AR18

CODE: 18CET209 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, Novemner-2020

STRUCTURAL ANALYSIS-I

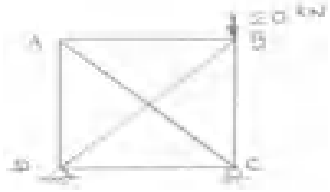
(Civil Engineering)

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

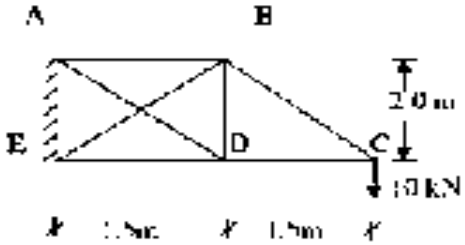
UNIT-I

1. Find the force in the member AC of the truss shown in Fig. shown below. 12M



(OR)

2. Find the force in the member BE of the frame shown in Fig. Take AE is constant for all the members. 12M



UNIT-II

3. A horizontal cantilever of 5 m span carries a point load of 12 kN at 2 m from fixed end. If the beam is propped at the free end to the level of fixed end a) find the load on the prop b) draw shear force and bending moment diagrams c) indicate the position of point of contra flexure. 12M

(OR)

4. A fixed beam of 8m span is loaded with two point loads of 50 kN at a distance 2m from both the end support. Draw the bending moment and shear force diagrams. Find also the maximum deflection. Given, I = 8 x 10^8 mm^4 and E= 2 x 10^8 kN/m^2. 12M

UNIT-III

5. A continuous beam ABC consists of two spans AB and BC of length 6m and 8m.The span AB carries a point load of 120kN at 4m from A, while the span BC carries a point load of 160kN at 5m from C. Find the moments and reactions at the supports. 12M

(OR)

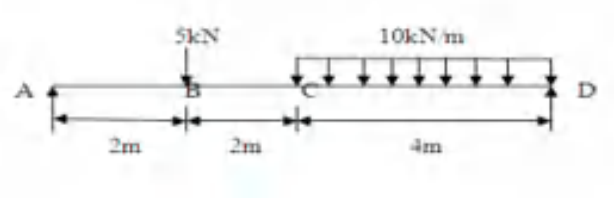
6. A continuous beam ABC consists of two consecutive spans AB and BC 4 m each and carries a distributed load of 60kN/m. The end A is fixed and the end C is simply supported. Find support reactions and support moments. Draw shear force and bending moment diagrams. 12M

UNIT-IV

7. A simply supported beam of span l carries a concentrated load P at a distance of 'a' and 'b' from two ends, Find the strain energy stored in the beam and the deflection under the load by Castigliano's theorem. 12M

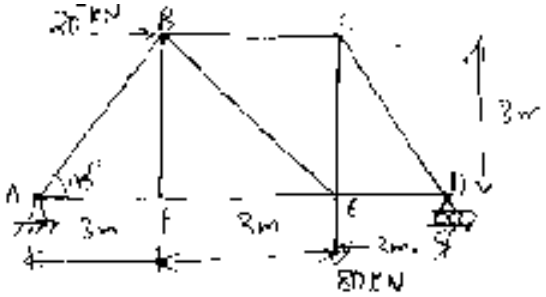
(OR)

8. Use strain energy method to find the deflection at the middle of the beam as shown in fig. Take E=200GPa and I= $400x10^6mm^4$. 12M



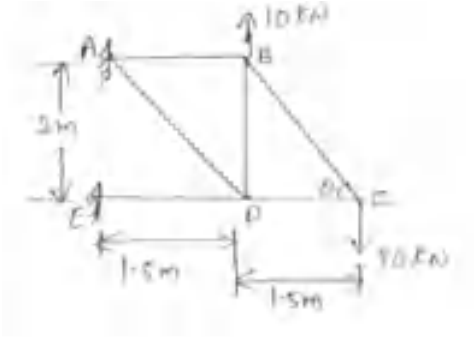
UNIT-V

9. Determine the vertical deflection of joint E of the truss. Take AE = 3.6 x 10^5 kN by unit load method. 12M



(OR)

10. Determine the horizontal deflection at 'C' of the truss loaded as shown below using strain energy method. All members have same cross sectional area of 1500 mm^2 and E = 200 GPa. 12M



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AR18

CODE: 18MET207 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, Novemner-2020

INSTRUMENTATION AND CONTROL

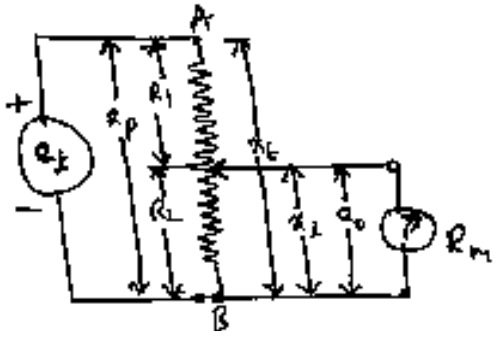
(Mechanical Engineering)

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) Define Dynamic characteristics of measurement system 6M
   b) A Resistive Displacement Transducer with a shaft stroke of 75 mm is applied to the circuit shown in figure1. the applied voltage is 15V. determine the displacement indicated for each of the voltage readings 5.0V,8.0V and 12.0V 6M



(OR)

2. With the aid of neat sketches, explain in detail the working principle of Capacitive and Resistive transducers used for the measurement of linear displacement. Also state advantages and limitations for both the transducers. 12M

UNIT-II

3. a) A 200Ω strain gauge is bonded to a low carbon steel bar which has been subjected to a tensile load. the bar has preload uniform cross sectional area of 2.0x10-4 mm^2 and Young's modulus of low carbon steel is 200GN/m2. If a load of 100KN produces a change of 2Ω in the gauge resistance, determine the gauge factor of the gauge 6M
   b) Explain the method of measuring tensile and compressive strains using strain gauges using quarter wheat stone bridge method. 6M

(OR)

4. a) With the help of neat sketch explain the working principle of strain gauge load cell. 6M
   b) A Tensile strain of 0.001 has been applied to a strain gauge having gauge factor of 2.0 the gauge resistance and other three resistances comprising the limbs of a wheat stone bridge circuit have an initial resistance of 120 Ω. determine 6M
      i) change in the value of variable resistance R2.
      ii) output voltage of bridge if supply voltage to bridge is 6V

UNIT-III

5. a) Give a detailed explanation of working of a McLeod gauge used for the measurement of pressure 12M

(OR)

6. a) Explain the working of Expansion type and resistive temperature gauges. Provide neat sketches of the working principle. 12M

UNIT-IV

7. a) Explain the working of Hot wire Anemometer with the help of neat schematic. List out various advantages and limitations of the same. 6M

   b) Explain how absorption type hygrometer is used to measure the humidity. 6M

(OR)

8. a) With the help of neat sketch, give a detailed explanation of working principle of Turbine Flow meter. Provide various advantages and limitations of the same 6M

   b) Explain how Sling Psychrometer is used to measure the humidity with the help of neat diagrams. 6M

UNIT-V

9. a) Construct Routh array, determine stability and find the location of roots for the systems represented by the following characteristic equation. 6M

   $S^4+8S^3+18S^2+16S+5$

   b) Construct the bode plot for a system having 6M

   $G(s)H(s)=\frac{100}{s(s+1)(s+2)}$

(OR)

10. a) Determine the range of values of K for the stability of a unity feedback system whose open loop transfer function is given by $G(s)=\frac{K}{s(s+1)(s+2)}$ 6M

    b) With a neat sketch explain the block diagram of closed loop control system. 6M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, Novemner-2020

CONTROL SYSTEMS

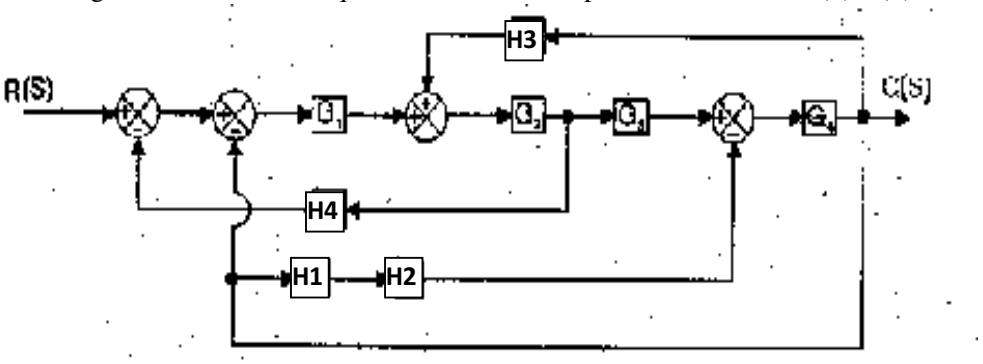
(Electrical and Electronics Engineering)

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

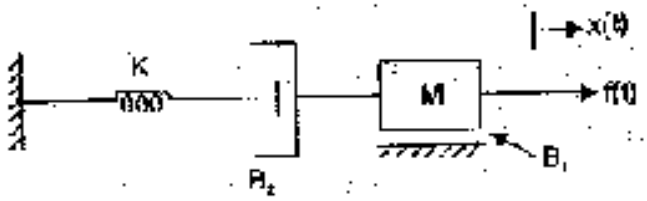
1. a) Using block diagram reduction technique find the closed loop transfer function C(S)/R(S) 8M



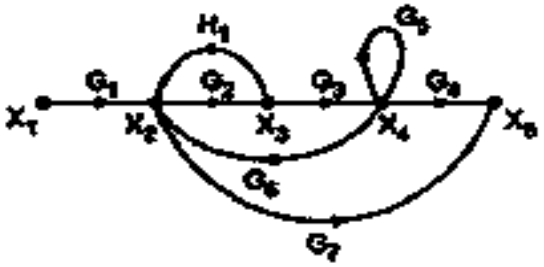
b) Clearly explain about effect of feedback characteristics? 4M

(OR)

2. a) Determine the transfer function of given system shown in figure below 6M



b) Using Masons gain formula obtain the closed loop transfer function for the signal flow graph 6 M



UNIT-II

3. a) What is the importance of test signals? and also mention different test signals. 5M
b) Derive the expression for Rise time, peak over shoot, settling time of second order system for given step in put. 7 M

(OR)

4. a) Explain the effects of proportional derivative, proportional integral systems with a suitable example. 5M

b) Find the error constants and steady state errors for a velocity input r(t) = 2t and step input of 2 units. The system is given by G(s)H(s)= 10/s(s+5). 7M

UNIT-III

5. a) The characteristics equation of the system $S^4+2S^3+(4K+1)S^2+9S+25=0$ using Routh Hurwitz stability criterion, determine the range of K for stability. 4 M

b) Sketch the root locus for unity feedback system whose open loop transfer function of a unity feedback system is given by 8 M

$$G(s)H(s)=\frac{K(S+9)}{S(S^2+4S+11)}$$

(OR)

6. a) What is breakaway and Break in point? How to determine them? 4M

b) Sketch the root locus for unity feedback system whose open loop transfer function of a unity feedback system is given by 8M

$$G(S)H(S)=\frac{K}{S(S+2)(S^2+2S+2)}$$

UNIT-IV

7. Plot the Bode plot, given transfer function $G(s)=\frac{10}{S(1+0.4S)(1+0.1S)}$. 12M

Assume unity feedback. Obtain gain and phase margin from the plot.

(OR)

8. a Explain Gain cross over frequency, phase cross over frequency, gain margin, phase margin. 6M

B Explain the advantages of Bode plot 6M

UNIT-V

9. a) What is a lag compensator, obtain the transfer function of lag compensator and draw its pole-zero plot. 4 M

b) Design a suitable compensating network for 8 M

$$G(S)=\frac{K}{S(S+1)(S+5)}$$

To satisfy the following specifications i.k_v (velocity error constant) $\geq$ 50 and phase margin $\geq 20^0$.

(OR)

10. a) What is a state transition matrix? Discuss the properties of it. 4 M

b) Determine the state transition matrix for the given system. 8 M

$$\begin{bmatrix} x_1' \\ x_2' \\ x_3' \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 20 & 9 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

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CODE: 18CST208 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, Novemner-2020

DESIGN & ANALYSIS OF ALGORITHMS

(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) What is time complexity of an algorithm? Write notes on time complexity. 6 M
   b) Explain different asymptotic. 6 M

(OR)

2. a) What is a recursive algorithm? Write and explain a recursive algorithm for solving Towers of Hanoi puzzle. 6 M
   b) Write iterative algorithm to compute factorial of a number. Determine it's time complexity using count variable method. 6 M

UNIT-II

3. a) Describe the general method of divide and conquer strategy. 6 M
   b) State and explain Strassen's matrix multiplication with an example. 6 M

(OR)

4. a) What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example. 6 M
   b) Consider the following data given for job sequencing problem and show how to solve it using greedy approach. 6 M

Job	J_1	J_2	J_3	J_4	J_5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

UNIT-III

5. a) Define Feasible solution and Optimal solution. Describe each by means of appropriate examples. 6 M
   b) Find the shortest path between all pairs of nodes in the following graph AB = 4, AD = 8, BC = 12, BD = 5, CA = 5 and DC = 7 6 M

(OR)

6. Discuss the Dynamic programming solution to construct the optimal binary search tree for the given data. 12 M

N=5, (k1, k2, k3, k4, k5) = (break, do, else, if, while)

i	0	1	2	3	4	5
p_i		0.15	0.10	0.05	0.10	0.20
q_i	0.05	0.10	0.05	0.05	0.05	0.10

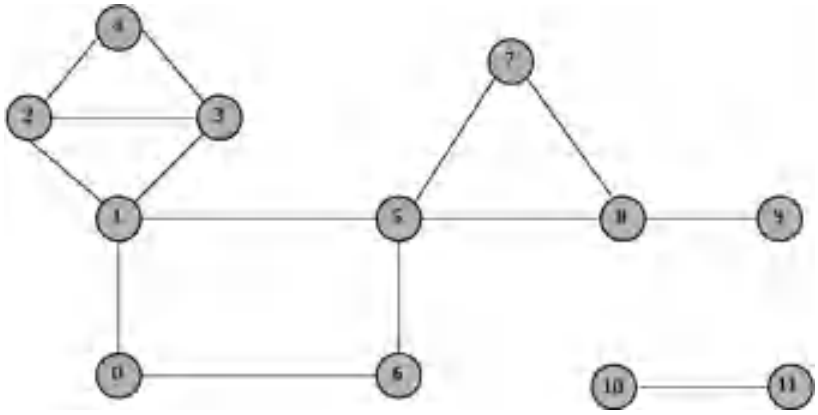
UNIT-IV

7. a) Solve sum of subsets problem using back tracking for n = 7 (w1, w2, w3, w4, w5, w6, w7) = (10, 7, 5, 18, 12, 20, 15) & m = 35. Find all possible subsets of w that sum to m using the backtracking algorithm for sum of subsets problem. 6 M

   b) Describe how to solve 8-queens problem using backtracking approach. 6 M

(OR)

8. Explain how to find the biconnected components of the following graph: 12 M



UNIT-V

9. Explain how to solve the following instance of Travelling Salesman problem using Least Cost branch and bound technique. 12 M

$$\begin{vmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{vmatrix}$$

(OR)

10. Write short notes on the following: 12 M

    a) NP problems b) NP-Hard Problems **c)** NP-Complete problems

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