AR20

CODE: 20CET203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December-2022

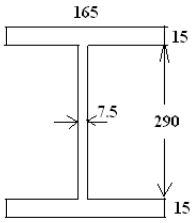
STRENGTH OF MATERIALS

(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)	Explain with illustrations and stress-strain diagram for mild steel along with the phenomenon of strain-hardening.	5	1	2
	b)	A copper rod, 25 mm in diameter is encased in steel tube 30 mm internal diameter and 35 mm external diameter. The ends are rigidly attached. The composite bar is 500 mm long and is subjected to an axial pull of 30 kN. Determine the stresses in the rod and the tube. Take E for steel = 2 x 10^5 N/mm^2 and E for copper as 1 x 10^5 N/mm^2.	5	1	3
		(OR)			
2.	a)	Derive relation between Young's modulus (E), Rigidity Modulus (G) and Bulk Modulus (K).	4	1	2
	b)	A steel bolt passes centrally through a brass tube. At the ends washers and nuts are provided. The whole assembly is raised in temperature by 50°C The area of the cross section of steel bolt is 2000 mm^2 and that of brass tube is 1000 mm^2. E_{steel} is 2 times E_{brass}. If the stress due to temperature rise is 40 N/mm^2 (tensile) in steel bolt, determine the stress in brass tube.	6	1	3
		UNIT-II			
3.		A cantilever of length 12 m carries two point loads 4 kN and 6 kN at a distance of 2 m and 6 m from fixed end respectively. In addition to this the beam also carries a uniformly distributed load of 2kN/m over a length of 4 m at a distance of 6 m from the fixed end. Draw the S.F and B.M diagrams for the cantilever.	10	2	3
		(OR)			
4.		Draw the SFD and BMD of the beam carrying a U.D.L of 8 KN/m over the entire span 6m by indicating all salient features.	10	2	3
		UNIT-III			
5.	a)	Derive governing pure bending equation.	5	3	2
	b)	A beam 500 mm deep of a symmetrical section has I = 1 × 10^8 mm^4 and is simply supported over a span of 10 meters. Calculate the maximum bending stress if the beam carries a central point load of 25 kN.	5	3	3
		(OR)			
6.	a)	Draw variation of shear stresses across rectangle, triangle, T and I-sections.	4	3	1

	b)	A beam of wide flange whose cross section is shown below is subjected a shear force of 45 KN. Construct the shear stress distribution across the depth. Also identify the maximum and minimum shear stress values in the web. 	6	3	3

UNIT-IV

7.	a)	Write the relative merits and demerits of moment area theorems.	2	4	1
	b)	Find the slope and deflection of cantilever beam of span L, fixed at left end and carrying (i) a point load P at the right end , (ii) a U.D.L of w KN/m over the entire span, using the double integration method.	8	4	3

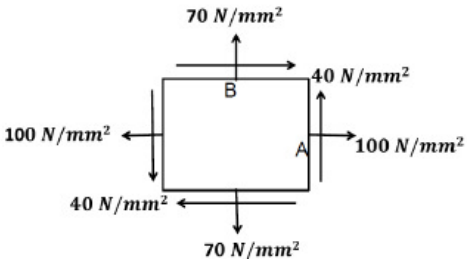
(OR)

8.	a)	Determine maximum deflection for simply supported beam of span 'L' and carrying a point load at centre of span, using moment area theorems.	5	4	3
	b)	A mild steel rectangular simply supported beam of length 4 m and cross section 120 mm × 180 mm is carrying a uniformly distributed load of 15 kN /m through its span. Find the maximum slope and deflection. Take E = 2 x 10^5 N/mm^2	5	4	3

UNIT-V

9.	a)	State the assumptions made in the formulation of pure torsion equation	4	5	1
	b)	A solid steel shaft in a rolling mill transmits 20 kW of power at 2 Hz. Determine the smallest safe diameter of the shaft if the maximum shear stress (τ_{max})is not to exceed 40 MPa and the angle of twist (θ) is limited to 6° in a length of 3 m. Use G = 83 GPa.	6	5	3

(OR)

10.	a)	For the stress system shown aside, find the normal and tangential stresses on an inclined plane at 60° to the vertical plane. 	3	5	3
	b)	For the stress system shown as above, find the major and minor principal stresses and its corresponding principal planes. (ii)Find the maximum shear stress and its corresponding planes. Solve by analytical (or) graphical method.	7	5	3

UNIT-VI

11.	a)	Explain the assumptions and limitations in the Euler's column theory	4	6	2
	b)	A column of timber section 150 mmx 200 mm is 6 m long both ends being fixed. E for timber is 17.5 kN/mm^2, Determine a) Crippling load b) Safe load for the column if factor of safety = 3	6	6	3

(OR)

12.	a)	Derive an expression for the Rankine's crippling load for a column.	5	6	2
	b)	Distinguish between Eulers and Rankine column theories	5	6	2

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CODE: 20EET203 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December, 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)	State Thevenin's theorem, and with example.	5M	CO1	L3
	b)	Explain Norton's theorem with example.	5M	CO1	L3
		(OR)			
2.	a)	State and explain the Reciprocity theorem.	5M	CO1	L3
	b)	From the following network verify Reciprocity theorem.	5M	CO1	L4

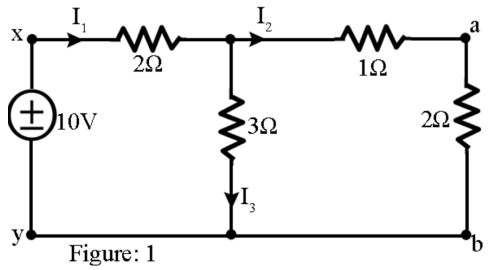


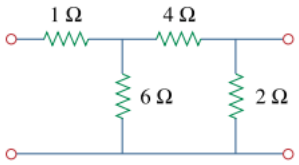
Figure: 1

UNIT-II

3.		State and explain the maximum power transfer theorem with suitable example?	10M	CO2	L3
		(OR)			
4.	a)	Write the difference between Series Resonance and Parallel Resonance	5M	CO2	L3
	b)	Derive the expression for bandwidth of series resonant circuit and its relation with Q	5M	CO2	L3
		UNIT-III			
5.		Derive the expression for power by using two wattmeter method.	10M	CO3	L4
		(OR)			
6.	a)	A three phase Y connected balanced load is connected by 400V, 50 Hz 3 phase supply. The impedance of each phase is 10 ohm. What is the total three phase power?	5M	CO3	L4
	b)	What are the advantages of three phase systems?	5M	CO3	L3

UNIT-IV

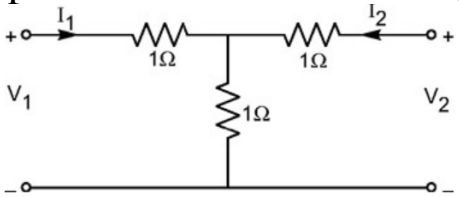
7.	a)	Obtain the z parameters for the network in Fig.	5M	CO4	L4



	b)	Write a short note on h- parameters in two port network.	5M	CO4	L3

(OR)

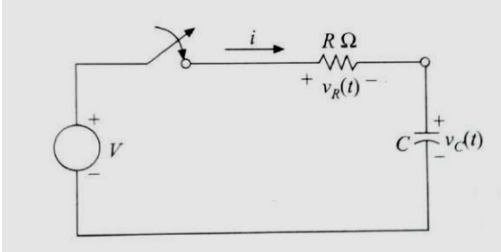
8.	a)	Find ABCD parameters in the following network.	5M	CO4	L4



	b)	Explain the interrelationships between Z-parameters in terms of ABCD -parameters for a two-port network	5M	CO4	L3

UNIT-V

9.		Obtain the transient response of RC Circuit with external DC excitation.	10M	CO5	L4



(OR)

10.		A series RL circuit has R= 25 Ω and L = 25 Henry. A dc voltage V of 100 V is applied to this circuit at t = 0 secs. Find: (a) The equations for the charging current, and voltage across R & L (b) The current in the circuit 0.5 secs after the voltage is applied. (c) The time at which the drops across R and L are equal.	10M	CO5	L4

UNIT-VI

11.	a)	Explain the Properties of Hurwitz Polynomials.	5M	CO6	L3
	b)	Explain Routh's criterion in detail.	5M	CO6	L3

(OR)

12.	a)	Obtain Cauer-2 Form for given Network function.	10M	CO6	L4

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

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CODE: 20MET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December, 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 point defect, Line defect and plane defect.	10	CO1	Understanding
		(OR)			
2.		Classify in detail the different types of crystal imperfections. Explain edge dislocation with a neat sketch	10	CO1	Applying
		UNIT-II			
3.		List and explain the methods of construction of phase diagrams.	10	CO2	Understanding
		(OR)			
4.		Draw and explain iron carbide diagram with invariant reactions.	10	CO2	Applying
		UNIT-III			
5.		Describe the structure, properties, and applications of plain carbon steels and low alloy steels	10	CO3	Applying
		(OR)			
6.		Explain the structure, properties, and applications of spheroidal graphite cast iron.	10	CO3	Applying
		UNIT-IV			
7.		Why hardening of steel is followed by tempering? Discuss the different stages of tempering and draw the resulting microstructures.	10	CO4	Applying
		(OR)			
8.	a)	Explain the various hardening methods of heat treatment.	5	CO4	Understanding
	b)	Explain the difference between hard working and cold working of the steel.	5	CO4	Applying
		UNIT-V			
9.		Explain the structure and properties of titanium and its alloys in detail.	10	CO5	Understanding
		(OR)			
10.		Explain the structure and properties of aluminium and its alloys in detail.	10	CO5	Understanding
		UNIT-VI			
11.		Plot stress-strain diagram of a mild steel and explain important points.	10	CO6	Applying
		(OR)			
12.	a)	Define and explain creep mechanism.	5	CO6	Understanding
	b)	Briefly explain about impact methods and influencing parameters.	5	CO6	Understanding

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CODE: 20ECT202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December, 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)	Draw the CE amplifier with emitter resistance and derive the expression for its Ri and Av.	5M	CO1	Analyse
	b)	Derive the expression for input resistance of a Darlington pair circuit.	5M	CO1	Analyse
		(OR)			
2.	a)	Draw the CC amplifier and derive the expression for A_I, R_I, A_V, Y_O.	6M	CO1	Understand
	b)	For a transistor amplifier in common emitter configuration, for a load resistance of 1 KΩ (h_{fe} =50 and h_{oe} =25μA/V), then find the current gain.	4M	CO1	Analyse
		UNIT-II			
3.	a)	With the help of a neat circuit diagram, describe the working of a two stage RC coupled cascade amplifier.	5M	CO2	Understand
	b)	Compare three types of coupling methods used in multistage amplifier.	5M	CO2	Remember
		(OR)			
4.		Draw the equivalent circuits of RC coupled amplifier for Mid-band, Low frequency range, high frequency range and derive the expressions for current gain and voltage gain.	10M	CO2	Analyse
		UNIT-III			
5.	a)	State and derive Barkhausan criterion8 for the oscillations.	5M	CO3	Remember
	b)	Derive the frequency of oscillation of Colpitts's oscillator.	5M	CO3	Create
		(OR)			
6.		Derive the expression for frequency of oscillation of BJT- RC phase-shift oscillator with necessary explanation.	10M	CO3	Create

UNIT-IV

7.	a)	What are the typical values of various components in hybrid – π model? Show that at low frequencies the hybrid –π model with rbe taken as infinite reduces to the approximate CE-h – parameter model.	6M	CO4	Analyse
	b)	Explain Miller's theorem	4M	CO4	Understand

(OR)

8.	a)	Derive expression for CE Short Circuit Current Gain with neat circuit diagram.	5M	CO4	Create
	b)	Define Hybrid-π model. Derive the expressions for different elements of the Hybrid –π model Determination of Trans Conductance	5M	CO4	Analyse

UNIT-V

9.	a)	Explain the operation of class B Push-Pull power amplifier.	5M	CO5	Understand
	b)	What is a cross over distortion and explain a remedy for it.	5M	CO5	Remember

(OR)

10.	a)	Show that the conversion efficiency of a transformer coupled power amplifier is 50%.	5M	CO5	Analyse
	b)	Define efficiency for a power amplifier. Classify power amplifiers based on their class of operation and compare them.	5M	CO5	Remember

UNIT-VI

11.	a)	Draw and explain the circuit diagram of a double tuned amplifier.	5M	CO6	Analyse
	b)	Differentiate between single tuning, double tuning and stagger tuned amplifiers.	5M	CO6	Remember

(OR)

12.	a)	Draw and explain the circuit diagram of a capacitance coupled tuned amplifier.	5M	CO6	Analyse
	b)	Draw and explain the circuit diagram of a stagger tuned amplifier.	5M	CO6	Understand

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CODE: 20CST202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December-2022

DISCRETE MATHEMATICS

(Common to CSE & IT & AIML)

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)	Find the principal conjunctive normal form of PV(Q→ R).	5	CO1	K3
	b)	Show that $R \wedge (PVQ)$ is valid conclusion from the premises PVQ, Q→ R, P→M and ¬M	5	CO1	K3
		(OR)			
2.	a)	Determine (p V q) →r is a valid argument (valid Conclusion) from the premises H1: p→r , H2: q→r.	5	CO1	K3
	b)	Define Tautology, contradiction and contingency with example?	5	CO1	K2
		UNIT-II			
3.	a)	Express each of the following statements in symbolic form a. Every person is precious b. All flowers are beautiful c. All monkeys have tails. d. Some monkeys have tails. e. No monkey has a tail.	5	CO2	K2
	b)	Verify the validity of the following arguments: All Mathematics professors have studied calculus. Leona is a Mathematics professor. Therefore, Leona has studied calculus.	5	CO2	K3
		(OR)			
4.	a)	Show that $\forall (x)(P(x) \rightarrow R(x))$ follows logically from the premises $\forall (x)(P(x) \rightarrow Q(x))$ and $\forall (x)(Q(x) \rightarrow R(x))$.	5	CO2	K3
	b)	Establish the validity of the following argument: All integers are rational numbers. Some integers are powers of 2. Therefore, some rational numbers are powers of 2.	5	CO2	K2
		UNIT-III			
5.		If A={1,2,3,5,30} and R is divisibility relation. Prove (A,R) is Lattice but not distributive.	10	CO3	K3
		(OR)			
6.	a)	Let A={1,2,3,4,6,12} on A,define the relation R by aRb if and only if a divides b. Verify that R is a Partial Ordering on A. Draw the Hasse diagram.	5	CO3	K3
	b)	Let R be the relation defined by $R = \{(a,b) / a \equiv b (\text{mod } m)\}$. Verify that the relation R is an equivalence relation.	5	CO3	K3

UNIT-IV

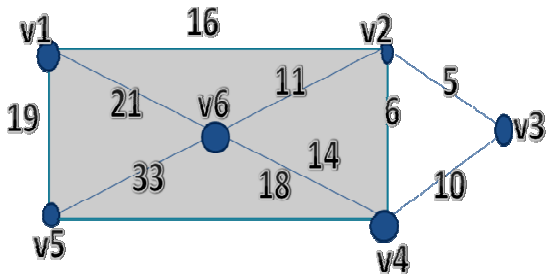
7.	a)	Draw the graph for the adjacency matrix $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$	5	CO4	K3
	b)	Give an example of a graph which is Eulerian but not Hamiltonian.	5	CO4	K3

(OR)

8.	a)	Determine the chromatic number of a cycle graph C_n for (n>2) with even number of vertices.	5	CO4	K2
	b)	A connected planar graph has 10 vertices each of degree 3. Into how many regions does a representation of this planar graph split the plane?	5	CO4	K3

UNIT-V

9.	a)	Illustrate Kruskal's algorithm with suitable example.	5	CO5	K3
	b)	Construct the minimal spanning tree for the given weighted graph, by Prim's algorithm.	5	CO5	K3



(OR)

10.	a)	Illustrate BFS algorithm with suitable example.	5	CO5	K3
	b)	Illustrate DFS algorithm with suitable example.	5	CO5	K3

UNIT-VI

11.		A young pair of rabbits (one of each gender) is placed on an island. A pair of rabbits does not breed until they are 2 months old. After they are 2 months old, each pair of rabbits produces another pair each month(assuming that rabbits never die) this phenomena modelled as the recurrence relations $F_{n+2} = F_{n+1} + Fn$, for $n \geq 0$ with $F_0=1$, $F_1=1$. Solve this recurrence relation.	10	CO6	K3

(OR)

12.	a)	Find the general solution of the recurrence relation $a_n = 7\ a_{n-1}$, $n \geq 1$ and $a_2=98$.	5	CO6	K3
	b)	Solve $a_n-10\ a_{n-1}+25\ a_{n-2}=0$	5	CO6	K3

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CODE: 18CET203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December,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) Calculate the modulus of rigidity, poissin's ratio and bulk modulus of a cylindrical bar of diameter 30mm and of length 1.5m if the longitudinal strain in a bar during a tensile test is three times the lateral strain. Take E is 1.1×10^5 N/mm^2 7M

   b) Derive the total extension of a uniformly tapered circular bar of diameters d1 and d2 over a length of L, when the rod is subjected to an axial pull P. 5M

(OR)

2 A copper bar 30 mm diameter is completely enclosed in a steel tube, 30 mm internal diameter and 50 mm external diameter. A pin, 10 mm in diameter is fitted transversely to the axis of the bar near each end, to secure the bar to the tube. Calculate the intensity of shear stress induced in the pins when the temperature of the whole is raised by 50^oK. Take $E_c = 1 \times 10^5$ N/mm^2; $Es = 2 \times 10^5$ N/mm^2 and $\alpha_c = 17 \times 10^{-5}$ per ^oK ; $\alpha_s = 11 \times 10^{-6}$ per o K. 12M

UNIT-II

3. a) A cantilever beam 2.5 m long carries point loads of 2 kN, 3 kN and 4 kN at 1.5 m, 2.0 m and 2.5 m from the fixed end respectively. Draw the shear force and bending moment diagrams for the beam. 7M

   b) Derive relation between rate of loading, shear force and bending moment 5M

(OR)

4. a) A simply supported beam of span 4.5 m carries a uniformly distributed load of 3.6 kN/m over a length of 2 m from the left end A. Draw the shear force and bending moment diagrams for the beam 8M

   b) Draw the shear force diagram if a simply supported beam of span "L" is subjected to a UDL throughout the span. 4M

UNIT-III

5. a) Define the Neutral axis and neutral layer of flexural members? 3M

   b) A simply supported beam of circular section 600mm diameter carries UDL 12kN/m over the span of 6m and point load 3kN at mid span. Find the maximum bending stress at mid span and 4m from right end? 9M

(OR)

6. a) Write te assumptions made in the derivation of simple bending equation and find the section modulus of rectangular section of size bxd 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

UNIT-IV

7. a) A circular beam of 100 mm diameter is subjected to a shear force of 30 kN. Calculate the value of maximum shear stress and sketch the variation of shear stress along the depth of the beam. 6M

   b) A beam of square section is used as a beam with one diagonal horizontal. Find the maximum shear stress in the cross section of the beam. Also sketch the shear stress distribution across the depth of the section. 6M

(OR)

8. a) T-beam section of flange width 150 mm, thickness 10mm and web length 300mm , thickness 8mm subjected to shear force 50kN. Draw shear stress distribution across the section and find out shear stress at 25mm above the neutral axis ? 8M

   b) Write the shear stress equation and explain the term, also draw the shear stress distribution in un symmetrical I-ection 4M

UNIT-V

9. a) A solid shaft is subjected to a torque of 12000 N-m. find the necessary diameter of the shaft if the allowable shear stress is 60 N/mm^2, and the allowable twist is 1^0 for every 20 diameters length of the shaft. Take $C = 0.8 \times 10^5$.

   b) A closely coiled helical spring is to carry a load of 800N. Its mean coil diameter is to be 10 times that of the wire diameter. Calculate these diameters if the maximum shear stress in the material of the spring is to be 90 N/mm^2

(OR)

10. Derive the torsion equation $\mathbf{T/J = q_s/r = C\theta/L}$ 12M

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AR18

CODE: 18EET204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

NETWORK ANALYSIS AND SYNTHESIS

(Electrical and Electronics Engineering)

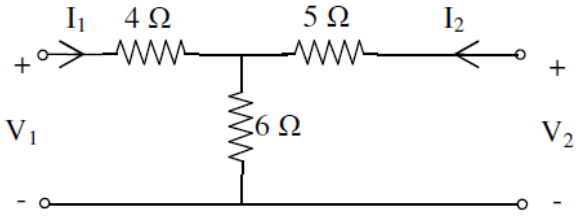
Time: 3 Hours **Max Marks: 60**

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) Two 2-port networks A and B are connected in parallel. Each of these networks has their own y-parameters. Show that resultant y-parameters of the combined parallel network is sum of y-parameters of the individual networks A and B. (6M)

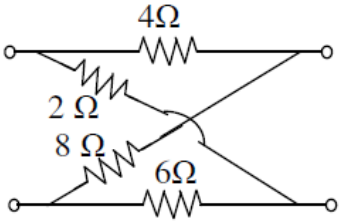
   b) Obtain the h-parameters of the network shown in Figure. (6M)



(OR)

2. a) Derive relationship between hybrid and Z-parameters of two port network. [5M] (6M)

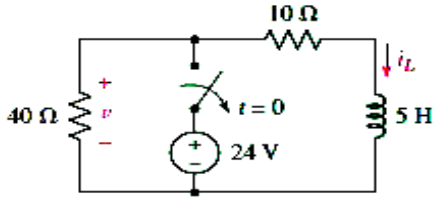
   b) Determine the z-parameters for the circuit shown below Figure. [5M] (6M)



UNIT-II

3. a) a) Derive an expression for voltage across 'L' in a series R-L circuit excited by a unit step voltage. Assume zero initial conditions. (5M)

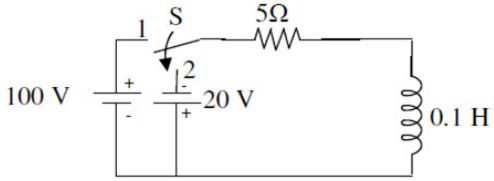
   b) Find the voltage v at t=200ms in the figure shown. (7M)



(OR)

4. a) A series R-L circuit has R=20 Ω and C=0.5 μF. The circuit is connected across a DC voltage source of 120 V at t=0. Calculate the expression for current through the circuit. (5M)

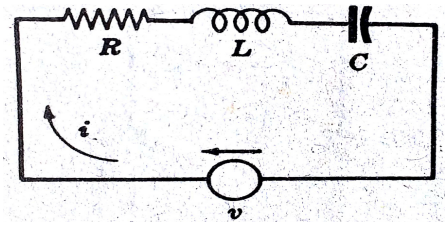
   b) In the circuit shown in fig., the switch S is in position 1 for 0.01 seconds and then changed to position 2. Find the time at which the current is zero and reversing its direction. (7M)



UNIT-III

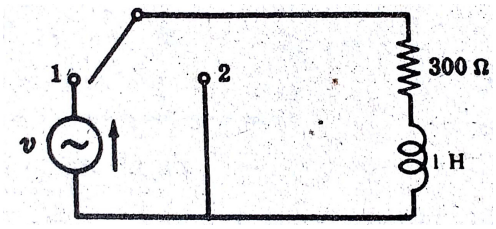
5. a) A series R-L circuit with resistance, R=100 ohms and inductance, L= 1H has a sinusoidal voltage source 200 Sin(500t + ϕ) applied at time when ϕ= 0. Find the expression for current. (6M)

   b) Draw the 's' domain circuit of the network shown and obtain the expression for current. (6M)



(OR)

6. a) The series RL circuit shown in figure is operating in the sinusoidal steady state with the switch in position 1.The switch is moved to position 2 when the voltage source is $v\,(t) = 100\,cos(100t + \phi) volts.$ Determine the resulting current if the switch is closed when ϕ=45˚. (12M)



UNIT-IV

7. a) Test whether the below given function is positive real or not (6M)

$$\frac{2s+1}{8s^2+4s+1}$$

   b) Check whether $P(s) = s^4 + 5s^3 + 5s^2 + 4s + 10$ is Hurwitz. (6M)

(OR)

8. a) What is Hurwitz polynomial? State its properties. (6M)

   b) Prove that if Z1(S) and Z2(S) are both positive real $Z(S)=\frac{Z1(S)Z2(S)}{Z1(S)+Z2(S)}$ must also be positive real. (6M)

UNIT-V

9. a) Synthesize the RC impedance using first Foster form (6M)

$$Z(s) = \frac{4(s+2)(s+6)}{s(s+4)}$$

   b) Using the Foster form I, synthesize the function (6M)

$$Z(s) = \frac{s(s^2+9)}{(s^2+5)(s^2+13)}$$

(OR)

10. a) State the properties of RC impedance function (6M)

    b) Explain the procedure by which the following impedance function can be synthesized using Cauer form I. (6M)

$$Z(s) = \frac{s(s^2+9)}{(s^2+5)(s^2+13)}$$

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AR18

CODE: 18MET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 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)	Discuss in detail about different types of bonds.	**[6 M]**
	b)	Explain about the effect of grain boundaries on the properties of Metals/Alloys.	**[6 M]**
		(OR)	
2.	a)	Define Crystallization. Explain the process of crystallization with a neat sketch.	**[6 M]**
	b)	Write a short note on imperfections in solids in detail.	**[6 M]**

UNIT-II

3.	a)	What is meant by a solid solution? Classify two types of solid solutions with a neat sketch.	**[6 M]**
	b)	What is meant by an Isomorphous phase diagram? Schematically sketch a simple Isomorphous phase diagram and label various phase regions.	**[6 M]**
		(OR)	
4.	a)	Draw Fe-Fe_3C phase diagram and label all phases.	**[8 M]**
	b)	What are Hume-Rothery's rules of solid solubility? Explain in brief	**[4 M]**

UNIT-III

5.	a)	What is meant by tool steel? Explain its types and importance with an example.	**[6 M]**
	b)	Write down the composition, properties and applications of white CI and Grey CI?	**[6 M]**
		(OR)	
6.	a)	Based on carbon content, how are the plain carbon steels classified? Discuss in detail the uses of these steels.	**[6 M]**
	b)	Discuss in brief about the cast iron and its alloys.	**[6 M]**

UNIT-IV

7.	a)	What is meant by Nitriding? Explain in brief	**[6 M]**
	b)	Compare Annealing and Normalizing heat treatments	**[6 M]**
		(OR)	
8.	a)	Draw TTT diagram for eutectoid steel and mention all phases in it.	**[8 M]**
	b)	Write about characteristics of metal powders. Explain the applications and advantages of Powder metallurgy.	**[4 M]**

UNIT-V

9.	a)	List out various Hardness testing methods. Explain any on method in brief.	**[6 M]**
	b)	State the composition, properties and applications of the Titanium and its alloys.	**[6 M]**
		(OR)	
10.	a)	Write a short note on Toughness Testing.	**[6 M]**
	b)	What are the alloying elements added to Al? Explain in brief about the role of each.	**[6 M]**

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AR18

CODE: 18EST202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December,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)	Illustrate different implementation issues in Problem solving and Explain the characteristics of an algorithm.	6M
	b)	List out all the operators available in C language and Explain each operator with syntax and examples.	6M
		(OR)	
2.	a)	Analyze the algorithm for generating Fibonacci series sequence for n terms.	6M
	b)	Explain in detail about various data types in C language.	6M

UNIT-II

3.	a)	Discuss the importance of for loop with example.	6M
	b)	Develop a C Program to perform Arithmetic operations using Switch Statement.	6M
		(OR)	
4.	a)	Write the syntax of 'nested if' statement and use it to write a C program to award grade to student based on percentage of marks.	6M
	b)	Discuss briefly about nested loop Branching.	6M

UNIT-III

5.	a)	What is an array? Explain the declaration and initialization of one and two dimensional arrays with examples?	6M
	b)	Name any five string handling functions and discuss with suitable examples.	6M
		(OR)	
6.	a)	Explain in detail the storage classes in C.	6M
	b)	Construct a C program to check the given number is Prime or not using Functions.	6M

UNIT-IV

7.	a)	Demonstrate the memory allocation functions in C language.	6M
	b)	Define a pointer. Describe the concept of Pointers for inter-function communication.	6M
		(OR)	
8.	a)	Explain the procedure of declaration of pointer variables with example.	6M
	b)	Explain Pointers as function arguments with suitable examples.	6M

UNIT-V

9.	a)	Explain various file input and output functions.	6M
	b)	Explain in detail the properties of a structure.	6M
		(OR)	
10.	a)	Differentiate Structure and Union. Give brief description of each with syntax and examples.	6M
	b)	Develop a C program to copy the contents of two files into a separate file.	6M

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AR18

CODE: 18CST202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December,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) Explain in detail about the Logical Connectives with Examples. [6M]

   b) Show that $(P \rightarrow Q) \wedge (\not\leftrightarrow R)$ $P \rightarrow (Q \wedge R)$ [6M]
   i) Using the Truth Table. ii) Without using Truth Table

(OR)

2. a) Find the PDNF of $(\sim P \leftrightarrow R) \wedge (Q \leftrightarrow P)$ [6M]

   b) Prove or disprove the validity of the following arguments using the rules of inference. i) All men are fallible ii) All kings are men iii) Therefore, all kings are fallible. [6M]

UNIT-II

3. Explain the properties of Binary relations with examples [12M]

(OR)

4. a) Draw the Hasse diagram for the poset $(P(S), \subseteq)$, where $S=\{1,2,3\}$ [6M]

   b) Show that a map f:R->R defined by f(x)=2x+1 for x€R is a bijective map from R to R. [6M]

UNIT-III

5. a) Write the rules for constructing Hamiltonian paths and cycles? [6M]

   b) Draw the following graphs [6M]
   i) W_7 ii) C_5 iii) K_5 iv) $K_{2,3}$

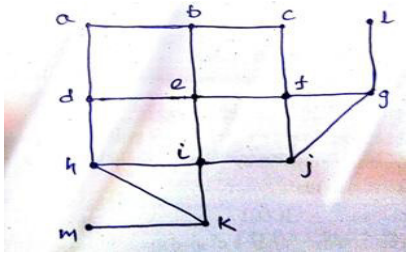
(OR)

6 Explain isomorphism of two graphs with suitable example? [12M]

UNIT-IV

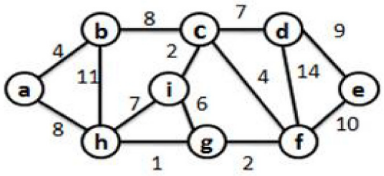
7. a) Show that K5 and K3,3 are not planar. [6M]

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



(OR)

8. a) Find Minimum spanning tree for a graph in Fig below using Kruskal's algorithm. [6M]



b) Find the chromatic number of [6M]

i. a bipartite graph K3,3
ii. a complete graph Kn
iii. a wheel graph W1,n
iv. cycle graph Cn

UNIT-V

9. Using generating function method solve the recurrence relation $a_{n+1} = 3a_n + (n+1), n \geq 0$ [12M]

(OR)

10. Solve $a_n - 2a_{n-1} + a_{n-2} = 2$, initial condition $a_0 = 25$ and $a_1 = 16$. [12M]

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AR16

CODE: 16EE2008 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I semester supplementary Examinations, December, 2022

ELECTRICAL CIRCUIT ANALYSIS

(Electrical and Electronics Engineering)

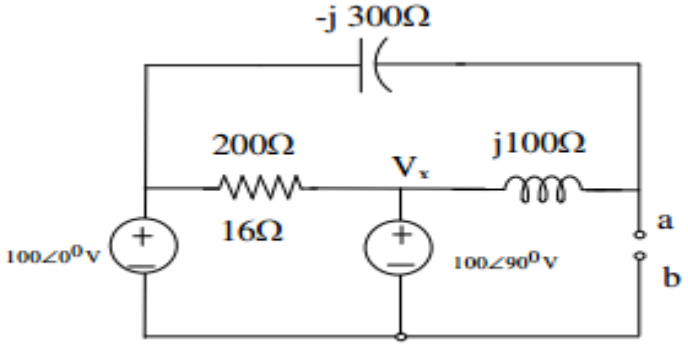
Time: 3 Hours **Max Marks: 70**

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 prove reciprocity theorem choosing a suitable circuit. 5M

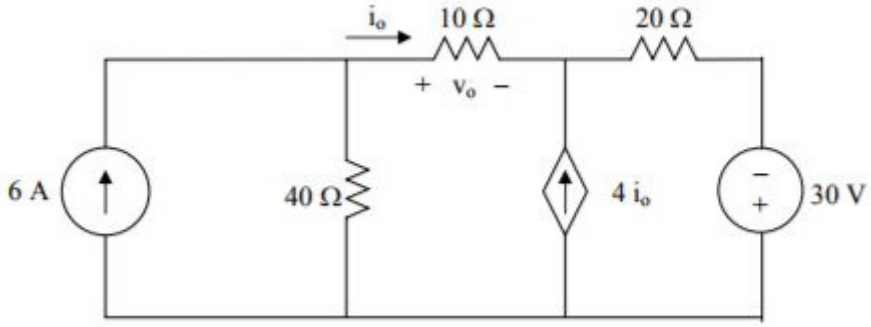
   b) For the circuit given below, determine the Norton's equivalent circuit. 9M



(OR)

2. a) State and prove Norton's theorem choosing a suitable sinusoidal circuit. 5M

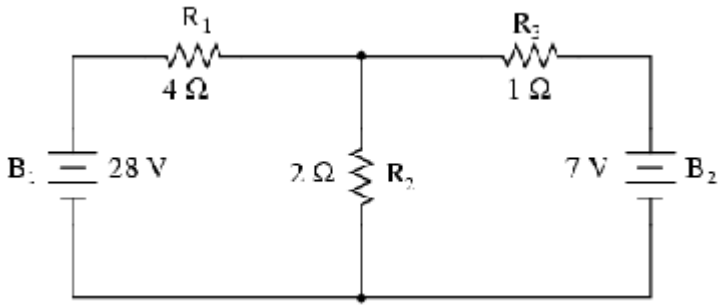
   b) Obtain V_o and i_o values using superposition principle for the circuit given below. 9M



UNIT-II

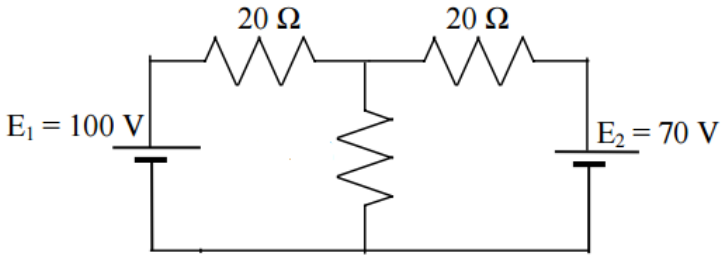
3. a) Derive the condition for maximum power to be transferred to the load for the following cases: 7M
   i) Load having constant resistance and variable reactance.
   ii) Load having variable resistance and constant reactance.
   iii) Load having variable resistance and variable reactance.
   Assume that the source has internal impedance of resistance and inductive reactance.

   b) Verify Tellegen's theorem for the circuit given below. 7M



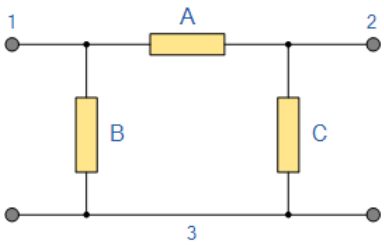
(OR)

4. a) State and prove Milliman's theorem with a suitable circuit. 7M
   b) What should be the value of the centre resistor for it to receive maximum power. Also find the maximum power. 7M



UNIT-III

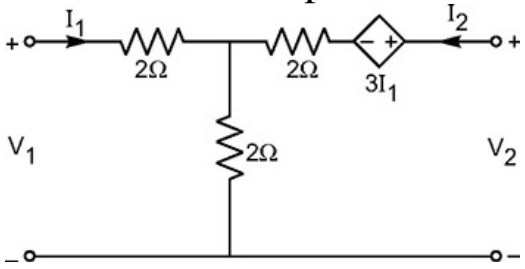
5. a) For the two port network shown below, obtain the Z-parameters. Take A= j10 ohms; B= 20 ohms and C= (5+j12) ohms. 7M



   b) Obtain the h parameters for the two port network having voltages; $V_1 = 2 I_2$ and $V_2 = -2 I_1 + 4 I_2$. Also draw the equivalent circuit. 7M

(OR)

6. a) Find the Z- parameters for the two port network given below. 7M

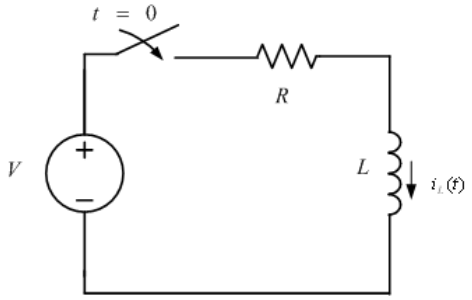


b) Determine the relationship between Y and h parameters. 7M

UNIT-IV

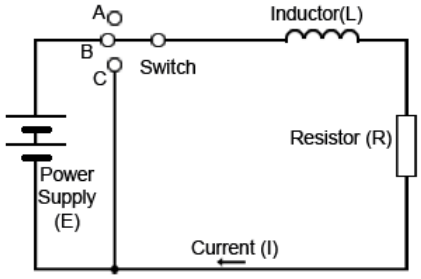
7. a) Derive an expression for the voltage response in a RC series circuit excited by a constant voltage source V. 7M

b) Find I (t) at t=16 sec for the circuit shown below. V=100 volts, R=10 ohms and L= 4 H. 7M



(OR)

8. Switch is in position B for a long time. At t=0 it is moved to position C. Calculate the voltage across R at t= 5 milli sec. 14M



UNIT-V

9. a) Synthesize the following immittance function in Foster 2nd form. 7M

$$Y(s)=\frac{(s+1)(s+3)}{(s+2)(s+5)}.$$

b) Synthesize the following impedance function in Cauer 1st and 2nd forms. 7M

$$Z(s)=\frac{(s+1)(s+3)}{s(s+2)(s+4)}$$

(OR)

10. a) What do mean by network synthesis? Explain with an example. 6M

b) Synthesize the following immittance function in Cauer 1st form. 8M

$$Z(s)=\frac{(s^2+7s+10)}{(s^2+4s+3)}.$$ Draw the network.

AR16

CODE: 16EC2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I semester supplementary Examinations, December, 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) Explain the operation of Full Wave Rectifier with Induction filter with necessary diagrams. 6 M
   b) A diode whose internal resistance is 20Ω is to supply power to a 100Ω load from 110V (R.M.S) source of supply. Calculate: i) Peak Load Current ii) DC Load Current iii) AC Load Current iv) % Regulation from No load to given load. 8 M

(OR)

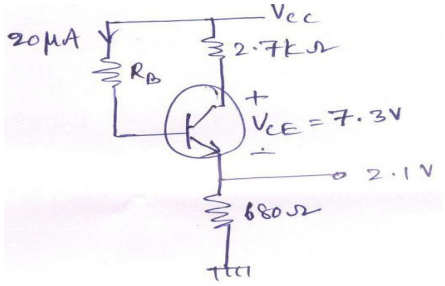
2. a) What is the need for filters in power supplies. 7 M
   b) Show that a Full-wave rectifier is twice as efficient as a Half-wave rectifier. 7 M

UNIT-II

3. a) Draw the circuit diagram of fixed bias circuit. Derive its stability factors S, S', and S". Mention its disadvantages? 8 M
   b) What is meant by thermal runaway and derive the condition to avoid thermal runaway. 6 M

(OR)

4. a) Determine β, V_{cc}, R_B for the following circuit. 7 M



   b) Derive the stability factor s for a voltage divider bias configuration and explain it in detail. 7 M

UNIT-III

5. a) Why hybrid parameters are more useful in analysing circuits having Bipolar Junction Transistor? 7 M

   b) Derive the equations for current gain, voltage gain, input and output impedance for Common Emitter Configuration. 7 M

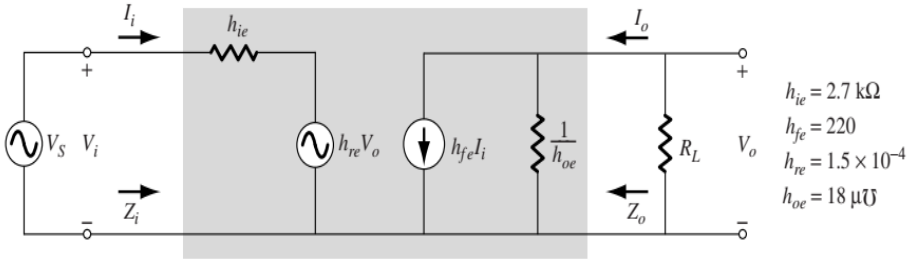
(OR)

6. a) Compare various BJT amplifier configurations? 7 M

   b) Derive the equations for current gain, voltage gain, input and output impedance for Common collector Configuration. 7 M

UNIT-IV

7. Calculate the values of A_i, A_v, Z_i and Z_o for the circuit shown in Fig. below and if the CE amplifier uses transistor with the specifications given in the figure and a resistive load of 1 *k*Ω. 14 M



(OR)

8. For the JFET amplifier: $g_m = 2$ mS, $r_{ds} = 30$ KΩ, $R_s = 3$ KΩ, $R_D = RL = 2$ KΩ, $R_1 = 200$ KΩ, $R_2 = 800$ KΩ, and $R_s = 5$ KΩ. if C_C and C_s are large and the amplifier is biased in the pinch off region. Find (a) Z_{in} (b) A_V (c) A_I. 14 M

UNIT-V

9. a) When will a negative feedback circuit amplifier becomes unstable. 7 M

   b) Compare negative feedback and positive feedback. 7 M

(OR)

10. An amplifier has an input signal of 80 mv to produce a certain output. With a negative feedback to produce the same output, the required input signal is 0.5 V. The voltage gain with feedback is 100. Find the open loop gain and feedback factor. 14 M

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AR13

CODE: 13CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I semester supplementary Examinations, December, 2022

MATHAMATICAL 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 positive 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

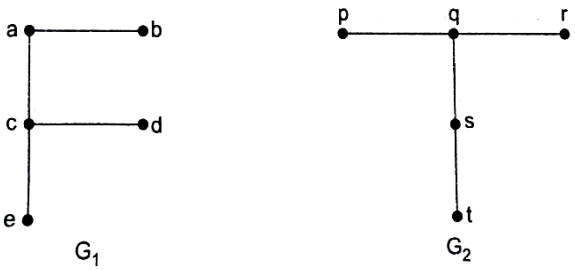
4. a) Using Euclidean algorithm , compute gcd($2002+2$, 2002^2+2, 2002^3+2 , ...) **6M**
   b) Use mathematical induction prove that $3^n > n^2$ where $n \geq 1$ a positive integer. **6M**

(OR)

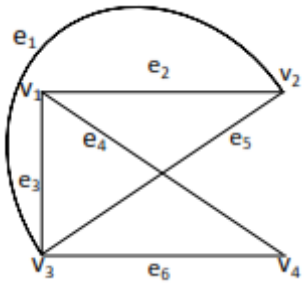
5. a) Using Fermat's theorem find $12^{4000} \pmod 5$. **6M**
   b) Prove that for any positive integer n, $n^3 + 2n$ is divisible by 3. **6M**

UNIT-III

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

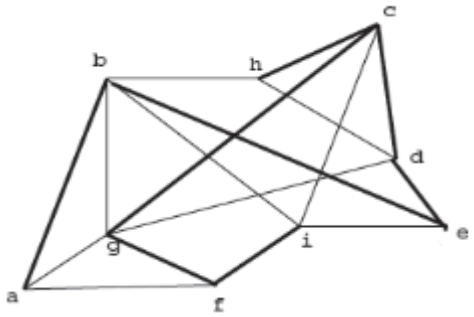


b) Find the Euler path to the following graph. **6M**



(OR)

7. a) Find the spanning tree to the following graph by BFS algorithm **6M**



b) Define chromatic number of a graph. Draw the graphs C_5 , K_5 . Also find the chromatic numbers of (i) Cycle C_n, (ii) Wheel graph W_n (iii) Path graph (P_n) **6M**

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 → S_2 and g : S_2 → S_3 be homomorphisms. Prove that the mapping of gof : S_1 → 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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