AR18

CODE: 18CET209 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February, 2021

STRUCTURAL ANALYSIS-I

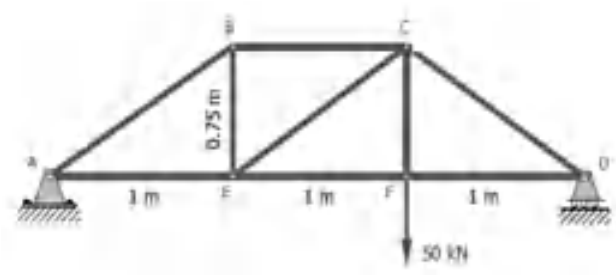
(Civil Engineering)

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

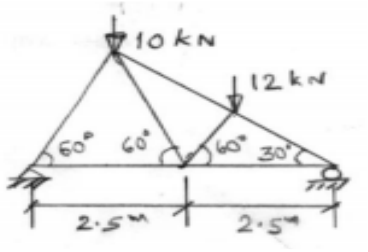
UNIT-I

1. For the truss shown in figure Evaluate the forces in the members BC, CE and EF. Use method of sections. 12M



(OR)

2. Fig. below shows a truss of 5 m span. Find the forces in all the members. 12M



UNIT-II

3. Draw the shear force & bending moment diagrams for a propped cantilever carrying a UDL of 'w' kN/m throughout the span 'L' & propped at the free end. 12M

(OR)

4. A fixed beam of 5m span carries a point load of 150 kN at 3m from the left end. Find the fixed end moments & reactions at the supports. Sketch SFD & BMD Take $E = 2 \times 10^8$ kN/m^2, $I = 3.2 \times 10^8$ mm^4. 12M

UNIT-III

5. Analyze the continuous beam shown in Fig. by the three moment equation method if support B sinks by an amount of 10mm. Draw the shear force and bending moment diagram. Take flexural rigidity EI = 48000 kNm^2. 12M

(OR)

6. A simply supported continuous beam ABC consists of spans AB & BC of length 6m and 8m. The beam carries a concentrated load of 30kN at the middle of span AB and a UDL of 40kN/m throughout the span BC. Determine the support moment and support reactions. Draw also SFD and BMD by using Clapeyron's three moment equation method. 12M

UNIT-IV

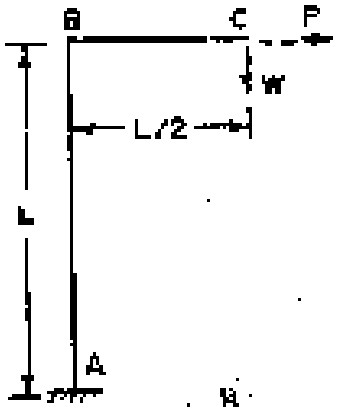
7. a) Using strain energy method, determine the deflection of the free end of a cantilever of length L, subjected to a concentrated load P at the free end. 6M
   b) State Maxwell's theorem of reciprocal deflection 6M

(OR)

8. a) State and derive Castigliano's first theorem. 6M
   b) Derive expressions for strain energy due to axial and bending. 6M

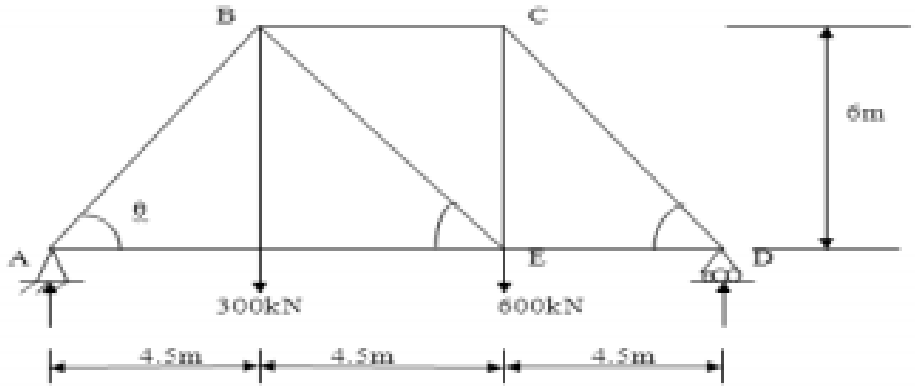
UNIT-V

9. a) A simply supported beam of span 7m carries a concentrated load of 50kN at a distance of 3m from A. find the strain energy stored in the beam and the deflection under the load by Castigliano's theorem. 6M
   b) A Vertical load W and a horizontal load P are applied to rigid cantilever shown in Figure. Assuming EI is constant throughout the frame, determine the vertical displacement of the joint C. Neglect the axial deformations. 6M



(OR)

10. Determine the horizontal displacement of roller support of the truss shown in fig. The cross sectional areas of AB, BC, CD members are 6000mm^2 and other members have cross sectional area 3000mm^2 . Take E= 200kN/mm^2 12M



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CODE: 18EET209 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, February, 2021

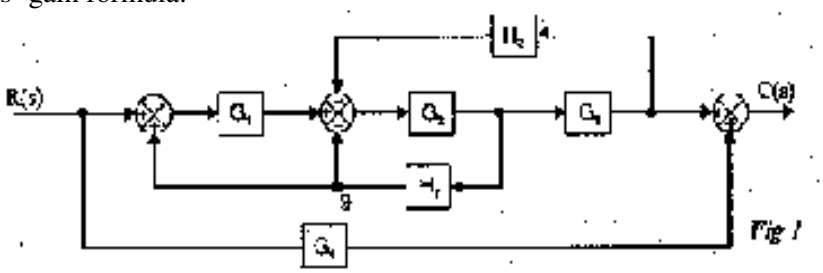
CONTROL SYSTEMS
(Electrical and Electronics Engineering)

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) Convert the block diagram to signal flow graph and determine the transfer function using Manson's 'gain formula. 8M

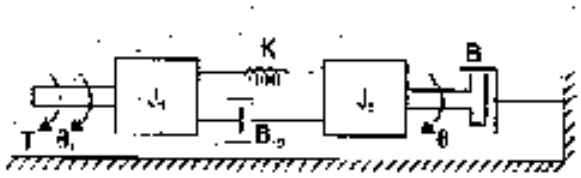


b) Distinguish between open loop and closed loop control systems with suitable examples. 4M

(OR)

2. a) What is feedback? Why negative feedback is invariably preferred in a closed loop system? 4M

b) Determine the transfer function for given rotational system 8M



UNIT-II

3. a) A unity feedback system is characterized by the open-loop transfer function 4M

$$G(S) = \frac{K}{S(1 + 0.1S)(1 + S)}$$

Determine the steady-state errors for unit-step and unit-ramp input.

b) Derive an expression for the transfer function of an field controlled DCservo motor and also draw the suitable block diagram 8M

(OR)

4. a) Define (i) Rise time (ii) Peak time (iii)Maximum overshoot (iv) Steady state error 4M
   b) Derive the expression for time response of under damper second order system with unit step input 8M

UNIT-III

5. a) How the roots of the characteristic equation are related to stability? 2M
   b) Sketch the root locus for the unity feedback system whose open loop transfer function is, $G(S) = \frac{K}{S(S^2+6S+10)}$ 10M

(OR)

6. A unity feedback system has an open-loop transfer function
$$G(S) = \frac{K(S+1)}{S(S-1)}$$ 12M
(i) Sketch the root locus plot with K as a variable parameter and show that the loci of complex roots are part of a circle with(-1,0) as centre and radius=$\sqrt{2}$.
(ii) Is the system stable for all values of K? If not, determine the range of K for stable system operation. Find also the marginal value of K which causes sustained oscillations and the frequency of these oscillations.
(iii) From the root locus plot, determine the value of 'K' such that the resulting system has a settling time of 4 sec. What are the corresponding values of the roots?

UNIT-IV

7. A unity feedback system has a plant transfer function of 12M
$$G(S) = \frac{Ke^{-0.2S}}{(S+2)(S+8)}$$
Determine K so that the system is stable with the phase margin = 45^0 and gain margin = 2db.

(OR)

8. a) What are frequency domain specifications?. 2M
   b) The open –loop transfer function of certain unity feedback system are given below. 10M
   Sketch the Nyquist plot and determine the stability of thesystem
$$G(s) = \frac{K}{(s+1)(s+1.5)(s+2)}$$

UNIT-V

9. A unit feedback system has an open loop transfer function. 12M

$G(S) = \frac{K}{S(1+2S)}$

Design a suitable lag compensator to meet the following specifications:
Steady state error for ramp input is less than or equal to 0.2, Phase margin = 40^o

(OR)

10. a) Define controllability and observability. 4M

b) Given the state equation $\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \\ \dot{x_3} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$. 8M

Determine the state transition matrix.

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February, 2021

DESIGN & ANALYSIS OF ALGORITHMS

(Common to CSE AND 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 an algorithm? Describe the criteria that an algorithm must satisfy. 6 M

   b) Explain in detail about asymptotic notations of algorithms. 6 M

(OR)

2. a) Discuss various factors to be considered while evaluating the time complexity of an algorithm. 6 M

   b) Write short notes on pseudocode conventions. 6 M

UNIT-II

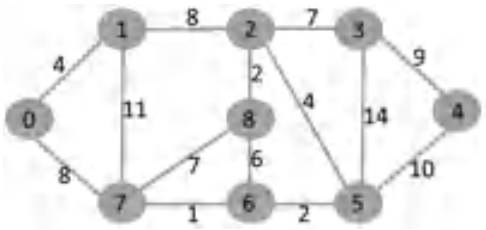
3. a) Show how to sort the list of elements, 23, 15, 56, 76, 45 and 38 using quicksort. When does worst case of quicksort occur? Explain. 8 M

   b) Derive the best, average and worst case time complexities of binary search. 4 M

(OR)

4. a) State Fractional knapsack problem. Show how to solve it using greedy approach. 6 M

   b) By considering 0 as the source node, solve single source shortest paths problem using greedy approach. 6 M



UNIT-III

5. a) Dynamic programming is best compared to the greedy method. Justify the statement. 6 M

   b) State the Matrix chain multiplication problem. Show how to solve it using dynamic programming. 6 M

(OR)

6. State the 0/1 knapsack problem. Consider the following instance of it and provide dynamic programming solution to it. Explain the process used to solve it. 12 M

n = 3; (W1, W2, W3) = (3, 5, 7); (P1, P2, P3) = (3, 7, 12); M = 4.

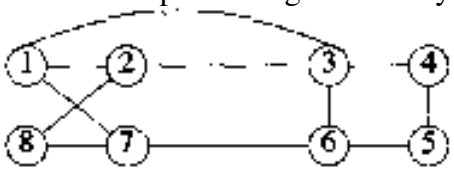
UNIT-IV

7. a) By means of an example graph, illustrate the working of DFS algorithm. 6 M

   b) Write brief notes on connected components and biconnected components. 6 M

(OR)

8. Define Hamiltonian cycle. Write the algorithm for finding Hamiltonian cycles in a given graph. Consider the following graph and draw the portion of the state space tree generated by the algorithm. 12 M



UNIT-V

9. Write short notes on the following: 12 M
   a. Dead node
   b. Live node
   c. E-node
   d. Bounding function

(OR)

10. a) Briefly explain the following: 6 M
      i. Non-deterministic algorithms
      ii. Cook's theorem

    b) Discuss various methodologies of Branch and Bound technique. 6 M

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