	-	-	-	-	**-**	60	3	-	-	**60**	-
	# Student Centered Activities (SCA)	-	-	4	-	-	50	**50**	-	-	-	-	**-**	50
	Total				**22**									**1050**

Note :-The Institutional authority may select alternative subjects, as indicated at Sr. No. 2.3, 2.4 and 2.6 based on the need of the respective branches offered at their institute. The alternative subjects once selected in first semester will not be selected in second semester.

4- STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMMEIN COMPUTER SCIENCE AND ENGINEERING

NOTE: I & II Sem. is common to all engineering & technology branches and implemented from the session 2024-2025 THIRD SEMESTER (COMPUTER IENCE AND ENGINEERING)

Sr. No.	SUBJECTS	Category & Course Type	STUDY SCHEME Periods /Week			Credits(C) (L+T)+P = C	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	Operating Systems	Prog Core (Theory)	3	-	-	3+0=3	40	-	**40**	60	03	-	-	**60**	**100**
3.2	Data base Management System	Prog Core (Theory)	3	-	-	3+0=3	40	-	**40**	60	03	-	-	**60**	**100**
3.3	Computer Network	Prog Core (Practicum)	2	-	4	3+1=4	40	-	**40**	60	03	-	-	**60**	**100**
3.4	Web Technologies	Prog Core (Practicum)	1	-	4	1+2=3	-	60	**60**	-	-	40	03	**40**	**100**
3.5	Operating Systems (Lab)	Prog Core (Practical)	-	-	2	0+1=1	-	60	**60**	-	-	40	03	**40**	**100**
3.6	Data base Management System (Lab)	Prog Core (Practical)	-	-	4	0+2=2	-	60	**60**	-	-	40	03	**40**	**100**
3.7	Computer Programming Using C	Prog Core (Practicum)	1	-	4	1+2=3	-	60	**60**	-	-	40	03	**40**	**100**
3.8	**Summer Internship -I (4 Weeks after 2nd Sem.)		-	-	-	2	-	50	**50**	-	-	-	-	-	**50**
	# Student Centred Activities (SCA)		-	-	8	-	-	50	50	-	-	-	-	-	**50**
TOTAL			**10**	**-**	**26**	**21**	**120**	**340**	**460**	**180**		**160**		**340**	**800**

FOURTH SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr.No.	SUBJECTS	Category & Course Type	STUDY SCHEME Periods/Week			Credits(C) (L+T)+P = C	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
4.1	Data Structures using C	Prog Core (Theory)	3	-	-	3+0=3	40	-	**40**	60	03	-	-	**60**	**100**
4.2	Software Engineering	Prog Core (Practicum)	2	-	4	3+1=4	40	-	**40**	60	03	-	-	**60**	**100**
4.3	Introduction to E-Governance	Prog Core (Theory)	2	-	-	2+0=2	40	-	**40**	60	03	-	-	**60**	**100**
4.4	Program Elective -1	Prog Elective (Theory)	3	-	-	3+0=3	40	-	**40**	60	03	-	-	**60**	**100**
4.5	(Q) Open Elective -1	Open Elective (Theory)	2	-	-	2	50*	-	-	-	-	-	-	-	-
	*Advance Skill Development	Open Elective Certification Course	-	-	-		-	-	-	-	-	-	-	-	-
4.6	Data Structures using C	Prog Core (Practical)	-	-	4	0+2=2	-	60	**60**	-	-	40	03	**40**	**100**
4.7	Scripting Languages (Python)	Prog Core (Practicum)	1	-	4	1+2=3	-	60	**60**	-	-	40	03	**40**	**100**
4.8	(Q) Essence of Indian Knowledge and Tradition	Audit Courses (Qualifying)	4	-	-	-	50*	-	-	-	-	-	-	-	-
	Student Centred Activities (SCA)		-	-	7	-	-	50	**50**	-	-	-	-	-	**50**
	TOTAL		**17**	**-**	**19**	**19**	**160**	**17**	**33**	**24**	**-**	**8**	**-**	**32**	**650**

SEMESTER-1

MATHEMATICS - I

COURSE OBJECTIVES

Contents of this course provide fundamental base for understanding elementary mathematics and their uses in solving engineering problems. Contents of this course will enable students to use basic mathematical function like logarithms, partial fractions, matrices and basic 2D curves in solving various engineering problems of all fields.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

- Understand and apply angle measurements, T-Ratios, and graph functions.
- Grasp the concepts of limits, differentiation and apply differentiation rules.
- Resolve proper and improper fractions into partial fractions with various factors.
- Solve problems using binomial theorem.
- Understand complex numbers in different forms , perform arithmetic operations and applications of De Moivre's theorem.

COURSE CONTENT

UNIT - I: Trigonometry (08 Periods)

Concept of angles, measurement of angles in degrees, and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub- multiple angles (2A) only. Graphs of $|x|$, sin x, cos x, and e^x .

UNIT-II : Differential Calculus (10 Periods)

Definition of function, concept of limits. Four standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$.

Differentiation of x^n, $\sin x$, $\cos x$, $\tan x$, e^x, $\log_e x$ by definition. Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric, functions, logarithmic differentiation, exponential functions.

UNIT - III: Partial fractions: (08 Periods)

Definition of polynomial fraction, proper & improper fractions and definition of partial fractions. To resolve proper fraction and improper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors.

UNIT- IV : Binomial theorem (06 Periods)

Value of ${}^{n}P_{r}$, ${}^{n}C_{r}$.

Binomial theorem (without proof) for positive integral index (expansion and general form); applications of Binomial theorem (General term, middle term, independent terms only).

APPLIED PHYSICS – I

COURSE OBJECTIVES

Applied physics includes the study of a diversified topics related to the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

- Identify the use of S.I. system of measurement and how it is used in engineering
- Represent physical quantities as scalars and vectors, applying the physical laws and concepts of linear and circular motion in everyday life.
- Analyse banking of roads/railway tracks and apply conservation of momentum principle to Explain recoil of gun etc.
- Derive work, power and energy relationship and solve problems about work and power.
- Define work, energy and power and their units.
- Describe conservation of energy and its applications
- Understand the concept of rotational motion of a rigid body and its applications
- Apply the physical laws and concepts of gravity, its variation with height and depth
- Understand the concept of elasticity, surface tension, pressure and the laws governing movement of fluids.
- Express physical work in term of heat and temperature; Measure temperature in various processes on different scales (Celsius, Kelvin, Fahrenheit etc.)
- Distinguish between conduction, convection and radiation and uses in daily life.

COURSE CONTENTS

1. Units and Dimensions (6 Periods)

1.1 Need of Measurement in engineering and science, unit of physical quantities - fundamental and derived units, systems of units (FPS, CGS and SI units)
1.2 Dimensions and dimensional formulae of physical quantities.
1.3 Principle of homogeneity of dimensions
1.4 Dimensional equations and their applications, conversion of numerical values of physical quantities from one system of units into another, checking the correctness of physical equations and deriving relations among various physical quantities
1.5 Limitations of dimensional analysis.

1. Force and Motion (6 periods)

1.1 Scalar and vector quantities – examples, representation of vector
1.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product.
1.3 Resolution of Vectors.
1.4 Force, Momentum, Statement of Conservation of linear momentum, its applications such as recoil of gun.
1.5 Gravitational force, Acceleration due to gravity (g) and its variation with depth and height from earth surface.

2. Work, Power and Energy (6 periods)

2.1 Work: and its units, examples of zero work, positive work and negative work.
2.2 Friction: modern concept, static, limiting and dynamic friction, Coefficient of friction.
2.3 Energy and its units, Kinetic energy, potential energy and Mechanical energy with examples.
2.4 Work Energy Theorem (statement only), Conservation of mechanical energy for freely falling bodies.
2.5 Power and its units, calculation of power in numerical problems.

3. Circular motion (6 periods)

3.1 Circular motion, Definition of Uniform and Non-uniform Circular motion
3.2 Definition of angular displacement, angular velocity, angular acceleration, frequency, time period.
3.3 Relation between linear and angular velocity, linear acceleration and angular acceleration
3.4 Centripetal acceleration (Definition and formula only)
3.5 Centripetal force with examples such as banking of roads and bending of cyclist. Definition of Centrifugal force.

4. Rotational Motion of a rigid body (6 periods)

4.1 Definition of rigid body, Rotational Motion of rigid body, Definition of torque with examples
4.2 Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only)
4.3 Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only).
4.4 Rotational kinetic energy

4.5 Angular momentum, Conservation of angular momentum and its examples

3. Properties of Matter (6 periods)

5.1 Elasticity: definition of stress and strain, Hooke's law (Definition and formula only).
5.2 Pressure: definition, its units.
5.3 Surface tension: concept, its units, cohesive and adhesive forces, angle of contact, Capillary action ascent formula (without derivation), applications of surface tension, effect of temperature on surface tension
5.4 Viscous force, Velocity gradient and its unit, coefficient of viscosity, Stoke's law and effect of temperature on viscosity.
5.5 Stream line flow of fluid motion, Equation of continuity, Bernoulli's Theorem (without derivation) and their applications to Torricelli's formula [$v=(2gh)^{1/2}$].

2. Heat and Thermometry (6 periods)

2.1 Concept of Heat and Temperature.
2.2 Different scales of temperature and their relationship
2.3 Modes of transfer of heat (Conduction, convection and radiation with examples)
2.4 Expansion of solids: coefficient of linear, surface and cubical expansions and relation amongst them
Concept of Mercury Thermometer.

APPLIED CHEMISTRY

COURSE OBJECTIVES

There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. On successful completion of this course content will enable technicians to understand, ascertain and analyses and properties of natural raw materials require for producing economical and eco-friendly finished products.

COURSE OUTCOMES

After undergoing this course, the students must be able to:

- Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications
- Solve the engineering problems using concept of electrochemistry and corrosion.

COURSE CONTENT

Unit 1: Atomic Structure, Chemical Bonding and Solutions (08 periods)

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), Heisenberg uncertainty principle, Quantum number. Shapes of s, p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bond (NaCl), covalent bond (H_2, F_2, HF), coordination bond $(NH_4)^+$. Hybridization in $BeCl_2$, BF_3, CH_4, NH_3, H_2O. Anomalous properties of NH_3, H_2O due to hydrogen bonding, metallic bonding.

Solution – idea of solute, solvent and solution, methods to express the concentration of solution molarity (*M* = mole per liter), Molality, Normality, ppm, mass percentage, volume percentage and mole fraction.

Unit 2: Water (08 periods)

Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.

Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and total dissolved solids (TDS).

i). Water softening techniques – soda lime process, zeolite process and ion exchange process.

ii). Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.

Unit 3: Engineering Materials (08 periods)

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, brief account of general principles of metallurgy.

Extraction of - Aluminum from bauxite ore.

Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.

General chemical composition, composition based applications (elementary idea only, details omitted): Port land cement and hardening, Composite materials (Wood, Glass fiber reinforced composites).

Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite), rubber and vulcanization of rubber.

Unit 4: Chemistry of Fuels and Lubricants (09 periods)

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula.

Fuel rating (octane and cetane numbers).

Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.

Lubrication – function and characteristic properties of good lubricant, classification with examples. Physical properties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants.

Unit 5: Electro Chemistry (09 periods)

Electronic concept of oxidation, reduction and redox reactions.
Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of Electrolysis and simple numerical problems. Industrial Application of Electrolysis –

- Electrometallurgy
- Electroplating
- Electrolytic refining.

Application of redox reactions in electrochemical cells –

- Primary cells – dry cell,
- Secondary cell - commercially used lead storage battery, fuel and Solar cells.

Introduction to Corrosion of metals –
Definition, types of corrosion (chemical and electrochemical), factors affecting rate of corrosion.

- Internal corrosion preventive measures –Purification, alloying and heat treatment
- External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic Inhibitors.

COMMUNICATION SKILLS IN ENGLISH

COURSE OBJECTIVES

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3	-	2

Communication Skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students.

COURSE OUTCOMES

After undergoing this course, the students must be able to:

1. Develop listening skills for enhancing communications.
2. Develop speaking skills with a focus on correct pronunciation and fluency.
3. Introduce the need for personality development - Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc., for that purpose group discussion extempore and other activities should be conducted during lab classes.

COURSE CONTENTS

Unit -1 Communication: Theory and Practice (08 Periods)

1.1 Basics of Communication, Definition Process of Communication
1.2 Types of communication (formal and informal, verbal and non-verbal), 7 C's of Communication
1.3 Barriers to communication and ways to overcome them
1.4 Tools or devices of Communication

Unit – 2 Soft Skills for Professional Excellence **(04 Periods)**

2.1 Introduction to Soft skills and hard skills
2.2 Importance of soft skills
2.3 Applying soft skills across cultures

Unit – 3 Reading Comprehension: English for Communication (08 Periods)

On Communication

3.1 Professional Development of Technicians
3.2 Leadership and Supervision
3.3 The Romance of Reading
3.4 Sir C V Raman

Unit: 4 Professional Writing (14 Periods)

CV Writing, Covering Letter, Resume, Notices, Precis -Writing, Official Letters (Memo, Circular, Office Orders, Agenda, Minutes of Meeting, Report Wring, E-mail Drafting)

Unit: 5 Vocabulary and Grammar (08 Periods)

5.1 Sentence and its Types
5.2 Parts of Speech
5.3 Tenses
5.4 Active and Passive Voice

5.5 Punctuation
5.6 One Word Substitution, Idioms and Phrases

1.5 Engineering Graphics

L	*T*	*P*
-	-	**4**

COURSE OBJECTIVES

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, shouldbe to develop conceptual skills in the students following BIS SP 46 – 1988.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Identify and use of different grades of pencils and other drafting instruments whichare used in engineering field
- Draw free hand sketches of various kinds of objects.

- Utilize various types of lines used in engineering drawing.
- Read and apply different dimensioning methods on drawing of objects.
- Use different types of scales and their utilization in reading and reproducing drawingsof objects and maps.
- Draw 2 - dimensional view of different objects viewed from different angles(orthographic views)
- Draw and interpret complete inner hidden details of an object which are otherwise notvisible in normal view
- To make projections of Solid
- Generate isometric (3D) drawing from different 2D (orthographic) views/sketches.
- Identify conventions for different engineering materials, symbols, sections of regularobjects and general fittings used in Civil and Electrical household appliances
- Use basic commands of AutoCAD.

COURSE CONTENT

Unit – I Basic elements of Drawing

Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards. Different types of lines as per BIS specifications Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments.
Common symbols and conventions of materials used in engineering.
Free hand and instrumental lettering (Alphabet and numerals) – Capital Letter, single stroke, vertical and inclined, series of 5,8,12 mm in the ratio of 7:4.

Dimensioning-

Necessity, method and principles, Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches Scales.
Scales –Needs & importance (theory), R.F., type of scales, and length of scale, drawing of plain and diagonal scales.

Unit – II Orthographic projections

Introduction, Projection of Points in different quadrant, Projection of Straight Line- parallel to both planes, perpendicular and inclined to reference plane, Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one plane, parallel and perpendicular to another plane in 1st angle only, Three views of orthographic projection of different objects. Identification of surfaces.

Unit – III Projection of Solid and Sections

Definition and types of Solids, To make projections, sources, Top view, Front view and Side view of various types of Solid, Importance and salient features.
Drawing of full section, half section, partial or broken out sections, Off-set sections, revolved sections and removed sections, Convention sectional representation of various materials, conventional breaks for shafts, pipes, rectangular,

square, angle, channel, rolled sections.

Unit – IV Isometric Projections

Introduction, Isometric scale and Natural scale, Isometric view and isometric projection, Illustrative problems related to objects containing lines, circles and arcs shape only.

Conversion of orthographic views into isometric view /projection.

Unit-V Introduction to Auto CAD

Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets on AutoCAD of cube, cuboid, cone, pyramid, truncated cone and pyramid, sphere and combination of above solids.

Auto CAD drawing will be evaluated internally by sessional marks and not by final theory paper.

1.6 SPORTS AND YOGA

L	T	P
-	-	2

COURSE OBJECTIVES

To make the students understand the importance of sound health and fitness principles as they relate to better health. To expose the students to a variety of physical and yogic activities aimed at stimulatingtheir continued inquiry about Yoga, physical education, health and fitness. To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury .To develop among students an appreciation of physical activity as a lifetime pursuit anda means to better health.

COURSE OUTCOMES:

On successful completion of the course the students will be able to:

- Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, andrelaxation.
- Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
- Learn breathing exercises and healthy fitness activities
- Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.
- Perform yoga movements in various combination and forms.
- Assess current personal fitness levels.
- Identify opportunities for participation in yoga and sports activities.
- Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
- Improve personal fitness through participation in sports and yogic activities.
- Develop understanding of psychological problems associated with the age and lifestyle.
- Demonstrate an understanding of sound nutritional practices as related to health andphysical performance.
- Assess yoga activities in terms of fitness value.
- Identify and apply injury prevention principles related to yoga and physical fitness activities.

- Understand and correctly apply biomechanical and physiological principles elated to exercise and training

COURSE CONTENT

1 Introduction to Physical Education

- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education

2 Yoga

- Meaning & Importance of Yoga
- Elements of Yoga- Gyan Yoga, Bhakti Yoga, Karm Yoga, Hathyoga, Astang Yoga .
- Introduction - Asans, Pranayama, Meditation & Bandh , Mudra and shat Karm .
- Meaning of Practice of various Yogic Sukhasan, Vyayams
- Practice of Asans and Benefits – Sidhasana, Padmasana,Vajrasana, Shasakasan, Singhasan, Gomukhasan, Virasan, Dhanurasan, Matsnyendrasan, Gorakhasan, Paschimottansan, Mayurasan, Garunasan, Pawanmuktasan, Kurmasan, Mandukasan, Shalabhasan, Makrasan, Bhujangasan, Naukasan, Shavasan, Sharvangasans, Halasan.
- Practice and Benefits of Pranayamas – Anulom- Vilom, Surya Bhedhi, Ujjayi, Sheetkari, Bhastrika, Bharamri, Murchha, kewali etc .
- Practice of Meditation – Meaning of Meditation, Types , Techniques, Benefits .

3 Olympic Movement

- Olympic Symbols, Ideals, Objectives & Values
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award,
- Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

4 Physical Fitness, Wellness & Lifestyle

- Meaning & Importance of Physical Fitness & Wellness
- Components of Physical fitness
- Concept of Positive Lifestyle

5 Yoga & Lifestyle

- Ideal life style
- Asans and pranayams a preventive measures
- Yoga and Immunity
- Concept of Yogic diet.

- **Life Style Diseases**– Yoga management of Diseases, Yoga management of Stress, Yoga management of Obesity, Yoga management of High Blood Pressure, Yoga management of Insomia, Yoga management of Asthma, Yoga management of Joints Pains, Yoga management of Digestive Disorders .

6 Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga

- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems.
- Circulatory System,
- Respiratory System,

7 Postures

- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.

8 Training and Planning in Sports

- Meaning of Training
- Warming up and limbering down

9 Psychology & Sports

- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development

10 Doping

- Meaning and Concept of Doping

11 Sports Medicine

- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention.

12 Sports / Games

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

- History of the Game/Sport.
- Specifications of Play Fields and Related Sports Equipment.
- Important Tournaments and Venues.

SEMESTER-2

1.1 MATHEMATICS –II

L	T	P
3	1	-

COURSE OBJECTIVES

This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, integral calculus, coordinate geometry, basic elements of vector algebra and first order differential equations.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

- Solve linear equations using determinants and matrix algebra.
- Perform integration techniques, solve area and volume problems.
- Solve first order differential equations and apply numerical methods.
- Form and interpret equations of lines, circles and conics.
- Perform vector operations and solve related engineering problems of relevant branch.

COURSE CONTENTS

UNIT - I: Determinants and Matrices (10 periods)

Elementary properties of determinants upto 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, inverse of a matrix, matrix inverse method to solve a system of linear equations in three variables.

UNIT - II: Integral Calculus (12 periods)

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Introduction to definite integration. Use of formulae $\int_0^{\frac{\pi}{2}} \sin^n x dx, \int_0^{\frac{\pi}{2}} \cos^n x dx, \int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$ for solving problems ,where m and n are positive integers.

Applications of integration for (i). Simple problems on evaluation of area bounded by a curve and axes.

(ii). calculation of volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT-III: Differential Equations & Numerical Methods (15 periods)

Definition of differential Equations, order and degree of a differential equation, formation of differential equations, solution of first order and first degree differential equations by variable separable method (simple problems). Trapezoidal rule, Simpson's 1/3 and Simpson's 3/8 rule and their applications in simple cases. MATLAB – Simple Introduction.

UNIT - IV: Two dimensional Co-Ordinate Geometry (10 periods)

Equation of straight line in various standard forms (without proof), intersection of two straightlines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

General equation of a circle and its characteristics. To find the equation of a circle, given:

i. Centre and radius,

ii. Three points ly

iii. ing on it and

Co-ordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola), their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

UNIT - V: Vector Algebra (9 periods)

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector product of two vectors. Simple problems related to work, moment and angular velocity.

INSTRUCTIONAL STRATEGY

The content of this course is to be taught on conceptual basis with plenty of real world examples. Differential equations and applications of differential equations can be taught with engineering applications of relevant branch.

MEANS OF ASSESSMENT

– Assignments and Quiz/Class Tests
– Mid-term and End-term Written Tests
– Model/Prototype Making

RECOMMENDED BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
5. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	10	20
2.	12	20
3.	15	25
4	10	20
5	9	15
Total	**56**	**100**

COURSE OBJECTIVES

Applied physics includes the study of a diversified topics related to the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.

COURSE OUTCOMES

After undergoing this subject, the student will be able to;

- Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.
- Define the terms: frequency, amplitude, wavelength, velocity of a wave.
- Explain various Engineering, Medical and Industrial applications of Ultrasonic.
- Define capacitance and its unit. They will be able to explain the function of capacitors in simple circuits, solve simple problems using C=Q/V
- Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.
- Explain the concept of electric current, resistance and its measurement.
- List the effects of an electric current and their common applications, State and apply Ohm's law, calculate the equivalent resistance of a variety of resistor combinations.
- Explain Bio-Savart Law, Lorenz Force, Faraday's law.
- State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field
- Apply the knowledge of diodes in various electronic circuits. Apply the concept of light amplification in designing of various LASER based instruments and optical sources.
- Explain total internal reflection and apply this concept for optical fiber and its uses in Medical field and Communication.

COURSE CONTENTS

1. Oscillations and Wave motion (06 periods)

1.1 Harmonic Motion, Oscillation, Definition of Simple Harmonic Motion (SHM),
1.2 Displacement equation y = a sin wt (without derivation), velocity, acceleration, time period, frequency in S.H.M., Energy of a body executing S. H. M.
1.3 Wave motion, transverse and longitudinal wave motion with examples.
1.4 Wave equation, phase, phase difference, wave length, wave velocity.
1.5 Ultrasonic – Introduction, properties and applications in engineering and medical applications.

2. Optics (06 periods)

2.1 Basic optical laws - Reflection and Refraction, Refractive Index.
2.2 Critical angle, Total internal reflection (TIR) and conditions for total internal reflection.
2.3 Application of total internal reflection (List Only).

2.4 Dual nature of light (concept only): Wave and particle nature of light 2.5 Examples of Wave and particle nature of light (List Only)

3. Electrostatics (06 periods)

3.1 Concept of charge, Quantization of charge, Coulombs law, Electric field of point charges
3.2 Electric lines of force and their properties, Electric flux, Gauss law of electrostatics (without derivation) 3.3 Electric potential and potential difference.
3.4 Capacitance and its units, Parallel plate Capacitor: Working principle and its Capacitance, Effect of Dielectric on capacitance.
3.5 Series and parallel combination of capacitors (numerical).

4. Current Electricity (06 periods)

4.1 Electric Current and its unit, Ohm's law, Resistance and its units,
4.2 Factors affecting Resistance of a wire, Specific Resistance, Conductance, Specific Conductance,
4.3 Series and Parallel combination of Resistances.
4.4 Kirchhoff's laws (KCL and KVL), Wheatstone bridge: Construction and its balanced condition, 4.5 Measurement of an unknown resistance using Meter Bridge.

5. Electromagnetism (06 periods)

5.1 Biot-Savart law for current carrying wire and Concept of Magnetic field (**B**) and it units.
5.2 Lorentz force (Force on moving charge in magnetic field), Force on current carrying conductor (Formula only).
5.3 Magnetic lines of forces and their properties, magnetic flux and its units.
5.4 Concept of electromagnetic induction, Faraday's Laws and Lenz's law.
5.5 Conversion of galvanometer into ammeter and voltmeter.

6. Semiconductor physics (06 periods)

6.1 Classification of solids on the basis of Energy bands (Definition only): Insulator, Semi-conductor and Conductor.
6.2 Intrinsic and extrinsic semiconductors, P-type and N-type semiconductors.
6.3 PN junction diode and its biasing (Forward and Reverse Biasing).
6.4 Some application of semiconductor diodes (list only)
6.5 Construction of PNP and NPN transistors and some electronic applications (list only)

7. Modern Physics (06 Periods)

7.1 Ground, Excited and Metastable energy levels of atom,
7.2 Spontaneous and stimulated emission, population inversion, pumping, Laser and its characteristics
7.3 Ruby laser and He- Ne laser, Engineering and medical applications of lasers.
7.4 Introduction to optical fibers, light propagation, acceptance angle and numerical aperture (without derivation).
7.5 Applications of optical fibers in telecommunication, medical and sensors.

LIST OF PRACTICALS (To perform minimum six experiments)

1. To determine the velocity of sound with the help of resonance tube.
2. To verify the laws of reflection from a plane mirror / interface.
3. To verify the laws of refraction (Snell's law) using a glass slab.
4. To determine the focal length and magnifying power of a convex lens.
5. To verify laws of resistances in series and parallel combination.

6. To verify ohm's laws by drawing a graph between voltage and current.
7. To measure very low resistance and very high resistances using Slide Wire bridge
8. Conversion of Galvanometer into an Ammeter and Voltmeter of given range.
9. To draw characteristics of a PN junction diode and determine knee and break down voltages.
10. To verify the Kirchhoff's Law using electric circuit.
11. To find numerical aperture of an optical fiber.
12. To draw magnetic field lines due to bar magnet using magnetic compass.

INSTRUCTIONAL STRATEGY

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

MEANS OF ASSESSMENT

- Assignment & Quiz
- Mid-Term and End-Term written test
- Model Making
- Actual Lab & Practical Work
- Viva-Voice

RECOMMENDED BOOKS

1. Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
4. Practical Physics, by C. L. Arora, S Chand publications
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6. Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications.
7. Physics Volume 2, 5th edition, Haliday Resnick and Krane, Wiley publication
8. Fundamentals of Physics by Haliday, Resnick & Walker 7th edition, Wiley publication

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	15
2	06	14
3	06	15
4	06	14
5	06	14
6	06	14
7	06	14
Total	**42**	**100**

1.3 INTRODUCTION TO IT SYSTEMS

L T P

2 - 4

COURSE OBJECTIVES

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools using MS Office/Open Office/Libre Office using internet etc., form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

Explanation of Introductory part should be demonstrated with practical work. Following topics may be explained in the laboratory along with the practical exercises.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Identify Computer Hardware Components, Network Components and Peripherals.
- Explain the role of an Operating System.
- Install System and Application Software.
- Explain the function of the system components including Processor, Motherboard and Input-output devices.
- Use Word Processing Software to prepare document.
- Use Spreadsheet Software to create workbooks and automate calculation.
- Use Presentation Software to create interactive presentation.
- Perform fundamental tasks common to most application software including print, scan, save, edit, cut, copy, paste, format, spell and grammar check.
- Find and evaluate information on the Web.
- Install Antivirus.
- Safeguard against Online Frauds, threats and crimes.
- Use online office tools (Google suits)

COURSE CONTENTS

1. Introduction to Computers and Peripherals. (05 Periods)

Introduction, Computer Generations, Components of Computer, Types of Computer, CPU, RAM, ROM, Hard disk, USB, Flash drive, Keyboard, Mouse, display devices, Printer, Scanner, Modem, Sound Cards, Speakers, CMOS battery, Sharing of Printers.

1. Operating System and Application Software (06 Periods)

System Software, Application Software, Virtualization Software, Utility Software, MS Office/Open Office/LibreOffice, Working with windows OS, Desktop components, Menu bars, creating shortcut of program. Installation of Application software's, Antivirus and Drivers.

2. Office Tools: MS Office/Open Office/ Libre Office (06 Periods)

Creation of document, spreadsheets and presentation, Google Suits (Google drive, google sheet, google doc, google presentation)

3. Internet (06 Periods)

Network topologies, Basics of Networking,– LAN,MAN, WAN, Connecting Devices(Bridge, Switch, Router, Gateway),Wi-Fi technologies, Concept of IP Address, DNS, Search Engines, e- mail, Web Browsing.

4. Basics of Information Security (05 Periods)

Introduction to security, Security threats: detection and prevention, Indian Cyber laws.

LIST OF PRACTICAL EXERCISES

1. Identify various components, peripherals of computer and list their functions.
2. Installation of operating system. (windows/linux/others)
3. Installation of various application software and peripheral drivers.
4. Creation and Management of files and folders (Rename, delete, search)
5. Installation of Antivirus and remove virus.
6. Scanning and printing documents.
7. Browsing, Downloading, Information using Internet.
8. E-Mail ID creation, composing, sending and receiving e-mail. Attaching a file with e-mail message.
9. Word Processing (MS Office/Open Office) File Management, Editing documents, Mail Merge, Security etc.

10. Spread Sheet Processing (MS Office/Open Office/Libre Office)Addition, deletion, formulation,Securityetc.
11. PowerPoint Presentation (MS Office/Open Office/Libre Office)Preparing Slides, customization, animation, Security etc.
12. Google Suite.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS Office/Open Office/Libre office/Google Suit in addition to working on internet. The student should be made capable of working on computers independently.

MEANS OF ASSESSMENT

- Class Tests/Quiz
- Software Installation and Use
- Viva-Voce
- Presentation

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Information Technology for Management by Henery Lucas, Tata McGraw Hills, New Delhi
3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi.
6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
8. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. On Your Marks - Net…Set…Go… Surviving in an e-world by AnushkaWirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

Reference websites

1. www. tutorialspoint..com
2. www.sf.net
3. Gsuite.google.com
4. Spoken-tutorial.org
5. Swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted (Periods)	Marks Allotted (%)
1	5	18
2	6	21
3	6	22
4	6	21
5	5	18
Total	**28**	**100**

COURSE OBJECTIVES

To learn basic concepts of various active and passive electronic components, signals, measuring instruments, digital electronics, electric and magnetic circuits, ac circuits, transformer, motors and their applications. To help the students deal with the electrical and electronics engineering principles and applications in industrial processes of different fields.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Understand and identify key electronic components and their applications.
- Use and understand basic electrical measuring instruments.
- Grasp the fundamentals of logic gates, Boolean algebra, and digital circuits.
- Understand basic concepts of electric and magnetic circuits.
- Analyze A.C. circuits and understand phase relationships and power calculations.
- Understand the principles and applications of transformers and electrical machines.

COURSE CONTENTS

UNIT- I Overview of electronic components: (09 Periods)

Active and Passive components, Resistor, Capacitor, Inductor and their types. Introduction to semi- conductor, Intrinsic and Extrinsic semi-conductors, P-N Junction diode - forward and reverse bias; introduction of Bipolar Junction Transistor; FET and MOSFET (brief idea only).

UNIT- II Basic measuring instruments: **(05 Periods)**

Basic concept of Ideal and non-ideal voltage and current sources, ammeter, voltmeter, wattmeter and digital multimeter, CRO (Block diagram, working and its uses).

UNIT –III Overview of Digital Electronics: (7 Periods)

Analog and digital signal, advantages of digital system. number system and its conversion (Decimal, binary ,octal ,hexadecimal) , Boolean Algebra, Logic Gates-Truth Table and Symbol of AND, OR, NOT, NAND, NOR, ExOR, ExNOR Gates.

Unit -IV Electric and Magnetic Circuits: (7 Periods)

Definitions of basic terms, such as Current, Resistance, EMF, Potential Difference, Power and Energy, Ohm's Law and its limitation, Kirchhoff's laws; M.M.F, magnetic force, flux, permeability, reluctance, BH curve, hysteresis loop; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically and Statically induced emf; concept of self and mutual inductance.

Unit -V A.C. Circuits: (7 Periods)

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; A.C in pure resistors, pure inductors and pure capacitors; Power in A.C. Circuit, power triangle; Introduction of poly phase system and comparison with single phase system.

Unit -VI Transformers and Machines: (7 Periods)

Single phase transformer: General construction, working principle, types, EMF equation, transformation ratio; Brief idea of Auto transformer.

DC machines: Types, EMF equation of motor.

Single Phase Induction Motor: Principle of operation and introduction to methods of starting. Three Phase Induction Motor: Principle of operation.

INSTRUCTIONAL STRATEGY

The instructional strategy combines lectures, demonstrations, and hands-on labs. Lectures will cover key concepts, while demonstrations will illustrate component functions and instrument operations. Hands- on labs will provide practical experience with electronic components and measuring instruments. Interactive quizzes and problem-solving sessions will reinforce and assess understanding, ensuring practical application of theoretical knowledge.

MEANS OF ASSESSMENT

–Assignment & Quiz
–Lab & Practical Work
–Viva-Voice

List of Practicals:- (8 practical to be performed)

1. Identify various passive and active electronic components in the given circuit.
2. Determine the value of given resistor using digital multi-meter to confirm with color code.
3. Exercise of soldering and de-soldering of components in circuits.
4. To measure frequency, time period and amplitude of a sinusoidal signal using CRO.
5. To measure voltage and current using digital multi-meter.
6. To verify the truth tables for all logic gates – NOT, OR, AND, NAND, NOR, XOR, XNOR
7. Verify the Kirchhoff's laws.
8. Measure voltage, current and power in 1-phase circuit with resistive load.
9. Verify the ohms law.
10. Use of voltmeter, ammeter, and watt-meter.
11. Connect resistors in series and parallel combination on bread board and measure its value using digital multi-meter.
12. Connect capacitors in series and parallel combination on bread board and measure its value using multi-meter.

REFERENCE BOOKS –

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House.
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN: 978- 0-07-0088572-5.
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition, ISBN: 9781107464353.
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405.
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375.
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN: 97881236529513.
7. Sedha, R.S., A Textbook of Applied Electronics, S. Chand, New Delhi, 2008, ISBN-13: 978-8121927833.
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi, 2015, ISBN-13: 0070634244-978.
9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13: 9788121924504.
10. Bell, David, Fundamentals of Electronic Devices and Circuits, Oxford University Press, New Delhi, 2015, ISBN: 9780195425239.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	09	20
2	05	10
3	07	15
4	07	18
5	07	18
6	07	19
Total	**42**	**100**

1.5 ENGINEERING MECHANICS

L T P

2 1 2

COURSE OBJECTIVES

The course provides a foundational understanding of mechanics, covering force systems, equilibrium, and beam analysis under different loads. It explores friction and its applications, centroids and moments of inertia for various shapes, and the principles and applications of simple lifting machines.

COURSE OUTCOMES

After completing this course, student will be able to:

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant simple lifting machine(s) for given purposes.

COURSE CONTENTS

Unit – I Introduction to Engineering Mechanics and Force System : (08 Periods)

Basic Concept and definitions, Law of Mechanics (Newton's Laws), Classification: Statics and Dynamics.
Principle of transmissibility of forces, System of forces and its classification, Moment of Force and couple, Resolution of force- Orthogonal component of force, Varignon's theorem, Composition of forces- Analytical method for determination of resultant for concurrent, non- concurrent and parallel co- planar force systems- Law of triangle, parallelogram and polygon of forces.

Unit– II Equilibrium of Forces and Concept of Beam: (10 Periods)

Condition of equilibrium, free body diagram (FBD), equilibrium of coplanar concurrent and non- concurrent forces, Lami's Theorem- statement and explanation, application for various engineering problems.
Beam- Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (Vertical and inclined point load, uniformly distributed load, couple). Beam reaction for cantilever, simply supported beam with or without overhang subjected to combination of point load and uniformly distributedload.

Unit– III Friction : (06 Periods)

Introduction, types and laws of friction, Coefficient of friction, angle of friction, angle of repose, cone of friction, equilibrium of bodies on horizontal surface (force parallel and inclined to the plane) and inclined plane (force parallel to the plane only).

Unit– IV Centroid and Moment of Inertia : (10 Periods)

Concept, definition and determination of Centroid of plain figures (square, rectangle, triangle, circle, semi-circle, quarter circle) and Centre of gravity of symmetrical solid bodies (Cube, cuboid, cone, cylinder, sphere, hemisphere). Concept of moment of inertia, Perpendicular axis theorem and Parallel axis theorem. Concept of second moment of area (Rectangle, Triangle and circle) and composite section (L,T &I).

Unit – V Simple Machines : (08 Periods)

Definition and types, mechanical advantage, velocity ratio. Application and efficiency of simple machines, Law of Machines, Ideal machine, reversible and irreversible machine.
System of pulleys (first, second, third system of pulleys) determination of velocity ratio, mechanical advantage and efficiency. Working Principle and application of : wheel and axel, simple screw jack, Worm and worm wheel, single and double winch Crab.

List of Practical (A minimum of eight practicals must be performed)

1. Verification of parallelogram law of forces.
2. Verification of triangle and polygon law of forces.
3. To find the Resultant of coplanar concurrent forces using force table.
4. Study of forces in various members of jib crane.
5. Determine reaction forces for simply supported beam.
6. Determine the coefficient of friction on horizontal and inclined plane.
7. Study of Ladder friction (analyze condition for equilibrium)
8. Determine the centroid of a composite lamina (Graphical and Analytical methods).
9. Determine moment of inertia of flywheel or physical pendulum or torsional pendulum.
10. To find the mechanical advantage, velocity ratio and efficiency for Screw Jack.
11. To find the mechanical advantage, velocity ratio and efficiency for Wheel and axel.
12. Derive Law of machine using Worm and Worm wheel.

INSTRUCTIONAL STRATEGY

The instructional strategy includes lectures, visual aids, and interactive examples for key mechanics concepts and force systems, along with problem-solving sessions. Equilibrium concepts are taught with practical demonstrations and hands-on beam analysis. Friction is explored through case studies and practical demonstrations, followed by exercises. Centroid and moment of inertia are covered with visual aids and practical tasks. Simple lifting machines are introduced through lectures and demonstrations, with problem-solving on mechanical advantage and efficiency.

MEANS OF ASSESSMENT

–Assignment & Quiz
–Lab & Practical Work
–Viva-Voice

RECOMMENDED BOOKS :

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
6. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.
8. Bhavikatti S.S., Engineering Mechanics, New Age International Publishers

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	20
2	10	25
3	06	10
4	10	25
5	08	20
Total	**42**	**100**

1.6 ENGINEERING WORKSHOP PRACTICE

L	T	P
-	-	4

COURSE OBJECTIVES

The course aims to provide hands-on experience and practical skills in various essential workshops, including carpentry, fitting, welding, sheet metal, plumbing, and painting and polishing. Students will gain proficiency in using different tools and machines, understanding and executing various processes and operations, and completing multiple jobs that involve intricate tasks. This practical knowledge will equip students with the necessary skills to handle real-world tasks efficiently, fostering a deeper understanding of the techniques and safety measures required in each shop.

COURSE OUTCOMES

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

1. Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking, and cutting tools & equipment's and machines
2. Explain job drawing and complete jobs as per specifications in allotted time
3. Inspect the job for the desired dimensions and shape
4. Operate, control different machines and equipment's adopting safety practices

DETAILS OF PRACTICAL CONTENTS

1. CARPENTRY SHOP

1.1. Demonstration of different wood working tools / machines.
1.2. Demonstration of different wood working processes, like plaining, marking, chiselling, grooving, turning of wood etc.
1.3. Three jobs involving joint like mortise and tenon, dovetail, bridle, and half lap.

2. *FITTING SHOP*

2.1. Demonstration of different fitting tools and drilling machines and power tools
2.2. Demonstration of different operations like filing, drilling, tapping, sawing, cutting etc.
2.3. Three fitting job involving practice of cutting, chipping, filing, marking, hacksawing, drilling, tapping, etc.

3. *WELDING SHOP*

3.1. Demonstration of different welding tools/machines.
3.2. Demonstration on Arc Welding, Gas Welding, MIG welding, gas cutting and rebuilding of broken parts with welding.
3.3. Two simple job involving butt and lap joint and T. Joint using electric arc welding.

4. *SHEET METAL SHOP*

4.1. Demonstration of different sheet metal tools/machines.

4.2. Demonstration of different sheet metal operations like sheet cutting, bending, edging, and curling, lancing, soldering, brazing, and riveting.

4.3. Three simple job involving sheet metal operations, soldering, and riveting.

4.4. Jobs

4.4.1. Cutting Practices

4.4.2. Single / Double Seam Joint

4.4.3. Cylinders

5. *PLUMBING SHOP*

5.1. Demonstration of different plumbing tools, accessories, valves and different pipe fittings and joints (GI and PVC).

5.2. Demonstration of different plumbing operations like cutting, threading, pipe fitting (GI and PVC).

5.3 One simple job involving pipe cutting and external thread cutting on GI pipe.

6. *PAINTING AND POLISHING SHOP*

6.1. Introduction of paints, Varnishes, Reason for Surface preparation, Advantage of painting, other method of surface coating i.e. Electroplating etc.

6.2. Jobs

6.2.1. To prepare a wooden surface for painting apply primer on side and to paint in the same side.

6.2.2. To prepare metal surface for painting, apply primer and paint on same side.

6.2.3. To Prepare a metal surface for spray painting. First spray primer and paint the same by spray gun and compressor system.

REFERENCES:

1. S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015
2. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
3. J.P. Bhati, Engineering Workshop, C.B.H. Publication, Jaipur.
4. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014
5. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York
6. Roop Lal and Bharadwaj P. K., Prarambhik KaryashalaTakneeki (Hindi), Vayu Education of India, New Delhi

1.7 ENVIRONMENTAL SCIENCE *L T P*

3 - -

COURSE OBJECTIVES:

A diploma holder must have knowledge of different types of pollution caused due to industriesand constructional activities so that he may help in balancing the ecosystem and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. He should know the concept of hazards and disaster management.

COURSE OUTCOMES:

After undergoing the subject, the student will be able to:

- Comprehend the importance of ecosystem and sustainable development.
- Demonstrate interdisciplinary nature of environmental issues
- Identify different types of environmental pollution and control measures.
- Explain environmental legislation acts.
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Analyze the impact of human activities on the environment
- Understand the basic concept of disaster and hazards.
- Analyze the impact of disaster on various social components.

COURSE CONTENT

1. Introduction (06 Periods)

Basics of ecology, eco system- concept, and sustainable development, Resources renewable and non- renewable. Global Warming, Climate change and its impact ,Green House Effect, Acid Rain, Concept of Green Building, Ground water management.

2. Air Pollution and Noise pollution (08 Periods)

Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air Pollution Control Methods. Introduction to Air Pollution and its Prevention and Control Act 1981 & Environmental Protection Act 1986 and Function of State pollution control board and National Green Tribunal (NGT).
Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.

3. Water Pollution and Soil Pollution (11 Periods)

Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollutionon human health, Turbidity, pH, total suspended solids, total dissolved solids, Concept of dissolved O_2, BOD, COD. Prevention of water pollution. Introduction to Water (Prevention and Control of Pollution) Act 1974.Concept of rain water harvesting system.
Sources of soil pollution, Types of Solid waste- House hold, Hospital, From Agriculture,

Biomedical, Animal waste and human waste, sediments and E-waste, Plastic Waste . Effect of Solid Waste, Disposal of Solid Waste, Solid Waste Management.

4. Disaster Causes and Hazards (6 Periods)

4.1 Introduction

4.2 Classification of Natural Disasters

4.3 Classification of Natural Disasters in India

- Earthquake
- Tsunami
- Flood
- Drought
- Land Slide
- Thunderstorm and Lightening

5 Disaster Management (11 Periods)

5.1 Framework

- Yokohama Strategy for a Safer World (1999)
- The Hyogo Framework for Action (HFA) (2005-2015)
- Sendai Framework for Action (SDGS) (2015-2030)

5.2 Disaster Management, Preparedness and Response in India

- National Disaster Management Authority (NDMA) Guidelines
- National Policy on Disaster Management (2009)
- National Disaster Management Act (2005)
- NDRF (National Disaster Response Force), SDRF (State Disaster Response Force), DDRF (District Disaster Response Force), and Aapda Mitra.
- Case studies of disaster management efforts: COVID-19 Pandemic, Earthquakes, Firefighting, Thunder Storm, and Lightning.

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits to green house, effluent treatment plant of any industry, rain water harvesting plant etc. may also be organized.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests,
- Mid-term and end-term written tests

RECOMMENDED BOOKS –

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and DeepPublications, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Science by Deswal and Deswal; DhanpatRai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by ErachBharucha; University Press (India) Private Ltd., Hyderabad.
7. Environmental Engineering and Management by Suresh K Dhamija; S K Katariaand Sons,New Delhi.
8. E-books/e-tools/relevant software to be used as recommended by AICTE/BTE/NITTTR,Chandigarh.
9. Disaster Management Second Edition AICTE Recommended by S C Sharma, Khanna Publishers
10. Bharat Bhautik Paryavaran Class 11, By NCERT.
11. Apda Avem Apda Prabhandhan | आपदा और आपदा ँबंधन | Mahesh Kumar Barnwal | CosmosPublication.
12. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna publishing House, New Delhi

Websites for Reference:

- http://swayam.gov.in
- https://www.amazon.in/Prabhandhan
- https://ncert.nic.in/textbook.php?khgy1=0-6
- https://rb.gy/yergl

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	6	15
2	8	20
3	11	25
4	6	15
5	11	25
Total	**42**	**100**

4- Recourse Requirement

A- LIST OF EQUIPMENT

APPLIED PHYSICS LABORATORY

Sr. No.	Description	Qty	Approx. Price (Rs)	Total
1.	Vernier calipers Working length 160 mm, Internal and external dia with locking arrangement	12	3,000	
2.	Screw Gauges Working length 15 mm, pitch 0.5 mm, least count .005 mm	12	3,000	
3.	Spherometers Distance between legs 2.5 mm, pitch 0.5 mm, least count .005 mm.	12	3,000	
4.	Mirrors (convex, concave and plane)	5 Each	1,500	
5.	Pendulum Setup	03	6,000	
6.	Gravesand's Apparatus	02	4,000	
7.	Double Inclined Plane Setup	02	4,000	
8.	D type Galvanometers Sensitivity: 20 microamperes per scale division,	10	10,000	
9.	Resistance boxes (dial type) assorted	03	3,000	
10.	Rheostats	02	1,000	
11.	Stoke's Apparatus with all accessories	2	10,000	
12.	Resonance Tube Apparatus with accessories and Tuning fork set	2	14,000	
13.	Ohmic resistance coil	10	5,00	
14.	Slide wire bridge with all accessories	2	8,000	
15.	PN Junction diode Apparatus kit	2	10,000	
16.	Numerical aperture setup	1	25,000	
17.	Ohms law setup kit	2	4,000	
18.	Series and parallel resistance combination kit	2	4,000	
19.	Hooks law setup with pan and weights	2	3,000	
20.	Optical bench with all accessories (setup) (with three holder in each setup)	2	7,000	
21.	Mercury Thermometer measuring room temperature (range 0°C to 100°C)	5	3,000	
22.	Coefficient of friction apparatus setup with pan and weights	2	4400	
23.	Kirchhoff's law setup	2	5,000	
24.	Miscellaneous (glycerin, glass slab for Snell's law, convex lens, optical fiber, bar magnet, compass needle, carbon composition resistors as per requirement .	LS	25,000	
25	Digital Multimeter (AC & DC current & Voltage can be measured, resistance & capacitance can be measured .	05	10,000	

Sr. No.	Description	Qty	Approx. Per Unit Price (Rs)
1.	Digital Balance	1	85,000
2.	Burette 50ml	30	250
3.	Pipette 25ml	60	200
4.	Beakers 100ml	60	200
5.	Burette stand	30	1,000
6.	Glazed tile	30	30
7.	Conical flask 50ml (Titration flask)	60	200
8.	Standard measuring flask 250/100ml	30	300
9.	Able's Flash Point apparatus	2	8,000
10.	(1/10)°C thermometer	06	1,000
11.	Candles	20	5
12.	Crucible with lid	06	700
13.	Muffle furnace	1	25,000
14.	Desiccator	06	3,000
15.	Pair of tongue (small and big)	24 (small) 2 (big)	150 200
16.	Digital hot plate with magnetic stirrer	2	17,000
17.	Conductivity meter with electrode	1	5,000
18.	Photo colorimeter	1	10,000
19.	Bomb calorimeter	1	1,30,000

20.	Ammeter (0-500mA)	5	800
21.	Rheostat (200ohm, 1A)	1	1,000
22.	Cuvette	20	800
23.	Copper electrode	1	6,500
24.	Salt bridge tube	5	800
25.	Zinc rod	1	1,000
26.	Voltameter (0-12V)	1	700
27.	DC variable voltage source(0-30V)	1	8,000
28.	Chemicals - EDTA-1 kg - Eriochrome Black-T(solochrome black T)-200g - Buffer solution (NH_3 - 2.5 ltr, NH_4Cl – 1 kg) - Zinc sulphate- 1kg - H_2SO_4- 2.5 ltr - Phenolphthalein indicator (as per requirement) - Methyl orange indicator (as per requirement) - Charcoal (as per requirement) - Kerosene (as per requirement) - KCl & agar-agar - Distilled water (as per requirement) - Cement - Ferrous ammonium sulphate - 40%Ammonium thiocyanate - Fuels(solid & Liquid) - Oxalic acid - Copper sulphate - NaOH - $KMnO_4$, Na_2CO_3, KOH, 2-Propanol - Hematite ore, copper pyrite ore - Hypo($Na_2S_2O_3$) , 10% KI, CH_3COOH	LS	40,000
29.	Miscellaneous	LS	10,000

COMMUNICATION LAB

Sr. No.	Description	Qty	Approx. Total Price (Rs)
1.	Stools	40	10,000
2.	Display Board/Screen	2	6,000
3.	Sound recording and playing system	1	6,000
4.	Audio cassettes	60	2,000
5.	Overhead Projector	1	5,000
6.	Transparencies slides	100	500
7.	TV, VCR and camera for video recording	1 each	20,000
8.	English spoken course	1	2,000
9.	A Quiz room equipped with two way audio system, back projection system and slide projector	1	30,000
10.	Miscellaneous	LS	1,500

ENGINEERING WORKSHOP PRACTICE

S.No.	Description	Qty.	Approx. Total price (Rs.)
	CARPENTRY SHOP		
1.	Work benches fitted with 4 carpenter vices 9"	5	60,000
2.	Circular saw grinder	1	6,000
3.	Wood cutting band saw-vertical	1	10,000
4.	Bench grinder	1	5,000
5.	Bench drilling machine with different drill bits	1	8,500
6.	Wood turning lathe machine	1	40,000
7.	Wood planner	1	20,000
8.	Tool accessories measuring and marking instruments	25	25,000
9.	Band saw blade brazing unit	1	10,000
10.	Miscellaneous	LS	1,500

PAINTING AND POLISHING SHOP			
1	Spray gun 1 Ltr. cup capacity with hose pipe	1	3,000
2	Paint brushes & rollers	20	3,000
3	Paint/varnish	LS	2,000
4	Air compressor with 2 hp motor	1 set	21,000
5	Miscellaneous	LS	2,000
WELDING SHOP			
1.	Electrical welding transformer set with accessories	3	30,000
2.	Gas cutting unit	1	3,000
3.	Work benches with vices	3	5,000
4.	Portable welding machine (220 amp)	1	9,000
5.	Oxy acetylene welding set with accessories	1	7,000
6.	Acetylene generating set	1	6,000
7.	Electric welder tool kit	10	10,000
8.	Projection welding machine	1	15,000
9.	Brazing equipment with accessories	1	10,000
10.	Soldering irons	3	1,000
11.	Pedestal grinder	1	3,000
12.	Angle grinder	1	3,000
13.	Metal spraying gun	1	10,000
14.	Spot welding machine	1	25,000
15.	Tig welding set	1	1,00,000
16.	Mig welding set	1	1,00,000
17.	Welding partition screen	5	2,500
18.	Miscellaneous	LS	3,000

	BUILDING AND PLUMBING SHOP		
1.	Work benches with vices (4 vices on each bench)	5	60,000
2.	Marking tables with scribers	4	24,000
3.	Surface plates	5	20,000
4.	Accessories like calipers, v blocks, height, gauges steel rules and scribers	25	50,000
5.	Tool kits —taps, dies, drills, number punch, letter punch	25	40,000
6.	Tool kits — chisels, hammers, files, hacksaw	25	25,000
7.	Bench drilling machine 3 phase	1	10,000
8.	Hand drill machine	1	5,000
9.	Pipe vice	2	10,000
10.	Chain wrenches	2	2,000
11.	Bench grinder	1	6,500
12.	Ring spanner set	5	600
13.	Pipe die set 2"	2 set	2,000
14.	Pipe bending device	1	5,000
15.	Various plumbing fittings	LS	2,000
16.	Miscellaneous	LS	1,500
	SHEET METAL SHOP		
1.	Hammers	8	3,000
2.	Mallets (hard & soft)	5	2,000
3.	Sheet and wire gauges	2	8,00
4.	Hand shearing machine	1	20,000
5.	Bar folding machine	1	20,000
6.	Burring machine	1	10,000
7.	Various sheet (black plain, galvanized iron)	1 Each	1,000
8.	Hand shears/snippers	4	2,000
9.	Nuts, bolts, rivets, screw	LS	1,000
10.	Miscellaneous	LS	2,000

S.N.	Name of Equipment	No. of Equipment	Approx. Total Price
1	Computer System with latest configuration	30	21,00,000
2	Printer (MFP)	1	25,000
3	Printer (Laser)	1	35,000
4	Antivirus Software	LS	10,000
5	Internet Facility on Computers	LS	2,00,000
6	LCD Projector	1	70,000
7	UPS	30	60,000
8	Software (latest MS Office, Others) A4,A3 Size	1	1,00,000
9	Scanner (A4,A3 Size)	1	10,000

Fundamentals of Electrical and Electronics Engineering Lab

S.N.	Instruments	Quantity	Approx. unit price (Rs.)
1	Voltmeter	6	3000
2	Ammeter	6	3000
3	Wattmeter	6	4000
4	Single Phase Transformer	1	10000
5	Single Phase Variac	1	4000
6	Resistive Load	1	4000
7	Digital Multi-meter	6	10000
8	Variable Choke coil	1	5000
9	Bread board	5	500
10	Soldering stations temperature controlled	1	10500
11	Soldering Set	2	3000
12	PN junction experimental kit	1	3500
13	Digital logic trainer	2	20000
14	Miscellaneous (PN junction diodes, resistors, capacitors, CRO probes, multipurpose PCB, connecting wires, different logic gate ICs, etc.)	LS	7000
15	Decade resistors, capacitors and inductor box	2 each	4500
16	D.C regulated power supply	2	8000
17	CRO	2	30000
18	Function Generator	2	12000

Sr No.	Instruments	Qty.	Approx. unit Price in Rs.
1.	Drawing Boards (700 x 500mm)	60	800
2.	Draughtsman Tables	60	3,000
3.	Draughtsman Stools	60	750
4.	Computer Aided Drawing (CAD) Software	30 User	5,00,000
5.	Wooden Model of different solids- cone, cylinder, prism, and polygon.	1set	2,000
6.	Wooden Model of different hollow cut sections- cylinder, cube, and Rectangle.	1set	1,500
7.	Miscellaneous	LS	10,000

Note- This subject will be evaluated as a theory examination.

B - Furniture Requirement

Norms and standards laid down by AICTE -APH (latest) be followed for working out furniture requirement for diploma courses

C- Human Resources:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE.

THEORY	3.1 OPERATING SYSTEMS	L	T	P
		3	-	-

COURSE OBJECTIVES

A general introduction to various ideas in implementation of operating systems, particularly introduction to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Understand functional architecture of an operating system.

CO2: Understand process management and distinguish CPU scheduling algorithms. CO3: Understand the concept of memory management.

CO4: Understand I/O System and distinguish Disk scheduling algorithms CO5: Classify File System and directory implementations.

COURSE CONTENT

UNIT 1: Overview of Operating System (6 Periods)

Introduction, Different types of OS, Functions & Services of OS, UNIX/LINUX Architecture, Kernel, Services and systems calls, System programs.

UNIT 2: Process Management: (10 Periods)

Process concepts, Operations on processes, CPU Scheduling, Scheduling Algorithms, IPC, Process synchronization, critical section, Deadlock, Condition, Avoidance & Prevention.

UNIT 3: Memory Management: (10 Periods)

Memory allocation, First Fit, Best fit & Worst Fit, Swapping, Paging and Segmentation, Page faults, Page Replacement Algorithm, Fragmentation & Compaction, Concept of virtual Memory.

UNIT 4: I/O System: (8 Periods)

Mass storage structure - Overview, Disk structure, Disk attachment, Disk scheduling algorithms, swap space management, RAID types.

UNIT 5: File management: (8 Periods)

Concept of a file, access methods, directory structure, file system mounting, file sharing and protection, file system structure and implementation, directory implementation, free- space management, efficiency and performance. Different types of file systems.

Reference Books:

1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited
2. UNIX Concepts and Applications, Sumitbha Das, McGraw-Hill Education
3. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India
4. Operating System Concepts, Ekta Walia, Khanna Publishing House
5. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India
6. Operating systems, Deitel & Deitel, Pearson Education, India

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	14
2.	10	25

3.	10	25
4.	08	18
5.	08	18
Total	**42**	**100**

		L	T	P
THEORY	3.2 DATA BASE MANAGEMENT SYSTEM	3	-	-

COURSE OBJECTIVES

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Describe

fundamentals of DBMS, its installation and working.

CO2: Understand the concept of keys and various data model.

CO3: Understand relational model and relational algebraic operations. CO4: Designing a

Relational Database

CO5: Apply SQL commands to create, insert, retrieve, update, delete data from the Relational databases.

COURSE CONTENT

UNIT 1: Introduction (6 Periods)

Database System Concepts and Architecture, Components of DBMS, Table Structure, Schema definition, ,Three views of Data (External View, Conceptual View, Internal View).

UNIT2: Data Model and Keys: (8 Periods)

Define data model, Data Models : Network Model Hierarchical Model, E-R Model, Advantage & Disadvantages of each Data Model, Concept of Keys (Primary, Candidate, Super, Foreign **),** Constraints, Strong Entity Set and Weak Entity Set.

UNIT 3: Relational Model: (10 Periods)

The Relational Data Model and Relational Database Constraints; ER/EER to Relational Model mapping; Relational Algebra and Relational Calculus, Relations algebra (Basic operation: Union intersection difference and Cartesian product), Additional Relational Algebraic Operations (Projection, Selection rows, Division, rename and join)

UNIT 4: Relational Database Design : (10 Periods)

Functional dependencies and normalization for relational databases, Types of Normalization (1NF, 2NF, 3NF, multivalued dependencies and BCNF, Forth Normal Form, Fifth Normal Form).

UNIT 5: SQL/MySQL: (8 Periods)

MySQL data types – Data Definition Commands – Data Manipulation Commands – Data Retrieval Commands, Types of operators – Arithmetic, Comparison and Logical Operators

Reference Books:

1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India.
4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	10
2.	08	25
3.	10	25
4.	10	25

5.	08	15
Total	**42**	**100**

		L	T	P
PRACTICUM	3.3 COMPUTER NETWORKS	3	-	2

COURSE OBJECTIVES

Understand functioning of computer networks and popular networking protocols

COURSE OUTCOMES:

CO1: Explain the fundamental concepts of data communication. CO2: Describe the functionalities of the physical layer and Data Link

CO3: Understanding the concept of IP address and key protocols of the Network Layer CO4: Describe the functionalities of the transport layer.

CO5: Recognize various network devices and network management system.

COURSE CONTENT:

UNIT 1: Introduction : (06 Periods)

Introduction to computer networks; Network Models- OSI Reference Model, TCP/IP Model;

Practical Exercise

1. Study of any Network simulation tool (Wireshark, Cisco Packet Tracer, NS-2, GNS3 etc)
2. To understand and practically observe how the data travels through OSI layers using network tools (Wireshark, Cisco Packet Tracer, NS-2, GNS3 etc)

UNIT 2: Data Communication and Communication Methodologies : (10 Periods)

Transmission Media – principles, issues and examples; Wired Media – Coaxial, UTP, STP, Fiber Optic Cables; Wireless Media – HF, VHF, UHF, Microwave, Ku Band; Network topologies; Data Link Layer – design issues, example protocols (Ethernet, WLAN, Bluetooth); Switching Techniques

(Circuit, Packet, Message)

Practical Exercise

1. Showing various types of networking cables and connectors, identifying them clearly
2. Looking at specifications of cables and connectors of various companies on Internet, find out dif- ferences.
3. Making patch cords using different types of cables and connectors - crimping, splicing, etc
4. Demonstration of different type of cable testers, using them for testing patch cords prepared by the students in Lab and standard cables prepared by professionals

UNIT 3: Network Layer : (10 Periods)

Network Layer – design issues, example protocols (IPv4); Concept of IPV6, Routing principles / issues, algorithms (Distance - vector, Link-state) and protocols (RIP, OSPF);

Practical Exercise

1. Configuring computing devices (PC, Laptop, Mobile, etc) for network, exploring different op- tions and their impact – IP address, gateway, DNS, security options, etc

UNIT 4: Transport Layer: (08 Periods)

Transport Layer – design issues, example protocols (TCP/UDP); Application Layer Protocols (SMTP, DNS)

Practical Exercise

1. TCP communication between two devices

UNIT 5: Network Devices (08 Periods)

Functioning of Network Devices – NIC, Hub, Bridge, Switch, Router, WiFi Devices; Network Management System and example protocol (SNMP).

Practical Exercise

1. Showing various networking devices – NICs, Hub, Bridge, Switch, Router, Gateway, WiFi access point, etc.
2. Looking at specifications of various networking devices various companies on Internet, find out differences.

REFERENCE BOOKS:

1. Computer Networks, 4th Edition (or later), Andrew S. Tanenbaum, PHI
2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addision Wesley
3. Data and Computer Communications, William Stallings, PHI
4. An Engineering Approach to Computer Networking, S. Keshav, Addision Wesley/Pearson
5. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House
6. Behrouz A Forouzan, Data Communications and Networking , Mc Graw Hill Publications.
7. Data Communication & Networking by Behrouz A. Forouzan 5th Edition
8. Cisco press books on CCNA
9. User manual of networking devices available in the lab
10. Wiki pages on networking devices

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	12
2.	10	25
3.	10	25
4.	08	25
5.	08	13
Total	**42**	**100**

PRACTICUM	3.4 WEB TECHNOLOGIES	L	T	P
		1	-	4

COURSE OBJECTIVES

This course will enable the students to understand and develop competency amongst the students to design professional database backed dynamic and feature based web sites. The course covers the use of programming with PHP applications. The main objective for this course is to motivate student's interest in learning Web-app development by giving them an insight into its possibilities through practical applications. In addition, the course also provides a sufficiently broad but practical introduction to Server- side web technologies.

COURSE OUTCOMES

At the end of the course students will be able to
CO1: Analyze a webpage and identify its elements and attributes.

CO2: Create webpages using HTML
CO3: Using Cascading Style Sheets to create webpages.

CO4: Build dynamic webpages using JavaScript (Client-side programming). CO4: Build dynamic webpages using PHP (Server-side programming).

COURSE CONTENT

Unit 1: Web Development Introduction (2 Periods)

WWW, Internet, Browser, Search engine Client Server Model, URL, Web Pages, Website and Web Services, Types of Websites (Static, Dynamic and Responsive), Developer options of Browser (View page source, Developer Tools, Inspect Element etc)

Practical Exercise:

1. Install, configure and start using developer tools /Code Editor/Browser.
2. *Pick any three websites and categorize them as Static, Dynamic, or Responsive with reasons for your classification*
3. *List the 5 web browser and search engine .*
4. *Open any website using Chrome Developer Tools. Modify the text and background color of a paragraph and take a screenshot.*

Unit 2: HTML Basics (3 Periods)

HTML Document, Basic Structure of HTML, Syntax, HTML Tags and Attributes, Types of HTML Tags, Rules of nesting, Basic Tags (HTML Tag. Head Tag, Title Tag, Body Tags).

Page Formatting: Adding a new Paragraph, Adding a line break, Inserting a blank space, changing page background, Div and Span tags

Text Formatting: Html Headings, Formatting elements (<b> Bold text, Important text,<i> Italic text, Emphasized text, <mark> Marked text, <small> Small text, <del> Deleted text, <ins>

Inserted text, <sub> Subscript text, <sup> Superscript text), Comments, Horizontal Lines

Creating Lists: Ordered List, Unordered Lists, Definition Lists Others: Images, Text Links, Image Links, opening a page in New Window or Tab, Linking to an area of same page, Introduction to Table Tags, Frames & I frame, HTML Forms

Practical Exercise:

1. Create an HTML file that contains your name, a brief bio, an image, and a list of hobbies.
2. Design an HTML table listing five products with their names, prices, and descriptions. Add proper column headers and styling.
3. Build an HTML form with fields for name, email, message, radio buttons for gender, a checkbox for subscribing to newsletters, and a submit button.

Unit 3: Cascading Style Sheets (3 Periods)

Introduction, Benefits of CSS, CSS Syntax, CSS Implementation (inline, internal and external), CSS Selectors (ID Selectors, Class Selectors, Grouping Selectors, Universal Selectors, CSS Pseudo-classes), CSS properties (background-color, background-image, border-style, height, width, color, text-align, font-family, font-style, font-size, font- weight), Box Model in CSS (margin, border, padding)

Practical Exercise:

1. Create an HTML file and use CSS to style elements using element selectors, class selectors, ID selectors, and pseudo-classes.
2. Create a navigation bar using Flexbox. The navigation bar should contain a logo and several navigation links, evenly spaced and aligned.
3. Create a webpage layout using CSS Grid. The layout should have a header, a sidebar, a main content area, and a footer..

Unit 4: Java Scripts (3 Periods)

Java Script Introduction , variables , data types , operators, control flow (if-else, for loop, while loop, do-while loop), Declaring Functions, Calling functions with parameters, Adding JavaScript to Web Documents, JavaScript Objects, Document Object Models, HTML Events and calling Java Script functions on Events.

Practical Exercise:

1. Write a JavaScript program that checks a user's input password and categorizes it as Weak, Medium, or Strong based on length.
2. Validate a form to ensure that the user has entered a valid email and password (minimum 8 characters, at least one number).

Unit 5: PHP (3 Periods)

Server side scripting, Arrays, function and forms, advance PHP Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table- names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs.

Practical Exercise:

1. Practicing PHP: Basics
2. Practicing PHP: Web Development Application
3. Practicing PHP: MySqL
4. Installation of WAMP/XAMPP Server

Reference Books:

1. "Web Technologies- A Computer Science Perspective", Jeffrey C Jackson
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. Web Applications: Concepts and Real World Design, Knuckles.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	10
2.	03	25
3.	03	15
4.	03	25
5.	03	25
Total	**14**	**100**

PRACTICAL	3.5 OPERATING SYSTEMS (Lab)	L	T	P
		-	-	2

COURSE OBJECTIVES

A general introduction to various ideas in implementation of operating systems, Introduction to various options available so as to develop capacity to compare, contrast, and evaluate the key trade- offs between different design choices.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Understand installation of operating system.

CO2: Understand process management and distinguish CPU scheduling algorithms. CO3: Understand the concept of memory management.

CO4: Understand I/O System and distinguish Disk scheduling algorithms CO5: Classify File System and directory implementations.

S.No.	NAME OF EXPERIMENT
1.	Practice of various Linux/ Unix commands like man, cp, mv, ln, rm, unlink, mkdir, rmdir, etc.
	Format and Install Windows Operating System.
2.	

Use Task Manager to monitor and terminate processes.
Understand process priorities.

3.

4. Simulate the following CPU scheduling algorithms.
   a) FCFS b) SJF c) Round Robin d) Priority.

5. Simulate the concept of Dining-philosophers problem.

6. Simulate Bankers Algorithm for Deadlock Avoidance

7. Simulate Bankers Algorithm for Deadlock Prevention

8. Write a program to simulate the following contiguous memory allocation Techniques
   a) Worst fit b) Best fit c) First fit.

9. Simulate all page replacement algorithms
   a) FIFO b) LRU c) OPTIMAL

10. Write a program to simulate disk scheduling algorithms.
    a) FCFS b) SCAN c) C-SCAN

11. Simulate all File Organization Techniques
a) Single level directory b) Two level directory

12. Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked.

PRACTICAL	3.6 DATA BASE MANAGEMENT SYSTEM (Lab)	L	T	P
			-	4

COURSE OBJECTIVES

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Installation

of database system.

CO2: Creating an database.

CO3: Record handling in a database. CO4:

Retrieving data from a database

CO5: Handle various operations of a database through case studies

S.No.	NAME OF EXPERIMENT
1.	Install and configure a database system (MySQL through XAMPP Server, MySQL, PostgreSQL, or SQLite)

Design an ER Model for a Library Management System

2. Study of the different properties present in an ER Model

3.

4. Creating Database

Creating a database
Creating a table
Specifying relational data types
Specifying constraints
Creating indexes

5. Table and Record Handling

INSERT statement
Using SELECT and INSERT together
DELETE, UPDATE, TRUNCATE Statement.
DROP, ALTER statement

6. Retrieving Data From a Database The SELECT statement

Using the WHERE clause
Using Logical Operators in the WHERE clause
Using In, BETWEEN, LIKE, ORDER BY, GROUP BY & HAVING clause
Using Aggregate Functions Combining Tables
Using JOINS

7. Case Study 1: SQL - Library Management System Scenario:

An institute manges a Library Management System with following column
BookID, Title, Author_Name, Year_of_publication, Publisher_name, Subject, MemberID, (You may add other fields also)

Task:

Design and implement a database for a library management system.
The library wants to track information about its books, members, authors, and publishers.

1. Retrieve the names of all books with specific author “A”
2. Retrieve the names of books of particular subject “X”
3. Decrease the book count by 1 from the table for BookID =”101”
4. Add a new member in the database

8. Case Study 2: SQL – Employee Database

Scenario:

An organization maintains an employee database with the following columns: EmployeeID,

FirstName, LastName, Department, Salary, JoiningDate

Task:

1. Retrieve the names of all employees in the "Sales" department.
2. Find all employees who joined after January 1, 2020.
3. Update the salary of employee EmployeeID = 102 by 10%.
4. Delete an employee record where EmployeeID = 105.

Case Study 3: SQL – Bookstore Inventory

Scenario :

9. **A bookstore stores information about books in the following columns: BookID, Title, Author, Price, Genre, StockCount.**

Task:

1. List all books in the "Science Fiction" genre.
2. Find all books priced greater than 200.
3. Increase stock count by 5 for all books authored by "John Doe".
4. Remove a book from inventory with BookID = 201

Case Study 4: SQL – Student Grades Database

10. **Scenario:**
A school database stores students' grades with columns: StudentID, FirstName, LastName, Subject, Grade.

Task:

1. Retrieve the names of all students with an "A" grade in the subject "Math".
2. Find the average grade of all students in the "English" subject.
3. Update the grade for StudentID = 103 in "History" to "B+".
4. Delete all records for students who have failed in "Science" (Grade: "F").

		L	T	P
PRACTICUM	3.7 COMPUTER PROGRAMMING USING- C	1	-	4

COURSE OBJECTIVES

To enable student, develop structured solutions to problems and implementing them using computers. This involves two parts: i) Formulating a solution for a given problem as a well-defined sequence of actions, and ii) Expressing solution in a machine-readable form or a programming language. For the second part, we will learn the common units of programming languages. The first part can only be learned through the repeated practice of solving problems.

COURSE OUTCOMES

At the end of the course, students will be able

CO1: Demonstrate knowledge on C Programming concepts. CO2: Develop

simple programs in C using basic constructs.

CO3: Develop C programs using conditional and looping concepts CO4: Understand the

concept of multi-dimensional array and strings.

CO5: Design modular C programs with reusable functions and pointers to improve code readability and maintainability.

COURSE CONTENT

UNIT 1: Introduction to Problem Solving: (2 Periods)

Computational way of thinking, Flowchart and Algorithm, Variable, constant and Representation, Data Types,

Keywords, Identifier.

Practical Exercise:

1. *Installation of C Compiler*
2. Familiarization with programming environment and options/menu of the installed compiler.
3. *Draw a Flowchart using MS Word (or any other editor or online tools like Draw.io etc.)*

UNIT 2: Operators & Expression: (3 Periods)

Arithmetic, Relational, Logical and Bitwise Operators, Input, Output, Expressions, Data Type Casting

Practical Exercise:

1. Programs using I/O statements and various operators

   a. *WAP to print your name*
   b. *WAP to perform various arithmetic and logical operators.*
   c. *WAP to swap two numbers with and without using third variable*

2. Programs using expression evaluation and precedence

   a. *WAP using unary and tertiary operators*
   b. *WAP using post and pre - increment operators*

UNIT 3: Conditional & Looping Statements: (3 Periods)

if, if-else, if-else ladder, switch–case, break and continue, Loops: for, while and Do-while and Nested Loops.

Practical Exercise:

1. Programs using decision making statements and branching statements

   a. *WAP to check whether the given number is odd or even*
   b. *WAP to check whether a given number is Prime or not.*
   c. *WAP to find the largest among the given three numbers*

2. Programs using loop statements

   a. *WAP to find the factorial of a given number*
   b. *WAP to print table of a given number*
   c. *WAP to to print all prime numbers from 1 to 100*
   d. *WAP to print Fibonacci series till a given number n*
   e. *WAP to print different star patterns*

UNIT 4: Arrays & String: (3 Periods)

Introduction to Arrays, Array Declaration, Length of array, Manipulating array elements, Single and Multidimensional Array, Arrays of characters, Introduction of Strings, String declaration and definition, String Related function i.e. strlen, strcpy, strcmp,.

Practical Exercise:

1. Programs to demonstrate applications of n dimensional arrays

   a. *WAP to print 3 x 3 matrix.*
   b. *WAP to print the transpose of a 3 x 3 matrix.*
   c. *WAP to add two matrices.*

2. Programs to demonstrate use of string manipulation functions

   a. *WAP to find the length of a given string*
   b. *WAP to concatenate two strings*
   c. *WAP to check whether the given string/number is palindrome or not*

UNIT 5: **Function & Pointer:** (3 Periods)

Introduction to functions, Global and Local Variables, Function Declaration, Function Call and Return, Types of Functions, Standard functions, Introduction to Pointer, Parameters and Parameter Passing, Call-by value/reference, recursive function, I/O and Formatting

Practical Exercise:

1. Programs to demonstrate parameter passing mechanism
   a. *Create a user defined function to add two numbers.*
   b. *WAP to implement call by value*
   c. *WAP to implement call by reference*
2. Programs to demonstrate recursion
   a. *WAP to print the factorial of a given number using recursion.*
3. Programs to demonstrate use of pointers
   a. *WAP to print the address of variable using pointer*
   b. *WAP to swap the contents of two variable using pointer.*

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.
7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	20
2.	03	20
3.	03	20
4.	03	20
5.	03	20
Total	**14**	**100**

3.8 SUMMER INTERNSHIP (4 weeks after 2nd Sem.)

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is Summer Internship, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised Summer Internship of 4 weeks duration to be organized during the semester break starting after first year i.e. after 2nd semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that an internship schedule may be drawn for each student before starting of the internship in consultation with the internship providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization. Equally important with the guidance is supervision of students internship in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on. An external assessment of **50 marks** has been provided in the study and evaluation scheme of 3rd Semester. Evaluation of professional Summer Internship report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. Teachers and students are requested to see the footnote below the study and evaluation scheme of 3rd semester for further details.

The teacher will conduct performance assessment of students. The components of evaluation will include the following:

a) Punctuality and regularity 15%

b) Initiative in learning new things 15%

c) Presentation and VIVA 15%

d) Industrial training report 55%

FOURTH SEMESTER

		L	T	P
THEORY	4.1 DATA STRUCTURES USING C	3	-	-

COURSE OBJECTIVES

To provide strong foundation for implementing programming language to formulate, analyze and develop solutions related to various data structures problems.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Understand

the fundamental data structures

CO2: Apply the operations of stack and queue CO3:

Understand the concepts of linked lists

CO4: Implement various sorting and searching techniques CO5:

Illustrate tree and graph traversal techniques

COURSE CONTENT

UNIT 1: Introduction to Data Structures: (6 Periods)

Basic Terminology, Classification of Data Structures, Operations on Data Structures.

UNIT 2: Linear Data Structures- Stacks (10 Periods)

: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks- Infix-to-Postfix Transformation, evaluating Postfix Expressions.

Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues- DeQueue, Circular Queue, Applications of Queues.

UNIT 3: Linked Lists: (07 Periods)

Singly Linked List, Representation in Memory, Operations on a Single Linked List, Circular Linked Lists, Doubly Linked Lists

UNIT 4: Sorting : (07 Periods)

Introduction to different sorting techniques - Bubble sort, Insertion sort, Quick sort and Merge Sort
Searching: Symbol Tables, Linear Search, Binary Search, Hash Tables.

UNIT 5: Trees: (12 Periods)

Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals, Types of Binary Trees, binary tree traversals: in-order, pre-order, post-order. Various operations of Binary Search Tree, B Tree and AVL Tree.

Graph: Graph Terminologies, Representation of Graphs- Adjacency List, Adjacency Matrix, Graph Traversals.

REFERENCE BOOKS:

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi

2. Data Structures Using C, Reema Thareja, Oxford University Press India
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw- Hill Education,India

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	15
2.	10	20
3.	07	20

4.	07	20
5.	12	25
Total	**42**	**100**

		L	T	P
THEORY	4.2 SOFTWARE ENGINEERING	3	-	2

COURSE OBJECTIVES

The system analysis and design is the backbone of Application software development. After studying the subject the students will be able to develop and design the system according to given requirements. It involves various steps in analysis and design of the system. It includes the knowledge of preparing project systematically. It is important to know about various aspects of the system analysis and design so that the students will be able to understand the responsibilities while designing and implementing the project.

COURSE OUTCOMES

After successful completion of this course, the student will be able to CO1: Understand the basic concepts of software development.

CO2: Classify life cycle models and their comparison

CO3: Will be able to write the SRS for the given problem and project planning estimation techniques. CO4: Explain various software design strategies

CO5: Explain about different testing methods, need for testing.

COURSE CONTENT

Unit 1: Introduction to Software Engineering (8 Periods)

System Concepts: Types of systems : (open, closed, static and dynamic systems), Basics of Software Engineering : Need for Software Engineering – Definition, Programs v/s Software Products, Software Characteristics.

Unit 2: Software Life Cycle Models (8 Periods)

Requirement of Life Cycle Model, Classic Waterfall Model, Prototyping Model, Evolutionary Model, Spiral Model, Introduction to agile methodology.

Practical Exercise:

1- Perform comparative analysis of various Models

Unit 3: Software Planning, Requirement Analysis and Specification (10 Periods)

Requirement gathering and Analysis, Software Requirement Specifications(SRS), Characteristics of good SRS., Metrics for Project Size Estimation- LOC(Lines of Code), Function Point Metric, Project estimation Techniques- Using COCOMO Model, Responsibilities of Software Project Manager.

Practical Exercise:

1. Develop a SRS on a given topic/project/problem.

Unit 4: Software Design and Implementation (8 Periods)

Characteristics and features of good Software Design Cohesion and Coupling, Software design Approaches- Function Oriented Design (Data flow diagrams, Data dictionary, Decision Trees and tables), Object Oriented Design, Structured Coding Techniques, Coding Styles, and documentation

Practical Exercise:

1- Develop DFD Model (level 0 and level 1 DFD) of the problem.

Unit 5: Software Testing and Maintenance (8 Periods)

Concept of Testing, Unit Testing, Black Box Testing, White Box Testing, alpha , beta testing, Integration testing, System testing, Testing type cycle (V-Model), Verification v/s Validations, Configuration management, Overview of test cases.

Practical Exercise:

1- Use of testing tools such as J-meter, Canoo Web Test
2. Write test cases for any known application

RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi
2. An Integrated Approach to Software Engineering by Pankaj alote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi
4. Software Engineering by KK Aggarwal and Yogesh Singh

5. Software Engineering – A Practitioner's Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	08	20
2.	08	20

3.	10	20
4.	08	20
5.	08	20
Total	42	100

		L	T	P
THEORY	**4.3 INTRODUCTION TO e-GOVERNANCE**	**2**	**-**	**-**

COURSE OBJECTIVES

To cover the concepts of e-Governance and to understand how technologies and business models shape the

contours of government for improving citizen services and bringing in transparency.

COURSE OUTCOME:

CO1: Exposure to various e-Governance lifecycle.

CO2: Introductory ideas of and practices followed in e-Governance initiatives in India. CO3: Understanding the architecture and various models of e-governance

CO4: Introduction to various e-government projects.

CO5: Analysis and evaluation of various e-governance projects.

COURSE CONTENT

UNIT 1: Introduction: (4 Periods)

Exposure to emerging trends in ICT for development; Understanding of design and implementation of e- Government projects, e-governance lifecycle.

UNIT 2: Government Process: (5 Periods)

Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules

UNIT 3: Architecture and models of e-Governance (7 Periods)

Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for In- novation and Change Management in e- Governance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT 4: e-Governance projects: (7 Periods)

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

UNIT 5: Mini Projects: (5 Periods)

Mini Projects by students in groups – primarily evaluation of various e-governance projects.

Reference Books:

Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India
The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India http://www.csi-sigegov.org/publications.php
https://negd.gov.in
https://www.nisg.org/case-studies-on-e-governance-in-india

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	04	18
2.	05	18
3.	07	25

4.	07	25
5.	05	14
Total	**28**	**100**

4.4 PROGRAM ELECTIVE-1

		L	T	P
THEORY	**(a) COMPUTER SYSTEM ORGANIZATION**	**3**	**-**	**-**

COURSE OBJECTIVES

To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers. To identify the elements of modern instructions sets and their impact on processor design. To explain the function of each element of a memory hierarchy. To identify and compare different methods for computer I/O.

COURSE OUTCOMES:

CO1: Understand the basic architecture of computer and number systems.
CO2: Understand concept of Logic Gates and Boolean Algebra.
CO3: Introduction to different combinational circuits.
CO4: Introduction to assembly language programming and microprocessor CO5: Understanding Memory and Digital Interfacing

COURSE CONTENT

UNIT 1: Structure of Computers: (8 Periods)

Computer Functional units, Von-Neumann architecture, Bus structures, Basic Operational Concepts Number System: Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa, Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction, Error detecting codes.

UNIT2: Logic Gates and Simplification: (9 Periods)

Concept of negative and positive logic, Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates, SSI, MSI, LSI, VLSI (Definition), Propagation delay, Noise Margin, Fan in, Fan out, Power dissipation, Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates, Karnaugh map (upto 4 variables).

UNIT 3: Introduction to combinational circuit: (9 Periods)

Multiplexer, De-multiplexer, Encoder, Decoder block diagram and Circuit, 7 segment decoder, BCD Encoder Circuit, Half adder and Full adder circuit, design and implementation, Half subtractor and Full subtractor or Circuit, design and implementation.

UNIT 4: Introduction to Microprocessor Architecture: (8 Periods)

Instruction Set Architecture design principles from programmer's perspective. One example microprocessor (Intel, ARM, etc).

Assembly Language Programming: Simple programs, Assembly language programs involving logical,

branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT 5: Memory and Digital Interfacing: (8 Periods)

Addressing and address decoding, interfacing RAM, ROM, EPROM, programmable peripheral interface, various modes of operation and interfacing to processor, inter- facing keyboard, displays, etc.

Reference Books:

1.1. Computer System Architecture, M. Moris Mano, Pearson/PHI, India.

1.2. Microprocessors Interface, Douglas V.Hall, Tata McGraw-Hill.

1.3. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, McGraw-Hill

1.4. Advanced Microprocessors and Peripherals- Architecture, Programming and interfacing, A.K.Ray, K.M.Bhurchandi, Tata McGraw-Hill, New Delhi, India.

1.5. Computer Organization and Design: A Hardwar/Software Interface (MIPS Etion) by Patterson and Hennessy

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	08	20
2.	09	20
3.	09	20
4.	08	20
5.	08	20
Total	42	100

4.4 PROGRAM ELECTIVE-1

		L	T	P
THEORY	(b) FOSS (FREE AND OPEN SOURCE SOFTWARE)	3	-	-

COURSE OBJECTIVES

The Free and Open Source Software (FOSS) course is designed to familiarize students with the development process using free and open source software, which includes Linux operating system, service configuration management, application software, and development tools.

COURSE OUTCOME

CO1: Understanding basic introductory concept of Open-Source Software CO2: Hands on with Linux Operating System
CO3: Working with Different Open Source Software.
CO4: Understanding Mobile Programming and Project Management Tools.

COURSE CONTENT

UNIT 1: **Introduction:** (12 Periods)

FOSS PHILOSOPHY Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free software, open source software, FOSS Licensing Models, FOSS examples

UNIT 2: **Basics of LINUX**: (10 Periods)

Linux Installation and Hardware Configuration, Boot Process, Dual-Booting Linux and other Operating Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server)

UNIT 3: **Programming Tools and Techniques**: (12 Periods) Libreoffice Tools; Samba: Cross platform; Introduction about LAMP; Brief Introduction to Programming using languages like Java /Python / Perl; Database Systems Mysql, PostgreSQL or equivalent; Open Source UML Tools; Introduction to Mobile Programming; Version Control Systems like SVN, Git or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

UNIT 4: **FOSS CASE STUDIES**: (8 Periods)

Some example case studies of FOSS implementation

Reference Books:

1. Linux in a Nutshell, by Ellen Siever
2. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
3. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-madeeasy/.
4. Version control system URL: http://git-scm.com/.
5. Samba: URL : http://www.samba.org/.
6. Libre office: http://www.libreoffice.org/.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	12	20
2.	10	20
3.	12	20
4.	08	20
Total	42	100

4.3 OPEN ELECTIVE -1

		L	T	P
THEORY	**a. PROJECT MANAGEMENT**	**2**	**-**	**-**

COURSE OBJECTIVES

To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved. To develop an understanding of key project management skills and strategies.

COURSE OUTCOMES

CO 1: Understand the Project Management Principles. CO 2: Able to

prepare project plans.

CO 3: Able to estimate effective cost of a project. CO 4: Create

risk report and cost benefit analysis.

CO 5: Prepare project scheduling through time-cost trade off.

COURSE CONTENT

UNIT-I: **Concept of a project:** (5 Periods)

Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time) project priority matrix- work break down structure.

UNIT-II: **Capital budgeting process:** (6 Periods)

Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

UNIT-III: **Financial estimates and projections:** (5 Periods)

Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.

UNIT-IV: **Basic techniques in capital budgeting:** (6 Periods)

Non discounting and discounting methods- payback period- Accounting rate of return-net present value- Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects.

UNIT-V: Project administration: (6 Periods)

Progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management software's.

Reference Books:

1. Project planning, analysis, selection, implementation and review – Prasanna Chandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
3. Project management - David I Cleland - McGraw Hill International Edition, 1999
4. Project Management – Gopala Krishnan – McMillan India Ltd.
5. Project Management-Harry-Maylor-Peason Publication

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	05	14
2.	06	14

3.	05	24
4.	06	24
5.	06	24
Total	28	100

4.5 OPEN ELECTIVE -1

THEORY	b. **INDUSTRIAL ROBOTICS**	L	T	P
		2	-	-

1. COURSE OBJECTIVES

This course aims to equip students with foundational and advanced knowledge of industrial robotics, including robot anatomy, programming, kinematics, and control systems. Students will learn to design, simulate, and operate robotic systems used in manufacturing. Emphasis is placed on automation integration, safety protocols, and real-world applications, preparing learners for careers in robotics engineering, industrial automation, and smart manufacturing environments.

2. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that **Students will be able to**

CO1• Comprehend and adhere to industry health and safety guidelines while working with robots' vehicles to mitigate hazards.

CO2• Differentiate coordinate systems and define the custom or user-defined coordinate frames.

CO3• Develop simple robot programs that incorporate various types of movements along with their respective parameters.

CO4• Integrate robot with different automation components i.e., PLC HMI, conveyor etc. CO5• Create variety of innovative ideas and develop creative approaches to problem-solving.

4. CONTENT

UNIT 1- INTRODUCTION TO INDUSTRIAL SAFETY PRACTICES AND INTRODUCTION TO INDUSTRIAL ROBOTICS (08 Periods)

Fire Extinguishers & its Types, safely handling Tools & Equipment, Use of proper Tools & Equipment & its maintenance, OSH & practices to be observed as a precaution.

Introduction of Robots and their Importance in Manufacturing and Production, Applications of robots in manufacturing and assembly for which they can be efficiently utilized, Role of robots and automation systems in boosting the safety at dangerous manufacturing tasks, Structure and functions of robot System (Basic Package) and additional Equipment, Major Applications of Robots-Pick and Place, Arc Welding, Ultrasonic welding, Part Transfer, Packing, Palletizing. Type of End of arm tools and differences between them: Handling tools - Pneumatic Gripper, Vacuum Gripper, Hydraulic Gripper, Hydraulic Gripper, and Servo-Electric Gripper. Welding guns – Arc Welding guns, Spot welding guns. Robotic cell and its various components. Cycle time and its importance. Operator job in robotic cell. Safety procedure for Programmer and an Operator.

UNIT 2- JOGGING OF ROBOT (04 Periods)

Turn ON /OFF Steps of Robot, Checking Robotic cell Health, Introduction to Teach pendent and key functions, Industrial robot Coordinate system, Different coordinate systems in Robots, Defining X, Y, Z co-

ordinate system, Jogging Robot using Teach pendant in different Modes of coordinate systems: Joint co- ordinate system, rectangular co-ordinate system, and User or object co-ordinate system, Tool co-ordinate system, TCP (Tool centre point definition) i.e., TCP File. , Creating user defined work objects i.e., user coordinate frame File.(Box, circle, triangle work object definition)

UNIT 3- PROGRAMMING OF A OF ROBOT USING TEACH PENDANT (06 Periods)

Robot Program Structure, Different Motion Types used in Programming (PTP, Linear, Circular, Spline): Move J (PTP) , Move L (Linear) , Move C (Circular) , Move S (Spline) ; Different Motion Parameters used in Program Point Recording, Basic Program creation using Motion types and parameters, Path optimization for smooth robot movement and cycle time, Safety instructions to be followed while loading and unloading of parts.

UNIT 4- ROBOT INTEGRATION WITH PLC, HMI AND OTHER EQUIPMENT (06 Periods)

PLC and robot communication and HMI, Conveyor system and its communication with PLC, Methods to create fencing and safety equipment's, Steps to work with two different types of Robots at same project, Tool mounting on Robot Flange, Different connections of grippers (Electric, Pneumatic etc.).

UNIT 5- ROBOT PROGRAMMING WITH ADVANCE LEVEL INSTRUCTIONS (04 Periods)

Loop control instructions, Arithmetic and Logical instructions, Shift instructions, Interfacing End of arm tools to Robot using robot I/O, establishing communication between Robot I/O and PLC modules, Function Keys in Pendant for Arc welding and Material Handling robot, MIG welding Instructions in Robot, MIG welding Program and how to optimize it, Material Handling Program and how to optimize it.

* Case studies and Mini Project should be carried out throughout the semester.

5. TEXT BOOKS/REFERNCE BOOKS

1. Modern Robotics: Mechanics, Planning, and Control
Authors: Kevin M. Lynch, Frank C. Park Publisher:
Cambridge University Press
2. Robot Modelling and Control
Authors: Mark W. Spong, Francesco Bullo Publisher: Wiley
3. **Springer Handbook of Robotics**
Editors: Bruno Siciliano, Oussama Khatib Publisher: Springer
4. **Robotics for Engineers** Author: Yoram Koren Publisher: McGraw-Hill
5. Robotic Engineering: An Integrated Approach
Author: Richard D. Klafter, Thomas A. Chmielewski, Michael Negin Publisher: Prentice Hall

6. INSTRUCTIONAL STRATEGY

Combine theoretical instruction with hands-on training using robotic arms and simulation software. Use lectures, demonstrations, and lab sessions to teach robot programming, kinematics, and control.
Incorporate project-based learning, real-world case studies, and industry visits. Assess through practical tasks, quizzes, and group projects to reinforce industrial robotics applications.

7. SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	8	30
2	4	15
3	6	20
4	6	20
5	4	15
Total	28	100

PRACTICAL	4.6 DATA STRUCTURES USING C (Lab)	L	T	P
		-	-	4

COURSE OBJECTIVES

To provide strong foundation for implementing programming language to formulate, analyze and develop solutions related to various data structures problems.

COURSE OUTCOMES

After successful completion of this course, the students should be able to CO1: Understand the fundamental data structures

CO2: Apply the operations of stack and queue CO3: Understand the concepts of linked lists

CO4: Implement various sorting and searching techniques

CO5: Illustrate tree and graph traversal techniques

LIST OF PRACTICALS

S.No.	NAME OF EXPERIMENT
1.	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2.	Write a program to implement Array

3. Write a program to implement different operations in Array

4. Write a program to implement different Stack operations

5. Write a program to implement different Queue operations

6. Write a program to implement single linked list

7. Write a program to implement double linked list

8. Write a program to implement circular linked list

9. Write a program to implement Linear and Binary Search

10. Write a program to implement different Sorting Algorithms

11. Write a program to implement Depth First Search and Breadth First Search

12. Write a program to implement Binary Search Tree.

PRACTICUM	4.7 SCRIPTING LANGUAGES (PYTHON)	L	T	P
		1	-	4

COURSE OBJECTIVES

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability.

COURSE OUTCOMES

At the end of the course students will be able to -

CO1: Understand the basic programming constructs of Python.

CO2: Develop Python programs using conditional statements and loops.

CO3: Understanding concepts of reusable functions, python packages and modules. CO4: File handling in Python and understanding regular expression.

CO5: Applying OOP concept to solve different problem.

COURSE CONTENT

UNIT 1: Introduction, Variables and Data Types **(2 Periods)**

History, Features, Setting up path, Installation and Working with Python, Basic Syntax

Understanding Python variables, Numeric data types, Using string data type and string operations, Basic Operators, Understanding coding blocks, Defining list and list slicing, Other Data Types (Tuples, List, Dictionary, Set)

Practical Exercise

1. Write and execute scripts based on data types
2. Write and execute scripts based on collections

UNIT 2: Control Structures **(3 Periods)**

Conditional blocks using if, else and elif, For loops and iterations, while loops, Loop manipulation using continue, break.

Practical Exercise

1. Write and execute Python scripts with conditional blocks
2. Write and execute Python scripts with loops

UNIT 3: Functions, Modules, Packages and Exception Handling **(3 Periods)**

Organizing codes using functions, Organizing projects into modules, Importing own module as well as external modules, Understanding Packages, Exception Handling.

Practical Exercise

1. Write and execute Scripts based on Functions and Modules
2. Write and execute Scripts based on Packages
3. Write a program which uses exception handling

UNIT 4: File I/O, Text Processing, Regular Expressions **(3 Periods)**

Understanding read functions, Understanding write functions, Programming using file operations, Pattern matching and searching, Pattern searching using regex

Practical Exercise

1. Write and execute Regular Expressions
2. File Processing scripts

UNIT 5: Classes in Python (3 Periods)

Principles of Object –Oriented Programming, Concept of Classes, Class Variables, Creating Classes, Instances, Methods, File Organization

Practical Exercise

1. Develop a program to implement the concept of class.
2. Develop a program using Inheritance concept.
3. Develop a program using Polymorphism concept.

REFERENCE BOOKS:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University
5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.
6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing
7. Practical Programming: An Introduction to Computer Science using Python 3, Paul Gries, The Pramatic Bookshelf.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	15
2.	03	15
3.	03	20
4.	03	25
5.	03	25

Total	14	100

Audit Course	4.8 ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	L	T	P
		2	-	-

COURSE OBJECTIVE:

Understand the fundamental aspects of the Indian Knowledge System, its integration with modern science, principles of Yoga and holistic healthcare, and practical applications in contemporary contexts.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

CO1: Overview, importance, and relevance of the Indian Knowledge System, including Vedas, Upavedas, Vedangas, and Upangas. CO2: Relevance of science and spirituality, and contributions of ancient Indian science and technology. CO3: Basic principles of Yoga, benefits of holistic healthcare, and integration with modern healthcare. CO4: Practical applications and case studies of the Indian Knowledge System's relevance today.

COURSE CONTENTS

Unit 1: Introduction to Indian Knowledge System (07 Periods)

Overview of Indian Knowledge System

- Importance and relevance
- Introduction to the Vedas
- Upavedas
- Vedangas
- Upangas

Unit 2: Modern Science and Indian Knowledge System (07 Periods)

- Relevance of Science and Spirituality,

- Science and Technology in Ancient India,

Unit 3: Yoga and Holistic Healthcare (07 Periods)

- Basic principles of Yoga
- Benefits of holistic healthcare practices
- Integration with modern healthcare

Unit 4: Case Studies / Assignment (07 Periods)

- Practical Applications / Case studies demonstrating the relevance of Indian Knowledge System in modern times

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	**Time Allotted** **(Periods)**	**Marks Allocation** **(%)**
1.	07	40

2.	07	30
3.	07	15
4.	07	15
Total	28	100