VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY
TECHNICAL CAMPUS, KILIMANOOR
(Accredited by NAAC with "B++" Grade)
A Unit of Vidya International Charitable Trust

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

S2 CE

(2024 – 28 BATCH)

CODE: GCEST 203	COURSE NAME: ENGINEERING GRAPHICS AND COMPUTER AIDED DRAWING	L:T:P:R 2-0-2-0	Credit: 3
Qn. No.	**Module-1**	**Marks**	**Year**
1	One end of a line CD is 15 mm above HP and 20 mm in front of VP. At the same time the other end is 60 mm above HP and 50 mm in front of the VP. The distance between the end projectors is 70 mm. Draw the projections of the line and locate the traces. Determine the true and apparent lengths. Also find the true and apparent inclinations.	20	KTU-Jan 2024
2	The top view of a line AB is 70 mm long and is inclined at 45 degrees to XY line. One end of the line is 22 mm above HP and 12 mm in front of VP. The other end of the line is 60 mm above HP and is in front of VP. Find the true length, elevation length and true inclinations of the line with HP and VP. Show the locations of the traces of the line.	20	KTU-Jan 2024
3	One end point of a line AB is 12 mm above HP and is 15 mm in-front of VP. Other end point is 50 mm above HP and is 42 mm in front of VP. Draw the projections of the line AB if its elevation measures 70 mm. Find out its true length and the true inclinations with respect to the reference planes.	20	KTU-June 2022
4	One end point P of a line PQ, 75 mm long, is 10 mm above HP and 20 mm in front of VP. The line is inclined 45° to HP and its plan is inclined 35° to x-y line. Draw the projections of the line PQ and find out true inclination of the line with respect to VP.	20	KTU-June 2022
5	Distance between end projectors of a line CD is 65mm. End C is 15mm above HP and 40mm in front of VP. Its front view and top view makes an angle of 40° and 45° respectively with XY- line. Draw the projections, find true length and true inclinations with HP and VP and locate its traces. The line is in the first quadrant.	20	KTU-June 2023
6	The front view of a line AB measures 70mm and makes an angle of 500 with XY-line. The end A is in the HP and the VT of the line is 30mm above HP. The line is inclined at 40° to the VP. Draw the projections of the line, find its true length and true inclination to HP and locate its HT.	20	KTU-June 2023
7	A line AB of length 75 mm has one of its ends 60 mm in front of VP and 20 mm above HP. The other end is 20 mm in front of VP and is above HP. The top view of the line is 55 mm long. Draw its projections and also locate its traces.	20	KTU-June 2024
8	A line of length 60 mm has its end P is 15 mm above HP and 20 mm in front of VP. Its top view and front view measures 50 mm and 40 mm respectively. Draw its projections and determine its true inclinations with HP and VP. Also locate its traces.	20	KTU-June 2024
9	One end of line AB is 10 mm above HP and other end is 70 mm in front of VP. It's FV is 20 degrees inclined to xy while it's HT & VT are 10 mm and 5 mm below xy respectively.	20	KTU-May 2024

	Draw projections and find TL with its inclinations with HP & VP.		
10	The end A of a line AB (True length 100mm) is 10 mm above HP and 20 mm in front of VP. The line AB is inclined at 30 degrees to the HP and 20 degrees to VP. Draw the projections of the line if the end B is in third quadrant and mark its traces.	20	KTU-May 2024
Qn. No.	**Module- 2**	**Marks**	**Year**
1	A cone of base 50 mm diameter and axis 75 mm long has one of its generators on the HP. A plane containing that generator and the axis is perpendicular to the HP and is inclined at 60° to the VP. Draw the projections of the cone when the base is nearer to the VP than the apex.	20	KTU-Dec 2023
2	A pentagonal pyramid, base 30 mm side and height 80mm has a triangular face on the ground and the vertical plane containing the axis make an angle of 30° with VP. Draw the projections of the solid.	20	KTU-Dec 2023
3	A hexagonal prism of base edge 25 mm and height 60 mm is resting on one of its base edges on HP. Draw its projection if the rectangular face carrying that base edge is inclined 35° to HP and the base edge at which it is resting is inclined 40° to VP	20	KTU-June 2023
4	Draw the projections of a triangular pyramid 35mm side and height 65 mm long, if it is resting on one of the corners of the base in HP with the slant edge containing that base corner making an angle of 30° with HP and top view of the axis making an angle of 45° with XY- line.	20	KTU-June 2023
5	A square pyramid of base side 30 mm and 60 mm long axis is freely suspended from one of the corners of its base. If the top view of the axis is 50 degrees inclined to XY line, draw the projections of the suspended solid. Make apex nearer to VP and right side of the viewer.	20	KTU-Jan 2024
6	A triangular prism of base edge 30 mm and height 50 mm is resting on one of its base edges on HP and that base edge is inclined 40 degrees to VP. Draw the projections of the solid if the axis is inclined at 40 degrees to HP. Top end face of the solid is away from VP and right side of the viewer.	20	KTU-Jan 2024
7	A square prism of base edge 30 mm and axis length 60 mm is resting on HP on one of its base edges such that the rectangular face containing the resting edge makes an angle of 40° with the HP. Draw its projections if the top view of the axis makes 30° with the VP.	20	KTU-June 2024
8	A tetrahedron of edge 35 mm is lying on the HP on one of its edges, such that the triangular face containing the resting edge is inclined at 30° to the HP and the resting edge is inclined at 50° to the VP. Draw its projection.	20	KTU-June 2024

9	A square prism of base 30 mm and length 60 mm has a base edge on VP, axis inclined at 30 degrees to VP and resting base edge is inclined at 40 degree to HP. Draw the projection of the solid.	20	KTU-May 2024
10	Draw projections of a cone of base diameter 50 mm and height 50 mm resting on HP on its generator with top view of axis inclined 30 degree to VP.	20	KTU-May 2024
Qn. No.	**Module- 3**	**Marks**	**Year**
1	A square prism of base side 30mm and height 75 mm rests on the HP on its base with two of its rectangular faces equally inclined to VP. It is cut by a plane perpendicular to VP and inclined at 60° to HP meeting the axis at 15 mm from top. Draw its elevation, sectional plan and true shape of section.	20	KTU-Dec 2023
2	Draw the development of the lateral surfaces of the hexagonal pyramid of base of side 25 mm and altitude 60 mm which is resting vertically on its base on the ground with two of the sides of the base perpendicular to the VP.	20	KTU-Dec 2023
3	A pentagonal pyramid side of base 30 mm, height 65 mm has its base on the ground and one of its base edge is parallel to and nearer to VP. This pyramid is cut by a section plane perpendicular to VP, passing through a point on the axis which is 20 mm below the apex and making an angle of 40° with HP. Draw the front view, sectional top view and true shape of the section.	20	KTU-June 2023
4	A square prism is resting on its base on HP with two base edges equally inclined to VP. A cutting plane perpendicular to VP and inclined 45° to HP cuts the solid meeting the axis 15 mm above the bottom base. Draw the development of the bottom portion. The base edge of the prism is 30 mm, and the height is 60 mm	20	KTU-June 2023
5	A pentagonal pyramid of base edge 30 mm and height 70 mm is resting on HP with one of the base edges perpendicular to VP and that base edge is situated left side of the viewer. It is cut be a section plane inclined towards right at 35 degrees to HP and it meet the axis of the solid at a distance 25 mm from the apex. Draw the front view, sectional top view, and true shape of the section.	20	KTU-Jan 2024
6	A right circular cylinder of 48 mm diameter and 62 mm height is cut by a section plane bisecting the axis inclined to left at 40 degrees to HP. Draw the development of the lateral surface of the truncated solid by considering the section plane perpendicular to VP. Also assume that cylinder is resting on its base on HP.	20	KTU-Jan 2024
7	A cone of base diameter 50 mm and axis length 70 mm rests with its base on HP. A section plane perpendicular to VP and inclined at 35° to HP and bisects the axis of the cone. Draw the development of the truncated cone.	20	KTU-June 2024

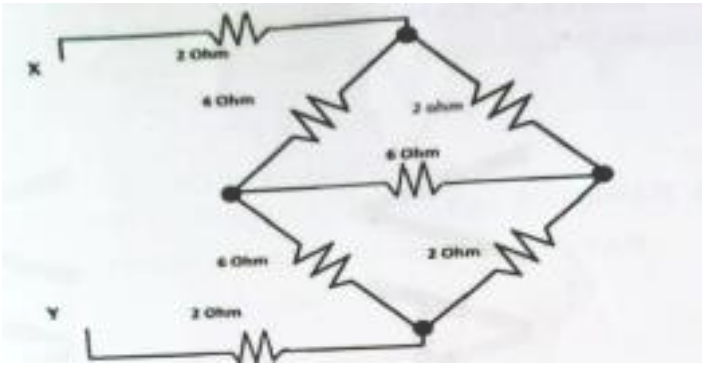
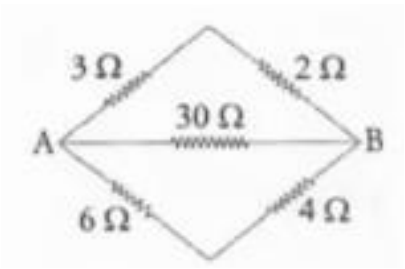
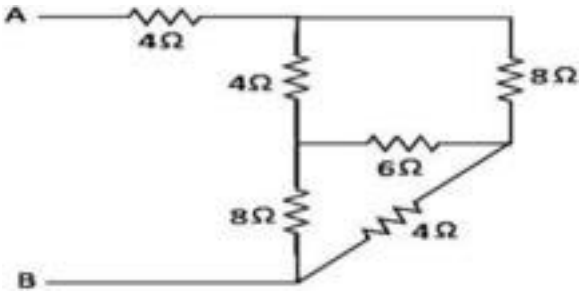
8	A hexagonal pyramid of base edge 30 mm and axis length 70 mm is resting on HP on its base. Two of its base edges are parallel to VP while it is resting. It is cut by a section plane perpendicular to VP and inclined at 45° to HP and passing through a point 15 mm above the base and is located on the axis. Draw the front view, sectional top view and true shape of the section.	20	KTU-June 2024
9	A hexagonal pyramid of base 30 mm and axis 60 mm rests on its base on HP with two base edges perpendicular to VP. It is cut by a plane perpendicular to VP and inclined at 30 degree to the HP meeting the axis at 25 mm from the vertex. Draw the elevation, sectional plan and true shape of the section. What is the maximum true length of the side in the section of the pyramid	20	KTU-May 2024
10	Draw the development of the lateral surface of a right regular hexagonal prism of 20 mm base edge and 60 mm height. An ant moves on its surface from a corner on the base to the diametrically opposite corner of the top face by the shortest route. Sketch the path of the ant in the elevation.	20	KTU-May 2024
Qn. No.	**Module- 4**	**Marks**	**Year**
1	A hemisphere of diameter 60 mm is placed centrally over a square slab of side 50mm and height 40 mm, with its flat surface facing upward. Draw the isometric view of the combination.	20	KTU-June 2023
2	A hexagonal pyramid of base edge 25 mm and height 40 mm is surmounted centrally over a cube of 50 mm side. The cube is lying on HP on one of its square face so that one base edge of the cube and one base edge of the pyramid are parallel to VP. Draw the isometric view of the combination.	20	KTU-June 2023
3	A cylindrical slab, 60 mm in diameter and 20 mm thick is surmounted by a cube of 30 mm side. The axes of the solids are in the same vertical line. Draw the isometric projection of the solids	20	KTU-Dec 2023
4	A waste paper basket is in the form of a frustum of hexagonal pyramid with base 100 mm hexagon and top 150 mm hexagon. Draw the isometric view if its height is 40 cm.	20	KTU-Dec 2023
5	A cube of side 52 mm is resting on HP on one of its faces with one of the base edges parallel to VP. A cone with base diameter 46 mm and height 48 mm is resting on the cube on its base with axes of both the solids coinciding each other. Draw the isometric view of the combination of solid.	20	KTU-Jan 2024
6	A square pyramid of base side 40 mm and height 46 mm rests on its base on top of a hexagonal prism of base side 40 mm and height 36 mm with both the axes coinciding each other. One of the base edges of both the solids are parallel to VP. Draw the isometric view of the combination of sloid.	20	KTU-Jan 2024

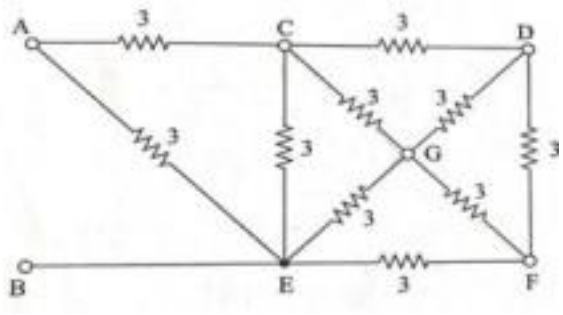
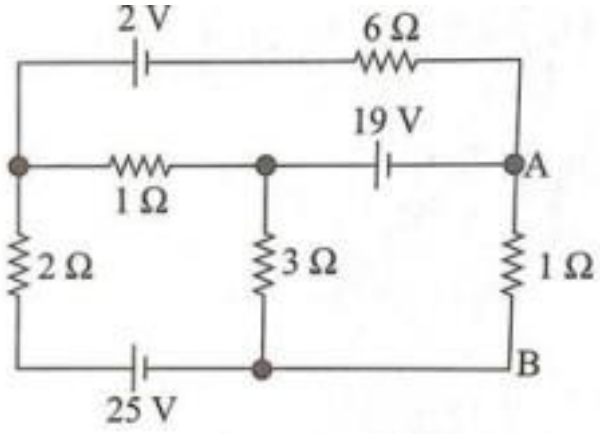
7	A cone of base diameter 40mm and axis length 60 mm is resting centrally over a square slab of edge length 50 mm and thickness 20 mm. Draw the isometric view of the combination of the solids.	20	KTU-June 2024
8	Draw the isometric projection of a pentagonal prism of base edge length 30 mm and axis length 65 mm, which is lying on the ground on one of its rectangular faces. Assume that the axis of the solid is perpendicular to the vertical plane, while it is resting.	20	KTU-June 2024
9	A frustum of a cone of base diameter 50 mm, top diameter 30 mm and height 50 mm resting upon its base on HP. Draw the isometric view of the frustum	20	KTU-May 2024
10	Draw the isometric projection of a sphere of 50 mm diameter resting centrally on a cube of side 30 mm.	20	KTU-May 2024

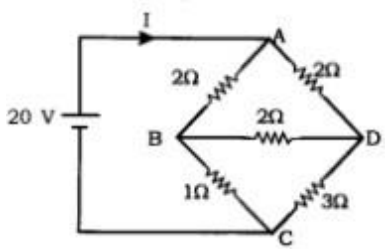
QUESTION BANK

GZEST204 BASIC ELECTRICAL ENGINEERING

MODULE 1

Sl No		Marks	KTU, Year
1	a) Find the equivalent resistance between the terminals X and Y  b) Find the current through the circuit shown below if the voltage applied is 50V  	10 10	KTU DEC2024 KTU DEC 2024
2	a) State and explain Kirchhoff's laws with examples b) Using star-delta transformation, determine the equivalent resistance  	10	KTU DEC 2024

3	Calculate equivalent resistance across B and A  	8	KTU-DEC 2023
4	a)A resistor of 5Ωis connected in parallel with a resistor of R1Ω. This combination is connected in series with an unknown resistor of R2Ω and the complete circuit is then connected to 50 V dc supply. Calculate the values of R1 and R2, if the power dissipated by the unknown resistor R1 is 150W with 5A passing through it.	5	KTU-DEC 2023
	b)By applying Kirchhoff's laws calculate current flowing through the 6Ω resistor in the network shown  	5	KTU-DEC 2022
5	a)State and explain ohms law	4	KTU DEC2022

	b)Find the source current I in the below figure using star-delta transformation.  	10	KTU-D EC 2021

6	a)Define the terms i) mmf ii) magnetic field strength iii) magnetic flux and iv) magnetic flux density State and explain i) Faraday's laws and ii) Lenz's law	4	KTU MAY 2021
	b) alternating current is represented by i(t)=14.14 sin (377t). Find (i)rms lue (ii) frequency (iii)time period and (iv)instantaneous value of the current t=3ms.	4	
	c) An alternating current varying sinusoidally with a frequency of 50Hz has an rms value of 20A. i) Write down the equation for the instantaneous current ii) Find the instantaneous value of current at 0.0025s. iii) Find the instantaneous value of current 0.125s after passing through a positive maximum value iv) At what time, measured from a positive maximum value, will the instantaneous current be 14.14 A?	4	KTU DEC2020
7	a)Two impedances Z1 and Z2 when connected separately across a 220V, 50 Hz supply, consume 300W and 150W at a power factor of 0.4 lagging and 0.7 leading respectively. When the two impedances are connected in series across the same supply, find total power consumed and overall power factor.	10	KTU DEC- 2020

	b) A balanced three phase load has per phase impedance of (30+j50) Ω. If the load is connected across 400V, 3 phase supply, find (i) phase current (ii) line current and (iii) power supplied to load when it is connected in (a) star (b) delta	8	KTU DEC- 2019
8	a) In a single phase ac circuit consisting of an impedance of 10Ω, the RMS value of applied voltage is 230V. i. Write down the expression for instantaneous voltage ii. If the current lags the applied voltage by 30º write down the expression for instantaneous current Calculate the power consumed in the circuit	10	KTU DEC- 2019
	b)A coil of resistance 10 Ω and inductance 0.1 H is connected in series with a 150 μF capacitor across 200V, 50 Hz supply. Calculate (i) Inductive reactance, Capacitance reactance, impedance, current and power factor. (ii) The voltage across the coil and capacitor respectively.	9	KTU DEC- 2019
9	An alternating voltage is defined as $v=100 \sin \alpha$ $0<\alpha<\pi$ $v=0$V $\pi<\alpha<2\pi$ What is the RMS value of this voltage	7	KTU DEC- 2018
10	A balanced 3 phase load consists of 3 coils each of resistance 6 Ω and inductive reactance of 8 Ω. Determine the line current and power absorbed when the coils are (i) star connected (ii) delta connected across 400V, 3 phase supply.	9	KTU DEC- 2018

MODULE 2

Sl No		Marks	KTU, Year
1	a)Explain the advantages of three-phase systems over single-phase systems in power generation and transmission	4	KTU DEC2024
	b)Explain the need for high-voltage transmission in power distribution.	5	KTU DEC2024

2	a)Explain primary and secondary transmission and distribution systems	5	KTU DEC2023
	b)What are the different types of DC generators?	5	KTU DEC2023
3	a)Derive the EMF equation for a single-phase transformer.	5	KTU DEC2023
	b)Explain why a single-phase induction motor is not self-starting.	7	KTU DEC2022
4	a)Describe two starting methods for a single-phase induction motor.	7	KTU DEC2022
	b)An alternating voltage v = 200 sin 314t is applied to a device that offers an ohmic resistance of 20Ω to the flow of current in one direction while entirely preventing the flow of current in the opposite direction. Calculate the r.m.s. value, average value and form factor	7	KTU DEC2022
5	a)Describe the concepts of active power, reactive power, and apparent power in AC circuits, and represent their relationship using a power triangle.	10	KTU DEC2021
	b)Draw the schematic of a hydroelectric power plant and explain the working.	10	KTU DEC2021
6	Draw the schematic of a thermal power plant and explain the working.	10	KTU DEC2021
7	Explain the construction and working principle of a single-phase transformer.	9	KTU DEC2020
8	Explain the constructional features of squirrel cage and slip ring induction motors and highlight the differences between them.	9	KTU DEC2020
9	a)Define synchronous speed and slip of a three-phase induction motor.	4	KTU DEC2019
	b)A 3-phase induction motor is wound for 8 poles and is supplied from a 50 Hz source. Calculate (1) synchronous speed (2) slip of the motor when the speed is 720rpm	7	KTU DEC2019

10	Define R.M.S value and Average value of an alternating current.	7	KTU DEC2018

GXEST104 INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING

(PART-2) (Common to Group A & B)

QUESTION BANK

ACADEMIC YEAR 2024-25 EVEN SEMESTER

Qn. No	MODULE – 3	Marks	Year
1	Distinguish between active and passive electronic components with examples for each	4	KTU DEC 2020
2	a. Draw the symbol of the resistor and explain any four specifications. b. Explain the colour coding of the resistor. Illustrate with examples. What are the merits and demerits of resistor colour coding schemes? c. In a 4-band resistor the last colour in the colour band is gold. If the upper range of resistance is 3.465Ω find its colour code. Write down the colour code for a given resistor of 47 kilo-ohmswith a tolerance of 10%.	4 6 4	KTU DEC 2022 & JAN 2024 KTU JUN 2023 & JAN 2024 KTU JUL 2021
3	a. What is an inductor? How does an inductor work What are the different types of inductors? Give two typical applications of inductors. b. What do you mean by permeability tuning? Identify and sketch any one electronic component that employs permeability tuning and explain the tuning mechanism.	5 4	KTU DEC 2022 KTU JUN 2023
4	a. What is a variable capacitor? List any two applications of variable capacitors. b. Write the significance of specifying the tolerance value of a component. Find the capacitance values for the following codes (i) 2n2 (ii)104K (iii)103J	4 4	KTU JAN 2024 KTU DEC 2021
5	a. What is the depletion region of a diode? How is it formed? b. Draw and explain the VI characteristics of a PN junction diode under forward and reverse bias	4 4	KTU JAN 2024 KTU JUN 2023 KTU DEC 2024

6	a. Compare the three transistor configurations. b. Discuss the parameters 'alpha' and 'beta' of a transistor and quote the relationship between them. (OR) Derive the relation between common base current gain andcommon emitter current gain. c. The collector current of a transistor varies by 1.987 mA when its emitter current is varied by 2 mA. Compute the alpha and beta of the transistor. d. For an NPN transistor, α=0.95 and IE=10mA. Find I_B and I_C. e. For an NPN transistor if the common base current gain is 0.99 and collector current is 20mA, Find the value of base current and emitter current?	4 6 4 4 3	KTU DEC 2022 KTU DEC 2022 & JAN 2024 KTU DEC 2022 KTU JUN 2022 KTU DEC 2024
7	Draw and explain the circuit diagram, and input and output characteristics of a transistor in common emitter configuration. With a neat diagram, mention any one application of the transistor in common emitter configuration.	10	KTU JUN 2023 & JAN 2024
8	a. Draw the block diagram of the DC power supply and explain the function of each block b. Sketch and explain the working of a full wave bridge rectifier with a capacitor filter. Draw its input and output waveforms. Suggest methods to reduce the ripple content of the output. c. Draw the circuit diagram of a simple zener voltage regulator and explain its working. Define the terms line regulation and load regulation.	10 10 6	KTU JUN 2022 KTU JUN 2023, JAN 2024 & DEC 2024 KTU JUN 2023
9	a. Draw the circuit diagram of a CE amplifier (RC-coupled) and discuss the role of each component used in it. Draw its frequency response and mark the 3dB bandwidth. Give reasons for the decrease in transistor amplifier voltage gain at low frequencies and high frequencies b. Draw the circuit of voltage divider biasing arrangement and mention the functions of various components used in the circuit.	10 6	KTU JUN 2022, JUN 2023 & JAN 2024 KTU DEC 2022 KTU DEC 2024

10	a. Explain the basic structure of a Field Effect Transistor (FET). b. What are the differences between N-channel and P-channel MOSFETs? c. Describe the pinch-off condition in a MOSFET. d. State the advantages of MOSFETs over BJTs (Bipolar Junction Transistors).	4 4 4 4	Model Questions

Qn. No	MODULE - 4	Marks	Year
1	a. What is modulation? Compare AM and FM.	4	KTU JUN 2023 & JAN 2024
	b. Explain the term 'modulation index' in a radio communication system. An AM-modulated carrier wave has maximum and minimum amplitudes of 600 mV and 450 mV respectively. Find the modulation index.	6	KTU JUN 2023
	c. Write the expression for an AM wave and comment on the bandwidthrequirement and modulation index.	5	KTU DEC 2020
	d. Draw the frequency spectrum of an amplitude-modulated (AM) wave. Given that the modulating signal is of frequency fm and amplitude Vm and the carrier is of frequency fc and amplitude Vc. Take the modulation index as m. What is the bandwidth requirement of this AM wave?	5	KTU JUL 2021
	e. State the merits and demerits of Amplitude Modulation.	4	KTU JUN 2022
	f. Write the frequency range and typical applications of VHF andUHF frequency bands.	4	KTU JUN 2022
	g. What do you mean by Amplitude Modulation and Frequency Modulation? Explain using diagrams.	6	KTU DEC 2024
2	With the necessary block diagram explain the principle of a superheterodyne receiver or AM Superheterodyne receiver. Explain the relevance of intermediate frequency in a superheterodyne receiver	6	KTU DEC 2022
3	Describe the principle and working of an antenna	6	KTU JUN 2022 KTU JAN 2024

4	a. What is the basic principle of cellular communication? b. Draw the block diagram of a GSM system and explain its working principle. c. Discuss the concepts of cell splitting and frequency reuse in a cellular communication system. d. Explain the principle of Global System for Mobile Communication (GSM) using block diagram	4 10 6 6	KTU DEC 2022 KTU JUN 2023 & JAN 2024 KTU JAN 2024 KTU DEC 2024
5	Explain the block diagram of an instrumentation system.	6	KTU JUN 2023
6	Compare the evolution of 3G, 4G, and 5G communication technologies in terms of speed, latency, and applications.	8	Model Question
7	a. With a neat block diagram, explain the working of a Function Generator and its applications. b. Draw and explain the block diagram of a Digital Multimeter and its various measurement modes. c. Compare the functionalities of a Digital Multimeter and Function Generator in testing electronic circuits.	8 8 8	Model Questions
8	a. Describe the working of a Cathode Ray Oscilloscope (CRO) with a block diagram. b. Explain how Lissajous patterns can be used to measure frequency and phase differences between two signals. Provide suitable examples. c. What are Lissajous patterns in CRO? Draw the Lissajous patterns when the waveforms in two inputs are sine waves having equal frequency and 90^0 phase difference.	8 6 3	Model Questions KTU DEC 2024
9	Discuss how IoT-based solutions are transforming healthcare, providing a specific case study to highlight its impact.	8	Model Question

CHEMISTRY FOR PHYSICAL SCIENCE

MODULE I

Engineering Materials

Sl. No:	Questions	Marks	KTU Year
1.	What is Gypsum, and what role does it play in the production of cement ?	(3)	Dec 2024
2.	Write an overview of Green Hydrogen	(3)	Dec 2024
3.	What instrumental method covered in this course would you recomment for measuring the calorific value of solid fuels? Please give an overview of the instrumentation, its operational principle, and the calculations used to determine the Higher Calorific Value (HCV) and Lower Calorific Value(LCV)	(6)	Dec 2024
4.	Explain how the aniline point of a lubricant is measured and discuss its significance in the context of lubricant performance.	(3)	Dec 2024
5.	Write a brief note on the following: (a) Cetane Number(b)Aniline Point(c) Sol-Gel method	(6)	
6.	Calculate the higher and lower calorific values(in kcal/kg) of a fuel sample containing 84% carbon, 1.5% sulphur, 1.4% Nitrogen , 8%Hydrogen and 4% Oxygen.	(3)	
7.	Discuss the steps involved in the manufacture of Portland cement	(6)	
8.	Discuss any one method for the synthesis of polypyrrole and give two applications of it.S		

MODULE II

Electrochemistry and Corrosion Science

Sl. No:	Questions	Marks	KTU Year
1.	Write any three difference between Electrochemical series and Galvanic Series.	(3)	2024 Dec
2.	What is Fuel Cell? Write the chemical reactions happening at the anode and cathode	(3)	2024 Dec
3.	Discuss the design of a Glass electrode and explain how a glass electrode can be employed in the measurement of PH of a solution	(6)	2024 Dec
4.	Describe the construction and Working of Lithium -ion cell	(6)	2024 Dec
5.	Write any three applications of Electrochemical series	(3)	2024 Dec
6.	How Sacrificial anode protection can be used for the prevention of corrosion	(3)	2024 Dec
7.	Discuss any three applications of Nernst Equation	(3)	
8.	Discuss the mechanism of Electrochemical Corrosion	(6)	

MODULE III

Molecular spectroscopy and Analytical techniques

Sl. No:	Questions	Marks	KTU Year
1.	How is Polyaniline synthesized?	(3)	2024 Dec
2.	Write any three applications of Carbon Nanotubes	(3)	2024 Dec
3.	Explain the various electronic transitions in electronic spectroscopy	(6)	2024 Dec
4.	Discuss the IR activity of various vibrational modes of CO2 molecule	(3)	2024 Dec
5.	State Beer-Lmberts Law. Write the mathematical expression	(3)	2024 Dec
6.	Briefly discuss the principle, working and any two applications of SEM	(6)	2024 Dec
7.	Brief out the instrumentation and working of dielectric thermal analysis technique (DETA)	(6)	

MODULE IV

Environmental Chemistry

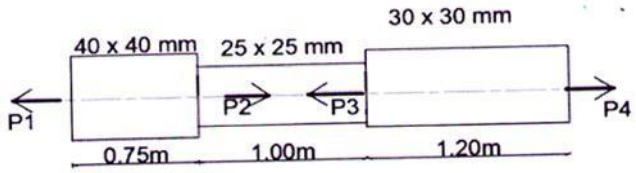
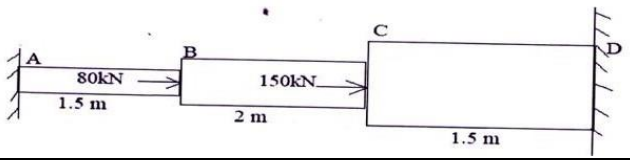
Sl. No:	Questions	Marks	KTU Year
1.	What is cod? Give its significance.	(3)	Dec 2024
2.	Calculate the temporary, permanent and total hardness of water with the following salts: Ca (HCO3)2= 6ppm, Mg(HCO3)2=8ppm, CaSO4=10ppm, MgSO4= 15ppm	(3)	Dec 2024
3.	Describe Trickling filter method in the sewage water treatment	(3)	Dec 2024
4.	Discuss any three sustainable development goals	(3)	Dec 2024
5	Write the principle and any two advantages of Reverse Osmosis	(3)	Dec 2024
6	What are iron exchange resins? Explain iron exchange process used for dementalization of water. How exhausted resins are regenerated.	(6)	Dec 2024
7	Discuss the chemistry behind ozone depletion	(3)	Dec 2024

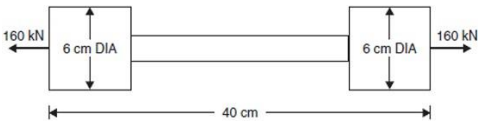
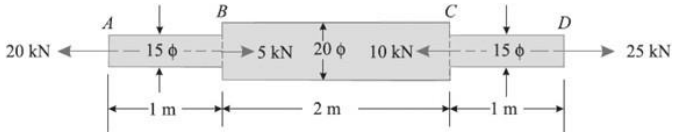
`

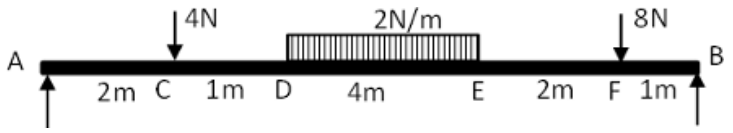
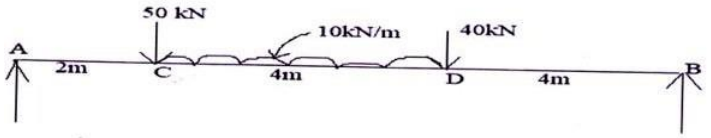
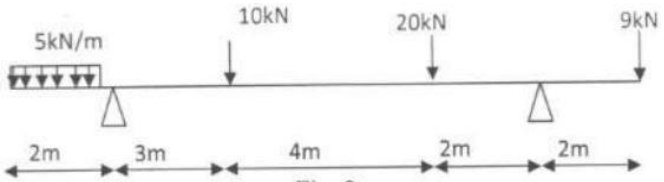
VIDYA ACADEMY OF SCIENCE AND TECHNOLOGYTECHNICAL CAMPUS, KILIMANOOR,THIRUVANANTHAPURAM-695602

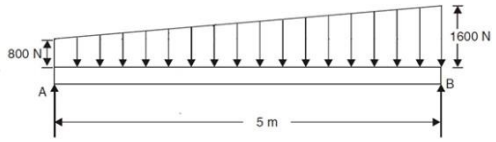
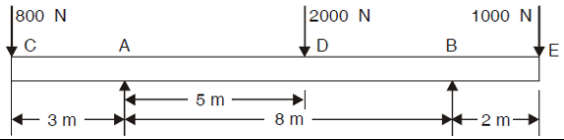
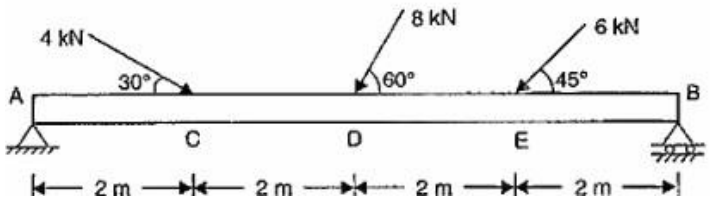
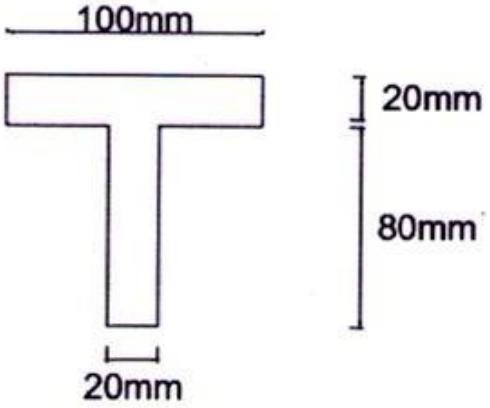
PCCET205 MECHANICS OF SOLIDS

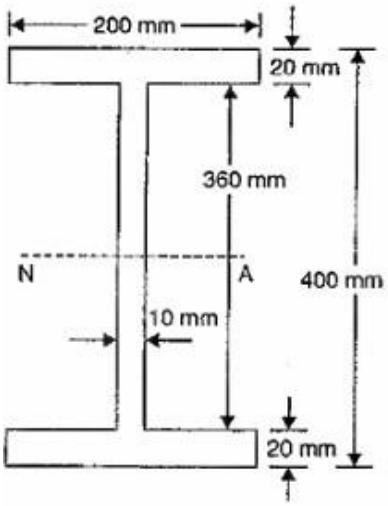
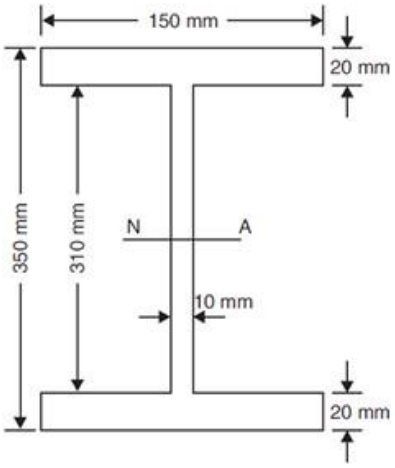
MODULE -1

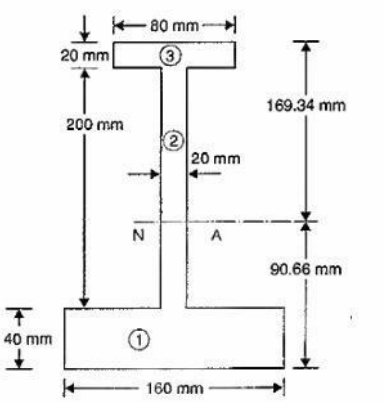
Sl No.	Question	Mark	Year
1	A steel bar ABCD consists of three sections: AB is of 20 mm diameter and 200 mm long; BC is 25 mm square and 400 mm long and CD is of 12 mm diameter and 200 mm long. The bar is subjected to an axial compressive load which induces a stress. of 30 MN/m^2 on the largest cross section. Determine total decrease in length of the bar when the load is applied. E=210 GPa	14	KTU 2022 DEC
2	A member ABCD is subjected to point loads P1, P2, P3, P4 as shown in figure. Calculate the force P3 necessary for equilibrium if P1 =120 kN ; P2 =220 kN and P4= 160 kN. Determine also the net change in length of member. E = 200 GPa 	14	KTU 2022 DEC
3	Two vertical rods one of steel and other of copper each are rigidly fixed at the top and 60 cm apart. Diameters and length of each rod are 3cm and 3.5cm respectively. A cross bar fixed to the rods at the lower ends carries a load of 6000 N such that the cross bar remains horizontal even after loading. Find the stresses in each rod and the position of the load on the bar. Take E for steel = 200GPa and for copper = 100 GPa	14	KTU 2023 DEC
4	A circular bar ABCD is rigidly fixed at A and D is subjected to axial forces as shown in figure. Determine the reactions, forces in each portion of the bar and displacement of point B and C. Take E=200GPa. Cross- sectional area of portions AB = 1000mm2, BC=1500mm^2 and CD=2000mm^2 	14	KTU 2023 DEC
5	a) Derive the expression for elongation of uniformly tapering rectangular bar. b) The bar shown in Fig. is subjected to a tensile load of 160 kN. If the stress in the middle portion is limited to 150 N/mm2, determine the diameter of the middle portion. Also, find the length of the middle portion if the total elongation of the bar is to be 0.2 mm. Young's modulus is given as equal to 2.1 × 105 N/mm^2.	14	KTU 2024 NOV

			
6	a) Derive the expression for elongation of uniformly tapering circular bar.	14	KTU 2024 NOV
	b) Find the elongation of the following steel bar. Take E = 200 GPa. Diameters are given in mm. 		
7	A brass bar of 25mm diameter is enclosed in a steel tube of 25mm internal diameter and 50 mm external diameter. Both of them are lm long at room temperature and fastened rigidly to each other at the ends. If the room temperature is 20oC, find to what temperature the assembly should be heated so as to generate a compressive stress of 48.7 MN/m^2 in brass. What is the stress in steel at this temperature? Assume E_s =200 GN/m^2; E_b=100 GN/m^2; α_s = l1.6 x $10^{-6}/C^o$ α_b =18.7 x $10^{-6}/C^o$	14	KTU 2022 DEC
8	a) A steel flat 150 mm wide, 15 mm thick and 6 m long carries a pull of 270 kN. Find the extension in the length & the contraction in width and thickness under the pull. Given μ=0.3& E=200GN/m^2.Also calculate the change in volume	10	KTU 2022 DEC
	b) A rod 12.5 mm in diameter is stretched 3.2 mm under a steady load of 10 KN. What stress would be produced in the bar by a weight of 700 N falling through 75 mm before commencing to stretch, the rod being initially unstressed. E = 210GPa.	10	KTU 2022 DEC
9	A bar of square section 6mm x 6mm is subjected to an axial pull of 6 kN. The lateral dimension of the bar is found to be changed to 5.998 mm x 5.998 mm. If the modulus of rigidity for the material is 0.8 x 105 N/mm^2, calculate the poison's ratio and modulus of elasticity for the material. For a given material E = 2x $l0^4$ kN/cm^2 and G=0.8 x $l0^4kN/cm^2$. Find the bulk modulus and poison ratio of the material	14	KTU 2023 DEC
10	a) A steel tube of 30mm external diameter and 20mm internal diameter encloses a copper rod of 15mm diameter to which it is rigidly joined at each end. If, at a temperature of $I00^0C$ there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised by 200^0C. Take Es =2.1 x $l0^5N/mm^2$, α_s= 11 x$10^{-6}/C$. E_c= 1 x $l0^5N/mm^2$ and α_c= 18 x$10^{-6}/C$	14	KTU 2023 DEC
	b) A steel tube of 30 mm external diameter and 20 mm internal diameter encloses a copper rod of 15 mm diameter to which it is rigidly joined at each end. If, at a temperature of 10°C there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised to 200°C. Take E for steel and copper as 2.1 × 10^5 N/mm^2 and 1 × 10^5 N/mm^2 respectively. The value of co-efficient of linear expansion for steel and copper is given as 11 × 10^{-6} per °C	14	KTU 2024 NOV

	and 18×10^{-6} per °C respectively.		
	MODULE -2		
1	A simply supported beam of span 10m is subjected to a combination of loads as shown in figure. Sketch the shear force and bending moment diagrams and find the position and magnitude of maximum bending moment. 	14	KTU 2024 JUNE
2	a) Draw the shear force and bending moment diagram of a cantilever of length 'l' subjected to a uniformly distributed load of 'w' per unit length over the whole span. b) Define point of contra flexure? In which beam it occurs? c) Draw the shear force and bending moment diagram of a simply supported beam of length 'l' subjected to a uniformly distributed load of 'w' per unit length over the whole span.	14	KTU 2024 JUNE
3	Draw SFD and BMD for the beam shown in figure and find the maximum bending moment 	14	KTU 2023 DEC
4	A beam of length 10m is placed over simple supports such that the beam overhangs by 2m at the left side and by 3m at the right side. The beam carries concentrated loads of 50kN and 80kN at the left and right ends respectively. In addition, it carries a uniformly distributed loads of 20kN/m in between the supports. sketch the shear force and bending moment diagrams indicating all salient features.	14	KTU 2022 DEC
5	Draw SFD and BMD for the overhanging beam shown in figure. Locate the points of contra flexure. Also determine the maximum bending moment.  Fig. 2	14	KTU 2020 JAN
6	a) A cantilever of length 2.0 m carries a uniformly distributed load of 2 kN/m length over the whole length and a point load of 3 kN at the free end. Draw the S.F. and B.M. diagrams for the cantilever. b) A simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m run at one end to 1600 N/m run at the other end. Draw the S.F. and B.M. diagrams for the beam.	14	KTU 2024 NOV

			
7	Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in Fig. Determine the points of contraflexure within the span AB. 	14	KTU 2024 NOV
8	A horizontal beam AB of length 8 m is hinged at A and placed on rollers at B. The beam carries three inclined point loads as shown in Fig. Draw the S.F., B.M. and axial force diagrams of the beam. 	14	
	MODULE -3		
1	A timber beam 150 nm x 200 mm is used as a simply supported beam of span 3m. Find the maximum uniformly distributed load that can be applied in addition to a concentrated load of 5 kN acting at the mid span, if the maximum bending stress and shear stress in the beam are not exceed 15 N/mm^2 and 2 N/mm^2 respectively. Neglect self-weight of the beam.	14	KTU 2022 DEC
2	A cast iron beam is of T section as shown in figure. The beam is simply supported on a span of 8m. The beam carries a uniformly distributed load of 1.5 kN/m length on the entire span. Determine the maximum tensile and maximum compressive stresses	14	KTU 2022 DEC
			
3	(a) Draw the bending stress variation for a rectangular cross section of a beam (b) A rolled steel joist of I section has the following dimensions: Top flange & Bottom flange 200mm x 20mm, web 360 mm deep and l0mm thick. This beam of I section carries a uniformly	14	KTU 2023 DEC

	distributed load of 40kN/m run on a span of l0m.Calculate the maximum stress produced due to bending		
4	(a) Derive the expression for shearing stress in a beam section stating the assumptions made (b) A rectangular beam 100 mm wide and 250mm deep is subjected to a maximum shear force of 50kN. Determine: (i) Average shear stress (ii) Maximum shear stress and (iii) shear stress at a distance of 25mm above the neutral axis.	14	KTU 2023 DEC
5	A rolled steel joist of I section has the dimensions: as shown in Fig. This beam of I section carries a u.d.l. of 40 kN/m run on a span of 10 m, calculate the maximum bending stress produced due to bending. 	14	
6	An I-section beam 350 mm × 150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 kN, sketch the shear stress distribution across the section. 	14	KTU 2024 NOV
7	a) A rectangular beam 200 mm deep and 300 mm wide is simply supported over a span of 8 m. What uniformly distributed load per metre the beam may carry, if the bending stress is not to exceed 120 N/mm^2? b) Calculate the maximum stress induced in a cast iron pipe of external diameter 40 mm; internal diameter 20 mm and of length	14	KTU 2024 NOV

	4 metre when the pipe is supported at its ends and carries a point load of 80 N at its centre.		
8	A cast iron beam is of I-section as shown in Fig. The beam is simply supported on a span of 5 meters. If the tensile stress is not to exceed 20 N/mm^2. Find the safe uniformly load which the beam can carry. Find also the maximum compressive stress.  	14	
	MODULE -4		
1	A hollow shaft of diameter ratio 3/5 is required to transmit 450kW at 120 r.p.m with a uniform twisting moment. The shear stress in the shaft must not exceed 60 MPa and the twist in a length 2.5m must not exceed 1o. Calculate the minimum external diameter of the shaft. Take N = 8 x 104 MPa.	14	KTU 2024 JUNE
2	A point is subjected to a tensile stress of 50 N/mm^2 and l0 N/mm^2, acting on two mutually perpendicular planes. A shear stress of 20 N/mm^2 is acting on these planes. Determine the principal stresses and the maximum shear stresses and its planes	14	KTU 2024 JUNE
3	A short column of rectangular cross section 80 mm x 60 mm carries a load of 40 kN at a point 20 mm from the longer side and 35 mm from the shorter side. Determine the maximum compressive and tensile stresses in the section	14	KTU 2022 DEC
4	Determine the diameter of a solid shaft which will transmit 112.5 kW of power at 200 rpm. Also determine the length of the shaft if the twist must not exceed 1.5 degree over the entire length. The maximum shear stress is limited to 55 N/mm^2.Take G as 0.8 x l0^4 N/mm^2	14	KTU 2023 DEC
5	Find the Euler's crippling load for a hollow cylindrical cast iron column l5 cm external diameter and 25 mm thick if it is 6m long and is hinged at both ends. Compare this load with the crushing load as given by Rankine's formula, taking σ_c = 550 N/mm^2 and Rankine's constant as l/1600; for what length of the column would these two formulae give the same crushing load? Take E=8 x l0^{4}N/mm^2.	14	KTU 2023 DEC
6	A solid round bar of 60 mm diameter and 2.5m long is used as a strut. Find the safe compressive load for the strut using Euler's formula, if i) both ends are hinged ii) both ends are fixed iii) one end fixed and one end hinged. Take E = 2 × 10^5 N/mm^2 and factor of safety = 3.	14	KTU 2024 JUNE

7	Two planes which are at right angles carry shear stress of intensity 17.5N/mm^2 while these planes also carry a tensile stress of 70N/mm^2 and a compressive stress of 35N/mm^2 respectively. Determine the principal planes and the principal stresses. Also determine the maximum shear stress and planes on which it acts.	14	KTU 2024 JUNE
8	a) Two shafts of the same material and of same lengths are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of hollow circular section, whose internal diameter is 2/3 of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts. b) Explain the procedure for the construction of Mohr's circle when a body is subjected to two mutually perpendicular principal tensile stresses accompanied by a simple shear stress.	14	KTU 2024 NOV

QUESTION BANK

Second Semester

GYMAT201: MATHEMATICS FOR ELECTRICAL SCIENCE AND PHYSICAL SCIENCE 2

Module 1			
Sl. No	**Questions**	**Marks**	**KU/KTU**
1	(a) Given $f = e^x siny + e^y cosx$, show that the function satisfies the Laplace equation $f_{xx} + f_{yy} = 0$ (b) Show that the equation $u(x,t) = sin(x - ct)$, satisfies wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	3+3	**KTU** Apr 2018 Dec 2021 Dec 2023
2	Let $w = 4x^2 + 4y^2 + z^2$, where $x = \rho\ sin\varphi\ cos\theta$, $y = \rho\ sin\varphi\ sin\theta$, $z = \rho\ cos\varphi$. Find $\frac{\partial \omega}{\partial \rho}, \frac{\partial \omega}{\partial \phi}, \frac{\partial \omega}{\partial \theta}$ using chain rule.	7	**KTU** Apr 2018 Dec 2021 Dec 2023
3	Locate all relative extrema and saddle points of the function $f(x, y) = 2xy - x^3 - y^2$	7	**KTU** Apr 2018 Dec 2019 Dec 2023
4	(a) The radius and height of a right circular cone are measured with errors of at most 1% and 4% respectively. Use differentials to approximate the maximum percentage error in the calculated volume. (b) The length and width of a rectangle are measured with errors of at most $r\%$, where r is small. Use differentials to approximate the maximum percentage error in the calculated length of the diagonal.	7+7	**KTU** Dec 2019 Sept. 2021 Dec 2023
5	(a) Find the local linear approximation L to the function $f(x, y) = \sqrt{x^2 + y^2}$ at the point P(3, 4). Compare the error in approximating f by L at the point Q (3.04, 3.98) with distance PQ. (b) Find the local linear approximation L of $f(x, y, z) = xyz$ at the point $P(1,2,3)$. Compute the error in approximation f by L at the point $Q(1.001, 2.002, 3.003)$.	7+7	**KTU** Dec 2019 Sept. 2021 Dec 2023

6	(a) Let , $w = f(P, Q, R)$ where $P = \frac{x}{y}, Q = \frac{y}{z}, R = \frac{z}{x}$ prove that $$x\frac{\partial w}{\partial x} + y\frac{\partial w}{\partial y} + z\frac{\partial w}{\partial z} = 0$$ (b) Let f be a differentiable function of three variables and suppose that $w = f(x - y, y - z, z - x)$, show that $$\frac{\partial w}{\partial x} + \frac{\partial w}{\partial y} + \frac{\partial w}{\partial z} = 0$$	7	**KTU** Dec 2019 Sept. 2021 Dec 2023
7.	(a) If $f(x, y) = xe^y + 5y$. Find the slope of $f(x, y)$ in the x-direction at (4,0). (b) Find the slope of the surface $z = \sqrt{x^2 + 4y^2}$ in the x-direction at the point (1,-2) and y-direction at (3,2).	3+3	**KTU** Dec 2019 Sept. 2021 Dec 2023
8	Locate all relative maxima, relative minima and saddle point of $f(x, y) = x^4y^2(12 - x - y)$.	7	**KTU** Dec 2019 Dec 2023
9	Given the function $W = xy + z$. Use chain rule to find the instantaneous rate of change of W at each point along the curve $x = cos\ cos\ t, y = sin\ sin\ t, z = t$.	3	**KTU** Apr 2018
10	Find $f_x(1,3)$ and $f_y(1,3)$ for the function $f(x, y) = 2x^3y^2 + 2y + 4x$.	3	**KTU** Apr 2018 Dec 2019 Sept 2021
Module 2			
1	(a) Find the mass of the square lamina with vertices (0, 0), (1, 0), (1, 1) and (0, 1) and density function $x^2 y$. (b) Find the Mass of the lamina with density $\delta(x, y) = x + 2y$ is bounded by the x-axis, the line $x = 1$ and the curve $y^2 = x$. (c) Find the mass and center of gravity of the lamina in the first quadrant bounded by the circle $x^2+y^2 = 1$ and the coordinate planes with density function xy.	3+3+7	**KTU** Apr 2018 Dec 2019 Dec 2021 Dec 2023
2	Evaluate $\int_{-2}^{2} \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} e^{-(x^2+y^2)}\, dxdy$ by changing to polar coordinates.	7	**KTU** Apr 2018 Dec 2019

			Dec 2021
3	Find the area bounded by the parabolas $y^2 = 4x$ and $x^2 = \frac{y}{2}$	7	**KTU** Apr 2018 Dec 2019 Dec 2021
4	(a) Change the order of integration and hence evaluate $\int_0^1 \int_{x^2}^{2-x} dydx$ (b) Evaluate $\int_0^1 \int_y^1 \frac{x}{x^2+y^2} dx\, dy$ by reversing the order of integration.	7	**KTU** Dec 2020 Dec 2021 Dec 2023
5	Find the volume bounded by the cylinder $x^2+y^2 = 9$ and the planes $y + z = 3$ and $z = 0$.	7	**KTU** Dec 2020 Dec 2021 Dec 2023
6	(a) Evaluate $\int_1^a \int_1^b x^2y\, dx\, dy$ (b) Evaluate $\int_0^3 \int_0^2 \int_0^1 xyz\, dx\, dy\, dz$	3+3	**KTU** Dec 2020 Dec 2021 Dec 2023
7	Use double integral to find the area of the plane region enclosed by the curves $y = \sin x$ and $y = \cos x$ for $0 \le x \le \frac{\pi}{4}$.	3	**KTU** Dec 2020 Dec 2021
8	Evaluate $\int \int_R \frac{\sin y}{y} dA$, where R is the triangular region bounded by the y-axis, $y = x$ and $y = \pi$.	7	**KTU** Dec 2020 Dec 2021
9	Use triple integral to find the volume of the solid within the cylinder $x^2 + y^2 = 9$ and between the planes $z = 1$ and $x + z = 5$.	7	**KTU** Dec 2020 Dec 2021
10	By converting into polar coordinates evaluate $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2)^{\frac{3}{2}} dy\, dx$	7	**KTU** Dec 2023
Module 3			
1	If $f(x,y,z) = x^2i - 3j + yz^2k$ find div F	2	KTU Apr-2018

2	Find the divergence and curl of the vector field $f(x,y,z) = yz\vec{i} + xy^2\vec{j} + yz^2\vec{k}$	2	KTU Apr-2018 & Dec-2017
3	Evaluate $\int_c (3x^2 + y^2)\,dx + 2xydy$ along the circular arc C given by $x = cost,\ y = sint$ for $0 \le t \le \frac{\pi}{2}$	3	KTU Dec-2017
4	Show that the integral $\int_{(1,1)}^{(3,3)} (e^x logy - \frac{e^y}{x})dx + \left(\frac{e^x}{y} - e^y logx\right) dy$ where x and y are positive, is independent of path and find its value.	5	KTU Dec-2017
5	If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = \lvert\vec{r}\rvert$, then show that $\nabla f(r) = \frac{f'(r)}{r}\vec{r}$.	5	KTU Dec-2017
6	Find the directional derivative of $f(x,y) = x^2 + 3xy + y^2$ at the point P(2,1)in the direction of $\vec{a} = \frac{1}{3}\vec{i} + \frac{2}{3}\vec{j}$	3	KTU-June 2022
7	Show that $f(x,y) = (cosy + ycosx)\vec{i} + (sinx - xsiny)\vec{j}$ is a conservative vector field. Hence find the scalar potential for it.	5	KTU Dec-2017
8	Find the work done by the force field $F(x,y,z) = xy\vec{i} + yz\vec{j} + xz\vec{k}$ along C where C is the curve $r(t) = t\vec{i} + t^2\vec{j} + t^3\vec{k}$	7	KTU April 2018
9	(a) Find the parametric equation of the tangent to the curve $\vec{r}(t) = 2cos\pi t\vec{i} + 2sin\pi t\vec{j} + 6t\vec{k}$ at $t = \frac{1}{3}$ (c) Show that the vector field $\vec{f}(x,y) = 2xy^3\,\vec{i} + 3y^2x^2\vec{j}$ is conservative and find ϕ such that $\vec{f} = \nabla\phi$. Hence evaluate $\int_{(2,-2)}^{(-2,0)} 2xy^3dx + 3y^2x^2dy$	7+7	KTU-June 2022
10	(a) Find the position and velocity vectors of the particle, given $\vec{a}(t) = (t+1)^{-2}\vec{j} + e^{-2t}\vec{k}, \vec{v}(0) = 3\vec{i} - \vec{j}, \vec{r}(0) = \vec{k}$	7	KTU-June 2023

Module 4			
1	Using Greens theorem, find the work done by the force field $\vec{f}(x,y) = (e^x - y^3)\vec{\imath} + (cosy + x^3)\vec{\jmath}$ on a particle that travels once around the unit circle $x^2 + y^2 = 1$ in the counter clockwise direction	5	KTU Apr-2018
2	If σ is any closed surface enclosing a volume V and $F = x\vec{\imath} + 2y\vec{\jmath} + 3z\vec{k}$, using divergence theorem show that $\iint_\sigma F.nds = 6\,V$.	3	KTU Apr-2018
3	Using line integral evaluate the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	2	KTU Dec-2017
4	Evaluate $\int_C (x^2 - 3y)dx + 3xdy$, where C is the circle $x^2 + y^2 = 4$	3	KTU Dec-2017
5	Using Stokes theorem evaluate $\int_c f.dr$ where $F = xz\,i + 4x^2y^2j + xy\,k$, C is the rectangle $0 \le x \le 1, 0 \le y \le 3$ in the plane $z = y$.	5	KTU DEC-2017
6	Using Divergence theorem evaluate $\iint_S F.nds$ where $F = (x^2 + y)i + z^2j + (e^y - z)k$ and S is the surface of the rectangular solid bounded by the co-ordinate planes $x = 3,\ y = 1,\ z = 3$	5	KTU Apr-2018
7	Find the circulation of $F = (x - z)i + (y - x)j + (z - xy)k$ using Stokes theorem around the triangle with the vertices A(1,0,0), B(0,1,0) and C(0,0,1).	7	KTU Dec 2017
8	Use Divergence theorem to find the outward flux of the vector field $F = 2xi + 3yj + z^3$k across the unit cube bounded by $x = 0, y = 0, z = 0, x = 1, y = 1, z = 1$	7	KTU June 2023
9	Determine whether the vector fields are free of sources and sinks, if it is not locate them. (i) $(y + z)i - xz^3j + x^2siny\,k$ (ii) $xy\,i - 2xyj + y^2\,k$.	5	KTU Dec-2017
10	(a) Use Green's theorem to find the work done by the force field	7+7	KTU-June 2022

	$\vec{f}(x,y) = xy\vec{i} + \left(\frac{x^2}{2} + xy\right)\vec{j}$ on a particle that starts at (4,0) transverse the upper semicircle $x^2 + y^2 = 16$ and returns to the starting point along X axis. (b) Find the mass of the lamina that is the portion of the cone $z = \sqrt{x^2 + y^2}$ that lies between the planes $z = 1$ and $z = 3$, if the density is $\phi(x,y,z) = x^2 z$.		

Course Code: UCEST206
Course Name: Engineering Entrepreneurship &IPR

Module I			
Sl. No	**Questions**	**Marks**	**Year**
1	**What is Ideation?**	**3**	**Model Question**
2	**Explain about Barriers to innovation in entrepreneurship?**	**3**	**Model Question**
3	**Explain about Frameworks for innovation and different types of innovation framework?**	**6**	**Model Question**
4	**What are the resources for Aspiring Entrepreneurs?**	**8**	**Model Question**
5	**Explain about the 4 main types of intellectual property rights(IPR)**	**8**	**Model Question**
6	**Explain about strategies for protecting intellectual property based on the type on innovation?**	**8**	**Model Question**
7	**Explain the Role of IPR in securing funding and competitive advantages?**	**6**	**Model Question**
8	**What is the importance of Building a strong team?**	**8**	**Model Question**
9	**Explain about Techniques for Generating Ideas?**	**9**	**Model Question**
10	**Explain develop strategies for bringing your innovation to life?**	**5**	**Model Question**

Module II			
1	Explain about problem and solution canvas preparation?	3	Model Question
2	What to include in a competitive analysis?	3	Model Question
3	Explain about customer profiling and importance of customer profiling?	8	Model Question
4	What are the different types of Market Research and benefits of Market Research?	8	Model Question
5	Discuss about types of customer segmentation?	6	Model Question
6	How to create a customer profile in steps and what data is necessary to create and ideal customer profile?	8	Model Question
7	What are the Benefits of persona development?	10	Model Question
8	Explain best practices to prioritize customer request?	6	Model Question
9	Explain about competitor analysis?	9	Model Question
Module III			
1	How to describe products and services in detail?	7	Model Question
2	Explain about Business plan preparation?	7	Model Question
3	What is the operational planning process?	8	Model Question
4	What should operational planning include?	8	Model Question
5	What are the steps to Build an operational plan?	6	Model Question
6	Explain prototype development plan preparation?	10	Model Question
7	What are the application of Software Testing?	5	Model Question
8	Difference between software testing and Quality assurance?	10	Model Question
9	Explain importance of feedback loops in Software Development?	10	Model Question
Module IV			
1	What Are The Types Of Investors?	(3	Model Question
2	What are the 3 types of investors in Business?	3	Model Question
3	Explain about partners in Business?	8	Model Question
4	What are core functions of prototype development advisors?	6	Model Question
5	Explain the importance of a prototype mentors?	8	Model Question

6	**Explain about customers?**	**6**	**Model Question**