16/01/25

JGi ARKA JAIN University, Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY			END SEM EXAMINATION School of Engineering & IT
Branch	ME / EEE / CSE	Program	B. Tech
Subject Name	Engineering Mathematics-III	Semester	III
		Year	January, 2025
Time: 3 Hour Max. Marks : 70	• Start writing from 2nd page onwards; don't Write on the 1st Page Backside • Answer all Questions of Section A (Compulsory) • Answer Any Four out of Six of Section B • Answer Any Three out of Five of Section C • Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will comes under Unfair Means and will Result in the Cancellation of the Paper(s).		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Write the general solution of one- dimensional Wave equation.	2	CO2	K1
ii	Solve $Z = px + qy + \sqrt{1 + p2 + q2}$.	2	CO1	K2
iii	Write the relation between Mean Median and Mode.	2	CO2	K2
iv	Define the Lagrange's Auxiliary equation?	2	CO2	K2
v	Write down the general solution of one-dimensional heat flow equation	2	CO1	K1
vi	Give one example of Quasi linear partial differential equation	2	CO3	K5
vii	In a continuous random variable p.d.f. is given by $f(x) = 3x^2$; $0<x<1$ and $P(x<a)=P(x>a)$ then find a.	2	CO1	K1
viii	Write two dimensional Laplace equation.	2	CO1	K2
ix	Find the PDF by eliminating Arbitrary function $f(x+y+z, x^2+y^2-z^2)$.	2	CO3	K2
x	A p.d.f is given as $f(x) = x(x-1)$; $0<x<1$, check whether it is a probability density function or not?	2	CO1	K3

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Solve $(D^2 - 4DD' + 4D'^2)z = e^{x+2y}$	05	CO2	K5
3	The initial Value problem $U_{tt} = 4\,U_{xx}$, $-\infty < x < \infty$, $t>0$ $U(x, 0) = -x$, $Ut(x,0) = 0$ then Find the value of $U(2,2)$.	05	CO2	K5
4	Solve $(x^2 - y^2 - z^2)p + 2xyq = 2xz$	05	CO2	K3
5	Find out Mean from the following data. Class Interval: 0-10 | 10-20 | 20-30 | 30-40 | 40-50 Frequency: 4 | 6 | 10 | 8 | 2	05	CO1	K3
6	The probability Mass function of a variabe X is X: 0 | 1 | 2 | 3 | 4 | 5 | 6 P(x): k | 3k | 5k | 7k | 9k | 11k | 13k (i). Find $p(x<4)$, $P(X>5)$, $P(3<x<6)$ (ii) what will be the minimum value of k so that $P(X<2)>3$.	05	CO1	K4
7	Solve $(D^2 + 3DD' + 2D'^2)\,z = 12xy$	05	CO1	K2

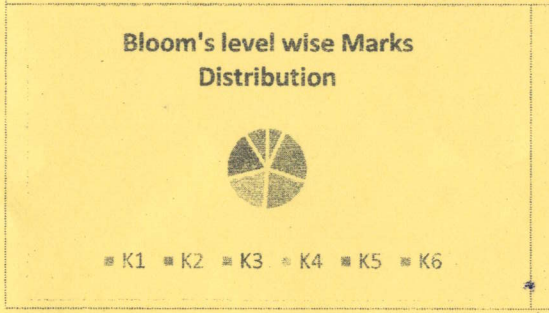
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

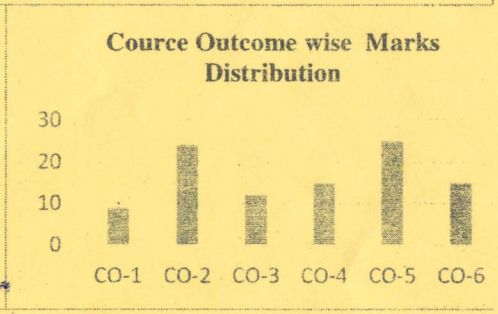
Q. No.	QUESTIONS	Marks	COs	KL
8	A string is stretched and fastened to two points L apart. Motion is started by displacing the string in the form $y = a\sin(\frac{\pi x}{l})$ from which it is released at time t=0. Show that the displacement of any point at a distance x from one end at a time t is given by $y(x,t) = a\sin(\frac{\pi x}{l})\cos(\frac{\pi ct}{l})$.	10	CO1	K4
9	Fit a straight line for the following data by least square method X: 1 | 2 | 3 | 4 | 6 | 8 Y: 2.4 | 3 | 3.6 | 4 | 5 | 6	10	CO1	K5
10	Derive the general solution of one dimensional wave equation.	10	CO1	K5
11	Classify the following partial differential equation $x^2\frac{\partial^2 u}{\partial t^2} + 3\frac{\partial^2 u}{\partial x \partial t} + x\frac{\partial^2 u}{\partial x^2} + 17\frac{\partial u}{\partial t} - 100u = 0$	10	CO3	K3
12	Find the CF and PI of the PDE: $(D^2 + 2DD' + D'^2)Z = \sin(2x + 3y)$	10	CO2	K5

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	The mathematical tools needed in evaluating multiple integrals and their usage.
	CO2	The effective mathematical tools for the solutions of differential equations that model physical processes.
	CO3	The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems
	CO4	An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems.
	CO5	A commitment to continuing learning and the capacity to maintain intellectual curiosity.
	CO6	An ability to develop statistical technique, data sampling.

GRAPHICAL REPRESENTATION





18/01/25

ARKA JAIN University, Jharkhand — NAAC GRADE A			END TERM EXAMINATION School of Engineering & IT
Branch	Electrical and Electronics Engineering	Program	B. Tech
Subject Name	Electrical Machine-I	Semester	III
		Year	January, 2025
Time: 3 Hour Max. Marks : 50	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any Four out of Six of Section B** • **Answer Any Three out of Five of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 02 Marks from Q1-i to Q1-x) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	Why starter is necessary? Justify	2	CO1	K2	PO3
ii	How core losses can be minimized?	2	CO3	K1	PO2
iii	Write down the properties of ideal transformer?	2	CO2	K1	PO3
iv	Why transformer is rated in KVA?	2	CO2	K2	PO2
v	Why low voltage winding are kept near the core?	2	CO5	K3	PO3
vi	Can we operate a transformer with DC supply if no, why?	2	CO3	K4	PO1
vii	Write down the condition of maximum efficiency of transformer.	2	CO3	K1	PO2
viii	What are the significant of back emf?	2	CO1	K4	PO1
ix	How the eddy current will minimized?	2	CO1	K2	PO3
x	Why Carbone brushes are generally preferred?	2	CO2	K1	PO2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Derive the condition of maximum efficiency of DC generator	5	CO2	K5	PO1
3	A 25 kVA, single-phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500-volt, 50 Hz mains. Calculate(i) Primary and Secondary currents on full-load, (ii) Secondary e.m.f., (iii) maximum flux in the core	5	CO3	K3	PO2
4	A 2,200/250-V transformer takes 0.5 A at a p.f. of 0.3 on open circuit. Find magnetizing and working components of noload primary current.	5	CO6	K4	PO1
5	Derive the expression of torque equation of dc motor	5	CO4	K4	PO2
6	Explain open circuit characteristics of DC generator	5	CO4	K4	PO3
7	A 4-pole, 220-V shunt motor has 540 lap-wound conductor. It takes 32 A from the supply mains and develops output power of 5.595 kW. The field winding takes 1 A. The armature resistance is 0.09ohm and the flux per pole is 30 mWb. Calculate (i) the speed and (ii) the torque developed in newton-metre.	5	CO2	K5	PO4

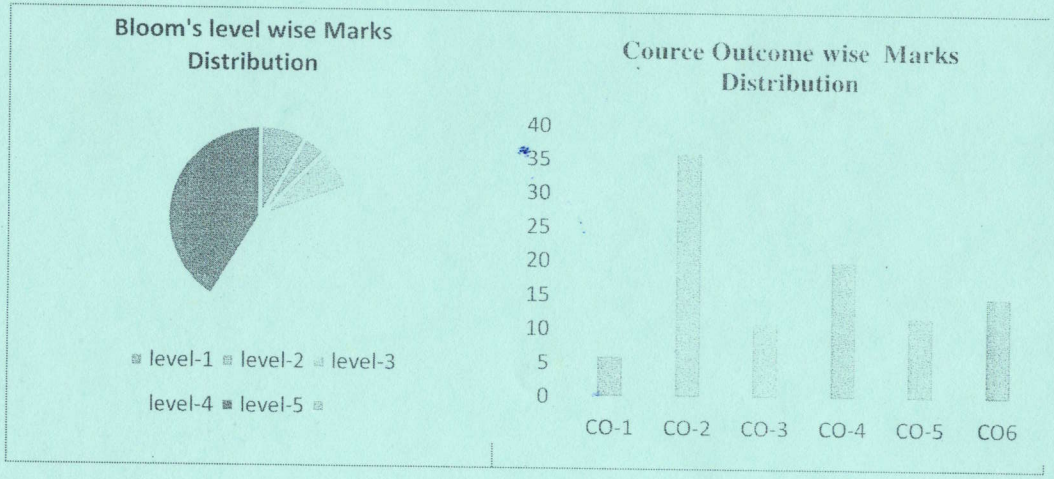
Section C (Answer any THREE out of FOUR) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
8	Explain armature reaction of dc machine	10	CO4	K4	PO2
9	Explain the operation of 4-point starter with neat sketch diagram.	10	CO2	K5	PO3
10	Write down the differentiate between core type and shell type transformer	10	CO3	K4	PO2
11	A shunt generator delivers 195 A at terminal p.d. of 250 V. The armature resistance and shunt field resistance are 0.02 2 and 50 Ω respectively. The iron and friction losses equal 950 W. Find (a) E.M.F. generated (b) Cu losses (c) output of the prime motor (d) Commercial, mechanical and electrical efficiencies.	10	CO2	K5	PO4
12	A 230/230 V, 3 kVA transformer gave the following results: O.C. Test: 230 V. 2 amp, 100 W S.C. Test: 15 V, 13 amp, 120 W Determine the regulation and efficiency at full load 0.80 p.f. lagging.	10	CO6	K5	PO2

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Recognize the concepts of magnetic circuits.
	CO2	Understand the operation of dc machines.
	CO3	Analyze single phase and three phase transformer circuits.
	CO4	Compare the differences in operation of different dc machine configurations.
	CO5	Evaluate performance parameters for transformer.
	CO6	Formulate the equation to find efficiency of transformer.

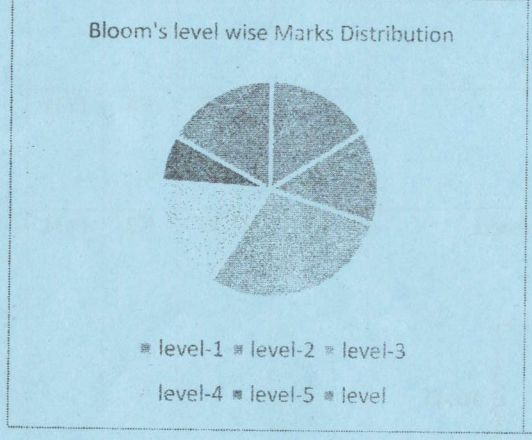
GRAPHICAL REPRESENTATION

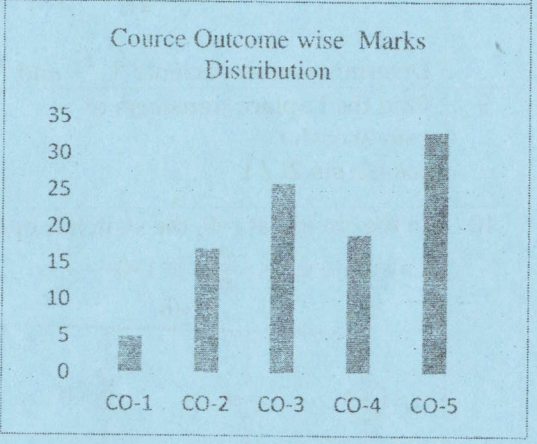


CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Identify the characteristics of circuit elements
	CO2	Demonstrate the resonance in R-L-C series circuit
	CO3	Apply network theorems for the analysis of electrical circuits.
	CO4	Analyze two port circuit behaviour
	CO5	Generate the transient and steady state response of electrical circuits.

GRAPHICAL REPRESENTATION





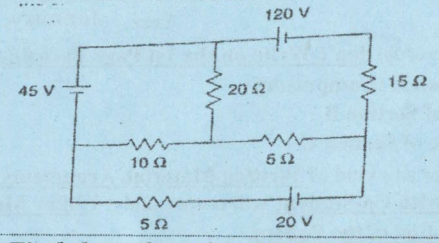
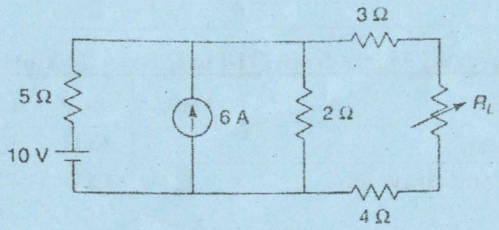
21/01/25

JGI ARKA JAIN University Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY			**END TERM EXAMINATION** **School of Engineering & IT**
Branch	**Electrical and Electronics Engineering**	**Program**	**B-Tech**
Subject Name	**Electrical Circuit Analysis**	**Semester**	**III**
		Year	**January, 2025**
Time: 3 Hour Max. Marks : 70	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any Four out of Six of Section B** • **Answer Any Three out of Five of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

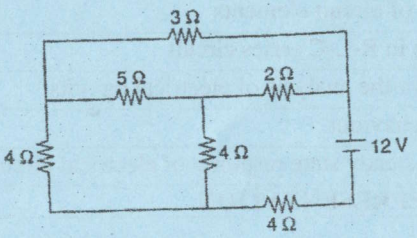
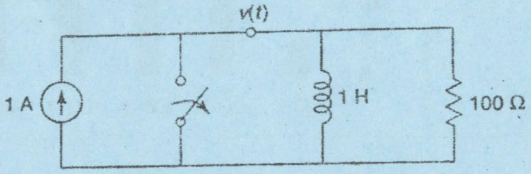
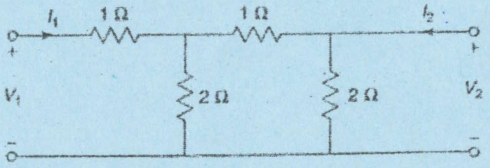
Section A (Each question Carry 02 Marks from Q1-i to Q1-x) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	Define superposition theorem.	2	CO3	K1	PO2
ii	Define Thevenin's theorem and draw its equivalent circuit diagram.	2	CO3	K3	PO1
iii	Draw the equivalent circuit of the Compensation theorem.	2	CO3	K3	PO3
iv	What do you mean by resonance and write down the condition of resonance in series RLC circuit.	2	CO2	K5	PO4
v	What do you mean by transient and transient period?	2	CO5	K1	PO3
vi	What is the Laplace transform's time-scaling property?	2	CO5	K2	PO2
vii	Find the Laplace transform of $4t^2+\sin 3t + e^{2t}$.	2	CO5	K1	PO4
viii	Find the Laplace transform of $e^{-3t}t^4$ using frequency shifting property.	2	CO5	K2	PO4
ix	Enlist the two-port network parameters.	2	CO4	K4	PO5
x	Write down the condition of reciprocity and symmetry for the Z-parameter.	2	CO4	K6	PO6

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Find current through 20Ω resister using Thevenin's Theorem 	5	CO3	K3	PO1
3	Find the value of resistance R_L in figure for maximum power and calculate maximum power 	5	CO3	K1	PO1
4	A series resonant circuit has an impedance of 500 ohm at resonant frequency. Cut-off frequencies are 10 kHz and 100 kHz. Determine (a) resonant frequency (b) value of L and C (c) quality factor at resonant frequency	5	CO2	K4	PO4
5	The Z-parameters of a two-port network are Z_{11}=20 Ω, Z_{22}=30 Ω, Z_{12}= Z_{21}=10 Ω. Find Y and ABCD parameters	5	CO4	K5	PO2
6	Verify the initial and final value theorem for $e^{-t}(t+1)^2$	5	CO5	K1	PO5
7	Derive the expression of voltage for series RC circuit.	5	CO1	K6	PO6

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
8	Find the current delivered by the 12 V Source  Determine mesh currents I_1, I_2 and I_3	10	CO3	K3	PO1
9	Find the Laplace transform of t sin 2t cosh t cos h2t sin 2t / t	10	CO5	K4	PO4
10	In the circuit, at t=0, the switch is opened. Calculate v, $\frac{dv}{dt}$, $\frac{d^2v}{dt^2}$, at t=0+ 	10	CO5	K2	PO4
11	Find Z-parameters for the network shown in the figure 	10	CO4	K3	PO5
12	A resistor and a capacitor are connected in series with a variable inductor. When the circuit is connected to a 230 V 50 Hz supply, the maximum current obtained by varying the inductor is 2 A. The voltage across the capacitor is 500 V. calculate the resistance, Inductance and capacitance of the circuit.	10	CO2	K6	PO6

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Identify the characteristics of circuit elements
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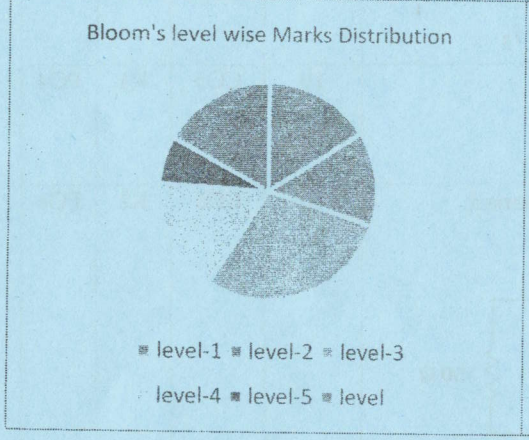

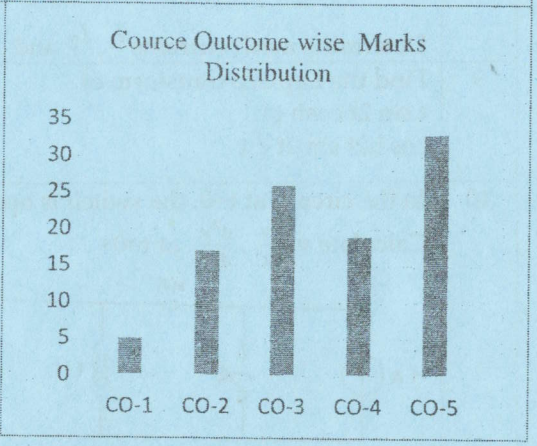

21/01/25

ARKA JAIN University Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY

END TERM EXAMINATION
School of Engineering & IT

Branch	**Electrical and Electronics Engineering**	**Program**	**B-Tech**
Subject Name	**Electrical Circuit Analysis**	**Semester**	**III**
		Year	**January, 2025**

Time: 3 Hour
Max. Marks : 70

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v	What do you mean by transient and transient period?	2	CO5	K1	PO3
vi	What is the Laplace transform's time-scaling property?	2	CO5	K2	PO2
vii	Find the Laplace transform of $4t^2+\sin 3t + e^{2t}$	2	CO5	K1	PO4
viii	Find the Laplace transform of $e^{-3t}\, t^4$ using frequency shifting property.	2	CO5	K2	PO4
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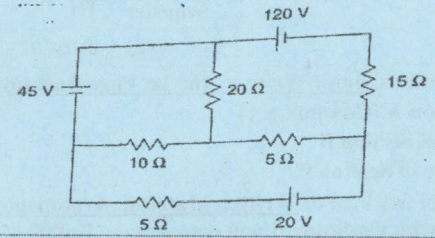
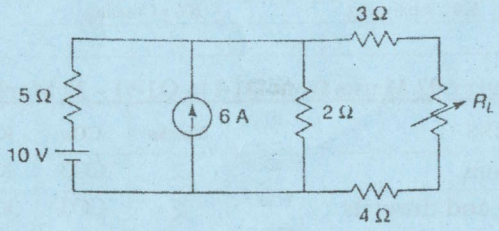
2	Find current through 20Ω resister using Thevenin's Theorem 	5	CO3	K3	PO1
3	Find the value of resistance R_L in figure for maximum power and calculate maximum power 	5	CO3	K1	PO1
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5	The Z-parameters of a two-port network are Z_{11}=20 Ω, Z_{22}=30 Ω, Z_{12}= Z_{21}=10 Ω. Find Y and ABCD parameters	5	CO4	K5	PO2
6	Verify the initial and final value theorem for $e^{-t}(t+1)^2$	5	CO5	K1	PO5
7	Derive the expression of voltage for series RC circuit.	5	CO1	K6	PO6

Section C (Answer any THREE out of FIVE) – 30 Marks
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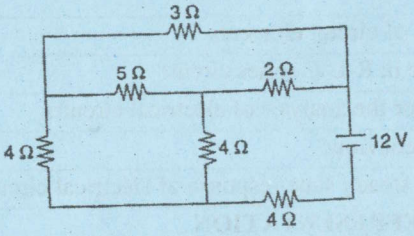
Q. No.	QUESTIONS	Marks	COs	KL	PO
8	Find the current delivered by the 12 V Source  Determine mesh currents I_1, I_2 and I_3	10	CO3	K3	PO1
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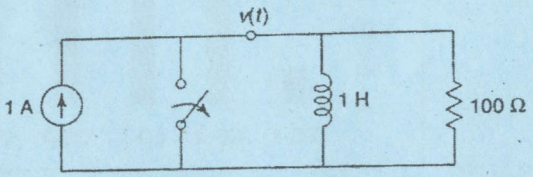
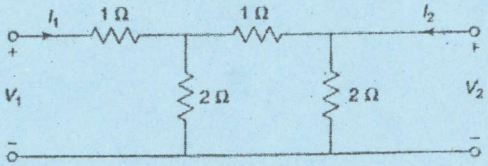
10	In the circuit, at t=0, the switch is opened. Calculate v, $\frac{dv}{dt}$, , $\frac{d^2v}{dt^2}$, at t=0+ 	10	CO5	K2	PO4
11	Find Z-parameters for the network shown in the figure 	10	CO4	K3	PO5
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ARKA JAIN University
Jharkhand

NAAC GRADE A
ACCREDITED UNIVERSITY

[23/01/2025]

END TERM EXAMINATION
School of Engineering & IT

Branch	**Electrical & Electronics Engineering**	**Program**	**B. Tech**
Subject Name	**Analog Electronics**	**Semester**	**III**
		Year	**January, 2025**

Time: 3 Hour
Max. Marks : **70**

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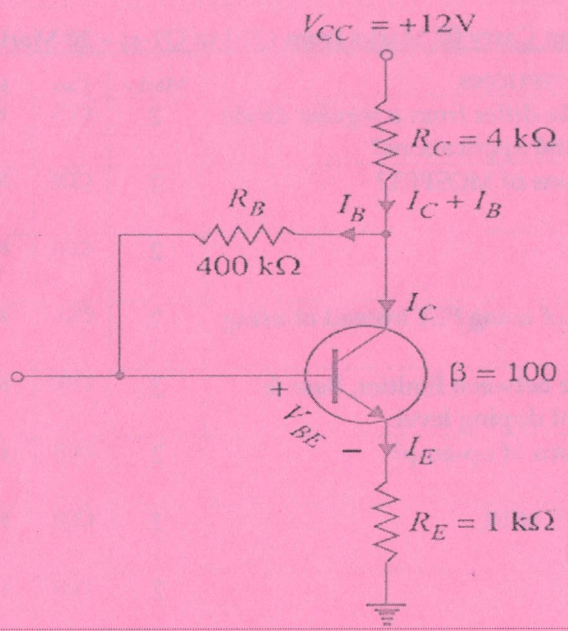
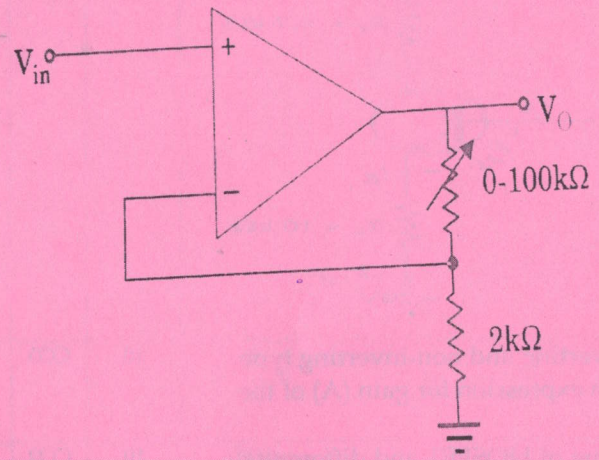
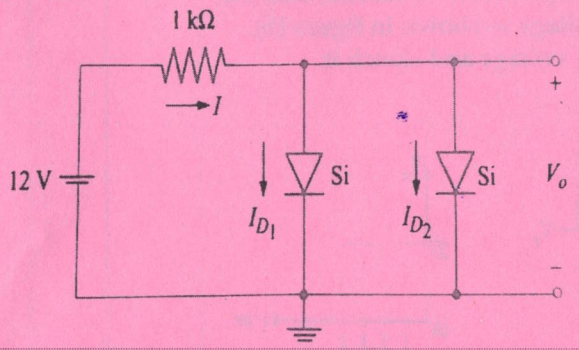
Section A (Each question Carry 02 Marks from Q1-i to Q1-x) – 20 Marks

Q. N 1	QUESTIONS	Marks	Cos	KL	PO
i	How does a zener diode differ from a regular diode in terms of operation and applications?	2	CO1	K1	PO1
ii	What are the applications of MOSFET?	2	CO1	K1	PO1
iii	What are Q-points?	2	CO1	K1	PO1
iv	What is the advantage of using FET instead of using BJT?	2	CO1	K3	PO1
v	Establish the difference between Emitter, Base & Collector on the basis of doping level.	2	CO2	K4	PO2
vi	What are the applications of op-amp?	2	CO1	K2	PO1
vii	Give an expression for CMRR.	2	CO1	K3	PO2
viii	What is virtual ground?	2	CO3	K1	PO1
ix	Enlist two characteristics of an ideal and practical op-amp.	2	CO1	K2	PO2
x	Enlist the applications of summing amplifier.	2	CO2	K4	PO1

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question 5 Marks)

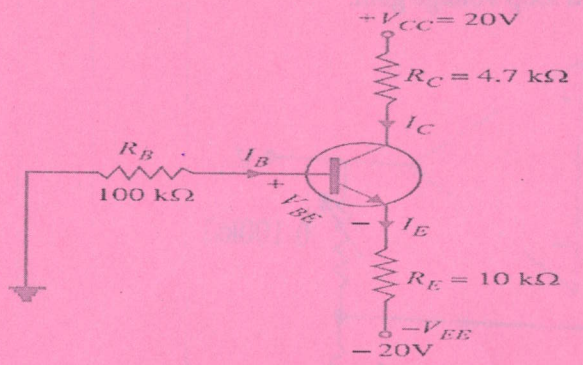
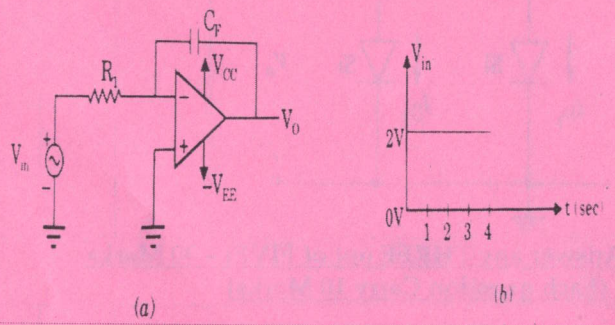
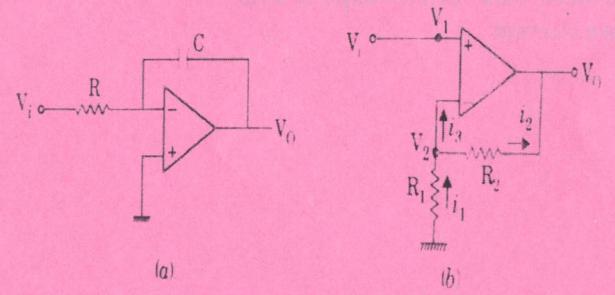
Q. No.	QUESTIONS	Marks	Cos	KL	PO
2	Explain briefly full wave bridge rectifier with an output waveform. Also derive an expression for average dc output voltage (Vdc)	5	CO1	K3	PO1
3	Derive an expression for base current and collector current in fixed bias.	5	CO3	K5	PO2
4	With a neat diagram explain the working of MOSFET highlighting the pinch off condition. OR Derive an expression for trans-conductance parameter in JFET.	5	CO2	K4	PO2
5	Find the Q-point values (IC and VCE) for the collector feedback bias circuit shown in figure.	5	CO3	K6	PO2



6	In the given fig. below, the variable resistance varies from zero to 100KΩ. Find out the maximum and minimum closed loop voltage gain.  	5	CO1	K1	PO1
7	For the circuit shown calculate Vo, ID1, ID2 and I.  	5	CO1	K2	PO1

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

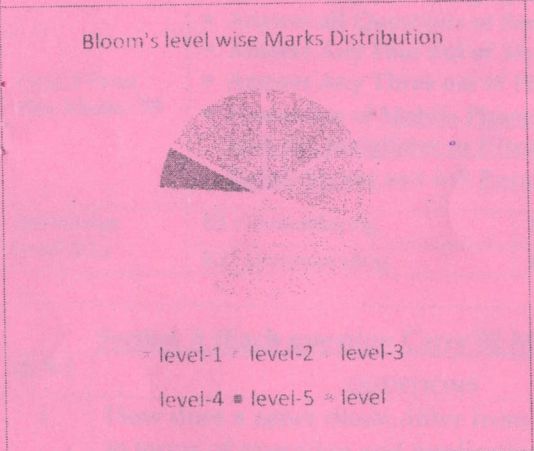
Q. No.	QUESTIONS	Marks	Cos	KL	PO
8	What is emitter stabilized bias? Derive expressions for collector and base current. OR	10	CO1	K1	PO1

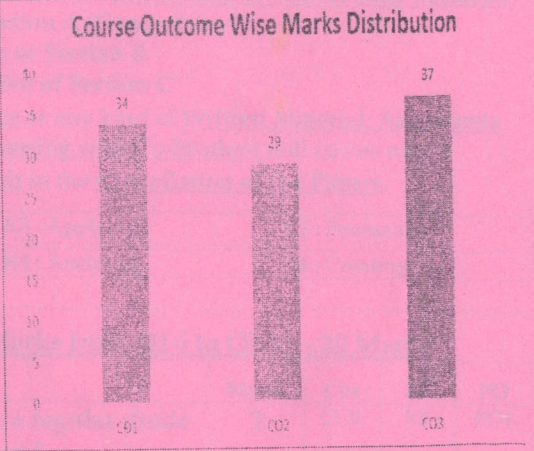
	For the emitter bias circuit shown in figure, find IE, IC, VC and VC and VCE for β= 85 and VBE = 0.7V. 				
9	Explain briefly inverting and non-inverting type op-amp. Derive an expression for gain (A) of the same.	10	CO3	K3	PO2
10	Explain the working of MOSFET and differentiate between its enhancement type and depletion type.	10	CO2	K6	PO1
11	In the circuit shown in (a), R1C1= 1 second, and the input is a step (dc) voltage as shown in figure (b). Determine the output voltage and sketch it. 	10	CO3	K5	PO2
12	Determine the output of both the circuits. 	10	CO2	K2	PO1

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Understand the concepts of continuous time and discrete time systems.
	CO2	Understand sampling theorem and its implications.
	CO3	Analyze systems in complex frequency domain.

GRAPHICAL REPRESENTATION





29/01/25

JGI ARKA JAIN University Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY		END SEM EXAMINATION School of Engineering & IT	
Branch	Electrical and Electronics Engineering	Program	B. Tech
Subject Name	Electromagnetic Field Theory	Semester	III
		Year	January, 2025
Time: 3 Hour Max. Marks : 70	• Start writing from 2nd page onwards; don't Write on the 1st Page Backside • Answer all Questions of Section A (Compulsory) • Answer Any Four out of Six of Section B • Answer Any Three out of Five of Section C • Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will comes under Unfair Meansand will Result in the Cancellation of the Paper(s).		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Define the unit vector.	02	CO1	K1
ii	Define magnetic Field Intensity.	02	CO1	K1
iii	Formulate the relation between electric Dipole and Dipole moment	02	CO3	K2
iv	How Force on Current Element in a electric Field can develop?	02	CO1	K3
v	What do you mean by mutual Inductances	02	CO5	K3
vi	Formulate the energy stored in magnetic field.	02	CO4	K2
vii	Define the magnetic potential.	02	CO2	K1
viii	State the Ampere's circuit law.	02	CO1	K2
ix	Define the Poynting vector.	02	CO6	K4
x	Write any two differences between electric and magnetic field.	02	CO2	K4

Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 05 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	Formulate the Biot Savart Law and write its mathematical derivation for determination of magnetic field in any free space.	05	CO2	K2
3	Write the expression of the magnetic field due to continuous charge distribution for (i) line charge (ii) surface charge (iii) volume charge	05	CO1	K4
4	Derive the mathematical expression to Determine the self Inductance of a Solenoid.	05	CO3	K4
5	State the Poynting's theorem and write its mathematical expression.	05	CO2	K3
6	Consider a parallel plate capacitor which is maintained at potential of 250 V. If the separation distance between the plates of the capacitor and area of the plates are 1 and 20 cm2. Calculate the displacement current for the time in μs.	05	CO6	K5
7	How we correlate the relation between current and current density inside the conductor and dielectric.	05	CO5	K2
Section C (Answer any THREE out of FIVE) – 30 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Derive the mathematical expression for electric field intensity due to infinitely long line charge.	10	CO2	K3
9	Explain the magnetic boundary conditions between the two media with the help of possible diagram.	10	CO6	K4
10	Derive the mathematical expression of wave equation for electric field density (D) in the uniform medium.	10	CO5	K4
11	Write and explain the Maxwell's equation for time varying field in differential and integral form.	10	CO2	K2
12	Compute , $\iint_s FdS$, Where F=(3x + z, y^2 –Sin x^2 z, xz + yex^5 Where $0 \leq X \leq 1$, $0 \leq y \leq 3$, $0 \leq z \leq 2$	10	CO6	K6

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Recall the basic laws of electromagnetism.
	CO2	Understand the propagation of EM waves
	CO3	Apply Maxwell's equation in different forms and different media.
	CO4	Analyze time varying electric and magnetic fields.
	CO5	Interpret the electric and magnetic fields for simple configurations under static conditions.
	CO6	Design various devices that can work based on the forces generated by electric and magnetic fields.

GRAPHICAL REPRESENTATION