AR20

CODE: 20CET203 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

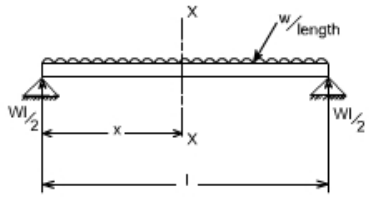
STRENGTH OF MATERIALS

(Civil Engineering)

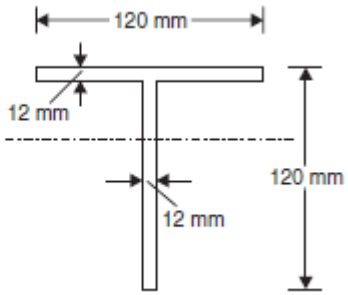
Time: 3 Hours **Max Marks: 60**

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)	Sketch stress and strain diagram for mild steel material and narrate silent features of this diagram?	4	1	1
	b)	A circular rod of diameter 16 mm and 500 mm long is subjected to a tensile force 40KN.The modulus of elasticity for steel may be taken as 200 kN/mm^2. Find stress, strain and elongation of the bar due to applied load.	6	1	3
		(OR)			
2.	a)	Derive the Relation between E, K and μ.	5	1	3
	b)	A steel rod of 3cm diameter and 5m long is connected to two grips and the rod is maintained at a temperature of 95^0 C. Determine the stress and pull exerted when the temperature falls to 30^{0}C,if (i) the ends do not yield and (ii) the ends yields by 0.12 cm Take E=2 X 105MN/m^2 and α =12 x 10^{-4}/^{0}c	5	1	4
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Describe different types of loading in beams?	4	2	3
	b)	Cantilever subjected to uniformly distributed load over whole length .Draw its shear force and bending moment diagrams?	6	2	4
		(OR)			
4.		Simply supported beam subjected to a uniformly distributed load [U.D.L]. Draw S.F and B.M Diagrams?	10	2	4



			Marks	CO	Blooms Level
		UNIT-III			
5.	a)	Write the section modulus for the Rectangular, hollow rectangular and hollow round shapes in beams	5	3	3
	b)	A beam has a rectangular cross section 80 mm wide and 100 mm deep. It is subjected to a bending moment of 15 KN-m at a certain point along its length. It is made from metal with a modulus of elasticity of 180 GPa. Calculate the maximum stress on the section.	5	3	4
		(OR)			
6.		A beam has cross-section as shown in figure below.If the shear force acting on this is 25 kN, draw the shear stress distribution diagram across the depth	10	3	4

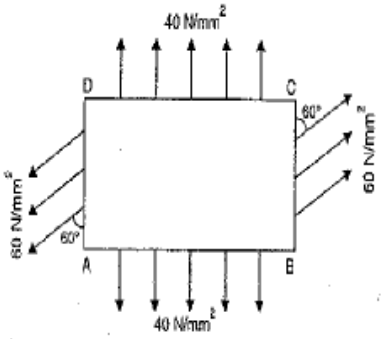


UNIT-IV

			Marks	CO	Blooms Level
7.		A Cantilever wih a point load at the free end .Derive an expression for deflection by double integration method	10	4	3
		(OR)			
8		A cantilever of length 2m carries a point load of 20KN at the free end and another load of 20KN at its centre. If $E=10^5$ N/mm^2 and $I=10^8$mm^4 for the cantilever then determine by moment area method, the slope and deflection of the cantilever at the free end	10	4	3

UNIT-V

			Marks	CO	Blooms Level
9.	a)	Derive an expression for maximum torque transmitted by a circular solid shaft?	5	5	3
	b)	A solid shaft of 150mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft, if the maximum shear stress induced to the shaft is 45N/mm^2.	5	5	3
		(OR)			
10.		A point in a strained material is subjected to the stresses as shown in figure below. Locate the principal planes and calculate the principal stresses	10	4	3



UNIT-VI

			Marks	CO	Blooms Level
11.	a)	Describe the various end conditions for long columns?	4	6	2
	b)	A solid round bar 4 m long and 5 cm in diameter was found to extend 4.6mm under a tensile load of 50 KN. This bar is used as a strut with both ends hinged. Determine the buckling load for the bar and also the safe load taking factor of safety as 4.0.	6	6	4
		(OR)			
12.		Derive an expression for crippling load when both end of the column is fixed.	10	6	4

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CODE: 20EET203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

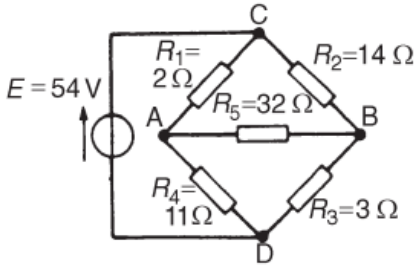
II B.Tech I Semester Regular Examinations, March-2022

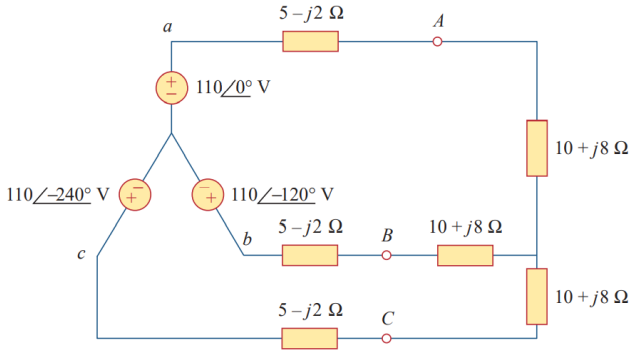
ELECTRIC CIRCUIT THEORY

(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.	a)	A Wheatstone Bridge network is shown in Figure 1(a). Calculate the current flowing in the 32 Ω resistor, and its direction, using Thevenin's theorem. Assume the source of have negligible resistance.	5	CO1	L4
					
	b)	State and Explain Reciprocity theorem	5	CO1	L3
		(OR)			
2.		State and explain super position theorem with a suitable example.	10	CO1	L3
		UNIT-II	Marks	CO	Blooms Level
3.	a)	A d.c. source has an open-circuit voltage of 20 V and an internal resistance of 2Ω. Determine the value of the load resistance that gives maximum power dissipation. Find the value of this power.	5	CO2	L4
	b)	Derive the expression for resonant frequency for parallel connected RLC-circuit.	5	CO2	L3
		(OR)			
4.	a)	Explain maximum power theorem with DC excitation.	5	CO2	L3
	b)	A series-connected circuit has R =4 Ω an L =25mH. (a) Calculate the value of C that will produce a quality factor of 50. (b) Find lower and higher cut off frequencies and bandwidth. Take Vm =100V	5	CO2	L4
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Calculate the line currents in the three-wire Y-Y system of Fig.5a	10	CO3	L4



(OR)

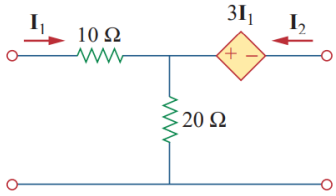
			Marks	CO	Blooms Level
6.		Derive the relation between line voltages and line currents in a three phase star and delta connected system	10	CO3	L3

UNIT-IV

			Marks	CO	Blooms Level
7.		Explain Z, Y and ABCD parameters of two port networks	10	CO4	L3

(OR)

			Marks	CO	Blooms Level
8.	a)	Express impedance parameters in terms of hybrid parameters	5	CO4	L3
	b)	Find the transmission parameters for the two-port network	5	CO4	L4



UNIT-V

		Marks	CO	Blooms Level
9.	A 20 μF capacitor is connected in series with a 50 kΩ resistor and the circuit is connected to a 20 V, d.c. supply. Determine (a) the initial value of the current flowing, (b) the time constant of the circuit, (c) the value of the current one second after connection, (d) the value of the capacitor voltage two seconds after connection, and (e) the time after connection when the resistor voltage is 15 V	10	CO5	L4

(OR)

		Marks	CO	Blooms Level
10.	Derive the expression for transient current for a RL series circuit with DC excitation	10	CO5	L3

UNIT-VI

		Marks	CO	Blooms Level
11.	Synthesize Foster form 1 for the driving point impedance $Z_D(s) = \frac{2s^2 + 12s + 16}{s^2 + 4s + 3}$	10	CO6	L4

(OR)

		Marks	CO	Blooms Level
12.	Explain the a) Properties of Positive real function b) Procedure for testing a given polynomial for Hurwitz Criterion	10	CO6	L3

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CODE: 20MET202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

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.		Explain the Mechanism of Crystallization in solids and liquids?	10	CO1	L3
		(OR)			
2.		Prove that FCC is closely packed than BCC by calculating atomic packing factor for both	10	CO1	L2
		UNIT-II	Marks	CO	Blooms Level
3.		Explain the Substitutional and Interstitial Solid Solution in the process of solidification?	10	CO2	L2
		(OR)			
4.		Define the following structures with iron carbide diagram and write in variant reactions. a) Austenite b) Cementite c) Ledeburtte d) Pearlite	10	CO2	L2
		UNIT-III	Marks	CO	Blooms Level
5.		Explain the changes in microstructure during slow cooling of steel of 0.2% and 1.0% carbon steel?	10	CO3	L3
		(OR)			
6.		What is cast iron and classify it and write properties and applications.	10	CO3	L1
		UNIT-IV	Marks	CO	Blooms Level
7.		What are the principal advantages of austempering compared with the conventional quench and temper method?	10	CO4	L3
		(OR)			
8.		Define the residual stresses. Plot and explain TTT diagram.	10	CO4	L4
		UNIT-V	Marks	CO	Blooms Level
9.		Explain the effect of titanium for enhancement of mechanical properties with nitrogen, aluminium and manganese?	10	CO5	L4
		(OR)			
10.		Discuss the importance of sintering process and write advantage and disadvantages of powder metallurgy?	10	CO5	L5
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Differentiate between Rockwell Hardness Test and Vickers Hardness Test?	5	CO6	L4
	b)	Write a short note on creep test.	5		
		(OR)			
12.		Explain the properties that can be measured through the tensile test?	10	CO6	L2

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CODE: 20ECT202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

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)	Derive simplified CE h parameter model of transistor.	5M	CO1	Analyse
	b)	Derive the expressions for A_I, R_I of CE amplifier circuit using approximate hybrid model.	5M	CO1	Understand
		(OR)			
2.	a)	Derive the equation for R_o of a simplified CC circuit.	5M	CO1	Analyse
	b)	Explain How Stability is improved in common emitter amplifier with emitter resistance.	5M	CO1	Analyse
		UNIT-II	Marks	CO	Blooms Level
3.	a)	With any circuit diagram describe the working, merits and demerits of two stage RC coupled amplifier.	5M	CO2	Analyse
	b)	Discuss about coupling methods of multistage amplifiers.	5M	CO2	Understand
		(OR)			
4.	a)	Derive the expression for input resistance of a Darlington pair circuit.	5M	CO2	Analyse
	b)	It is desired to have a high gain amplifier with high input impedance and low output impedance. If a cascade of four stages is used, what configuration should be used for each stage.	5M	CO2	Apply
		UNIT-III	Marks	CO	Blooms Level
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	Marks	CO	Blooms Level
7.	a)	Sketch and explain the hybrid π model of the transistor CE model.	5M	CO4	Analyse
	b)	Derive the expressions for feedback conductance and input conductance of CE π model.	5M	CO4	Analyse
		(OR)			
8.	a)	Explain various high frequency parameters of a BJT and derive the relation between them.	5M	CO4	Understand
	b)	Investigate the role of transconductance g_m in Hybrid- π Conductances with necessary equations.	5M	CO4	Evaluate
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Show that the conversion efficiency of a transformer coupled power amplifier is 50%.	5M	CO5	Evaluate
	b)	Compare and Contrast various Classes of power amplifiers.	5M	CO5	Apply
		(OR)			
10.	a)	Illsutrate the operation of class A push-pull power amplifier with neat diagrams.	5M	CO5	Understand
	b)	What is a cross over distortion and explain a remedy for it.	5M	CO5	Apply
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Explain the circuit of capacitor coupled single tuned amplifier with a neat sketch.	5M	CO6	Analyse
	b)	Explain operation, frequency response and Bandwidth of doubled tuned amplifiers.	5M	CO6	Evaluate
		(OR)			
12.	a)	Derive an expression for bandwidth of a capacitive coupled tuned amplifier.	5M	CO6	Analyse
	b)	Compare tuned amplifiers on different aspects.	5M	CO6	Apply

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CODE: 20CST202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

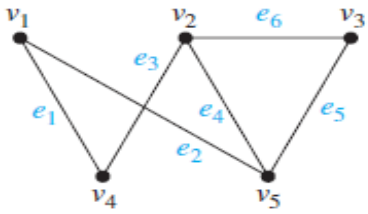
DISCRETE MATHEMATICS

(Common to CSE & IT)

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

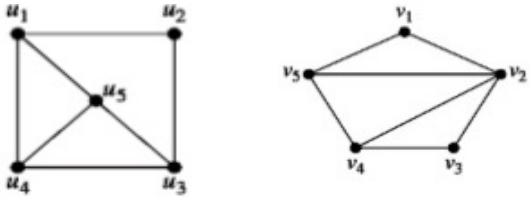
			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Examine that the compound proposition $\neg p \rightarrow (p \rightarrow q)$ is a tautology or not.	5	CO1	K3
	b)	Show that $\neg(p \vee q)$ and $\neg p \wedge \neg q$ are logically equivalent.	5	CO1	K3
		(OR)			
2.	a)	Find CNF and DNF of the following: $(p \wedge (q \vee r)) \vee (q \wedge (p \vee r))$	5	CO1	K3
	b)	Demonstrate C: "r" is a valid inference from the premises H1: $p \rightarrow q$, H2: $q \rightarrow r$ and H3: p.	5	CO1	K3
		UNIT-II			
3.	a)	Use predicates and quantifiers to express the following statements. a. All flowers are beautiful b. Some students of this school can speak English and know Hindi. c.No rationales are real.	5	CO2	K2
	b)	Define Universal generalization and Existential generalization using one example.	5	CO2	K3
		(OR)			
4.		Verify the validity of the following quantified statements by Rules of Inference. Lions are dangerous animals There are Lions Therefore, there are dangerous animals.	10	CO2	K2
		UNIT-III			
5.	a)	Let R be the relation defined by R = $\{(a,b)/a \equiv b \pmod{m}\}$. Verify that the relation R is an equivalence relation.	6	CO3	K3
	b)	Which of these are satisfying Reflexive, symmetric, Transitive, and antisymmetric properties?1) R1 = {(1,1),(1,2),(1,4),(2,1),(2,2),(3,3),(4,1),(4,4)} . 2) R2 = {(1,2), (2,1), (2,2)}	4	CO3	K2
		(OR)			
6.	a)	Draw the Poset diagram representing the partial ordering using the relation R = {(a, b) $\mid a \leq b$} on the set {1, 2, 3, 4, 5, 6 }.	5	CO3	K3
	b)	Determine whether (P (S), $\subseteq$) is a lattice or not if S = {1, 2, 3,4 }.	5	CO3	K2
		UNIT-IV			
7.	a)	Obtain the incidence matrix of the following graph.	5	CO4	K2



	b)	Identify the number of edges in a graph with 10 vertices each of degree 6.	5	CO4	K3

(OR)

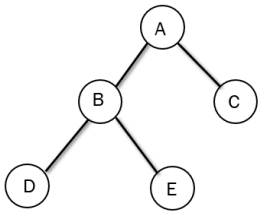
			Marks	CO	Blooms Level
8.	a)	Check whether the following graphs are isomorphic or not	5	CO4	K2



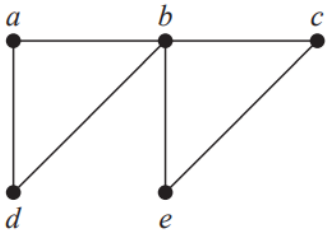
	b)	Find the chromatic number of a wheel graph and cycle graph (when number of vertices is even and odd)	5	CO4	K3

UNIT-V

			Marks	CO	Blooms Level
9.	a)	Determine the pre-order, post-order, in-order traversal for the following graph.	5	CO5	K3

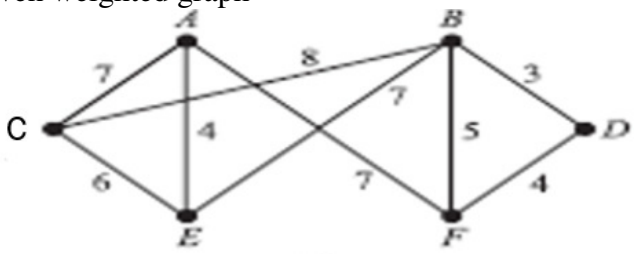


	b)	Obtain three spanning trees of the following simple graph	5	CO5	K3



(OR)

10.		Apply Kruskal's algorithm to find a minimum spanning tree for the given weighted graph	10	CO5	K3



UNIT-VI

			Marks	CO	Blooms Level
11.	a)	Find the coefficient of x^9 in the power series of the function $(1 + x^3 + x^6 + x^9 + \cdots\cdots\cdots)^3$	5	CO6	K3
	b)	Find a closed form for the generating function for the given 0, 0, 0, 1, 1, 1, 1, 1, 1, ...	5	CO6	K3

(OR)

12.		Solve non-homogeneous recurrence relation $a_n - 3\,a_{n-1} - 10\,a_{n-2} = 8^n$ for $n \geq 2$ when $a_0 = 1,\ a_1 = 2$	10	CO6	K3

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AR18

CODE: 18CET203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

MECHANICS OF SOLIDS-I

(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

UNIT-I

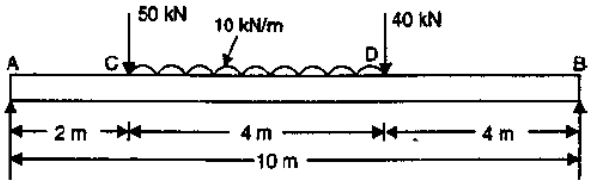
1. a) Define modular ratio, Poisson's ratio? Write the relationship between bulk modulus, rigidity modulus and Poisson's ratio? 4M
   b) Derive relations for normal and shear stresses acting on an inclined plane at a point in a stained material subjected to two mutually perpendicular direct stresses. 8M

(OR)

2. a) Define thermal stresses? What is the procedure for finding the thermal stresses in a composite bar? 4M
   b) A reinforced concrete column 250x250mm is reinforced with 8 steel bars of diameter 16mm . The column carries an axial load 180kN. If Young"s modulus of steel is 18 times of concrete (Es/Ec=18) then find out 8M
   (i) The stresses in concrete and steel.
   (ii) The area of steel ,if the stress in the concrete limited to 4N/mm2

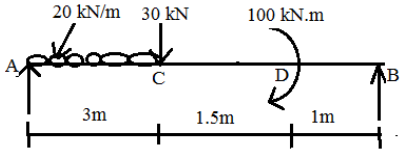
UNIT-II

3. a) Explain point of contraflexure? Sketch the shear stress variation for symmetrical I section? 4M
   b) A simply supported beam of length 10m carries the uniformly distributed load and two point loads as shown in Fig. Draw the S.F and B.M diagram for the beam and also calculate the maximum bending moment. 8M



(OR)

4. a) A cantilever beam of span 4m is subjected to a UDL of 2 kN/m over its entire length. Sketch the bending moment diagram for the beam. 4M
   b) Draw shear force and bending moment diagram for the beam shown in Fig. 8M



UNIT-III

5. a) Explain theory of simple bending with suitable example? 4M

   b) A simply supported rectangular beam of 200x400mm depth is subjected to a UDL 3kN/m over the entire span of 5m. Find out the (i) maximum bending stress at 2m and 4m from left end. 8M

(OR)

6. a) Explain the concept of section modulus with an example? What assumptions are made in the theory of the simple bending? 4M

   b) A high strength steel band saw, 20 mm wide by 0.80 mm thick, runs over pulleys 600 mm in diameter. What maximum flexural stress is developed? What minimum diameter pulleys can be used without exceeding a flexural stress of 400 MPa? Assume E = 200 GPa. 8M

UNIT-IV

7. a) Explain the concept of shear stress theory with a suitable example? 4M

   b) An I-beam section of top and bottom flange width 200 mm , thickness 10mm and web length 350mm , thickness 10mm subjected to shear force 60kN. Draw shear stress distribution across the section and find out shear stress at 25mm above the neutral axis? 8M

(OR)

8. a) Draw shear stress distribution for unsymmetrical I- section simply supported beam carried UDL? 4M

   b) A rectangular-beam section width 200 mm and depth 400mm is subjected to shear force 80kN. Find out the shear stress at 40mm and 80mm above neutral axis. 8M

UNIT-V

9. a) List the assumptions made in the theory of torsion? Explain the Torsional equation. 4M

   b) A close coiled helical spring is made of a round wire having 'n' turns and the mean coil radius R is 5 times the wire diameter. Show that the stiffness of the spring = 2.05 R/n. If the above spring is to support a load of 1.2kN with 120mm compression. Calculate mean radius of the coil and number of turns assuming G = 8200 N/mm2 and permissible shear stress, λ allowable = 250 N/mm^2. 8M

(OR)

10. a) State the types of stresses when a closed coiled spring is subjected to (i) axial load and (ii) axial twisting moment. 4M

    b) Find the maximum torque that can be applied safely to a shaft of 300mm dia. The permissible angle of twist is 1.50 in a length of 7.5m length and the shear stress is not to exceed 42 N/mm^2. Take $C=84.4KN/mm^2$ 8M

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AR18

CODE: 18EET204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

NETWORK ANALYSIS AND SYNTHESIS

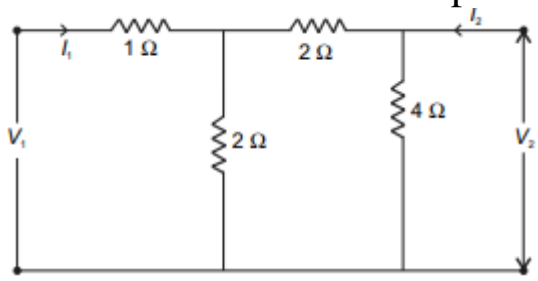
(Electrical and Electronics Engineering)

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

UNIT-I

1. a) Define two port network and Brief about the following parameters with necessary equations. 6M
   1. Impedance Parameters 2. Transmission parameters

   b) 

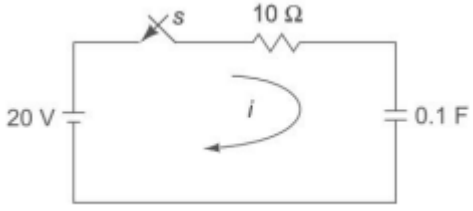
6M

Find the Y-parameters for the circuit given.

(OR)

2. a) With neat circuit and necessary equations, discuss about parallel connection of Two-port Networks. 6M
   b) Derive the necessary relationship for expressing Z-parameters in terms of Y-parameters. 6M

UNIT-II

3. a) Derive the transient current and voltage equations for RL series circuit with DC excitation. 6M
   b) 

6M

A series RC circuit consists of a resistor of 10 V and a capacitor of 0.1 F as shown in Fig. A constant voltage of 20 V is applied to the circuit at t = 0. Obtain the current equation. Determine the voltages across the resistor and the capacitor

(OR)

4. a) With necessary circuit diagram, obtain the DC response for RLC series circuit. 6M

   b) Using the formula for laplace transform of derivatives, obtain the Laplace transform of sin 3t. 6M

UNIT-III

5. Derive the expression for sinusoidal response of RC series circuit. 12M

(OR)

6. Define Damping. Obtain the condition for critically damped response of a series RLC circuit excited by a sinusoidal ac source. 12M

UNIT-IV

7. Test whether the following polynomials are Hurwitz or not : 12M

   (i) $F(s) = S^4 + S^3 + 2S^2 + 3S + 2$

   (ii) $F(s) = S^4 + S^2 + 2$

   (iii) $F(s) = S^4 + 2S^3 + 2S^2 + 6S + 10$

(OR)

8. a) Define positive real function and explain the properties of positive real functions. 6M

   b) Check the positive realness of the following function. 6M

$$\frac{(2s+4)}{(s+5)}$$

UNIT-V

9. Brief about four forms realization. Obtain any two of the four forms realization for Z(s) $\frac{(s+1)(s+3)}{s(s+2)}$ 12M

(Or)

10. a) Explain the Synthesis of reactive one-ports by the cauer method with necessary circuits and expressions. 6M

    b) The driving-point impedance of an LC network is given by 6M

$$\frac{(2s^5+2s^3+16s)}{(s^4+4s^2+3)}$$

Determine the first Cauer form of the network.

***

AR18

CODE: 18MET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

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

UNIT-I

1.	a)	Prove that FCC is closely packed than BCC by calculating atomic packing factor for both	6M
	b)	Explain the process of solidification of metals to form polycrystalline structure.	6M
		(OR)	
2.	a)	Distinguish Ionic bond, Covalent bond, Metallic bonds	6M
	b)	What are the parameters which control the grain size on solidification?	6M

UNIT-II

3.	a)	State Hume-Rothery's rules for the formation of substitutional solid solution.	6M
	b)	Define solid solution and explain about substitutional solid solutions with suitable Examples.	6M
		(OR)	
4.		Draw neatly and explain the phase diagram where two components are completely soluble in liquid state and partly insoluble in solid state (with example)	12M

UNIT-III

5.	a)	What is cast Iron and Classify it and write the properties	6M
	b)	What factors control the structure of cast iron? Explain in detail	6M
		(OR)	
6.		Discuss the classification of steel based on Carbon percentage gives the composition, properties and applications of each	12M

UNIT-IV

7.	a)	Discuss the importance of heat treatment.	4M
	b)	Discuss the various steps involved in the fabrication of a part using the technique of powder metallurgy.	8M
		(OR)	
8.	a)	Draw and explain TTT Diagram	6M
	b)	Distinguish between annealing and normalizing.	6M

UNIT-V

9.	a)	Explain the stages of age hardening of aluminum alloys.	6M
	b)	What are different hardness tests? Explain in detail advantages and disadvantages of various hardness test	6M
		(OR)	
10.	a)	Briefly explain the classification of Titanium alloys	6M
	b)	Draw Stress-Strain diagram for ductile materials indicating the salient points	6M

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AR18

CODE: 18EST202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

PROGRAMMING FOR PROBLEM SOLVING

(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

UNIT-I

1.	a)	Explain the functional block diagram of a computer with the help of neat diagram?	6M
	b)	The operators we use in C language have their own precedence and associativity. Evaluate the following expressions based on their precedence and associativity – assume a1,b=2,c=3,d=4,e=5, f=6 i) –a+b*c-d/e+f ii) a – b / c + d * e – f	6M

(OR)

2.	a)	Explain (a) Structure of C Program (b) Input/output Statements in C (c) Compiling and executing C Programs.	6M
	b)	Differentiate the "Keywords" and "Identifiers" with 6 examples to each.	6M

UNIT-II

3.	a)	Explain un-conditional statements in C with an example?	6M
	b)	Write a C program to calculate sum and product of digits of a number?	6M

(OR)

4.	a)	What is nested loop? Explain nested for loop with suitable example?	6M
	b)	Write a C program to print the reverse of a given number.	6M

UNIT-III

5.	a)	Discuss the use of different storage classes used in C language with appropriate examples.	6M
	b)	Write a program to append three strings entered by the user into the third one. Do not use the built in functions	6M

(OR)

6.	a)	Explain the difference between a function declaration and function definition.	6M
	b)	Write a C program to check whether a given string is palindrome or not without using string handling functions.	6M

UNIT-IV

7.	a)	Explain pointer arithmetic with suitable example?	6M
	b)	Write a well structured C program to find the average of an array using pointer	6M

(OR)

8.	a)	List out the differences between array and pointer with an example?	6M
	b)	What are the differences between malloc() and calloc() functions. Explain them with the examples	6M

UNIT-V

9.	a)	What is a structure? How to declare, initialize and access structure elements?	6M
	b)	Write a C program to read student details(SNO,SNAME,MARKS) and print those details.	6M

(OR)

10.	a)	Explain about the fopen, fclose, feof, fprintf, fscanf, fseek and rewind functions.	6M
	b)	Write a c program to copy contents of one file to another file?	6M

AR18

CODE: 18CST202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

DISCRETE MATHEMATICS

(Common to CSE & IT)

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

UNIT-I

1. a) Show that $R \wedge (PVQ)$ is valid conclusion from the premises PVQ, Q$\rightarrow R$, P$\rightarrow$M and $\neg$M. 6M

   b) Simplify the compound propositions using the laws of logic $\neg\left[\neg\{(p \vee q) \wedge r\} \vee \neg q\right]$ 6M

(OR)

2. a) Obtain the PCNF of the $\neg(p \leftrightarrow q) \Leftrightarrow \neg\left[(p \rightarrow q) \wedge (q \rightarrow p)\right]$. 6M

   b) Show that $\neg\left(p \vee (\neg p \wedge q)\right)$ and $(\neg p \wedge \neg q)$ are logically equivalent. 6M

UNIT-II

3. a) Let $X = \{1,2,...,7\}$ and $R = \{(x,y) / x - y \text{ is divisible by } 3\}$. Show that R is an equivalence relation. 6M

   b) Draw the Hasse diagram representing the positive divisors of 36. 6M

(OR)

4. a) Show that every chain is a distributive Lattice. 6M

   b) Show that $f : R \rightarrow R$ defined by $f(x) = 2x - 3$ is a bijection and find its inverse. 6M

   Compute $f^{-1} \circ f$ and $f \circ f^{-1}$.

UNIT-III

5. a) Let G be a (p,q) graph such that all vertices have k or (k+1). If G has t(t>0) vertices have degree k then show that $t = p(k+1) - 2q$. 6M

   b) Show that in every graph the number of vertices of odd degrees is even? 6M

(OR)

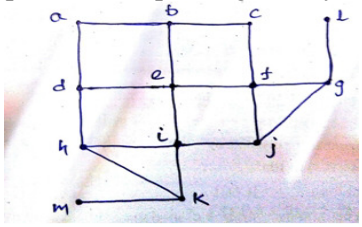
6. a) State necessary conditions for the graph to be Isomorphic and justify that it is not sufficient with suitable example. 6M

   b) Define Isomorphism? Explain Isomorphism with suitable examples. 6M

UNIT-IV

7. a) Show that the complete bipartite graph $K_{3,3}$ is non-planar. 6M

   b) Using the below connected graph obtain a spanning tree by BFS algorithm. 6M



(OR)

8. a) Illustrate with an example to find minimal spanning tree using Kruskal's algorithm. 6M

   b) Write short note on BFS and DFS. 6M

UNIT-V

9. a) Solve $a_n - 5a_{n-1} - 6a_{n-2} = 0$ where $a_0 = 3, a_1 = 3$. 6M

   b) Find the particular solution of the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 2^n$. 6M

(OR)

10. Using the method of generating function solve the recurrence relation 12M
    $a_n - 5a_{n-1} - 6a_{n-2} = 7^n,\ n \geq 2$ with $a_0 = 2, a_1 = 3$.

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AR16

CODE: 16CE2002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

STRENGTH OF MATERIALS-I

(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

UNIT-I

1. A steel tube 32mm external diameter and 20mm internal diameter encloses a copper rod 16mm diameter to which it is rigidly joined at each end. If, at a temperature of 300^{o} c there is no longitudinal stresses. Calculate the stresses in the rod and the tube when the temperature is raised to 160^{o} c. The coefficient of expansion for steel and copper are $11x10^{-6}$ and $18x10^{-6}$ per degree centigrade respectively. Take E for steel is $2x10^{5}$ N/mm^2 and for copper as $1x10^{5}$ N/mm^2 — 14 M

(OR)

2. a) Derive relation between elastic modulus and rigidity modulus. — 7 M

   b) A bar of uniform cross section is subjected to an axial tensile load such that the linear strain in the direction of load is 1.4mm over a length of 1meter. If μ=0.3, find volumetric strain. — 7 M

UNIT-II

3. A Horizontal beam 10m long is carrying UDL of 2 KN/m. The beam is supported on two supports 6m apart. Find the position of supports so that the bending moment as small possible. Also draw the Shear force and Bending moment diagrams. — 14 M

(OR)

4. A simply supported beam of 6m span carries a UDL of 20kN/m over middle 2m length and point loads of 10kN and 20kN at distance of 1m and 5m respectively from the left end. Draw the shear force and bending moment diagrams and determine magnitude and position of maximum bending moment. — 14 M

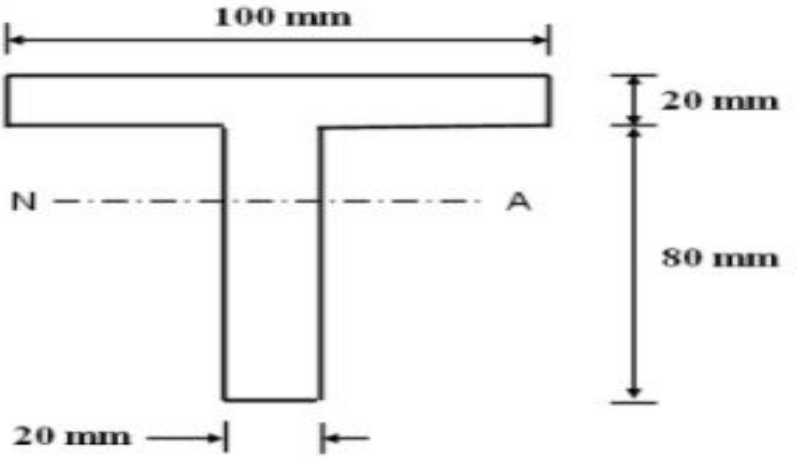
UNIT-III

5. a) Define the terms: bending stress in a beam, neutral axis and section modulus. — 7 M

   b) Derive an expression for bending stress at a layer in a beam and mention the assumptions made while deriving the equation. — 7 M

(OR)

6. a) The shear force acting on a section of a beam is 50kN. The section of the beam is T – shaped of dimensions as shown in Figure 1. The moment of inertia about the horizontal neutral axis is 314.221x104 mm^4. Estimate the shear stress at the neutral axis and at the junction of the web and flange. 10 M



b) List out the assumptions in theory of Pure bending. 4 M

UNIT-IV

7. a) Derive an expression for the shear stress at any point in a circular section of a beam, which is subjected to a shear force F. 7 M

b) A wooden beam 100mm wide and 150mm deep is supported over a span of 4m. If the shear force at a section of the beam is 4500N, find the shear stress at a distance 25mm above the neutral axis. 7 M

(OR)

8. a) Prove that the maximum shear stress in a rectangular section of a beam is 1.5 times the average shear stress. 10 M

b) Draw the shear stress distribution across T-beam section. 4 M

UNIT-V

9. a) Derive the Torsion equation and state the assumptions made. 7 M

b) Derive an expression for deflection of a closely coiled helical spring subjected to axial load 'W". 7 M

(OR)

10. List out assumptions made in theory of pure torsion and derive torsion equation. 14 M

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AR16

CODE: 16EE2008 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

ELECTRICAL CIRCUIT ANALYSIS

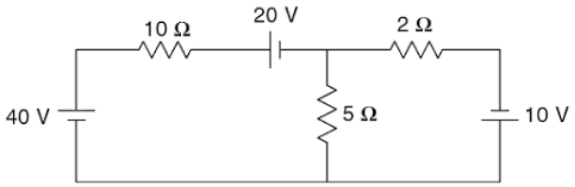
(Electrical and Electronics Engineering)

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

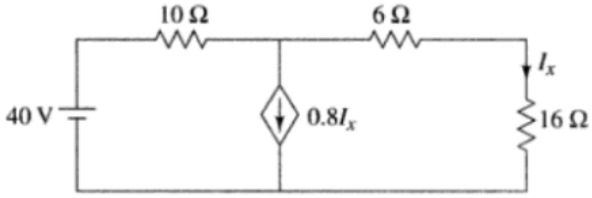
UNIT-I

1. a. State and explain Norton's theorem **7M**
   b. Find the current through 2ohm resistor using super position theorem **7M**

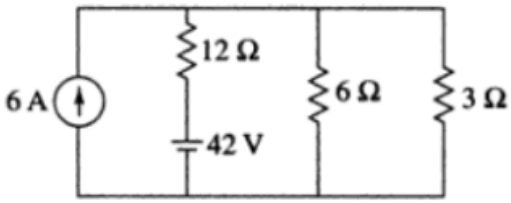


(OR)

2. a. **Determine the current through 16ohm resistor using norton's theorem** **7M**



   b. **Find the current through 3ohm resistor using thevenin's theorem** **7M**

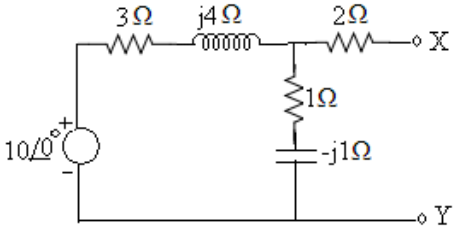


UNIT-II

3. a. State and explain Tellegen's theorem **7M**
   b. Explain compensation theorem with an example. **7M**

(OR)

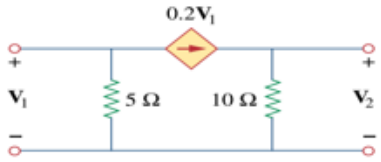
4. a. Find the load impedance for maximum power transfer in the network.If the load is purely resistive ,What will be its value for maximum power transfer and also find the maximum power Taken by the load in both cases **10M**



   b. State and prove Milliman's theorem **4M**

UNIT-III

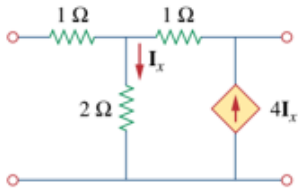
5. a. Determine Y- parameters for the given network **7M**



b. Determine the relationship between ABCD and hybrid parameters **7M**

(OR)

6. a. Determine transmission parameters for the given network **7M**



b. Obtain the relationship between ABCD and Y parameters **7M**

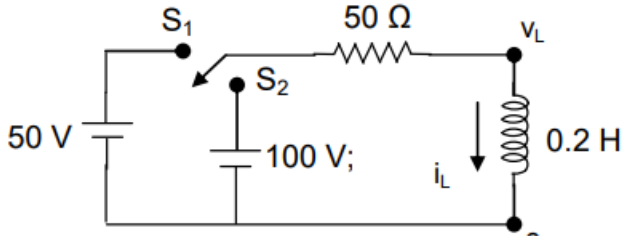
UNIT-IV

7. Derive the expression for a RL series circuit with DC excitation **14M**

(OR)

8. a. A series RLC circuit comprises of R = 30 ohms, L = 0.6H and C = 2uF is excited by a constant voltage source of 50 V. Obtain the expression for the current. (Assume that the circuit is relaxed initially) **7M**

b. For the circuit shown, with zero inductor current the switch is closed on to position S1 at time t = 0. At one mille second it is moved to position S2 Obtain the equation for the currents in both the intervals. **7M**



UNIT-V

9. a. Synthesize the following LC impedance function in cauer form **7M**
$\{s(s^2+3)(s^2+5)\}/\{(s^2+2)(s^2+4)\}$

b. Test whether the function $F(s)= (S^3+S^2+3S+5)/(S^2+6S+8)$ is a positive real function? **7M**

(OR)

10. a. Explain the procedure for realization of RC network in Foster forms. **7M**

b. Test whether the polynomials are Hurwitz or not? **7M**

i) $S^4+S^3+5S^2+3S+4$

ii) $S^7+2S^6+2S^5+S^4+4S^3+8S2+8S+4$

AR16

CODE: 16EC2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

ELECTRONIC CIRCUITS – I

(Electronics and Communication 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

UNIT-I

1.	a)	With circuit and necessary waveforms explain the operation of Half wave rectifier.	6M
	b)	Derive HWR parameters ripple factor, rectification efficiency and transformer utilization factor.	8M
		(OR)	
2.	a)	Draw the circuit diagram and derive the expression for ripple factor of FWR with an inductor filter?	10M
	b)	Compare the parameters of rectifier circuits?	4M

UNIT-II

3.	a)	Draw the circuit diagram of fixed bias and derive the expression for stability factor(S)?	8M
	b)	Explain self bias circuit.	6M
		(OR)	
4.	a)	Explain diode compensation circuit for variations in V_{BE} for self bias circuit.	7M
	b)	Derive an expression for stability factor S in collector to base biasing circuit.	7M

UNIT-III

5.	a)	Derive the expressions for A_V, A_I, R_i, R_o of a transistor amplifier in CE configuration using low frequency h-parameters model?	10M
	b)	Discuss how h – parameters can be obtained from transistor characteristics.	4M
		(OR)	
6.	a)	Draw the a.c equivalent circuit for amplifier shown in figure. For the transistor assume $h_{rb}=0$, $h_{ib}=25\Omega$, $h_{fb}=$ -0.99 and $h_{ob}=10^{-6}$A/V. Calculate Ai, A_{vs}, Ro and Ri	10M

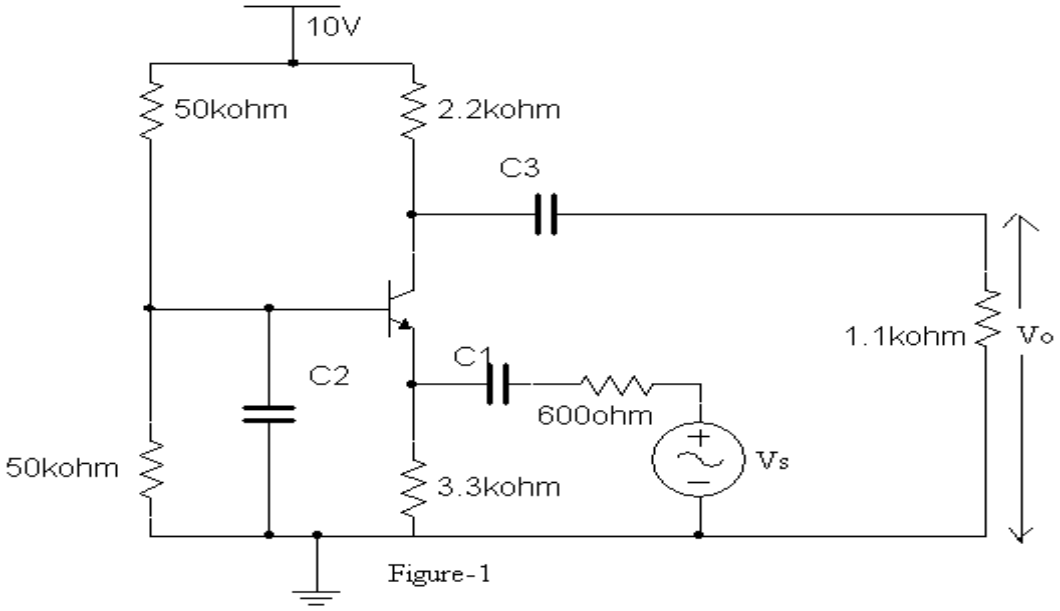


Figure-1

b) Consider a single stage CE amplifier with R_S= 1Kohm, R_C=1K , R_L=1K , h_{fe}=50 and h_{ie}=1.1K . Calculate current gain and input impedance. 4M

UNIT-IV

7. a) State and explain Miller's theorem. 7M
   b) Explain FET characteristics. 7M

(OR)

8. a) Draw the CE amplifier with un bypassed emitter resistance and formulate an expression for Ri and Av. 7M
   b) Reproduce CB amplifier and formulate an expression for A_i, R_i and Av using approximate model 7M

UNIT-V

9. a) Formulate the expression for input impedance (R_{if}) and output impedance (R_{of}) of current series feedback amplifier. 10M
   b) Compute the feedback factor when the gain of an amplifier is decreased from 4000 to 2000 after applying a feedback. 4M

(OR)

10. a) Explain the concept of feedback and draw the topologies of various feedback amplifiers. 8M
    b) Give the advantages of negative feedback amplifiers. 6M

AR16

CODE: 16CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

MATHEMATICAL FOUNDATION OF 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

UNIT-I

1. a) Show that $(\neg p \wedge (\neg q \wedge r)) \vee (q \wedge r) \vee (p \wedge r) \Leftrightarrow r$ 7M
   b) Obtain a conjunctive normal form of $\neg(p \vee q) \leftrightarrow (p \wedge q)$ 7M

(OR)

2. a) Using mathematical induction ,prove that the product of three consecutive integers are divisible by 6 7M
   b) Verify the following argument is valid or not 7M
   All cigarettes are hazardous to health
   All smokers are cigarettes.
   Hence, all smokers are hazardous to health

UNIT-II

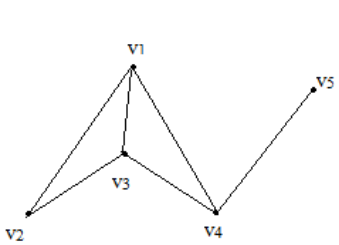
3. Consider the poset (X, ≤) where X = {1, 2, 3, 5, 30} and the partial ordered relation ≤ is defined as i.e. if x and y □ X then x ≤ y means 'x divides y'. Then show that poset (I+, ≤) is a lattice. 14M

(OR)

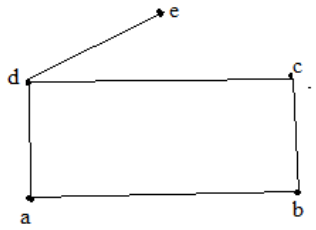
4. a) Show that if seven integers are selected from the first 10 positive integers, there must be at least two pairs of these integers with the sum 11. 7M
   b) If f(x) = 2x + 3, g(x) = x^2- 3x + 5, then find fOg, gOf 7M

UNIT-III

5. a) Show that the following graphs are isomorphic 7M



G



G'

b) Draw the graphs represented by the following adjacency matrix: 7M

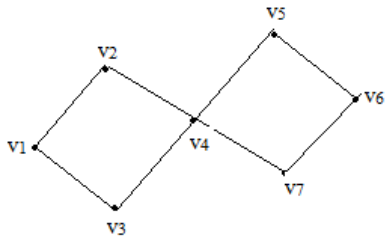
$$\begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

(OR)

6. a) Draw $K_{3,3}$ graph and find the chromatic number of $K_{3,3}$. 7M
   b) Explain Euler and Hamiltonian graphs with example 7M

UNIT-IV

7. a) Illustrate Prim's algorithm with an example. 7M
   b) Find a spanning tree of a graph G by using breadth-first search algorithm 7M



(OR)

8. a) Illustrate depth first search (DFS) algorithm with an example.. 7M
   b) Illustrate with an example to find minimal spanning tree using Kruskal's algorithm 7M

UNIT-V

9. Suppose that the number of bacteria in a colony triples every hour. 14M
   a) Set up a recurrence relation for the number of bacteria after n hours have elapsed.
   b) If 100 bacteria are used to begin a new colony, how many bacteria will be in the colony in 10 hours?

(OR)

10. Solve the recurrence relation $a_{n+1} - 8a_n + 16a_{n-1} = 4^n$, $n \geq 1$, where $a_0=1, a_1=8$. 14M

AR13

CODE: 13CE2001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022
STRENGTH OF MATERIALS-I
(Civil Engineering)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define Hooks Law
   b) The Magnitude of temperature stress on a bar of length 2 M supported freely , subjected to temperature from 20^0 to 80^0
   c) Define point of contra flexure
   d) Write the relation between Shear Force and Bending Moment
   e) Define the Section Modulus
   f) Write the Simple Bending Equation
   g) Relation between max Shear stress to average Shear stress for triangular section
   h) Relation between average Shear stress to Maximum Shear stress for circular cross section
   i) Maximum slope of simply supported beam of length L subjected to central point load of W kN is
   j) Maximum Deflection of a cantilever beam of length L subjected to end point load of W kN is

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Define the following i) Elasticty ii) Plasticty (iii) Ductility (iv) Poisson's ratio . 6M
   b) Draw the stress strain curve for a Mild steel bar and locate and explain the various salient points 6M

(OR)

3. a) Define the following i) Working stress ii) Factor of safety iii) Lateral strain iv) volumetric strain 6M
   b) Determine the stress developed in the each part of the bar shown in Fig.1 and also the total change in length of the bar given E=210GPa 6M

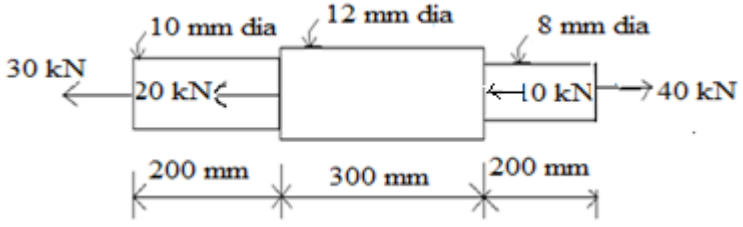


Fig.1

UNIT-II

4 a) Draw SFD and BMD for a beam simply supported at the ends and is loaded with UDL for the entire span 6M

   b) Draw SFD and BMD for a beam cantilever and is loaded with UDL for the entire span 6M

(OR)

5. A beam 8.5m long rests on supports 5m apart. The right hand end overhang is 2m and left end overhang is 1.5m.it carries a uniformly distributed load of 50kN/m run between the supports. A point load of 60kN acts at the extreme right end and another point load 40kN acts at the left hand end. Construct the SFD and BMD and state the position of the points of inflexion. 12M

UNIT-III

6. a) What are the assumptions made in theory of simple bending. 4M
   b) Derive an expression for bending stress. 8M

(OR)

7. A T-beam having flange 160mm x 20mm and web 20mm x170mm is simply supported over a span of 6.5m. It carries a UDL of 6kN/m including self weight over its entire span, together with a point load of 40 kN at mid span. Find the maximum tensile and compressive stresses occurring in the beam section and sketch the stresses across the section. 12M

UNIT-IV

8. A beam of I-section is having overall depth as 600 mm and overall width as 200 mm. The thickness of flanges is 25 mm whereas the thickness of web is 15 mm. If the section carries a shear force of 50 kN, calculate the maximum shear stress. Also sketch the shear stress distribution across the section. 12 M

(OR)

9. a) Derive an expression for the shear stress at any point in a circular section of a beam, which is subjected to a shear force F. Sketch the variation of shear stress across the section. 6M
   b) Obtain from first principles the expression for maximum shear stress in a triangular section of a beam .sketch the variation of shear stress. 6M

UNIT-V

10. a) What is Macaulay's method for finding out the slope and deflection of a beam. Discuss the cases, where it is of a particular use. 6M

    b) A 3 m long cantilever is loaded with a point load of 450 N at the free end . if the section is rectangular 80 mm (wide) x 160 mm (deep) and E = 10 GN/ m^2 . Calculate slope and deflection.(i) at the free end of cantilever (ii) at a distance of 0.55 m from the free end**.** 6M

(OR)

11. A simply supported 6 meters long rolled steel joist carries a uniformly distributed load of 9.5 kN/meter length and a point load of 40kN at its centre . Determine slope and deflection at a distance of 3 meters from one end of the beam**.** 12M

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AR13

CODE: 13ME2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2022

PROUCTION TECHNOLOGY
(Mechanical Engineering)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define solidification time
   b) What are the types of furnaces being used in casting process?
   c) What are types of weld joints?
   d) Write down a typical application of TIG welding process?
   e) Why forming process is suitable for mass production? Justify.
   f) Define angle of bite in rolling process
   g) Write down the various types of forging processes?
   h) What are the major types of extrusion processes?
   i) Define magnetic pulse forming process?
   j) What is function of plasticizer in plastics processing?

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Explain various types of allowances in casting process with neat diagram? **6**
   b) Describe the CO_2 moulding process to fabricate a given product with neat diagram? **6**

(OR)

3. a) Describe the construction and working principle of cupola furnace with neat diagram? **9**
   b) Briefly explain about causes and remedies of major three casting defects with neat diagram? **3**

UNIT-II

4. a) Explain various types of flames used in gas welding process and its significance and applications? **8**
   b) Differentiate between shielded metal arc welding and submerged arc welding process **4**

(OR)

5. a) Explain friction welding process with neat diagram and also discuss about its process parameters? **8**
   b) Briefly explain thermit welding and braze welding process with neat diagram? **4**

UNIT-III

6. a) Differentiate between hot working and cold working processes **8**
   b) Write down the major advantages of forming process compared to other manufacturing processes? **4**

(OR)

7. a) Explain the metal working mechanism of rolling process with neat diagram? **8**
   b) Write down the causes and remedies for at least four major defects in rolling process? **4**

UNIT-IV

8. a) Explain in detail about four major extrusion processes with neat diagram? **12**

(OR)

9. a) Explain about the press forging and upset forging process in detail with diagram **6**
   b) Describe spring back effect in sheet metal forming with neat diagram and also discuss its importance? **6**

UNIT-V

10. a) Explain in detail about Electro hydraulic forming with neat diagram and also discuss its process parameters? **8**
    b) Bring out at least six major advantages of high velocity forming? **4**

(OR)

11. a) Explain about calendaring and blow moulding process in detail with neat diagram? **6**
    b) Suggest a suitable process to fabricate PET bottle and explain in detail about the process with neat diagram? **6**

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AR13

CODE: 13CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Common to CSE and IT)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Write the truth value of the statement " If 5 < 3 then -3 < -5".
   b) What is the negation of the statement $\exists x\,(x^2 < 1)$
   c) Write the statement of division theorem.
   d) Find a +ve value of x such that $17 \equiv x \pmod 5$
   e) When two graphs are said to be isomorphic?
   f) Find the chromatic number of the complete graph K_5.
   g) Give an example of an algebraic system which is a semi group but not a monoid.
   h) Define Homomorphism of groups.
   i) Find the coefficient of x^{10} in $\frac{1}{(1-x)^3}$.
   j) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 0$.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Find the Principle Disjunctive Normal Form for $p \vee (\neg p \rightarrow (q \vee (\neg q \rightarrow r)))$ **6M**
   b) Show that the following premises are inconsistent. **6M**
   "If Jack misses many classes through illness, then he fails high school. If Jack fails high school, then he is uneducated. If Jack reads a lot of books, then he is not uneducated. Jack misses many classes through illness and reads a lot of books."

(OR)

3. a) Show that the two statements $p \rightarrow (q \rightarrow p)$ and $\neg p \rightarrow (p \rightarrow q)$ are equivalent using equivalence laws. **6M**
   b) Establish the validity of the following argument **6M**
   $p \rightarrow r$, $r \rightarrow s$, $t \vee \neg s$, $\neg t \vee u$, $\neg u \Rightarrow \neg p$

UNIT-II

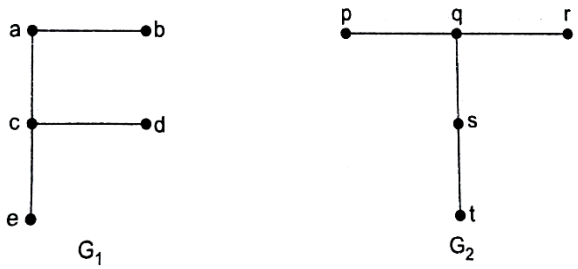
4. a) Using Euclidean algorithm , compute gcd($2002+2$, 2002^2+2, 2002^3+2 , ...) **6M**
   b) Use mathematical induction prove that $3^n > n^2$ where $n \geq 1$ a positive integer. **6M**

(OR)

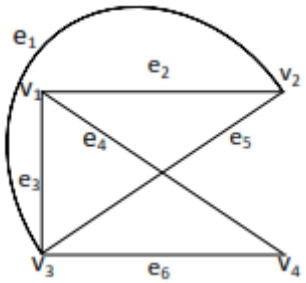
5. a) Using Fermat's theorem find $12^{4000} \pmod 5$. **6M**
   b) Prove that for any positive integer n, $n^3 + 2n$ is divisible by 3. **6M**

UNIT-III

6. a) Show whether the following graphs are isomorphic or not. **6M**

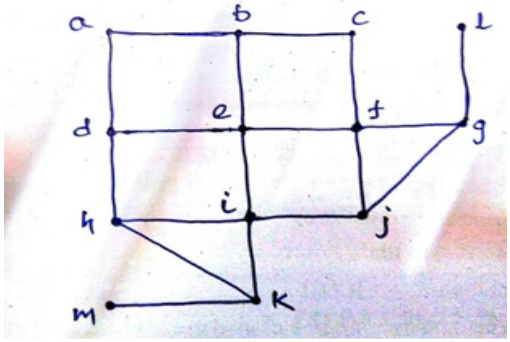


b) Find the Euler path to the following graph. **6M**



(OR)

7. Find the spanning tree to the following graph by BFS and DFS algorithm **12M**



UNIT-IV

8. a) Consider the algebraic system (G,*), where G is the set of all non-zero real numbers and * is a binary operation defined by : a*b = ab/4 $\forall a,b \in G$. Show that (G,*) is an abelian group. **6M**

b) Prove that H = {0, 2, 4} forms a subgroup of $(Z_6, +)$. **6M**

(OR)

9. a) Prove that the set G = {1,3,5,7} forms a finite abelian group with respect to multiplication modulo 8. **6M**

b) Let $(S_1,*_1)$, $(S_2,*_2)$ and $(S_3,*_3)$ be semi groups and f : $S_1 \rightarrow S_2$ and g : $S_2 \rightarrow S_3$ be homomorphisms. Prove that the mapping of gof : $S_1 \rightarrow S_3$ homomorphism. **6M**

UNIT-V

10. a) Find the general solution of the recurrence relation $a_n + 5a_{n-1} + 4a_{n-2} = 56.(3^n)$ **6M**

b) Solve the recurrence relation $a_n = 2a_{n-1} + 1$ with $a_1 = 7$ for n >1, by substitution method. **6M**

(OR)

11. a) Obtain the generating function for the sequence $1^3,2^3,3^3,.....$ **6M**

b) Find the general solution of the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 3.(2^n)$. **6M**

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