

ORDINANCE No. V (2A) (B9)
Bachelor of Technology (B.Tech)
Computer Science & Engineering (AI & ML)
(Syllabus Effective From 2023-24)



BHAI JAITA SUBHARTI ENGINEERING COLLEGE
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(FACULTY OF ENGINEERING AND TECHNOLOGY)

Swami Vivekanand Subharti University Meerut, Uttar Pradesh
(Established under the UP Act No. 29 of 2008 & approved under Section 2 (f) of UGC Act, 1956)

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**SWAMI VIVEKANAND
SUBHARTI UNIVERSITY, MEERUT**



EVALUATION SCHEME

B.TECH - I year

Computer Science & Engineering

In

Artificial Intelligence & Machine Learning

W.E.F. SESSION 2023-24

**FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT**
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Meerut -250005 (UP)
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**BHAI JAITA SUBHARTI ENGINEERING COLLEGE
FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech^Ist Year/^Ist Semester (Common to all branches)
w.e.f. academic Session 2023-24**

SEMESTER I

**3-WEEKS INDUCTION PROGRAMME
in the beginning of the session**

S. No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	KAS-101/ KAS-102	Engineering Physics/ Engineering Chemistry	BS	3	1	0	20	10	30	-	70	-	100	4
2	KAS-103	Engineering Mathematics-I	BS	3	1	0	20	10	30	-	70	-	100	4
3	KEEE-101/ KCSE-101	Basic Electrical & Electronics Engineering/ Programming For Problem Solving	ES	3	1	0	20	10	30	-	70	-	100	4
4	KME-151/ KME-152	Engineering Graphics & Design Lab/Workshop Practices Lab	ES	1	0	4	-	-	-	15	-	35	50	3
5	KAS-151/ KAS-152	Engineering Physics Lab/ Engineering Chemistry Lab	BS	0	0	3	-	-	-	15	-	35	50	1
6	KEEE-151/ KCSE-151	Basic Electrical & Electronics Engineering Lab/Programming for Problem Solving Lab	ES	0	0	3	-	-	-	15	-	35	50	1
7	KHU-101	Design Thinking Lab	HS	0	0	2	-	-	-	15	-	35	50	1
8	KAU-101*	IDEA Lab Workshop	AU	2	0	4	-	-	-	15	-	35	50	1
Total												550	18	

*Compulsory Qualifying Audit Course

Abbreviation Used:

BS: Basic Science Course

ES: Engineering Science Course

HS: Humanities and Social Sciences including Management Course

AU: Audit Course

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BHAI JAITA SUBHARTI ENGINEERING COLLEGE
FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME

B.Tech^Ist Year/2nd Semester (Common to all branches)

w.e.f. academic Session 2023-24

SEMESTER II														
S No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	KAS-201/ KAS-202	Engineering Physics/ Engineering Chemistry	BS	3	1	0	20	10	30	-	70	-	100	4
2	KAS-203	Engineering Mathematics II	BS	3	1	0	20	10	30	-	70	-	100	4
3	KEEE- 201/ KCSE-201	Basic Electrical& Electronics Engineering/ Programming For Problem Solving	ES	3	1	0	20	10	30	-	70	-	100	4
4	KME-251 / KME-252	Engineering Graphics & Design Lab/Workshop Practices Lab	ES	1	0	4	-	-	-	15	-	35	50	3
5	KHU- 201	Professional English	HS	2	0	0	20	10	30	-	70	-	100	2
6	KAS-251/ KAS-252	Engineering Physics Lab/ Engineering Chemistry Lab	BS	0	0	3	-	-	-	15	-	35	50	1
7	KEEE-251/ KCSE-251	Basic Electrical& Electronics Engineering Lab/Programming for Problem Solving Lab	ES	0	0	3	-	-	-	15	-	35	50	1
8	KHU- 251	Professional English Lab	HS	0	0	2	-	-	-	15	-	35	50	1
9	KHU-202	Universal Human Values-II: Understanding Harmony and Ethical Human Conduct	HS	2	1	0	20	10	30	-	70	-	100	3
10	KAU-202*	Sports and Yoga/NSS or NCC	AU	0	0	3	-	-	-	100	-	-	100	0
Total												800	23	

***Compulsory Qualifying Audit Course**

Abbreviation Used:

BS: Basic Science Course

ES: Engineering Science Course

HS: Humanities and Social Sciences including Management Course

AU: Audit Course

*Summer Internship (4-week) / NPTEL Course (4-week) during summer break after Semester-II
and same will be assessed/evaluated in the Semester-III*

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KEEE-101/ KEEE-201	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Apply the concepts of KVL/KCL and network theorems in solving DC circuits.	K3
CO2	Analyze the steady state behavior of single phase AC electrical circuits.	K4
CO3	Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Illustrate the working principles of induction motor and DC machine and employ them in different area of applications.	K2 & K4
CO4	Understand the basics of electronic components based on semiconductors and apply them to create electronic circuits.	K2, K3 & K6
CO5	Understand the role and importance of general-purpose test instruments and analyse their results.	K2, K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit -1: Network Laws and Theorems	8
Network Laws for D.C. networks- Kirchoff's laws, Node voltage and mesh current methods, Delta-Star and Star-Delta conversion, Classification of network elements, Principle of Superposition, Thevenin's and Norton's Theorems.	
Unit-2: Single Phase A.C. Circuits	6
Single-phase EMF generation, Effective and Average values of sinusoids and determination of form factor, Phasor diagram, Symbolic notation, phasor in polar, rectangular and exponential form. Resistive, Inductive and Capacitive circuits, A.C. series and parallel circuits. Analysis of simple RLC-series circuits, Solution of parallel circuits - resonance, Q factor.	
Unit-3: Three Phase Circuits and transformer	8
Three Phase A.C. Circuits: Three -phase EMF generation, Delta and star connection, Line and phase quantities and relations, Phasor diagrams. Transformers- Ideal and practical transformer, equivalent circuit, losses in transformers, voltage regulation and efficiency, numerical on transformers. Introduction to Electrical machines- DC Machines, Single-phase and Three-phase Induction motor	

A/E

Unit 4: Semiconductor Diodes and Applications:	8
Review of PN Junction Diode, Diode Equivalent Circuits, V-I Characteristics, Ideal diode, Zener Diode, Light-Emitting Diode (LED), Varactor Diode, and Photodiode. Regulated Power Supply: Block diagram of power supply, Half wave, Full wave and Bridge rectifiers, Passive filters, Regulators, Line regulator and load regulators, Zener Diode as voltage regulator.	
Unit 5: Electronic Instruments	6
Role and importance of general-purpose test instruments, Cathode Ray Oscilloscope (CRO): Block diagram and working of CRO, Cathode Ray Tube (CRT), Amplitude, frequency and phase measurements using CRO.	

Text Books:

1. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishing House, 2018.
2. P.V. Prasad, S.Sivanagaraju, "Electrical Engineering: Concepts and Applications" Cengage, 2018.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
5. Boylestead and Nashelsky, "Electronic Devices and Circuit Theory", 11th edition, Pearson Education India, New Delhi, 2013.

Reference Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India, 1989.
4. Bhargava, N. N., and NN Bhargava SC Gupta DC Kulshreshtha, "Basic Electronics and Linear Circuits" Tata McGraw-Hill Education, (1984).

Spoken Tutorial (MOOCs):

1. AC DC Circuit Analysis using NgSpice, Open Source Software (<http://spoken-tutorial.org>)

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KEEE-151/ KEEE - 251	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.	K3
CO2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.	K4
CO3	Perform experiment illustrating BH curve of magnetic materials.	K3
CO4	Calculate efficiency of a single phase transformer and DC machine.	K4
CO5	Understand the principles, operation and application of the basic electronic component/devices and the Characteristics of the active and passive devices. And create a working mini-project	K2, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

LIST OF EXPERIMENTS

Note: A minimum of ten experiments, five from each section from the following should be performed.

(A) Section A

1. Verification of Kirchhoff's laws
2. To assemble and test 5V/9V DC regulated power supply
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Connection and measurement of power consumption of a fluorescent lamp (tube light).
6. Measurement of power in 3- phase circuit by two-wattmeter method and determination of its power factor for star as well as delta connected load.
7. Determination of parameters of ac single phase series RLC circuit.
8. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase Transformer
9. Determination of efficiency of a dc shunt motor by load test.
10. To study running and speed reversal of a three phase induction motor and record speed in both directions.
11. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.

A/H

(B) Section B

1. To get familiar with the working of the following instruments:
 - a) Cathode ray oscilloscope (CRO)
 - b) Multimeter (Analog and Digital)
 - c) Function generator
 - d) Power supply.
2. a) Plot the forward and reverse V-I characteristics of P-N junction diode
b) Study of Zener diode in breakdown region
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of V_{rms} , V_{dc} .
4. To assemble and test 5V/9V DC regulated power supply.
5. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
6. Soldering shop: Soldering and disordering of Resistor in PCB. Soldering and disordering of IC in PCB. Soldering and disordering of Capacitor in PCB
7. Micro project (Submit any circuitry on general purpose PCB based on experiment number 2-4)

(C) Experiments available on virtual lab

1. **Kirchhoff's laws. Virtual lab link:**
<http://vlab.amrita.edu/?sub=3&brch=75&sim=217&cnt=2>
2. **Thevenin Theorem. Virtual lab link:**
<https://vlab.amrita.edu/?sub=1&brch=75&sim=313&cnt=1>
3. **RLC series resonance. Virtual lab link:**
<https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1>
4. **Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load. Virtual lab link:** <http://vp-dei.vlabs.ac.in/Dreamweaver/measurement.html>
5. **Determination of parameters of ac single phase series RLC circuit. Virtual lab link:**
<https://vlab.amrita.edu/?sub=1&brch=75&sim=332&cnt=1>
6. **To observe the B-H loop of a ferromagnetic material in CRO. Virtual lab link:**
<https://vlab.amrita.edu/?sub=1&brch=282&sim=1507&cnt=2>
7. **Determination of the efficiency of a dc motor by loss summation method (Swinburne's test). Virtual lab link:**
<http://em-iitr.vlabs.ac.in/exp5/index.php?section=Theory>

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KAS-102 / KAS-202	ENGINEERING CHEMISTRY	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able to:

CO	CO Statement	Bloom's Level
CO1	Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (Nanomaterials and Graphite) as well as the Principles of Green Chemistry.	K3
CO2	Apply the fundamental concepts of determination of structure with various spectral techniques.	K4
CO3	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.	K3
CO4	Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal.	K3
CO5	Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1:	8
<p>Atomic and Molecular Structure: Molecular orbital's of diatomic molecules, Bond Order, Magnetic characters and numerical problems.</p> <p>Chemistry of Advanced Materials:</p> <p>Graphite; Introduction, Structure and applications.</p> <p>Nanomaterials; Introduction, Preparation, characteristics of nanomaterials and applications of nanomaterials, Carbon Nano Tubes (CNT),</p> <p>Green Chemistry: Introduction, 12 principles and importance of green Synthesis, Green Chemicals, Synthesis of typical organic compounds by conventional and Green route (Adipic acid and Paracetamol), Environmental impact of Green chemistry on society.</p>	
Unit-2:	8
<p>Spectroscopic Techniques and Applications:</p> <p>Atomic spectroscopy: Introduction to spectroscopy, atomic absorption spectrophotometry and its application.</p> <p>Molecular Spectroscopy: Beer-Lambert's Law, molecular spectroscopy, principle, instrumentation and applications of UV-Vis and IR spectroscopy</p>	

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Unit-3:	8
<p>Electrochemistry and Batteries: Basic concepts of electrochemistry, Nernst Equation.</p> <p>Batteries; Classification and applications of Primary Cells (Dry Cell) and Secondary Cells (Lead Acid battery).</p> <p>Corrosion: Introduction to corrosion, Types of corrosion, Cause of corrosion, Corrosion prevention and control, Corrosion issues in specific industries (Power generation, Chemical processing industry, Oil & gas industry and Pulp & paper industries).</p> <p>Phase Rule: States of matter; phase; component and degree of freedom; Gibb's phase rule; one component and two component systems.</p>	
Unit-4:	8
<p>Water Technology: Sources and impurities of water, Hardness of water, Boiler troubles (Scale and Sludge Formation in boiler and its prevention) Techniques for water softening (Lime-Soda, Zeolite, Ion Exchange and Reverse Osmosis process), Determination of Hardness and alkalinity, Numerical problems.</p> <p>Fuels and Combustion: Definition, Classification, Characteristics of a good fuel, Calorific Values, Gross & Net calorific value, Determination of calorific value by Bomb Calorimeter and Dulong's method, Analysis of coal by Proximate and Ultimate analysis method, Numerical problems.</p>	
Unit-5:	8
<p>Materials Chemistry:</p> <p>Polymers; Classification, Polymerization processes, Thermosetting and Thermoplastic Polymers, Polymer Blends and Composites, Conducting and Biodegradable polymers, Preparation, properties, industrial applications of Teflon, Lucite, Bakelite, Kelvar, Dacron, Thiokol, Nylon, Buna-N and Buna-S and their environmental impact on society, Speciality polymers.</p> <p>Organometallic Compounds: General methods of preparation and applications of Organometallic compounds (RMgX and LiAlH₄).</p>	

Reference Books:

1. Engineering Chemistry by Rath & Singh, 2nd Edition, Cengage Learning India Pvt Ltd Delhi.
2. Engineering Chemistry by SS Dara, S Chand & Co Ltd
3. Engineering Chemistry by Jain & Jain, S.Chand & Comp, New Delhi
4. Engineering Chemistry by K. Sessa Maheswaramma, Pearson
5. Engineering Chemistry by OG Palanna, Mc Graw Hill Education, New Delhi
6. Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Comp, New Delhi
7. University Chemistry by BH Mahan
8. University Chemistry by CNR Rao

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KAS-152/ KAS -252	ENGINEERING CHEMISTRY LAB	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Get an understanding of the use of different analytical instruments.	K3
CO2	Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water.	K3
CO3	Measure the hardness and alkalinity of the water.	K3
CO4	Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol.	K3
CO5	Estimate the rate constant of reaction.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments

Instructor may choose any 10 experiments from above and may also change any two of the above.

1. Calibration of Analytical Equipment and apparatus.
2. Determination of Hardness of water sample by EDTA method.
3. Determination of Alkalinity of water sample.
4. Determination of pH by titrimetric method.
5. Determination of surface tension of given liquid.
6. Determination of Viscosity of a given liquid by viscometer.
7. Determination of the strength of Ferrous ammonium sulfate using external indicator.
8. Determination of the strength of Potassium dichromate using internal indicator.
9. Determination of available chlorine in bleaching powder.
10. Determination of chloride content in water sample.
11. Preparation of Phenol formaldehyde (PF) resin.
12. Preparation of Urea formaldehyde (UF) resin.
13. Preparation of Adipic acid / Paracetamol.
14. Determination of Cell Conductance of a solution.
15. Determination of Rate constant of hydrolysis of esters.
16. Element detection and identification of functional groups in organic compounds.

KHU-101	Design Thinking Lab	0L:0T:2P	1 Credit
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COURSE OBJECTIVE(S):

The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Course Outcomes:

On completion of course the students are able to:

CO	CO Statement	Bloom's Level
CO1	Compare and classify the various learning styles and memory techniques and Apply them in their engineering education.	K1,K2,K3
CO2	Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products.	K4,K5
CO3	Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products.	K6
CO4	Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development.	K3,K6
CO5	Perceive individual differences and its impact on everyday decisions and further Create a better customer experience	K2,K5,K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Unit 1: An Insight to Learning

Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting

Unit 2: Remembering Memory

Understanding the Memory process, Problems in retention, Memory enhancement techniques

Unit 3: Emotions: Experience & Expression

Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers

Unit 4: Basics of Design Thinking

Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test

Unit 5: Being Ingenious & Fixing Problem

Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving

Unit 6: Process of Product Design

Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design

Unit 7: Prototyping & Testing

What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, **Sample Example**, Test Group Marketing

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Unit 8: Celebrating the Difference

Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences

Unit 9: Design Thinking & Customer Centricity

Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design

Unit 10: Feedback, Re-Design & Re-Creat

Feedback loop, Focus on User Experience, Address “ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – **“Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”**”.

Text/Reference Books:

1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.

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KME-151/ KME -251	ENGINEERING GRAPHICS & DESIGN LAB	1L:0T:4P	3 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Use scales and draw projections of objects.	K1,K2,K6
CO2	Explain views of solids and their sectional surfaces.	K2,K3
CO3	Analyze and draw isometric projections of objects.	K4,K6
CO4	Demonstrate orthographic representation of perspective views using modern tools.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Content
Unit-1: Introduction to Engineering Drawing (8 hours)
Principles of Engineering Graphics and their significance. Dimensioning, Lettering. Scales: Plain, Diagonal and Engineering Scales.
Unit-2: Projection of Points and Lines (8 hours)
Orthographic Projection, Projection of Point, Projection of Lines: Projection of straight lines; Projection of lines inclined to one plane and both planes.
Unit-3: Projection of Planes and Solids (8 hours)
Projection of polygonal surface and circular lamina located in first quadrant inclined to one or both reference planes. Classification of solids, Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.
Unit-4: Sections of Regular Solids and development of Surfaces (8 hours)
Sections of Solids: Right regular solids and Auxiliary views for the true shape of the sections such as Prism, Cylinder, Pyramid, and Cone. Development of surfaces for various regular solids such as Prism, Cylinder, Pyramid and Cone.
Unit-5: Isometric Projection (8 hours)
Isometric Projection: Isometric scales, Isometric projections of simple and combination of solids. Perspective Projection: Orthographic representation of perspective views — Plane figures and simple solids — Visual Ray Method. Conversion of pictorial view into orthographic Projection.

Suggested Text/ Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C.M. (2012), Engineering Graphics, TMH Publication
4. Engineering Graphics & Design, A.P. Gautam & Pradeep Jain, Khanna Publishing House
5. Narayana, K.L. & P Kannaiyah (2008), Text book on Engineering Drawing, Scitech Publishers.
6. (Corresponding set of) CAD Software Theory and User Manuals.

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KME-152/ KME -252	WORKSHOP PRACTICES LAB	1L:0T:4P	3 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Use various engineering materials, tools, machines and measuring equipments.	K3
CO2	Perform machine operations in lathe and CNC machine.	K3
CO3	Perform manufacturing operations on components in fitting and carpentry shop.	K3
CO4	Perform operations in welding, moulding, casting and gas cutting.	K3
CO5	Fabricate a job by 3D printing manufacturing technique	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

S. No.	Mechanical Workshop	Duration
1	Introduction to Mechanical workshop material, tools and machines	3 Hrs
	To study layout, safety measures and different engineering materials (mild steel, medium carbon steel, high carbon steel, high speed steel and cast iron etc) used in workshop.	
	To study and use of different types of tools, equipment, devices & machines used in fitting, sheet metal and welding section.	
	To determine the least count of Vernier calliper, vernier height gauge, micrometer (Screw gauge) and take different reading over given metallic pieces using these instruments.	
2	Machine shop	6 Hrs
	Demonstration of working, construction and accessories for Lathe machine	
	Perform operations on Lathe - Facing, Plane Turning, step turning, taper turning, threading, knurling and parting.	
3	Fitting shop	6 Hrs
	1. Practice marking operations. 2. Preparation of U or V -Shape Male Female Work piece which contains: Filing, Sawing, Drilling, Grinding.	
4	Carpentry Shop	3 Hrs
	Study of Carpentry Tools, Equipment and different joints.	

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	Making of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint	
5	Welding Shop	6 Hrs
	Introduction to BI standards and reading of welding drawings.	
	Practice of Making following operations Butt joint, Lap Joint using ARC Welding, MIG Welding	
6	Moulding and Casting Shop	6 Hrs
	Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces.	
	Foundry tools and their purposes	
	Demo of mould preparation and Aluminum casting Practice – Study and Preparation of mould for Plastic	
7	CNC Shop	6 Hrs
	Study of main features and working parts of CNC machine and accessories that can be used. Perform different operations on metal components using any CNC machines	
	Total	36 Hrs

Reference Books:

1. Workshop Practice, H S Bawa, McGraw Hill
2. Mechanical Workshop Practice, K C John, PHI
3. Workshop Practice Vol 1, and Vol 2, by HazraChoudhary , Media promoters and Publications
4. CNC Fundamentals and Programming, By P. M. Agrawal, V. J. Patel, Charotar Publication.

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KAS-103	Engineering Mathematics-I	3L:1T:0P	4 Credits
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Objectives:

- To acquaint the student with the essential tools of matrices, eigen values and its application in a Comprehensive-manner.
- To apply the knowledge of differential calculus in the various fields of engineering and have a basic understanding of Beta and Gamma functions and application of Dirichlet's integral.
- To deal with functions of several variables that is essential in optimizing the results of real life problems
- To deal with vector calculus that is required in different branches of Engineering to graduate engineer.

Unit No.	Particulars	Contact Hours
1	Matrices: Complex Matrices, Hermitian, Skew-Hermitian and Unitary Matrices, Elementary transformations, Inverse of a matrix, Rank of matrix, Solution of a system of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Linear Dependence and Independence of vectors, Eigen values and Eigen vectors, Linear Transformation and matrix representation, Applications to Engineering problems.	8
2	Differential Calculus- I: Successive Differentiation (nth order derivatives), Leibnitz theorem, Partial derivatives, Euler's Theorem for homogeneous functions, Total derivative, Change of variables, Curve tracing.	8
3	Differential Calculus-II: Expansion of functions by Taylor's and Maclaurin's theorems for functions of one and two variables, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Jacobians, Approximation of errors.	8
4	Multiple integration: Double integral, Triple integral, change of order of integration, Change of variables, Beta and Gama functions and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.	8
5	Vector Calculus: Vector differentiation: Gradient, Curl and Divergence and their Physical interpretation, Directional derivatives. Vector Integration: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem and Stoke's theorem (without proof) and their applications.	8

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Course Outcomes:

	Course Outcome (CO)	Bloom's Level
At the end of this course, the students will be able to:		
CO 1	Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations	K2 & K5
CO 2	Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives	K1, K6 & K5
CO 3	Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians	K3 & K5
CO 4	Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral	K1 & K4
CO 5	Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.	K3, K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. R K. Jain & S R K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House 2002.

Reference Books:

1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, Calculus, Eleventh Edition, Pearson.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Veerarajan T., Engineering Mathematics for first year, McGraw-Hill, New Delhi, 2008.
6. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, McGraw-Hill; Sixth Edition
7. P. Sivaramakrishna Das and C. Vijaya Kumari, Engineering Mathematics, 1st Edition, Pearson Education.
8. Advanced Engineering Mathematics. Chandrika Prasad, Reena Garg, 2018.

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KAS-203	Engineering Mathematics-II	3L:1T:0P	4 Credits
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Objectives:

- To apply the effective mathematical tools for the solutions of differential equations that model physical processes.
- To introduce the basic knowledge of Laplace transform and its applications in solving differential equations.
- To apply the tools for convergence of series and expansion of function using Fourier series for learning advanced Engineering Mathematics.
- To deal with the tools of differentiation and integration of complex functions that are used in various techniques dealing with engineering problems.

Unit No.	Particulars	Contact Hours
1	Ordinary Differential Equation of Higher Orders: Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Solution of second order linear differential equations with variable coefficients by changing independent variable and method of variation of parameters, Cauchy-Euler equation, Application of differential equations in solving engineering problems.	8
2	Integral Transforms: Laplace transform, Properties of Laplace Transform, Laplace transform of derivatives and integrals, Unit step function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem. Application of Laplace Transform to solve ordinary differential equations and simultaneous differential equations, Z-transform, inverse Z-transform and its application to solve difference equations.	8
3	Sequence and Series: Definition of Sequence and series with examples, Convergence of sequence and series, Tests for convergence of series by comparison test, D' Alembert's ratio test, Raabe's test, Fourier series, change of interval, half range Fourier sine and cosine series.	8
4	Complex Variable–Differentiation: Functions of complex variable, Limit, Continuity and differentiability, Analytic functions, Cauchy- Riemann equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions, Milne's Thompson Method, Conformal mapping, Mobius transformation and their properties.	8
5	Complex Variable –Integration: Complex integration, Cauchy- Integral theorem, Cauchy integral formula, Taylor's and Laurent's series, zeros of analytic functions, singularities and its classification, Residues, Cauchy's Residue theorem and its application to evaluate the real definite integrals $\int_0^{2\pi} f(\sin \theta, \cos \theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$.	8

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Course Outcomes:

	Course Outcome (CO)	Bloom's Level
At the end of this course, the students will be able to:		
CO 1	Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order.	K1 & K5
CO 2	Understand and apply the concept of integral transforms to evaluate differential and difference equations	K2, K3 & K5
CO 3	Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series.	K2 & K4
CO 4	Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation	K3, K6 & K3
CO 5	Apply the concept of Cauchy Integral theorem, Cauchy Integral formula, singularity and calculus of residue to evaluate integrals	K3 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. R K. Jain & S R K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House 2002.

Reference Books:

1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, Calculus, Eleventh Edition, Pearson.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Veerarajan T., Engineering Mathematics for first year, McGraw-Hill, New Delhi, 2008.
6. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, McGraw-Hill; Sixth Edition
7. G.B Thomas, R L Finney, Calculus and Analytical Geometry, Ninth Edition Pearson, 2002.
8. James Ward Brown and Ruel V Churchill, Complex Variable and Applications, 8th Edition, McGraw-Hill.
9. P. Sivaramakrishna Das and C. Vijaya Kumari, Engineering Mathematics, 1st Edition, Pearson Education.
10. Advanced Engineering Mathematics. Chandrika Prasad, Reena Garg, 2018.
11. Laplace Transforms by Schaum's series, 2005 Edition, Spiegel Publication.

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KHU-201	Professional English	2L:0T:0P	2 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand and apply the formal elements of specific genres of Technical communication.	K2, K3
CO2	Understand and apply the formal elements of specific genres of written Technical communication.	K2, K3
CO3	Developing intellectual, personal and professional abilities through effective communication skills	K6
CO4	Analyse and evaluate different styles of spoken technical communication.	K4 & K6
CO5	Understand various elements of communication and create their own style of writing.	K1, K2 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Course Objectives:

1. Students will be enabled to understand the correct usage of technical communication.
2. Students will be able to converse well with effective speaking skills in English.
3. Students will be able to learn motivational skills.
4. Student will be able to equip with basics of conversational & social skills and will apply it in their professional as well as personal level.
5. Students will be able to build up personal traits that will make the transition from institution to workplace smoother and help them to excel in their jobs.

Course Content:

Unit	Description	Lectures
Unit-1	COMMUNICATION SKILLS	08
	<p>Technical Communication: Introduction to Communication, Definition, Process of Communication & types of communication, Levels of communication, Flows of Communication, Barriers to communication.</p> <p>Mass Communication: Print media, Electronic media</p>	
Unit-2	CONVERSATIONAL & SOCIALSKILLS	10
	<p>Parts of speech: Review</p> <p>Advanced Vocabulary: Antonyms, Synonyms, Homophones, Homonyms, One word substitution, Abbreviations, New word Formation, Prefix and Suffix.</p> <p>Conversation: Definition, Speech and Conversation, Rules of Conversation, Conversation and Personality, Importance of Conversation</p> <p>Social Skills: Role of Communication; Purposeful Socializing.</p>	

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Unit-3	WRITING AND READING SKILLS	08
	Letter Writing, Application writing, Report Writing, Paragraph Writing, Précis writing, Reading Comprehension	
Unit-4	WORK-PLACE SKILLS	08
	Managing Stress: Techniques: Application of 4A's; Avoid; Alter; Access; Adapt Resilience: Flexibility in Thought and Behavior; Tolerance and Self-Belief; Team-Work and Communication; Compassion in Leadership; Communication Skills; Listening and Responding; Speaking Skills; Positive Thinking: Controlling Mind.	
Unit-5	PRESENTATION SKILLS	09
	Introduction to oral communication, Nuances and Modes of Speech Delivery, Elements OF Non- verbal Communication: Kinesics, Proxemics, Chronemics, Paralinguistic features of Voice-Dynamics, and Presentation Strategies: planning, preparation, organization, delivery	

Text/Reference Books:

1. Personality Development & Soft Skills: Barun K. Mitra, Oxford University Press, New Delhi, 2012.
2. Technical Communication, (Second Ed.); O.U.P., Meenakshi Raman & S. Sharma, New Delhi, 2011.
3. Personality Development, Harold R. Wallace et.al, Cengage Learning India Pvt. Ltd; New Delhi, 2006.
4. Practical Communication by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Banerji; McMillan India Ltd, Delhi, 1990.
6. Communication Skills for Engineers and Scientists: Sangeeta Sharma et. al., THI Learning Pvt. Ltd, New Delhi, 2011.
7. Public Speaking, William S. Pfeiffer, Pearson, Delhi, 2012.
8. Human Values, A.N. Tripathi, New Age International Pvt. Ltd. Publishers NewDelhi, 2005.
9. Business Communication for Managers, Payal Mehra, Pearson, Delhi, 2012.

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1	ENGLISH LANGUAGE FOR COMPETITIVE EXAMS	PROF. AYSHA IQBAL	IIT MADRAS
2.	TECHNICAL ENGLISH FOR ENGINEERS	PROF. AYSHA IQBAL	IIT MADRAS

Course Outcomes: The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

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KHU-251	Professional English Lab	0L:0T:2P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Get familiarized with English vocabulary and language proficiency.	K1, K2
CO2	Improve nature and style of sensible writing, acquire employment and workplace communication skills.	K2, K3
CO3	Improve their Technical Communication Skills through Technical Reading and Writing practices.	K3, K4
CO4	Identify common errors in spoken and written communication.	K4, K5
CO5	Perform well in campus recruitment, engineering and all other general competitive examinations.	K4, K5, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments

1. Introduction to Phonetics- Speech Sounds- Vowels and Consonants.
2. Articles, Prepositions, Word Formation-Prefixes & suffixes, Synonyms & Antonyms.
3. Descriptions- Narrations- Giving directions and guidelines Sequence of Tenses, Question Tags and One Word Substitutes.
4. Extempore- Public Speaking Active and Passive Voice, Common Errors in English, Idioms and Phrases.
5. Information Transfer- Oral Presentation Skills Reading Comprehension and Job Application with Resume Preparation

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KAU-101	IDEA Lab Workshop	2L:0T:4P	0 Credit
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Course Objectives:

1. To learn all the skills associated with the tools and inventory associated with the IDEA Lab.
2. Learn useful mechanical and electronic fabrication processes.
3. Learn necessary skills to build useful and standalone system/ project with enclosures.
4. Learn necessary skills to create print and electronic documentation for the system/project

Course Outcomes:

On completion of course the students are able to:

CO	CO Statement	Bloom's Level
CO1	To familiarize the students with basic electronic components, mechanical tools and basic Binary system	K1, K2
CO2	To understand working of Basic measuring instruments, power tools and five component model of a computer.	K2
CO3	To study basic building blocks of circuits, 3D printing and latest technology and equip oneself with MS office.	K2, K3
CO4	To apply the knowledge gained to plan and implement a mini project.	K3, K4, K5
CO5	To create a mini project replete with Report and video.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Course Contents:

Unit #	Topics		
1.	Electronic component familiarization, Understanding electronic system design flow. Schematic design and PCB layout	Introduction to basic hand tools - Tape measure, combination square, Vernier Calipers, Micrometers, Dial Gauges, Height Gauges, Depth Gauges, Slip gauge, Filler gauge, Thread Gauge, Dial Indicator, Surface plate, hammers, fasteners, wrenches, pliers, saws, tube cutter, chisels, vice and clamps, tapping and threading.	Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes-BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

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2.	Familiarization and use of basic measurement instruments: Signal and function generator. Circuit prototyping using (a) breadboard, (b) Zero PCB (d) custom PCB. Single. PCBs. Single and PCB prototype fabrication in the lab. Soldering using soldering iron/station.	Introduction to Power tools: Power saws, hand saw, jigsaw, Grinder. Various types of drill bits. Introduction of Injection molding machine. Basic welding and other joining techniques for assembly. Concept of Lab aboard a Box.	Five Component Model of a Computer: System and Application software (introduction) storage devices , primary (RAM, ROM, PROM, EPROM, cache) Memory and secondary (magnetic tape, hard disk, Compact disks) memory , peripheral devices , printers.
3.	Electronic circuit building blocks including common sensors Digital Input and output. Measuring time and events. PWM. Serial communication. Analog input. Power Supply design (Linear).	3D printing and prototyping technology – 3D printing using FDM, and SLA. Prototyping using subtractive cutting processes. Basics of IPR and patents; Accessing and utilizing patent information in IDEA Lab	Introduction to MS Office: Office Writer : Editing and Reviewing, Drawing, Tables, Graphs, Templates, Office Excel : Worksheet Management , Formulas, Functions, Charts Office Power Point: designing powerful power-point presentation
4.	Discussion and implementation of a mini project.		
5.	Documentation of the mini project (Report and video).		

Laboratory Activities:

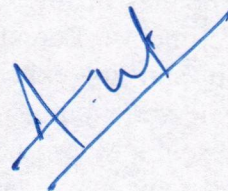
S. No.	List of Lab activities and experiments
1.	Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
2.	Design of Half -Adder & Full-Adder using Logic Gates.
3.	Machining of 3-D geometry of soft material such as soft wood or modeling wax.
4.	3-D printing of scanned geometry using SLA printer.
5.	Familiarity and use Gauges, Vernier Calipers, micrometer, and dial indicator.
6.	Study of Computer Hardware: Dismantling and Installation of PC
7.	Understanding and working with MS Office, Inserting Table, Formatting
8.	Understanding and working with MS Excel: Worksheet Management, Formatting, working with numerical data
9.	Understanding and working with MS Excel: Formulas, Functions and Charts
10.	Understanding and working with MS Power Points: Preparing and presenting power point presentation

Reference Books:

1. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), Khanna Book Publishing.

Aut

2. All-in-One Electronics Simplified, A.K. Maini; 2021. ISBN-13: 978-9386173393, Khanna Book Publishing Company, New Delhi.
3. Simplified Q&A - Data Science with Artificial Intelligence, Machine Learning and Deep Learning, Rajiv Chopra, ISBN: 978-9355380821, Khanna Book Publishing Company, New Delhi.
4. 3D Printing & Design, Dr. Sabrie Soloman, ISBN: 978-9386173768, Khanna Book Publishing Company, New Delhi.
5. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-1681884325.
6. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan (Author). Weldon Owen; 2017. ISBN-13: 978-1681881584.
7. Make: Tools: How They Work and How to Use Them. Platt, Charles. Shroff/Maker Media. 2018. ISBN-13: 978-9352137374
8. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press. ISBN: 9780521809269
9. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill. ISBN-13: 978-1259587542
10. Encyclopedia of Electronic Components (Volume 1, 2 and 3). Charles Platt. Shroff Publishers. ISBN-13: 978-9352131945, 978-9352131952, 978-9352133703
11. Building Scientific Apparatus. 4th edition. John H. Moore, Christopher C. Davis, Michael A. Coplan and Sandra C. Greer. Cambridge University Press. ISBN-13: 978-0521878586
12. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill. ISBN-13: 978-1259641633
13. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education. ISBN-13 : 978-1260019193
14. Pro GIT. 2nd edition. Scott Chacon and Ben Straub. A press. ISBN-13 : 978-1484200773
15. Venuvinod, PK., MA. W., Rapid Prototyping – Laser Based and Other Technologies, Kluwer
16. Ian Gibson, David W Rosen, Brent Stucker., “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, Springer, 2010
17. Chapman W.A.J, “Workshop Technology”, Volume I, II, III, CBS Publishers and distributors, 5th Edition, 2002.
18. Morris Mano, Digital Logic and Computer Design, Pearson
19. R.P. Jain, —Modern Digital Electronics, TMH, 2nd Ed,
20. A Anand Kumar, —Fundamentals of Digital Logic Circuits, PHI



KAS-101 / KAS-201	ENGINEERING PHYSICS	3L:1T:0P	4 Credits
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Course Objective:

The objective of the course is to understand the basic concepts of nature around us and to synthesize the knowledge from different areas of physics for analysing and solving various critical problems.

Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand and apply the principle of conservation of momentum, the theory of relativity.	K1, K2
CO2	To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation.	K1, K4
CO3	Understand Maxwell's equations of electromagnetic theory with the aim to apply them in a communication system.	K1, K2, K5
CO4	To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power.	K2, K3
CO5	To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser.	K1, K2

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1: Relativistic Mechanics	9
Inertial and Non- Inertial Frames of references, Galilean transformation equations, Michelson Morley Experiment, Lorentz Transformation equations, Length contraction, Time dilation and its experimental evidence, Relativistic velocity addition formula, Relativistic variation of mass with velocity, Evidence of variation of mass with velocity, Einstein's Mass-Energy equivalence, examples from nuclear physics, Relativistic energy momentum relation.	
Unit-2: Quantum mechanics	9
Inadequacy of classical mechanics, Planck's theory of black body radiation(qualitative), Compton effect, de-Broglie concept of matter waves, Davisson and Germer Experiment, Phase velocity and group velocity, Time-dependent and time-independent Schrodinger wave equations, Physical interpretation of wave function, Particle in a one-Dimensional box.	

Aut

Unit-3: Electromagnetic Field Theory	8
Ampere's law and Faraday's law of electromagnetic induction, Derivation of Maxwell's equations and their physical significance, Correction of Ampere's law by Maxwell, Concept of displacement current, Poynting theorem, Maxwell's equations in free space & velocity of electromagnetic waves, Transverse character of the wave and orthogonality of E , H and k vectors, Maxwell's equation in dielectric medium and velocity of e.m. wave, Comparison with free space, Maxwell's equations in conducting media & solution of differential equation in this case, penetration depth & its significance.	
Unit-4: Wave Optics	10
Coherent sources, Interference in uniform and wedge shaped thin films, Necessity of extended sources, Newton's Rings and its applications, Introduction to diffraction, Fraunhofer diffraction at single slit and double slit, Absent spectra, Diffraction grating, Spectra with grating, Dispersive power, Resolving power, Rayleigh's criterion of resolution, Resolving power of grating.	
Unit-5: Fiber Optics & Laser	9
Fibre Optics: Principle and construction of optical fiber, Acceptance angle, Numerical aperture, Acceptance cone, Step index and graded index fibers, Fiber optic communication principle, Attenuation, Dispersion, Application of fiber. Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Population inversion, Einstein's Coefficients, Principles of laser action, Solid state Laser (Ruby laser) and Gas Laser (He-Ne laser), Laser applications.	

Reference Books:

1. Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill)
2. Optics - Brijlal & Subramanian (S. Chand)
3. Engineering Physics: Theory and Practical- Katiyar and Pandey (Wiley India)
4. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)
5. Engineering Physics-Malik HK and Singh AK (Mc Graw Hill)

Ant



KAS-151/ KAS -251	ENGINEERING PHYSICS LAB	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	<i>Apply</i> the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light.	Apply
CO2	<i>Compute</i> and <i>analyze</i> various electrical and electronic properties of a given material by using various experiments.	Analyze
CO3	<i>Verify</i> different established laws with the help of optical and electrical experiments.	Apply
CO4	<i>Determine</i> and <i>calculate</i> various physical properties of a given material by using various experiments.	Apply
CO5	<i>Study</i> and <i>estimate</i> the performance and parameter of given equipment by using graphical and computational analysis.	Apply

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments

Any ten experiments (at least four from each group).

Group A

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.
4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.
5. To measure attenuation in an optical fiber.
6. To determine the wavelength of He-Ne laser light using single slit diffraction.
7. To study the polarization of light using He-Ne laser light.
8. To determine the wavelength of sodium light with the help of Fresnel's bi-prism.
9. To determine the coefficient of viscosity of a given liquid.
10. To determine the value of acceleration due to gravity (g) using compound pendulum.

Group B

1. To determine the energy band gap of a given semiconductor material.
2. To study Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.

And

4. To verify Stefan's law by electric method.
5. To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.
6. To study the resonance condition of a series LCR circuit.
7. To determine the electrochemical equivalent (ECE) of copper.
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
10. To measure high resistance by leakage method.

Reference Books

1. Practical Physics- K. K. Dey & B. N. Dutta (Kalyani Publishers New Delhi)
2. Engineering Physics-Theory and Practical- Katiyar & Pandey (Wiley India)
3. Engineering Physics Practical- S K Gupta (Krishna Prakashan Meerut)



KCSE-101/ KCSE-201	PROGRAMMING FOR PROBLEM SOLVING	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	To Develop Simple Algorithms for Arithmetic and Logical Problems.	K2, K3
CO2	To Translate the Algorithms to Programs & Execution (in C Language).	K3
CO3	To Implement Conditional Branching, Iteration and Recursion.	K3
CO4	To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach.	K4
CO5	To Use Arrays, Pointers and Structures to Develop Algorithms and Programs.	K2, K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit -1:	8
Introduction to Components of a Computer System: Memory, Processor, I/O Devices, Storage, Operating System, Concept of Assembler, Compiler, Interpreter, Loader and Linker. Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo Code with Examples, From Algorithms to Programs, Source Code. Programming Basics: Structure of C Program, Writing and Executing the First C Program, Syntax and Logical Errors in Compilation, Object and Executable Code. Components of C Language. Standard I/O in C , Fundamental Data types, Variables and Memory Locations, Storage Classes.	
Unit-2:	8
Arithmetic Expressions and Precedence : Operators and Expression Using Numeric and Relational Operators, Mixed Operands, Type Conversion, Logical Operators, Bit Operations, Assignment Operator, Operator precedence and Associativity. Conditional Branching: Applying if and Switch Statements, Nesting if and Else and Switch.	
Unit-3:	8
Iteration and Loops: Use of While, do While and for Loops, Multiple Loop Variables, Use of Break , Goto and Continue Statements. Arrays: Array Notation and Representation, Manipulating Array Elements, using Multi Dimensional Arrays. Character Arrays and Strings, Structure, union, Enumerated Data types, Array of Structures, Passing Arrays to Functions.	
Unit-4:	8
Functions: Introduction, Types of Functions, Functions with Array, Passing Parameters to Functions, Call by Value, Call by Reference, Recursive Functions.	

Am

Basic of searching and Sorting Algorithms: Searching & Sorting Algorithms (Linear Search , Binary search , Bubble Sort, Insertion and Selection Sort)	
Unit-5:	8
Pointers: Introduction, Declaration, Applications, Introduction to Dynamic Memory Allocation (Malloc, Calloc, Realloc, Free), String and String functions , Use of Pointers in Self-Referential Structures, Notion of Linked List (No Implementation) File Handling: File I/O Functions, Standard C Preprocessors, Defining and Calling Macros and Command-Line Arguments.	

Text Books:

1. Schaum's Outline of Programming with C by Byron Gottfried , McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education .
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
5. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
6. Let Us C By Yashwant P. Kanetkar.
7. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison- Wesley, 2006.
8. Programming in C by Kochan Stephen G. Pearson Education – 2015.
9. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication.
10. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
11. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
12. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication

And

KCSE-151/ KCSE-251	PROGRAMMING FOR PROBLEM SOLVINGLAB	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.	K3, K4
CO2	Demonstrate an understanding of computer programming language concepts.	K3, K2
CO3	Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.	K6, K4
CO4	Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures.	K1, K5
CO5	Develop confidence for self-education and ability for life-long learning needed for Computer language.	K3, K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP to calculate the area and circumference of a circle.
4. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5 = (F-32)/9$.
5. WAP that swaps values of two variables using a third variable.
6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.
10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:

Between 90-100%	Print 'A'
80-90%	Print 'B'
60-80%	Print 'C'
Below 60%	Print 'D'
11. WAP that takes two operands and one operator from the user, perform the operation, and prints the result by using Switch statement.
12. WAP to print the sum of all numbers up to a given number.
13. WAP to find the factorial of a given number.
14. WAP to print sum of even and odd numbers from 1 to N numbers.
15. WAP to print the Fibonacci series.
16. WAP to check whether the entered number is prime or not.
17. WAP to find the sum of digits of the entered number.
18. WAP to find the reverse of a number.
19. WAP to print Armstrong numbers from 1 to 100.
20. WAP to convert binary number into decimal number and vice versa.
21. WAP that simply takes elements of the array from the user and finds the sum of these elements.
22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third

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- array and prints them.
23. WAP to find the minimum and maximum element of the array.
 24. WAP to search an element in a array using Linear Search.
 25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
 26. WAP to add and multiply two matrices of order nxn.
 27. WAP that finds the sum of diagonal elements of a mxn matrix.
 28. WAP to implement strlen (), strcat (),strcpy () using the concept of Functions.
 29. Define a structure data type TRAIN_INFO. The type contain
 Train No.: integer type
 Train name: string
 Departure Time: aggregate type
 TIME Arrival Time: aggregate type
 TIME Start station: string
 End station: string
 The structure type Time contains two integer members: hour and minute.
 Maintain a train timetable and implement the following operations:
 - a. List all the trains (sorted according to train number) that depart from a particular section.
 - b. List all the trains that depart from a particular station at a particular time.
 - c. List all he trains that depart from a particular station within the next one hour of a given time.
 - d. List all the trains between a pair of start station and end station.
 30. WAP to swap two elements using the concept of pointers.
 31. WAP to compare the contents of two files and determine whether they are same or not.
 32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

Note:

- a) *The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner*
- b) *The subject teachers are suggested to use the concept of project based learning. The subject teacher may giver certain use cases/case studies where student is able to apply multiple concepts in one single program*
- c) *It is also suggested that open source tools should be preferred to conduct the lab. Some open source online compiler to conduct the C lab are as follows:*
 - ❖ <https://www.jdoodle.com/c-online-compiler/>
 - ❖ https://www.tutorialspoint.com/compile_c_online.php
 - ❖ <https://www.programiz.com/c-programming/online-compiler/>
 - ❖ <https://www.hackerrank.com/>

Mapping with Virtual Lab

Name of the Lab	Name of the Experiment
Problem Solving Lab	Numerical Representation
	Beauty of Numbers
	More on Numbers
	Factorials
	String Operations
	Recursion
	Advanced Arithmetic
	Searching and Sorting
	Permutation
	Sequences

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KAU-202	Sports and Yoga	0L:0T:3P	0 Credit
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Objective of the Course:

1. To maintain mental and physical wellness upright and develop ability in the students to cope up with the stress arising in the life.
2. To create space in the curriculum to nurture the potential of the students in sports/games/yoga etc.
3. To introduce a practice oriented introductory course on the subject. More involved / advanced course may come up in subsequent years of study

Syllabus/ Guidelines

Part A: Sports/Games

Some form of Athletics would be compulsory for all students, unless restricted due to medical / physical reasons. In addition to this, student has to opt for at least one game out of the remaining mentioned below.

A fair theoretical knowledge and a reasonable amount of field / site practice of the chosen games will be essential.

1. Athletics **Compulsory**
2. Volleyball
3. Basketball
4. Handball
5. Football
6. Badminton
7. Kabaddi
8. Kho-kho
9. Table tennis
10. Cricket

Part B: Yoga

a. Introduction of Yoga

Introduction of Yoga, Origin of Yoga, Aims and Objective of Yoga, Patanjali Yoga darshan, Hathyoga, Gheranda Samhita, Karmyoga, Gyanyoga.

b. Asanas, Pranayam and Meditation Practices

Meaning of Asanas, Objective of Asanas, rules and regulations of Asanas and Pranayams, Types of Yogasana

Yogic postures: Standing Posture, Sitting posture, Supine posture, Prone posture, balancing Postures, Pranayam according to Patanjali and Hath Yoga, Meditaion Mudras

c. Science of Yoga

Physiological effects of Asanas- Paranyama and meditation, stress management and yoga, Mental health and yoga practice, Health and Personality Development.

General Guidelines.

1. Institutes must assign minimum of three periods in the Time Table for the activities of Sports/Yoga.
2. Institutes must provide field/facility and offer a minimum of five choices of the Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

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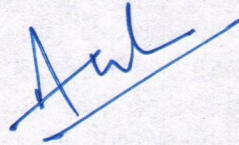
4. Student must be made familiar with the terminologies, rules/regulations, dimension/ marking of the play field/area and general knowledge of national/international level facts/figures related to the chosen game.

Assessment:

The Institute must assign coordinator/ subject teacher for the subject, for every batch/group of the students, who would be responsible for coordinating the required activities and keep watch on the level of student's participation in the chosen game.

Coordinator/mentor would be responsible for the award of the sessional marks based upon following components.

1. Level of understanding and general awareness (20 %)
2. Involvements in the Practice Sessions (50 %)
3. Regularity, Sincerity and Discipline (20 %)
4. Participation in University level / District level / State level / National Level events (10 %)



KHU-202	UNIVERSAL HUMAN VALUES-II: UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	2L:1T:0P	3 Credits
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Course Outcomes:

On completion of course the students are able to:

CO	CO Statement	Bloom's Level
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	K2
CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.	K2,K4
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society	K2
CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.	K2
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	K3, K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Module 1 – Introduction to Value Education

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: Self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

Module 2 – Harmony in the Human Being

Lecture 7: Understanding Human being as the Co-existence of the Self and the Body

Lecture 8: Distinguishing between the Needs of the Self and the Body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of Self and Body

Lecture 9: The Body as an Instrument of the Self

Lecture 10: Understanding Harmony in the Self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self

Lecture 11: Harmony of the Self with the Body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of Self with the Body

Module 3 – Harmony in the Family and Society

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

- Lecture 16:** Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

Module 4 – Harmony in the Nature/Existence

- Lecture 19:** Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

Module 5 – Implications of the Holistic Understanding – a Look at Professional Ethics

- Lecture 23:** Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Guidelines and Content for Practice Sessions (Tutorials)

In order to connect the content of the proposals with practice (living), 14 practice sessions have been designed. The full set of practice sessions is available in the Teacher's Manual as well as the website.

Text Books:

Text Book and Teachers Manual

1. The Textbook - A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
2. The Teacher's Manual- Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, RR Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53
3. Professional Ethics and Human Values, Premvir Kapoor, ISBN: 978-93-86173-652, Khanna Book Publishing Company, New Delhi, 2022.

**SWAMI VIVEKANAND
SUBHARTI UNIVERSITY, MEERUT**



EVALUATION SCHEME

B.TECH II Year

Computer Science & Engineering

In

Artificial Intelligence & Machine Learning

W.E.F. SESSION 2024-25

**BHAI JAITA SUBHARTI ENGINEERING COLLEGE
FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT**

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BHAI JAITA SUBHARTI ENGINEERING COLLEGE
FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech 2nd Year/3rd Semester (AIML)
w.e.f. academic Session 2024-25

SEMESTER III														
S. No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	KOE-3**/ KAS-303	Science Based Open Elective/Engineering Mathematics-III	ES/BS	3	1	0	20	10	30	-	70	-	100	4
2	KHU-305/ KAS-304	Soft Skills*/ Environmental Science *	HS/BS	3	0	0	20	10	30	-	70	-	100	3
3	KCSE-301	Data Structure using C++	ES	3	1	0	20	10	30	-	70	-	100	4
4	KCSE-302	Computer Organization and Architecture	ES	3	1	0	20	10	30	-	70	-	100	4
5	KCSE-303	Discrete Structures and Theory of Logic	ES	2	1	0	20	10	30	-	70	-	100	3
6	KCSE-351	Data Structure using C++ Lab	ES	0	0	3	-	-	-	15	-	35	50	1
7	KCSE-352	Computer Organization and Architecture Lab	ES	0	0	3	-	-	-	15	-	35	50	1
8	KCSE-353 / KCSE-354	Web Designing Workshop/ MATLAB Workshop	ES	0	0	2	-	-	-	15	-	35	50	1
9	KCC-351	Internship Assessment/Mini Project		-	-	-	-	-	-	100	-	-	100	2
Total												750	23	

* May be offered through NPTEL.

Abbreviation Used:

BS: Basic Science Course

ES: Engineering Science Course

HS: Humanities and Social Sciences including Management Course

BHAI JAITA SUBHARTI ENGINEERING COLLEGE
FACULTY OF ENGINEERING AND TECHNOLOGY
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech 2nd Year/4th Semester (AIML)
w.e.f. academic Session 2024-25

SEMESTER IV														
S No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	KOE-4**/ KAS-403	Science Based Open Elective/ Engineering Mathematics-III	ES/BS	3	1	0	20	10	30	-	70	-	100	4
2	KHU-405/ KAS-404	Soft Skills/ Environmental Science	HS/BS	3	0	0	20	10	30	-	70	-	100	3
3	KCSE-401	Operating System	ES	3	1	0	20	10	30	-	70	-	100	4
4	KCSE-402	Theory of Automata and Formal Languages	ES	2	1	0	20	10	30	-	70	-	100	3
5	KCSE-403	Object Oriented Programming with Java	ES	3	1	0	20	10	30	-	70	-	100	4
6	KCSE-451	Operating System Lab	ES	0	0	3	-	-	-	15	-	35	50	1
7	KCSE-452	Object Oriented Programming with Java Lab	ES	0	0	3	-	-	-	15	-	35	50	1
8	KCSE-454/ KCSE-453	MATLAB Workshop/ Web Designing Workshop	ES	0	0	2	-	-	-	15	-	35	50	1
Total												650	21	

Abbreviation Used:

BS: Basic Science Course

ES: Engineering Science Course

HS: Humanities and Social Sciences including Management Course

AU: Audit Course

The Mini Project or internship (4 weeks) will be done during summer break after 4th Semester and will be assessed during V semester.

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KCSE-402	Theory of Automata and Formal Languages	2L:1T:0P	3 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars	K4, K6
CO2	Analyse and design, Turing machines, formal languages, and grammars	K4, K6
CO3	Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving	K1, K5
CO4	Prove the basic results of the Theory of Computation.	K2, K3
CO5	State and explain the relevance of the Church-Turing thesis.	K1, K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1: Basic Concepts and Automata Theory	8
Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ϵ -Transition, Equivalence of NFA's with and without ϵ -Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata.	
Unit-2: Regular Expressions and Languages	8
Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages	
Unit-3: Regular and Non-Regular Grammars	8
Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Arden's Theorem, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.	
Unit-4: Push Down Automata and Properties of Context Free Languages	8

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Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata(DPDA) and Deterministic Context free Languages(DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.	
Unit-5: Turing Machines and Recursive Function Theory	8
Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondence Problem, Introduction to Recursive Function Theory.	

Reference Books:

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia
2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill
3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI
4. An Introduction to Theory of Automata & Formal Languages by Manish K. Jha, Khanna Book Publishing Co.(P) Ltd.

KCSE-302	Computer Organization and Architecture	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Study of the basic structure and operation of a digital computer system.	K1, K2
CO2	Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations.	K2, K4
CO3	Implementation of control unit techniques and the concept of Pipelining	K3
CO4	Understanding the hierarchical memory system, cache memories and virtual memory	K2
CO5	Understanding the different ways of communicating with I/O devices and standard I/O interfaces	K2, K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1:	8
Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.	
Unit-2:	8
Arithmetic and logic unit: Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers	
Unit-3:	8
Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.	
Unit-4:	8

Adh

<p>Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks</p> <p>Virtual memory: concept implementation.</p>	
<p>Unit-5:</p>	<p>8</p>
<p>Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.</p>	

Reference Books:

1. Computer System Architecture - M. Mano
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Reference books
4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006.
5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.
6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed IndiaPrivate Limited, Fifth edition, 2012
7. Structured Computer Organization, Tannenbaum(PHI)



KCSE-352	Computer Organization and Architecture Lab	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	To implement adder circuits using basic gates	K1,K2
CO2	To understand the converter circuits using basic gates.	K3
CO3	To understand the working of Multiplexer	K4,K5
CO4	To understand the various circuits for ALU, data path and control units.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments (Indicative & not limited to)

1. Implementing HALF ADDER, FULL ADDER using basic logic gates
2. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
3. Implementing 3-8 line DECODER.
4. Implementing 4x1 and 8x1 MULTIPLEXERS.
5. Verify the excitation tables of various FLIP-FLOPS.
6. Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.
7. Design of an 8-bit ARITHMETIC LOGIC UNIT.
8. Design the data path of a computer from its register transfer language description.
9. Design the control unit of a computer using either hardwiring or microprogramming based on its registertransfer language description.
10. Implement a simple instruction set computer with a control unit and a data path.

Reference Books:

1. Computer System Architecture: By M. Morris Mano.
2. Structured Computer Organization: By Tanenbaum.
3. Computer Organization: By Stallings.
4. Computer Architecture and Organization: By Hayes.
5. Microprocessor Architecture, Programming, and Applications with the 8085 - Ramesh S. Gaonkar Pub: Penram International.

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KCSE-351	Data Structure using C++ Lab	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Ability to identify the appropriate data structure for given problem.	K1,K2
CO2	Graduate able to design and analyze the time and space complexity of algorithm or program.	K3, K4
CO3	Ability to effectively use compilers includes library functions, debuggers and trouble shooting.	K5,K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

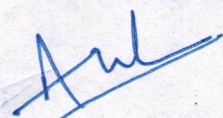
S. No.	List of programs
1	Write a C++ programs to implement recursive and non recursive a) Linear search b) Binary search
2	Write a C++ programs to implement a) Bubble sort b) Selection sort c) Quick sort d) Insertion sort
3	Write a C++ programs to implement the following using an array. a) Stack ADT b) Queue ADT
4	Write a C++ programs to implement list ADT to perform following operations a) Insert an element into a list.

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	b) Delete an element from list c) Search for a key element in list d) count number of nodes in list
5	Write C++ programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT
6	Write C++ programs to implement the deque (double ended queue) ADT using a doubly and an array.
7	Write a C++ program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.
8	Write C++ programs for implementing the following sorting methods: a) Merge sort b) Heap sort
9	Write C++ programs that use recursive functions to traverse the given binary tree in a) Preorder b) Inorder c) Postorder.
10	Write a C++ program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree

Reference Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.



KCSE-301	Data Structure using C++	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand and apply the concepts of programming in C++	K ₁ , K ₂
CO2	Understand data structure and implement arrays and linked lists using C++	K ₂ , K ₃
CO3	Implementation of Stack, Queue and discuss the computational efficiency of the sorting and searching algorithms.	K ₂ , K ₃ , K ₄
CO4	Implementation of Trees and Graphs and perform various operations on these data structure.	K ₃
CO5	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.	K ₅ , K ₆

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

CONTENT
<p>Unit-1:</p> <p>OOPs with C++: Basic Concepts of Object Oriented Programming, C++ Program Structure, Data Types, Tokens, Input/Output Streams, Dynamic Memory Allocation with new and delete, Control Structures, Function Prototyping, Call by Reference, Function Overloading, A Simple Class and Object, Accessing members of class, Initialization of class objects: (Constructor, Destructor), Inheritance example, Objects as Function Arguments, Member functions defined outside the class.</p>
<p>Unit-2:</p> <p>Introduction: Data Types, Built in and User Defined Data Structures, Applications of Data Structure, Algorithm Analysis, Worst, Best and Average Case Analysis, Notations of Space and Time Complexity, Basics of Recursion.</p> <p>Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Sparse Matrices.</p> <p>Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable & Two variables Polynomial.</p>
<p>Unit-3:</p> <p>Stacks: Stack operations: Push & Pop, Array and Linked Implementation of Stack in C++, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Problem solving using iteration and recursion with examples such as Binary search, Fibonacci series, and Hanoi towers. Tradeoffs between iteration and recursion.</p> <p>Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.</p>

Aul

Searching: Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing & Collision resolution Techniques used in Hashing.
Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.

Unit-4:

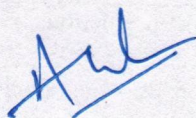
Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Pointer(Linked List) Representation, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Constructing Binary Tree from given Tree Traversal, Operation of Insertion, Deletion, Searching & Modification of data in Binary Search. Threaded Binary trees, Traversing Threaded Binary trees. Huffman coding using Binary Tree. Concept & Basic Operations for AVL Tree, B Tree & Binary Heaps

Unit-5:

Graphs: Basic terminology, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prim's and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshall Algorithm and Dijkstra Algorithm.

Reference Books:

1. Aaron M. Tenenbaum, Yeddyah Langsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India.
2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India.
3. Lipschutz, "Data Structures" Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.
4. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.
5. Michael T. Goodrich, Roberto Tamassia, David M. Mount "Data Structures and Algorithms in C++", Wiley India.
6. Berziss, AT: Data structures, Theory and Practice, Academic Press.
7. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.



KCSE-303	Discrete Structures and Theory of Logic	2L:1T:0P	3 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Acquire Knowledge of sets and relations for solving the problems of POSET and lattices.	K ₃ , K ₄
CO2	Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities.	K ₁ , K ₂
CO3	Employ the rules of propositions and predicate logic to solve the complex and logical problems.	K ₃
CO4	Explore the concepts of group theory and their applications for solving the advance technological problems.	K ₁ , K ₄
CO5	Illustrate the principles and concepts of graph theory for solving problems related to computer science.	K ₂ , K ₆

K₁ – Remember, K₂ – Understand, K₃ – Apply, K₄ – Analyze, K₅ – Evaluate, K₆ – Create

COURSE CONTENTS:

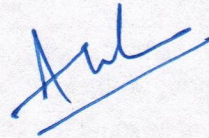
Content	Contact Hours
Unit-1:	8
Set Theory & Relations: Introduction, Combination of sets. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations. POSET & Lattices: Hasse Diagram, POSET, Definition & Properties of lattices – Bounded, Complemented, Distributed, Modular and Complete lattice.	
Unit-2:	8
Functions: Definition, Classification of functions, Operations on functions. Growth of Functions. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps.	
Unit-3:	8
Theory of Logics: Proposition, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. Predicate Logic: First order predicate, well-formed formula of predicate, quantifiers, Inference theory of predicate logic.	
Unit-4:	8
Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.	

AM

Unit-5:	8
Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring. Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle	

Reference Books:

1. Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
3. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
4. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004
5. Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill.
6. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.
7. Deo, Narsingh, "Graph Theory With application to Engineering and Computer Science.", PHI.
8. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi



KAS-303 / KAS-403	Engineering Mathematics-III	3L:1T:0P	4 Credits
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Course Outcomes:

	Course Outcome (CO)	Bloom's Knowledge Level (KL)
At the end of this course, the students will be able to:		
CO1	Remember the concept of partial differential equation and to solve partial differential equations and analyze the concept of partial differential equation to evaluate the problems concerned with partial differential equations	K1, K3, K4 & K5
CO2	Understand the concept of correlation, moments, skewness and; kurtosis and curve fitting	K2
CO3	Remember the concept of probability to evaluate probability distributions and apply the concept of hypothesis testing	K1, K3 & K5
CO4	Understand the concept of transcendental and polynomial equations, finite differences and interpolation	K2
CO5	Analyze the concept of numerical differentiation and integration that are used in dealing with various engineering problems	K4 & K6

- K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

Unit No.	Particulars	Contact Hours
1	Partial Differential Equations: Formation of partial differential equations, Linear and Non Linear Partial Equations of first order, Lagrange's linear PDE, solution of first order linear and non-linear PDEs by Charpit's method, Solution of homogenous and non-homogenous linear partial differential equations of second and higher orders with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients. Applications of Partial Differential Equations: Classification of linear partial differential equation of second order, Method of separation of variables, Solution of wave and heat conduction equation up to two dimension, Laplace equation into two dimensions.	8
2	Statistical Techniques I: Measures of central tendency, Moments, Moment generating function (MGF), Skewness, Kurtosis, Curve Fitting, Method of least squares, Fitting of straight lines, Fitting of second-degree parabola, Exponential curves, Correlation and Rank correlation, Regression Analysis: Regression lines of y on x and x on y, regression coefficients, properties of regression coefficients and non-linear regression.	8
3	Statistical Techniques II: Probability and Distribution: Introduction, Addition and multiplication law of probability, Conditional probability, Baye's theorem, Random variables (Discrete and Continuous Random variable), Probability mass and density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poisson and Normal distribution	8

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	tions. Sampling, Testing of Hypothesis: Introduction, Sampling Theory (Small and Large), Hypothesis, Null hypothesis, Alternative hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, Student's T-test and Chi-square test.	
4	Numerical Techniques-I: Zeros of transcendental and polynomial equations using Bisection method, Regula – Falsi method and Newton – Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, Newton's forward and backward difference formulae, Lagrange's interpolation formula and Newton's divided difference formula for unequal intervals.	8
5	Numerical Techniques-II: Numerical solution of system of linear equations by matrix decomposition method, Jacobi method and Gauss-Seidel method. Numerical differentiation, Numerical integration by trapezoidal rule, Simpson's one-third and three-eighths rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge-Kutta methods.	8

Text/Reference Books:

1. Higher Engineering Mathematics: B.S. Grewal
2. Advanced Engineering Mathematics: E. Krezig
3. Introduction to Engineering Mathematics Vol. IV: H.K. Das; S. Chand Publications, New Delhi, India.
4. Probability and statistics for Engineers: Johnson. PHI.
5. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
6. D.N. Elhance, V. Elhance & B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

KAS-304/404	Basic Environmental Engineering and Pollution Abatement	3L:0T:0P	3 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand the Basics of Ecology and Environmental Biodiversity & Remember the significance of ecosystem services and identify risks associated with them.	K2
CO2	Analyze Pollution Types, Sources, Their Environmental Impact and industrial pollution control methods in Gross Polluting Industries (GPI)	K4
CO3	Evaluate treatment schemes for surface and ground water, domestic and industrial wastewater, and advances in secondary treatment processes.	K5
CO4	Create Pollution Prevention and Control Strategies	K6
CO5	Analyze Industrial Pollution Control and Waste Management Practices	K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

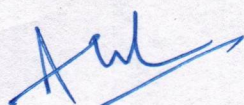
Content	Contact Hours
Unit-1:	8
Introduction; Ecology, environment and biodiversity; Ecosystem services and its risk Ecosystem services and its risk Pollution types and sources ; Impact/consequences of pollutants; Transmission of pollutants in environment ; Transmission of pollutants in environment	
Unit-2:	8
Ambient air quality and standards; Water quality and standards ; Water quality and standards ; Industrial pollution and standards Sampling and Characterization of gas/air/emission; Sampling and Characterization of water/waste water; Characterization of solid wastes and soil; Environmental law and regulatory framework	
Unit-3:	8

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<p>Pollution prevention strategies and processes ; Pollution prevention strategies and processes ; Pollution prevention by using optimum water ; Pollution prevention by using optimum water.</p> <p>Air pollution control ; Air pollution control; Air pollution control ; Air pollution control</p>	
Unit-4:	8
<p>Treatment of surface and ground water for drinking water generation; Treatment of domestic and industrial waste water: Schemes; Primary treatment equipment; Secondary treatment process</p> <p>Secondary treatment equipment ; Secondary treatment equipment ; Advances in secondary treatment process ; Advances in secondary treatment process</p> <p>Tertiary treatment ; Tertiary treatment ; Sludge management; Pollution control in industry</p>	
Unit-5:	8
<p>Industrial pollution control in GPI ; Industrial pollution control in GPI ; Industrial pollution control in GPI ; Industrial pollution control in GPI ; Tutorial 10.</p> <p>Industrial pollution control in GPI Solid waste management schemes; Solid waste transformation (incineration); Solid waste transformation (gasification)</p> <p>Solid waste transformation (Pyrolysis); Solid waste transformation (Anaerobic digestion); Hazardous waste management; Management of special category wastes</p>	

Prescribed Books:

1. "Pollution Control Acts, Rules, Notification issued there under" CPCB, Ministry of Env. And Forest, G.O.I., 3rd Ed.(2006)
2. Vallero D., "Fundamentals of Air Pollution", 4th Ed. Academic Press.(2007)
3. Eckenfelder W. W., "Industrial water pollution Control", 2nd Ed., McGraw Hill.(1999)
4. Kreith F. and Tchobanoglous G., "handbook of Solid waste Management", 2nd Ed., McGraw Hill.(2002)
5. Pichtel J., "Waste Management Practices: Municipal, Hazardous and Industrial", CRC.(2005)
6. Tchobanoglous G., Burton F. L. and Stensel H.D., "Waste Water Engineering: Treatment and Reuse", 4th Ed., Tata McGraw Hill.(2003)



KCSE-354/454	IT Workshop	0L:0T:2P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand the use of different windows in matlab.	K1
CO2	Understand the use of different matlab commands.	K2,K3
CO3	Analyze the use of different operational symbols	K4
CO4	Apply and evaluate the different signals in matlab.	K5
CO5	Create the different math functions	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

1. a. To Know the history and features of MATLAB b. To Know the local environment of MATLAB
2. Write a program in MATLAB to perform Union, Intersection and Complement operations
3. Write a program in MATLAB to implement De-Morgan's Law.
4. Write a program in MATLAB to plot various membership functions
5. Use Fuzzy toolbox to model tip value that is given after a dinner which can be-not good, satisfying, good and delightful and service which is poor, average or good and the tip value will range from Rs. 10 to 100.
6. Generate ANDNOT function using McCulloch-Pitts neural net by MATLAB program.
7. Generate XOR function using McCulloch-Pitts neural net by MATLAB program.
8. Write a MATLAB program for Hebb Net to classify two dimensional input patterns in bipolar with their targets given below: '*' indicates a '+' and '.' Indicates '-'
9. Write a MATLAB program for Perceptron net for an AND function with bipolar inputs and targets.
10. Write a M-file to calculate the weights for the following patterns using hetero-associative neural net for mapping four input vectors to two output vectors.
11. Write an M-file to store vector [-1 -1 -1 -1] and [-1 -1 1 1] in an auto-associative net. Find weight matrix. Test the net with [1 1 1 1] as input.

Reference Books:

1. Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, Rudra Pratap, Oxford University Press
2. MATLAB for Beginners, The Introduction to MATLAB Programming, Mr MD Irfan Ali
3. MATLAB AND SIMULINK FOR ENGINEERS, Agam Kumar Tyagi, University Press

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KCSE-452	Object Oriented Programming with Java Lab	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Able to use Java compiler and eclipse platform to write and execute java program based on OOPS.	K1, K2
CO2	Able to apply the concept of multithreading, exception handling and implementation develop packages in Java.	K2, K3
CO3	Able to apply the concept of I/O programming, GUI programming with Applet and developed applications.	K3, K5
CO4	Able to Implement and analyze java programs with Event Handling and GUI Programming with Swing and JDBC	K3, K4
CO5	Develop applications using Console I/O and File I/O, GUI applications and JSP	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

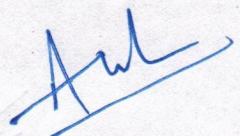
List of Experiments (Indicative & not limited to)

Note: Use Java compiler and eclipse platform to write and execute java program.

1. Program to define a structure of a basic JAVA program
2. Program to define the data types, variable, operators, arrays and control structures.
3. Program to define class and constructors. Demonstrate constructors.
4. Program to define class, methods and objects. Demonstrate method overloading.
5. Program to define inheritance and show method overriding.
6. Program to demonstrate Packages.
7. Program to demonstrate Exception Handling.
8. Program to demonstrate Multithreading.
9. Program to demonstrate I/O operations.
10. Program to demonstrate the Java Database Connectivity
11. Program to demonstrate Applet structure and event handling.
12. Program to demonstrate Swings and event handling
13. Program to demonstrate Servlets for application of session and Cookies
14. Program to demonstrate JSP with JDBC

Reference Books:

1. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
2. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
3. Herbert Schildt, "Java The complete reference", McGraw Hill Education
4. Steven Holzner, "Java Black Book", Dreamtech.
5. Balagurusamy E, "Programming in Java", McGraw Hill



KCSE-403	Object Oriented Programming with Java	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand the basics of Java and object-oriented programming concepts using Java	K1, K2
CO2	Understand exception handling, multi-threading in Java and develop packages in Java	K2, K3
CO3	Apply I/O programming, GUI programming with Applet and evaluate the developed applications.	K3, K5
CO4	Implement and analyze java programs with Event Handling and GUI Programming with Swing and JDBC	K3, K4
CO5	Create Web Application using Servlets and Java Server Pages (JSP)	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1:	8
<p>Introduction: Introduction of Java, Java Environment, Java Source File Structure, and Compilation. Fundamental, Tokens, Operator, Data type, Variable, Operators, Control statements, Methods, Arrays, String.</p> <p>Object-Oriented programming concepts: Basics of objects and classes, Constructors, Finalizer, Visibility modifiers, Methods and objects. Inheritance and Polymorphism: Inheritance, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Abstract class, Interface.</p>	
Unit-2:	8
<p>Multithreading: Thread, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Inter-thread Communication.</p> <p>Packages: Defining Package, CLASSPATH Setting for Packages, Making JAR Files for Library Packages, Import and Static Import Naming Convention for Packages.</p> <p>Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.</p>	
Unit-3:	8

AM

<p>Java I/O programming: The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file, Text and Binary I/O.</p> <p>GUI programming with Applet: Java Applet, Life cycle of an applet, Event handling, Introduction to AWT, AWT controls, Layout managers, String handling.</p> <p>Event Handling: The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.</p>	
Unit-4:	8
<p>GUI Programming with Swing: Introduction, limitations of AWT, MVC architecture, Components, Containers, Exploring swing- JApplet, JFrame and JComponent, Icons and Labels, Text fields, Buttons –The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.</p> <p>Java Database Connectivity (JDBC): Merging data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.</p>	
Unit-5:	8
<p>Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Session Tracking, Cookies, Session Tracking with Http Session.</p> <p>Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries</p>	

Reference Books:

1. Object Oriented Programming through Java, P. Radha Krishna, University Press
2. Herbert Schildt, "Java The complete reference", McGraw Hill Education
3. Steven Holzner, "Java Black Book", Dreamtech.
4. Balagurusamy E, "Programming in Java", McGraw Hill
5. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
6. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press

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KCSE-451	Operating System Lab	0L:0T:3P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Ability to implement the scheduling algorithms	K1, K2
CO2	Ability to implement interprocess communication between the two processes	K2,K3
CO3	Ability to solve and design synchronization problems	K4
CO4	Ability to develop solutions for synchronization problems using semaphores	K4,K5
CO5	Ability to simulate and implement OS concepts such as deadlock management	K3,K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

List of Experiments (Indicative & not limited to)

1. A program to simulate the FCFS CPU scheduling algorithm
2. A program to simulate the SJF CPU scheduling algorithm
3. A program to simulate the priority CPU scheduling algorithm.
4. A program to simulate the Round Robin CPU scheduling algorithm
5. A program to simulate the Bankers Algorithm for Deadlock Avoidance
6. A program to simulate Bankers Algorithm for Deadlock Prevention.
7. A program to simulate FIFO Page Replacement Algorithm
8. A program to simulate LRU (least-recently-used) Page Replacement algorithm
9. A program to simulate Paging technique of memory management.

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KCSE-401	Operating System	3L:1T:0P	4 Credits
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Understand the structure and functions of OS	K ₁ , K ₂
CO2	Learn about Processes, Threads and Scheduling algorithms.	K ₁ , K ₂
CO3	Understand the principles of concurrency and Deadlocks	K ₂
CO4	Learn various memory management scheme	K ₂
CO5	Study I/O management and File systems.	K ₂ , K ₄

K₁ – Remember, K₂ – Understand, K₃ – Apply, K₄ – Analyze, K₅ – Evaluate, K₆ – Create

COURSE CONTENTS:

Content	Contact Hours
Unit-1: Introduction	8
Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	
Unit-2: Concurrent Processes	8
Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.	
Unit-3: CPU Scheduling	8
Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	
Unit-4: Memory Management	8
Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.	

Ans

Unit-5: I/O Management and Disk Scheduling	8
I/O devices, and I/O subsystems, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system protection and security.	

Reference Books:

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition, TMH
5. William Stallings, "Operating Systems: Internals and Design Principles ", 6th Edition, Pearson Education



KCSE-353/ KCSE-453	Web Designing Workshop	0L:0T:2P	1 Credit
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Course Outcomes:

On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	Design web pages using HTML Tags	K1, K2
CO2	Apply Cascading Style Sheets to design attractive web pages	K3
CO3	Implementation of key features of Bootstrap Framework	K3, K4
CO4	Creation of responsive Website quickly using Bootstrap Features	K5, K6
CO5	Design dynamic web pages using JavaScript	K5, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

S. No.		Duration
1	HTML	3 Hrs
	Elements, attributes, heading, paragraph, styles, comments, links, images, favicon, tables, list, class, id, HTML forms, HTML media, navigation bar.	
2	CSS (Cascading Style Sheets)	6 Hrs
	Types of CSS, colors, background, margins, padding, height, width, text, font, icon, links, list, tables, display, z-index, float, overflow, CSS media queries, inline block, navigation bar, image gallery, forms, round corners	
3	BOOTSTRAP	6 Hrs
	Fundamentals of implementing responsive web design ,Use Balsamiq to mockup and wireframe websites, The fundamentals of UI design for websites ,How to install the Bootstrap framework ,Understanding the Bootstrap grid layout system, How to use bootstrap containers to layout your website easily, Use other Bootstrap components such as buttons ,Adding symbols using Font Awesome, Bootstrap carousels. Add Bootstrap cards to your website. Using Bootstrap navigationbars,	
4	JavaScript	3 Hrs
	Introduction to java script, function, output, statement, variables, operators, datatypes, objects, events, string methods, Arrays, if else, switch, loop for, loop in, loop for, debugging, validation of forms , Functions and invocation patterns, Event handler (onclick, onsubmit etc.). Discussion of ECMAScripts, Intermediate JavaScript , JS Expressions, Operators, Statements and Declarations , Object-Oriented Programming JS Objects and Prototypes, 'This', Scope and Closures Objects and Prototypes Refactoring and Debugging	
	Total	36 Hrs

AW

List of Experiments (Indicative & not limited to)						
Experiment No.	List of Experiments (Indicative & not limited to)					
1	Design the following static web pages required for an online bookstore website. HOME PAGE: <ul style="list-style-type: none"> ✦ The static home page must contain three frames. ✦ Top frame: Logo and the college name and links to Homepage, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). 					
	For example: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame. Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.					
		Logo	Web Site Name			
		Home	Login	Registration	Catalogue	Cart
		CSECEEEEE CIVIL	Description of the WebSite			
	LOGIN PAGE: This page looks like below:					
		Logo	WebSite Name			
		Home	Login	Registration	Catalogue	Cart

4.	<p>CARTPAGE: The cart page contains the details about the books which are added to the cart. The cart page should look like this:</p> <table border="1" data-bbox="438 313 1524 571"> <tr> <td data-bbox="438 313 566 369">Logo</td> <td colspan="4" data-bbox="566 313 1524 369">Web Site Name</td> </tr> <tr> <td data-bbox="438 369 566 414">Home</td> <td data-bbox="566 369 782 414">Login</td> <td data-bbox="782 369 1069 414">Registration</td> <td data-bbox="1069 369 1348 414">Catalogue</td> <td data-bbox="1348 369 1524 414">Cart</td> </tr> <tr> <td data-bbox="438 414 566 448">CSE</td> <td data-bbox="566 414 782 448">Book name</td> <td data-bbox="782 414 1069 448">Price</td> <td data-bbox="1069 414 1348 448">Quantity</td> <td data-bbox="1348 414 1524 448">Amount</td> </tr> <tr> <td data-bbox="438 448 566 481">ECE</td> <td data-bbox="566 448 782 481">Java 2</td> <td data-bbox="782 448 1069 481">\$35.5</td> <td data-bbox="1069 448 1348 481">2</td> <td data-bbox="1348 448 1524 481">\$70</td> </tr> <tr> <td data-bbox="438 481 566 515">EEE</td> <td data-bbox="566 481 782 515">XML bible</td> <td data-bbox="782 481 1069 515">\$40.5</td> <td data-bbox="1069 481 1348 515">1</td> <td data-bbox="1348 481 1524 515">\$40.5</td> </tr> <tr> <td data-bbox="438 515 566 571">CIVIL</td> <td data-bbox="566 515 782 571">Total amount</td> <td data-bbox="782 515 1069 571">-\$130.5</td> <td data-bbox="1069 515 1348 571"></td> <td data-bbox="1348 515 1524 571"></td> </tr> </table>	Logo	Web Site Name				Home	Login	Registration	Catalogue	Cart	CSE	Book name	Price	Quantity	Amount	ECE	Java 2	\$35.5	2	\$70	EEE	XML bible	\$40.5	1	\$40.5	CIVIL	Total amount	-\$130.5		
Logo	Web Site Name																														
Home	Login	Registration	Catalogue	Cart																											
CSE	Book name	Price	Quantity	Amount																											
ECE	Java 2	\$35.5	2	\$70																											
EEE	XML bible	\$40.5	1	\$40.5																											
CIVIL	Total amount	-\$130.5																													
5.	<p>REGISTRATION PAGE : Create a “ registration form“</p> <p>with the following fields</p> <ol style="list-style-type: none"> 1) Name (Text field) 2) Password (password field) 3) E-mail id(text field) 4) Phone Number(text field) 5) Sex(radio button) 6) Date of birth(3 select boxes) 7) Languages known(checkboxes–English, Telugu, Hindi, Tamil) 8) Address(text area) 																														
6.	<p>Js VALIDATION: Write <i>JavaScript</i> to validate the following fields of the above registration page.</p> <ol style="list-style-type: none"> 1. Name (Name should contains alphabets and the length should not be less than 6 characters). 2. Password (Password should not be less than 6 characters length). 																														
7.	<p>Js VALIDATION:</p> <ol style="list-style-type: none"> 3. E-mailid (should not contain any invalid and must follow the standard pattern(name@domain.com) 4. Phone Number(Phone number should contain 10 digits only). 																														
8.	<p>CSS: Design a web page using CSS(Cascading Style Sheets) which includes the following:</p> <ol style="list-style-type: none"> 1) Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles. 2) Set a background image for both the page and single elements on the page. 																														
9.	<p>CSS:</p> <ol style="list-style-type: none"> 1) Control the repetition of the image with the background-repeat property. 2) Define styles for links as 																														

	<p>A:link</p> <p>A:visited</p> <p>A:active</p> <p>A:hover</p>
10.	<p>Consider a small topic of your choice on which you can develop static Webpages and try to implement all topics of html, CSS and Js within the topic.</p> <p>Choose any one topic.</p> <ol style="list-style-type: none"> 1. Your Own Portfolio 2. To-Do List 3. Survey Form 4. A Tribute Page 5. A Questionnaire

Reference Books:

1. Meloni, J. C., Kyrnin, J. (2018). HTML, CSS, and JavaScript All in One: Covering HTML5, CSS3, and ES6, Sams Teach Yourself. United Kingdom: Pearson Education.
2. McGrath, M. (2020). HTML, CSS & JavaScript in easy steps. United Kingdom: In Easy Steps Limited.
3. Duckett, J. (2014). Web Design with HTML, CSS, JavaScript and JQuery Set. United Kingdom: Wiley.
4. Fajfar, I. (2015). Start Programming Using HTML, CSS, and JavaScript. United Kingdom: CRC Press.

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