AR23

CODE: 23MET202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026.

MATERIALS ENGINEERING

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	What are bonds in solids? Give two examples.	6	1	L2
	b)	Show that the atomic packing factor for BCC is 0.68.	8	1	L3
		(OR)			
2.	a)	Define grain and grain boundary with a suitable diagram.	7	1	L3
	b)	Differentiate point, line, and surface defects with suitable illustrations.	7	1	L2
		UNIT-II			
3.	a)	What do you understand by substitutional and interstitial solid solutions? Give suitable examples	7	2	L2
	b)	What is a eutectic reaction? Write its general form.	7	2	L2
		(OR)			
4.		Draw and represent of α -ferrite, Ɣ-austenite, δ- ferrite in Fe-Fe3C phase diagram along with invariant reactions.	14	2	L3
		UNIT-III			
5.	a)	What is the principal difference between wrought and cast alloys?	6	3	L2
	b)	Differentiate white, gray, and malleable cast irons in terms of microstructure.	8	3	L2
		(OR)			
6.	a)	Compare steels and cast irons in terms of mechanical properties strength, ductility, and machinability.	7	3	L2
	b)	What is the significance of using ceramic tools in modern machining?	7	3	L2
		UNIT-IV			
7.	a)	How do flame hardening and induction hardening differ from conventional quenching?	6	4	L2
	b)	What is nitriding? Explain how it differs from carburizing.	8	4	L2
		(OR)			
8.	a)	Give a short note on various processes of heat treatment of alloys.	6	4	L2
	b)	In terms of heat treatment and the development of microstructure, what are two major limitations of the iron-carbide phase diagram?	8	4	L3
		UNIT-V			
9.	a)	What are common defects in powder metallurgy parts? Write a short on each.	7	5	L2
	b)	How is powder metallurgy used in the automotive industry?	7	5	L2
		(OR)			
10.	a)	What is the difference between elastic deformation and plastic deformation?	4	5	L2
	b)	Explain the Brinell & Rockwell hardness test and its procedure.	10	5	L2

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CODE: 23EET202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March, 2026

ELECTRONIC DEVICES AND CIRCUITS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Explain the VI characteristics of PN junction diode and mention its applications.	7	1	K2
	b)	Make use of characteristics of zener diode and explain how zener diode acts as a voltage regulator.	7	1	K3
		(OR)			
2.	a)	Explain the VI characteristics of zener diode and mention its use.	7	1	K2
	b)	Explain the working principle of light emitting diode and list its applications.	7	1	K2
		UNIT-II			
3.	a)	Explain the operation of half wave rectifier.	7	2	K3
	b)	Explain the working principle of full wave rectifier using centre tapped transformer with the help of circuit diagram and waveforms	7	2	K2
		(OR)			
4.	a)	Explain how capacitor filter with full wave rectifier will give smooth DC signal when sinusoidal signal is applied at the input.	7	2	K1
	b)	Compare half wave rectifier and full wave rectifier. What is the need for filter circuit after rectifier circuit?	7	2	K4
		UNIT-III			
5.	a)	Explain the working operation of a BJT. What is the relation between α, β and γ?	7	3	K2
	b)	Explain the input and output characteristics of a BJT in common emitter configuration.	7	3	K2
		(OR)			
6.	a)	Explain the construction and working operation of MOSFET with its characteristics.	7	3	K2
	b)	Explain the input and output characteristics of a BJT in common base configuration.	7	3	K2
		UNIT-IV			
7.	a)	What is transistor biasing? What is the need for transistor biasing? What is thermal run away in transistors?	7	4	K1
	b)	Make use of the knowledge of transistor three regions of operation and explain how transistor will act as a switch with diagram.	7	4	K3
		(OR)			
8.	a)	List any two types of biasing circuits and explain any one biasing method with its advantages or limitations.	7	4	K2
	b)	Draw a simple transistor amplifier circuit and explain how transistor will act as an amplifier with necessary sketches.	7	4	K2
		UNIT-V			
9.	a)	What is feedback in amplifiers? Explain different feedback topologies in amplifiers.	7	5	K2
	b)	What is the condition for oscillations? Explain the principle of RC phase shift oscillator.	7	5	K2
		(OR)			
10.	a)	What is negative feedback in amplifiers? Explain the effect of negative feedback on gain, bandwidth, noise, input and output impedances in amplifiers.	7	5	K2
	b)	What are LC oscillators? Explain the working operation of Colpitt's oscillator.	7	5	K2

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CODE: 23ECT203 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations **March – 2026**

SCHEME OF EVALUATION

CONTROL SYSTEMS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

NOTE: SCHEME OF EVALUATION MAY BE TYPED OR HAND WRITTEN.
HAND WRITTEN SCHEME SCANNED COPIES ARE REQUIRED TO BE SENT

UNIT-I

Q1(a). Mason's formula – Transfer function (7M)

Identification of forward paths & gains – 2M

Loop gains & non-touching loops – 2M

Application of Mason's formula – 2M

Final transfer function – 1M

Q1(b). Electrical analogous system (7M)

Correct identification of mechanical components – 2M

Mapping to electrical elements using force-voltage analogy – 2M

Proper circuit diagram – 2M

Final equivalent transfer function – 1M

Q2(a). Block diagram reduction (7M)

Series/parallel reductions – 2M

Feedback reductions – 3M

Final closed-loop transfer function – 2M

Q2(b). Feedback concept (7M)

Definition of feedback – 2M

Effects on sensitivity, stability, bandwidth, noise, etc. – 5M

UNIT-II

Q3(a). Time domain specifications (7M)

Rise time – 2M

Peak time – 1M

Maximum overshoot – 2M

Settling time – 2M

Q3(b). Steady state error (7M)

Identification of system type – 2M

Error constants calculation – 3M

Final steady-state error – 2M

Q4(a). Second order system parameters (7M)

Damping ratio (ζ) – 1M

Natural frequency (ωn) – 1M

Peak time – 1M

Rise time – 2M

Overshoot – 1M

Settling time – 1M

Q4(b). PI controller effect (7M)

Formulation of closed-loop transfer function – 2M

PI controller steady state error—5M

UNIT-III

Q5(a). Root locus sketch (7M)

Poles & zeros marking – 2M

Root locus sketch (rules applied) – 3M

Stability comment – 2M

Q5(b). Routh array (7M)

Correct tabulation – 3M

Counting sign changes – 2M

Roots in RHP + stability conclusion – 2M

Q6(a). Root locus concept & rules (7M)

Definition – 2M

Rules listing (centroid, asymptotes, breakpoints, etc.) – 5M

Q6(b). Range of K using Routh criterion (7M)

Formation of Routh array – 3M

Stability condition derivation – 2M

Final range of K – 2M

UNIT-IV

Q7(a). Frequency response terms (7M)

Magnitude plot – 1M

Phase plot – 1M

Gain crossover frequency – 1M

Phase crossover frequency – 1M

Gain margin – 1M

Phase margin – 1M

Proper explanation – 1M

Q7(b). Bode plot analysis (7M)

Plot sketching – 3M

Gain margin – 2M

Phase margin – 2M

Q8(a). Procedure for Bode plot (7M)

Steps for constructing magnitude plot – 3M

Steps for constructing phase plot – 3M

Neat explanation/diagram – 1M

Q8(b). Bode plot for given TF (7M)

Low-frequency slope – 2M

Corner frequencies – 2M

High-frequency slope – 2M

Proper sketch – 1M

UNIT-V

Q9(a). Nyquist criterion (7M)

Nyquist plot sketch – 5M

Stability comment – 2M

Q9(b). Polar plot (7M)

Polar plot sketch – 2M

Gain margin – 2M

Phase margin – 2M

Stability comment – 1M

Q10 (a). Polar plot & stability (7M)

Polar plot sketch – 5M

Stability comment – 2M

Q10(b). Nyquist vs Polar plot (7M)

Definition of Nyquist – 2M

Definition of Polar – 2M

Differences explained – 2M

Stability significance – 1M

AR23

CODE: 23CST202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026

Mathematical Foundation in Computer Science

(COMMON TO CSE & IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

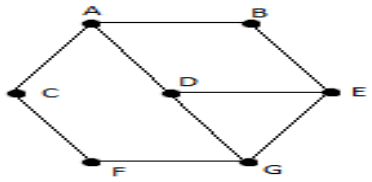
			Marks	CO	BTL
		UNIT-I			
1	a.	Verify whether (¬ p ∧ (p → q)) → ¬q is a tautology.	7	1	3
	b.	Show that ~ $p \vee (\sim p \wedge q)$ and($\sim p \wedge \sim q$) are logically equivalent.	7	1	2
		(OR)			
2		Find the PDNF & PCNF without using the truth table: (P ∧ Q) V (~P ∧ R) V (Q ∧ R)	14	1	3
		UNIT-II			
3		Verify whether the following arguments are valid or not All integers are rational numbers. Some integers are powers of 2. Therefore some rational numbers are powers of 2.	14	2	3
		(OR)			
4	a.	Explain Modus Ponens, Modus Tollens, Hypothetical Syllogism, Disjunctive Syllogism in propositional logic with example.	7	2	2
	b.	Define free and bound variables with example. Explain Universal Generalization, Universal Specification, Existential Generalization and Existential Specification.	7	2	2
		UNIT-III			
5	a.	Let R be the relation on the set of ordered pairs of positive integers such that ((a, b), (c, d)) ∈ R if and only if a + d = b + c. Show that R is an equivalence relation.	7	3	2
	b.	Construct the Hasse diagram representing the partial ordering. {(a,b) | a divides b} on {1,2,3,4,6,8,12} and find the diagram is lattice or not.	7	3	3

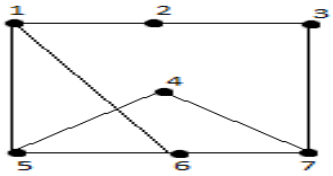
(OR)

6		Verify whether the ({1, 2, 3, 4, 5}, |) and ({1, 2, 4, 8, 16}, |) are lattices.	14	3	3

UNIT-IV

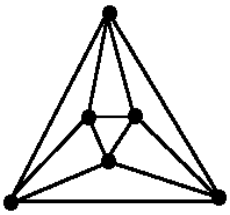
7		Check whether the following graphs are isomorphic or not.	14	4	3

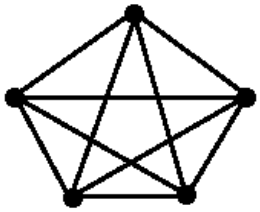




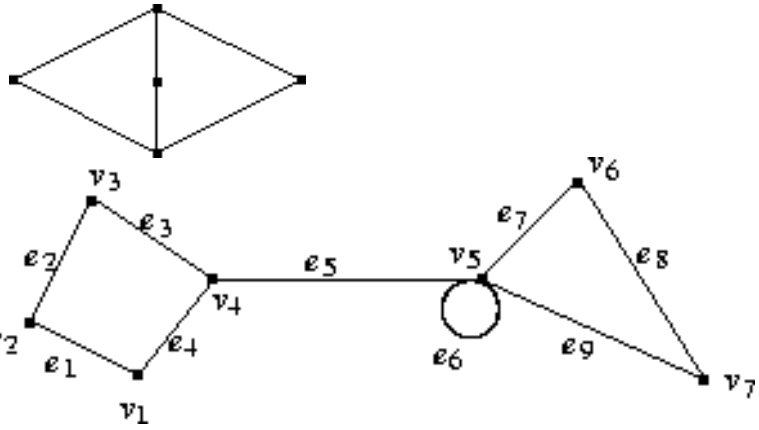
(OR)

8	a.	What is Hamiltonian graph? Verify whether the graphs contain Hamiltonian cycle.	7	4	3





	b.	Define Euler path and circuit. Check whether graphs have Euler path and circuit.	7	4	3



UNIT-V

9.	a.	Demonstrate Kruskal's algorithm with example.	7	5	2
	b.	Solve the recurrence relation $a_n - 2a_{n-1} = 4^{n-1}$ where $n \geq 1$ where $a_0 = 1$ and $a_1 = 3$.	7	5	3

(OR)

10	a.	Solve the following recurrence relation $a_n + 7a_{n-1} + 8a_{n-2} = 0 \text{ for } n \geq 2, a_0 = 1, a_1 = -2.$	7	5	3
	b.	Make use of generating functions and find the coefficient of x^{14} in $(1 + x + x^2 + x^3)^{10}$.	7	5	3

AR23

CODE: 23CET202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026

BUILDING PLANNING AND CONSTRUCTION TECHNOLOGY

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Explain what do you understand about building bye-laws and explain them in brief.	7	1	2
	b)	Explain the following terms and mention the requirements of FAR and FSR for different types of buildings: a) Floor area ratio b) Floor space index	7	1	3
		(OR)			
2.	a)	Explain the Principles underlying building bye-laws and their importance.	7	1	3
	b)	Discuss about classification of buildings based on their functional requirements, and discuss about open space requirements of educational and residential buildings	7	1	4
		UNIT-II			
3.	a)	State and explain the various basic principles of building planning?	7	2	2
	b)	Discuss the requirements of various room sizes and their grouping in a two-bed independent house, and draw a rough plan showing all the rooms	7	2	3
		(OR)			
4.	a)	What is meant by orientation and state the factors affecting the Orientation of building?	7	2	2
	b)	Discuss about Planning of a government high school building and draw a rough plan by showing all the components	7	2	4
		UNIT-III			
5.	a)	Discuss Flemish bond and English bonds with neat sketches.	7	3	3
	b)	Distinguish between stone masonry and brick masonry	7	3	3
		(OR)			
6.	a)	Discuss about Rubble and Ashlar stone Masonry with diagrams	7	3	3
	b)	Discuss the importance of pointing, plastering and distempering.	7	3	3
		UNIT-IV			
7.	a)	Explain the requirements of good Form work and its types	7	4	3
	b)	Explain about Scaffolding, Shoring, and Underpinning	7	4	4
		(OR)			
8.	a)	Discuss the importance of Prefabricated Elements in construction.	7	4	2
	b)	Explain in brief the different construction techniques for various structural elements.	7	4	4
		UNIT-V			
9.	a)	Name the different types of earth work, Excavators, and discuss about their applications	7	5	3
	b)	Discuss briefly about the basic features of concrete batching plants.	7	5	2
		(OR)			
10.	a)	Discuss about the types of quality control measures to be considered with respect to RMC	7	5	3
	b)	Discuss in detail about pre-stressing jacks and grouting equipment	7	5	4

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AR23

CODE: 23CAT201 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March - 2026

COMPUTER NETWORKS

(Common to CSE(AIML) & CSE (DS) Branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain the importance of network hardware.	7	CO1	K2
	b)	Discuss about the various address in computer networks.	7	CO1	K2
		(OR)			
2.		Demonstrate various layers of TCP/IP protocol reference model. Also explain the merits of OSI compared with TCP IP model.	14	CO1	K3
		UNIT-II			
3.	a)	Explain the process of framing in detail.	7	CO3	K2
	b)	Discuss about the CSMA protocol.	7	CO4	K2
		(OR)			
4.	a)	Describe the operation of sliding window protocol with selective repeat ARQ.	7	CO3	K2
	b)	Encode the message 1011101 by using hamming code. Consider odd parity.	7	CO3	K2
		UNIT-III			
5.	a)	Discuss about flooding.	7	CO2	K2
	b)	explain various congestion prevention policies.	7	CO3	K2
		(OR)			
6.	a)	Discuss about distance vector routing algorithm.	7	CO3	K2
	b)	Explain each field of IPv4 header.	7	CO1	K2
		UNIT-IV			
7.	a)	List out and explain the various elements of transport layer protocol.	7	CO3	K2
	b)	Describe the connection release process of TCP.	7	CO3	K2
		(OR)			
8.		Illustrate the header of TCP. Explain each field in detail.	14	CO3	K3
		UNIT-V			
9.	a)	Differentiate static and dynamic web documents.	7	CO5	K2
	b)	Discuss about HTTP.	7	CO5	K2
		(OR)			
10.	a)	Explain in detail about DNS.	7	CO5	K2
	b)	Explain various agents in email.	7	CO5	K2

AR20

CODE: 20MET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026

MATERIALS ENGINEERING

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	What is a metallic bond, and how does it differ from other types of chemical bonds like covalent and ionic bonds?	5M	CO1	Understand
	b)	What are grain boundaries in the context of metal structures, and why do they exist?	5M	CO1	Remembering
		(OR)			
2.	a)	Discuss the influence of grain boundaries on the properties of metals.	5M	CO1	Understand
	b)	Describe the process of crystallization in metals. How does it contribute to the formation of a regular atomic arrangement in metals?	5M	CO1	Remembering
		UNIT-II			
3.	a)	Why is alloying necessary in materials science, and how does it improve the properties of metals?	5M	CO2	Understand
	b)	Explain the concept of intermediate alloy phases and electron compounds.	5M	CO2	Remembering
		(OR)			
4.		Draw the iron-iron carbide (Fe-Fe3C) phase diagram. What are the significant phases and their compositions in this system?	10M	CO2	Understand
		UNIT-III			
5.	a)	Classify different types of cast Iron and explain the structure and properties of white cast iron.	5M	CO3	Understand
	b)	Discuss the characteristics and applications of grey cast iron in engineering.	5M	CO3	Understand
		(OR)			
6.	a)	Explain the structure and properties of plain carbon steels, and provide examples of their common uses.	5M	CO3	Understand
	b)	Discuss the unique characteristics of tool and die steels. Where these steels are commonly employed?	5M	CO3	Understand
		UNIT-IV			
7.	a)	What are the common cooling methods used in heat treatment processes? Explain different heat treatment methods in terms of cooling methods.	5M	CO4	Understand
	b)	Describe the purpose and process of annealing in heat treatment. How does it affect the properties of steel?	5M	CO4	Understand
		(OR)			

8.	a)	Enumerate and describe the various methods used for surface-hardening of steels. Briefly explain flame hardening process.	5M	CO4	Understand
	b)	Differentiate between hot working and cold working of steels.	5M	CO4	Understand

UNIT-V

9.	a)	Describe the various methods used for the production of metal powders.	5M	CO5	Understand
	b)	Discuss the design considerations that are crucial in powder metallurgy.	5M	CO5	Understand

(OR)

10.	a)	What are the key mechanical properties of aluminium? Discuss briefly.	5M	CO5	Remembering
	b)	What are the application of titanium and its alloys?	5M	CO5	Understand

UNIT-VI

11.	a)	Explain the concept of mechanical properties in materials science and provide examples of important mechanical properties.	5M	CO6	Understand
	b)	Describe the principles behind the Rockwell hardness test. What are its advantages and limitations?	5M	CO6	Understand

(OR)

12.	a)	Explain the Izod impact test as measures of material toughness. How is this tests conducted?	5M	CO6	Analyzing
	b)	Define creep and describe the conditions under which it occurs in materials. Why is creep testing essential for high-temperature applications?	5M	CO6	Understand

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CODE: 20EET203 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026

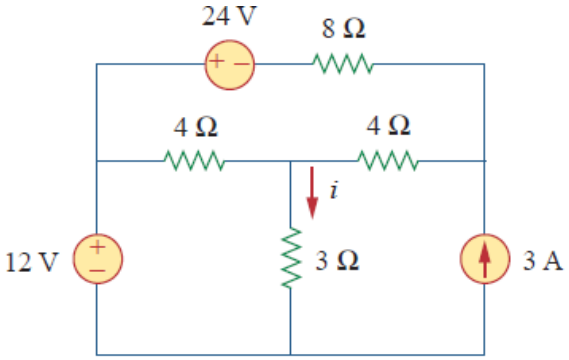
ELECTRIC CIRCUIT THEORY

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 60**

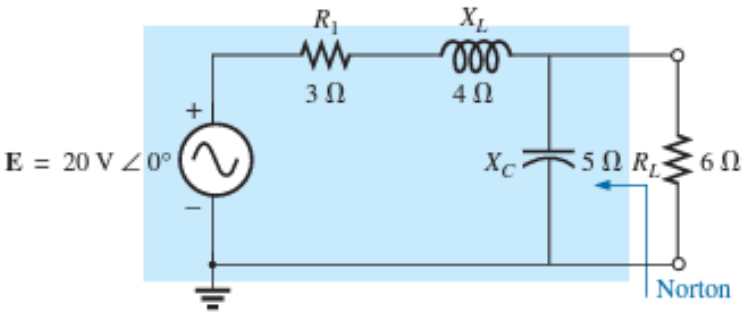
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
	UNIT-I			
1.	Calculate the current through 3 Ohms using Super position theorem for the circuit shown in Fig.	10	CO1	L4



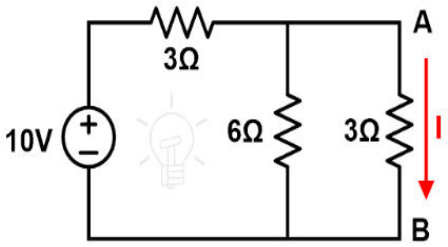
(OR)

2.	Determine the Norton equivalent circuit for the network external to the 6-ohm resistors in Fig.	10	CO1	L4

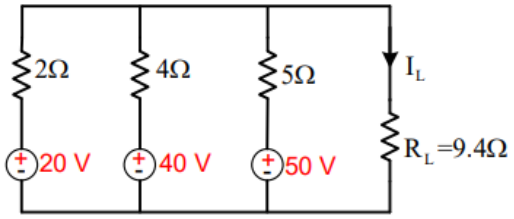


UNIT-II

3.	a)	Verify the compensation theorem for the circuit shown in fig.	5	CO2	L3



	b)	Using Millman's theorem find current through RL for the circuit shown in Fig.	5	CO2	L3



(OR)

4.		An impedance Z1= (10+j10) Ω is connected in parallel with another impedance of resistance 8.5Ω and variable capacitance connected in series. Find capacitance 'C' such that the circuit is resonant at 5 KHz.	10	CO2	L4

UNIT-III

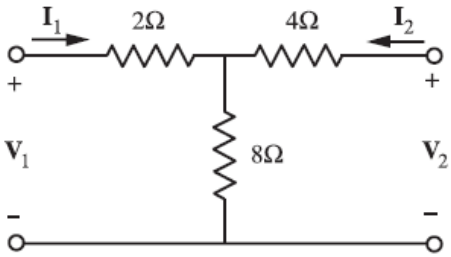
5.		A balanced star- connected Load of (4+j3) Ω per phase is connected to a balanced 3-Φ, 3-wire,Y-connected system has V_{RY}=400V supply. The phase current is 12A. Find Active Reactive and apparent power.	10	CO3	L3

(OR)

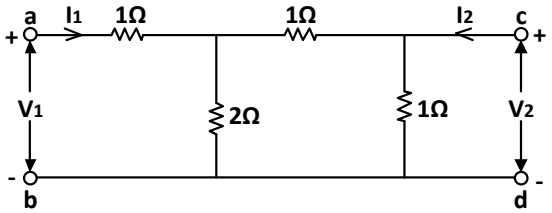
6.		A 3-Φ, 3-wire balanced Δ-connected 400Volts supply feeds an unbalanced 3-Φ, 3-wire, Δ-connected load having the Three impedances ZRY=20∠300Ω,ZYB=40∠600Ω and ZBR=10∠-900Ω . Compute the Phase currents.	10	CO3	L3

UNIT-IV

7.	a)	Determine the Impedance parameters of the T network shown in Fig.	5	CO4	L3

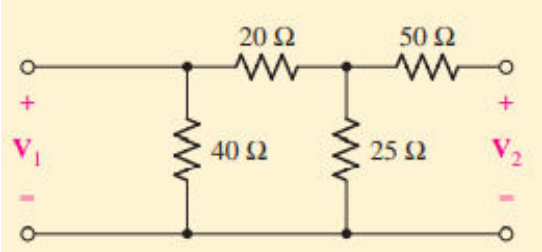


	b)	Compute the transmission parameters of the network shown in Fig.	5	CO4	L3



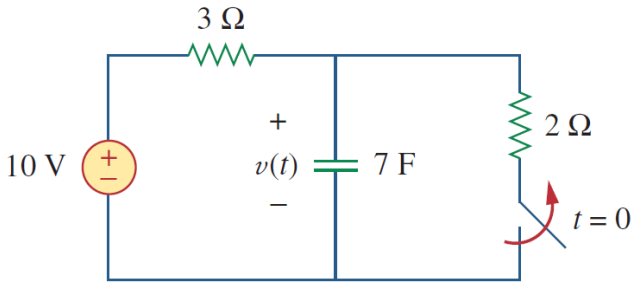
(OR)

8.	a)	Derive the hybrid parameters in terms of ABCD parameters.	5	CO4	L2
	b)	Compute the h-parameters of the network shown in Fig.	5	CO4	L3



UNIT-V

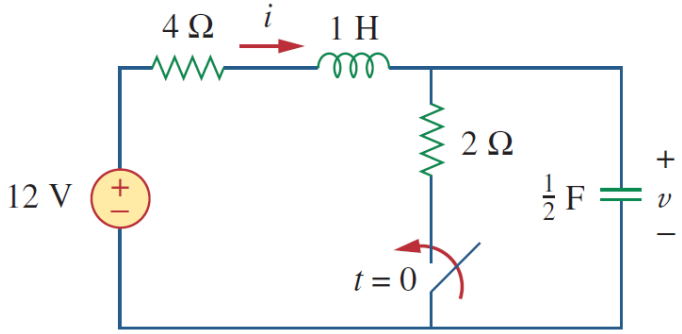
9.	a)	Determine the voltage across the capacitor just before the switch is opened at t=0. For the circuit given below.	5	CO5	L2



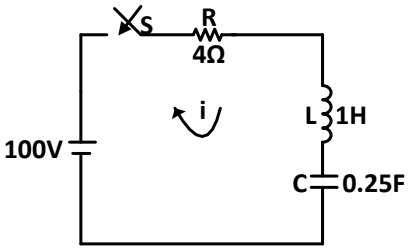
	b)	Sketch the first order response of an RC series circuit with suitable equations.	5	CO5	L3

(OR)

10.	a)	For the given circuit compute i (0+) and v (0+)	5	CO5	L2



	b)	The circuit shown in fig consists of Resistance, inductance, and capacitance in series with a 100V constant source, when the switch is closed at t=0 compute the current response using Laplace transform method.	5	CO5	L3



UNIT-VI

11.	a)	Prove that polynomial $P(s)=s^4+s^3+2s^2+3s+2$ is not Hurwitz.	5	CO6	L3
	b)	Write down the properties of a positive real function.	5	CO6	L2

(OR)

12.		Realise the Cauer forms of the Impedance function.	10	CO6	L3

$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

AR20

CODE: 20ECT202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026.

ELECTRONICS-II

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Analyse the simplified hybrid model of common Emitter Circuit.	5M	CO1	Analyse
	b)	Discuss about Millers theorem with the help of a circuit diagram	5M	CO1	Understand
		(OR)			
2.	a)	Analyse common emitter amplifier with emitter resistance and highlight the trade-off due to this resistance.	5M	CO1	Analyse
	b)	Derive the terms A_I and R_i for Simplified CC circuit.	5M	CO1	Analyse
		UNIT-II			
3.	a)	Derive the voltage gain equation for two stage common Emitter amplifier at high frequencies.	5M	CO2	Analyse
	b)	Differentiate between direct and capacitive coupling of multiple stages of amplifiers. With the help of a neat circuit diagram, describe the working of a cascade amplifier.	5M	CO2	Apply
		(OR)			
4.	a)	Derive the expression for input resistance of a Darlington pair circuit.	5M	CO2	Analyse
	b)	Draw and explain the operation of common source (CS) JFET amplifier.	5M	CO2	Evaluate
		UNIT-III			
5.	a)	Derive the expression frequency of oscillation and condition for sustained oscillations of a BJT based RC Phase shift oscillator.	5M	CO3	Analyse
	b)	State and explain barkhausen criterion.	5M	CO3	Understand
		(OR)			
6.	a)	Explain the concept of frequency and amplitude stability of oscillators.	5M	CO3	Understand
	b)	With the help of suitable schematic explain the operation of a Wien Bridge oscillator and derive an expression for its frequency of operation.	5M	CO3	Evaluate

UNIT-IV

7.	a)	Draw the Hybrid- π CE model and explain each perimeter.	5M	CO4	Analyse
	b)	Investigate the role of transconductance g_m in Hybrid- π Conductance with necessary equations.	5M	CO4	Evaluate

(OR)

8.	a)	Prove that Hybrid –π Model is valid only up to frequencies $f_T/3$.	5M	CO4	Evaluate
	b)	Derive the expressions for Hybrid–π Capacitances.	5M	CO4	Analyse

UNIT-V

9.	a)	A single ended class A amplifier has a transformer coupled load of 8 Ω. If the transformer turns ration is 10, find the maximum power output delivered to the load. Take the zero signal collector current of 500mA.	5M	CO5	Apply
	b)	Compare and Contrast various Classes of power amplifiers.	5M	CO5	Apply

(OR)

10.	a)	What is a cross over distortion and explain a remedy for it.	5M	CO5	Understand
	b)	With the help of a suitable circuit diagram, show that the maximum conversion efficiency of a class B power amplifier is 78.5%	5M	CO5	Evaluate

UNIT-VI

11.	a)	Analyse the working of a Stagger tuned amplifier.	5M	CO6	Analyse
	b)	Show that Bandwidth decreases with cascading of single tuned amplifiers.	5M	CO6	Evaluate

(OR)

12.	a)	Discuss about single tuned transformer coupled amplifier.	5M	CO6	Understand
	b)	Compare tuned amplifiers on different aspects.	5M	CO6	Apply

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CODE: 20CST202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2026

Discrete Mathematics

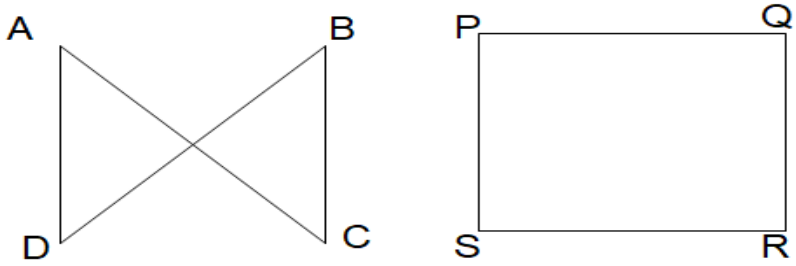
(Common to CSE, CSE(AIML), CSE (DS) & IT Branches)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

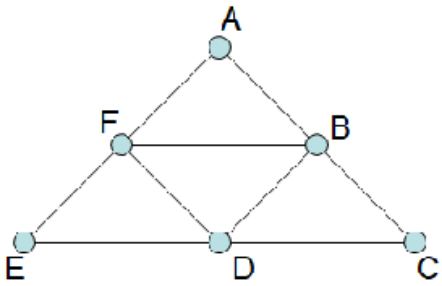
			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Prove that $[(P \rightarrow R) \wedge (Q \rightarrow R)] \rightarrow [(P \vee Q) \rightarrow R]$ is a tautology	5M	CO1	K3
	b)	Using indirect proof method derive $P \rightarrow \neg S$ from $P \rightarrow (QVR)$, $Q \rightarrow \neg P$, P, $S \rightarrow \neg R$	5M	CO1	K3
		(OR)			
2.	a)	Obtain the PDNF and PCNF of the following formulas. P V (~P-> (Q V (~Q->R)))	10M	CO1	K3
		UNIT-II			
3.	a)	Define quantifiers, universal quantifiers and existential quantifiers by giving an example	5M	CO2	K1
	b)	Test the Validity of the Following argument. If you work hard, you will pass the exam. You did not pass. Therefore, you did not work hard.	5M	CO2	K3
		(OR)			
4.	a)	Translate into symbols. Use E(x) for "x is even" and O(x) for "x is odd." (i) No number is both even and odd. (ii) One more than any even number is an odd number. (iii) There is prime number that is even. (iv) Between any two numbers there is a third number. (v) There is no number between a number and one more than that number.	5M	CO2	K2
	b)	Show that R → S can be derived from the premises P→ (Q→ S), ⌉ R∨P and Q	5M	CO2	K3
		UNIT-III			
5.	a)	Prove that if r is a transitive relation on a set, then $r^2 \subseteq r$	5M	CO3	K3
	b)	Let S={a,b,c} and P(S) is the power set of S. On P(S) define the relation R by X R Y if and only if $X \subseteq Y$. Show that this relation is POSET on P(S) by using the Hasse diagram	5M	CO3	K2
		(OR)			
6.		Explain about special types of lattices with examples.	10M	CO3	K1

			Marks	CO	Blooms Level
		UNIT-IV			
7.		Show whether the following graphs are isomorphic or not?	10M	CO4	K3



(OR)

8.	a)	Define chromatic number. Find is the chromatic number of a cycle graph.	5M	CO4	K1, K2
	b)	Give the Euler circuit, by giving the edges visited in the sequence, by the graph represented below by starting at F	5M	CO4	K3



		UNIT-V			
9.		Illustrate Kruskal's algorithm with suitable example.	10M	CO5	K2
		(OR)			
10.		Illustrate DFS algorithm with suitable example.	10M	CO5	K3
		UNIT-VI			
11.	a)	In the expansion of $(2x - 3y + 5z)^8$ i) Evaluate the coefficient of $x^3\ y^3\ z^2$ ii) How many terms are there in the expansion ?	5M	CO6	K3
	b)	Solve the recurrence relation $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 3$.	5M	CO6	K3
		(OR)			
12.		Solve non-homogeneous recurrence relation $a_n - 7a_{n-1} + 10\ a_{n-2} = 4^n$ for $n \geq 2$ and $a_0 = 8,\ a_1 = 36$	10M	CO6	K2

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CODE: 20CET203 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March -2026

Strength of Materials

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	A specimen was tested on UTM in an industrial testing lab. Initial diameter of the specimen is 13mm, final diameter at fracture is measured as 9mm. Gauge length of the specimen was measured as 50mm before testing and 70mm after testing at fracture point, load dial gauge readings were recorded as 35kN, 60kN and 30kN corresponding to yield point, ultimate point and breaking point respectively, determine i) Yield strength of the material ii) Ultimate tensile strength of the material iii) The breaking strength of the material iv) Percentage elongation of the material v) Percentage reduction in cross-sectional area of the material	5	1	4
	b)	A bar is constructed of three different cross-sections, three different materials, and with different forces as shown in **Fig 1**. Determine the stresses produced in each part and net change in length of the bar. Take the Young's modulus of the three different materials as: E_1=200GPa, E_2=210GPa and E_3= 220GPa	5	1	3

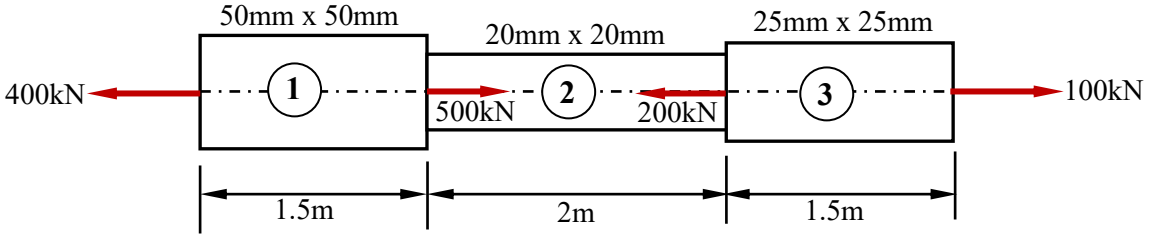

Fig 1.

(OR)

2.	a)	Derive the relation between elastic Constant and write the assumptions.	10	1	3

			Marks	CO	Blooms Level
		UNIT-II			
3.	a)	Deduce the relation among load intensity, shear force and bending moment.	5	2	3
	b)	Draw the shear force and bending moment diagram of the simply supported beam carrying uniformly distributed lode throughout the beam	5	2	3

(OR)

			Marks	CO	Blooms Level
4.		Draw the shear force and bending moment diagram of the beam shown in **Fig. 4**.	10	2	4

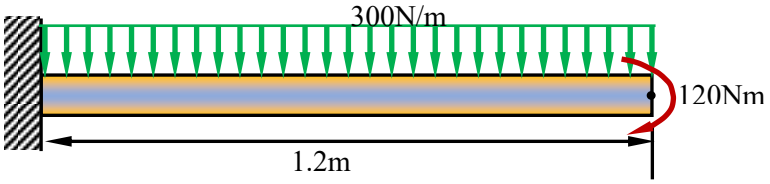

Fig. 4

UNIT-III

			Marks	CO	Blooms Level
5.	a)	Derive the Euler-Bernoulli flexure formula for straight beam.	5	3	2
	b)	A timber beam 240mmx400mm weighing 500n/m is simply supported over a span of 4m. It carries a concentrated load of 20000N at a distance 1m from the left support. Determine i) maximum stress in the beam ii) maximum stress at the mid span of the beam. Given E= $1x10^4 N/m^2$	5	3	3

(OR)

6.	a)	Prove that for a triangular cross section beam the ratio of maximum shear stress and average shear stress =1.5.	5	3	2
	b)	A beam of T-section shown in **Fig. 5** is 5m long and simply supported at the ends. If maximum permissible tensile and compressive stress are 40MPa and 25MPa, respectively, then determine the maximum permissible uniformly distributed load the beam can carry.	5	3	3

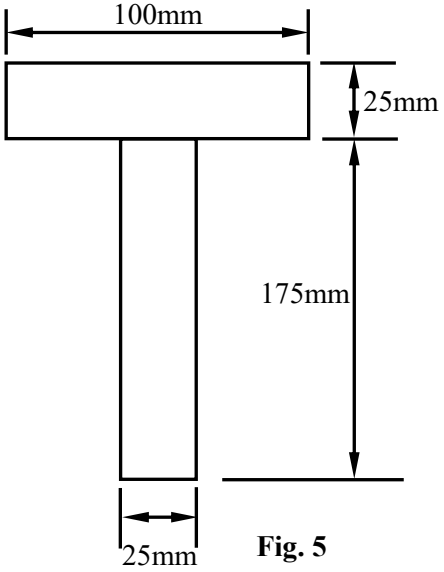

Fig. 5

UNIT-IV

			Marks	CO	Blooms Level
7.	a)	What is moment area theorem?	5	4	2
	b)	Explain the 'Macaulay's method to calculate the deflection of a beam.	5	4	2
		(OR)			
8.	a)	A cantilever beam of length 'L' and uniform flexural rigidity 'EI' is loaded on one half of its length from the free end with uniformly distributed load '*w*' per unit length as shown in **Fig. 7**. Derive a formula for the i) deflection at the free end ii) slope at the free end and iii) deflection at mid-span.	5	4	4

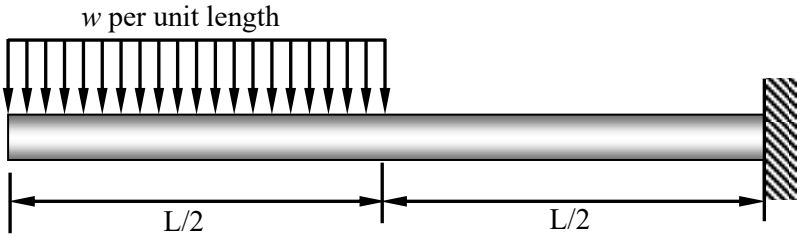

Fig. 7

	b)	Derive the equation of deflection of the following beam shown in **Fig. 6.** The flexural rigidity of the beam is EI.	5	4	4

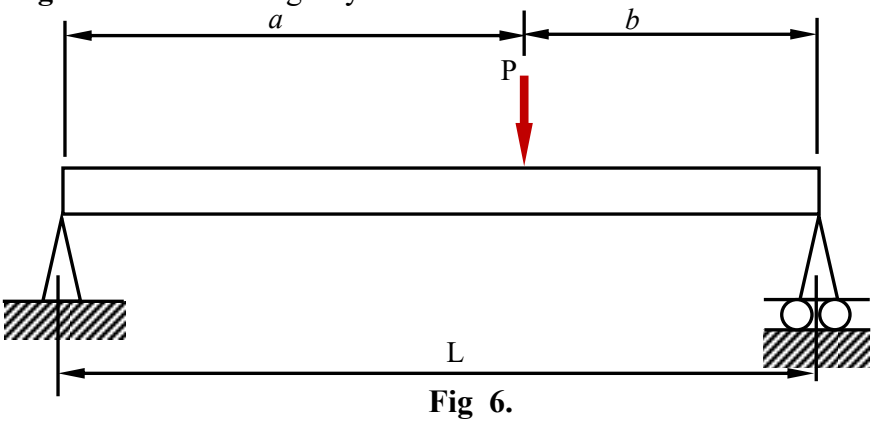

Fig 6.

UNIT-V

			Marks	CO	Blooms Level
9.	a)	What are the assumptions for theory of pure torsion?	3	5	2
	b)	A steel shaft circular in cross-section has to withstand a torque of $12x10^3$Nm. If the shearing stress is not to exceed 45MPa and angle of twist has to remain within one degree per 5m length of the shaft, find i) the minimum diameter of the solid shaft, ii) minimum diameter of hollow shaft if external diameter is twice the internal diameter. Given G=$8x10^4$MPa.	7	5	3
		(OR)			

			Marks	CO	Blooms Level
10.	a)	What do you mean by principal planes and principal stresses?	4	5	2
	b)	A rectangular block of material is subjected to a tensile stress of $10000N/cm^2$ on a plane and a tensile stress of $4000N/cm^2$ at right angles to the former together with a shear stress of $6000N/cm^2$ on the same planes as shown in **Fig. 8**. Calculate i) the direction of principal planes ii) magnitude of principal stresses iii) magnitude of the maximum shear stress and the corresponding plane.	6	5	3

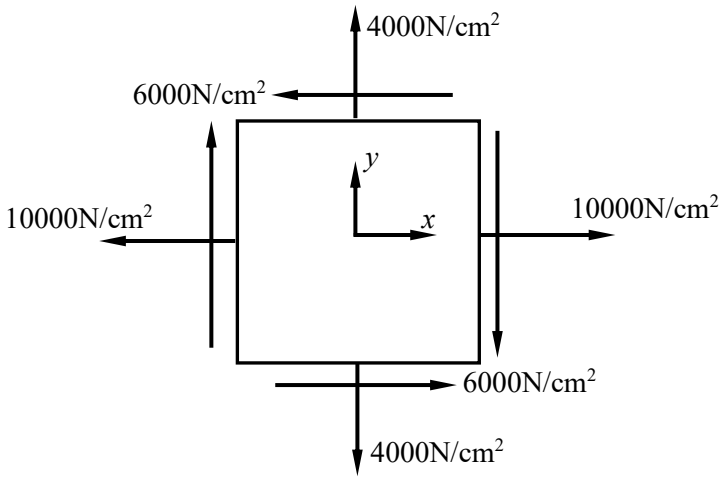

Fig. 8

UNIT-VI

			Marks	CO	Blooms Level
11.	a)	What is slenderness ratio of a column, and what is Rankine-Gordon formula of buckling?	5	6	2
	b)	Compare the buckling strength of two columns; one is of hollow circular cross-section and other is of solid cross-section. The internal diameter of the hollow column is $3/4^{th}$ of its outer diameter. Both columns are of same cross-sectional area, same length, and same support conditions and also are made of same material.	5	6	3
		(OR)			
12.	a)	What are the limitations of Euler's theory of buckling?	3	6	2
	b)	Calculate the Euler's buckling load for pinned end column.	7	6	2