AR13

CODE: 13CE2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, October-2021

STRUCTURAL ANALYSIS-I

(Civil Engineering)

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

PART-A

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

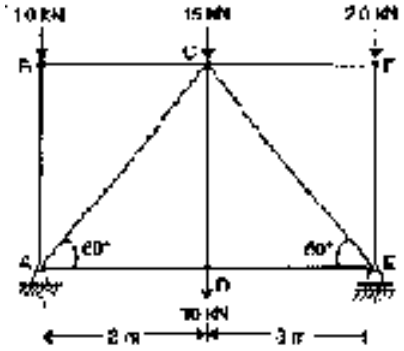
1. a) Differentiate between beam and truss
   b) How method of joint differs from the method of section in the analysis of pin jointed trusses?
   c) What are the different types of arches
   d) Differentiate between beam and arch
   e) Write three moment area equation
   f) Explain with figures the difference of fixed beam and continuous beam
   g) Which method is used to find the reaction at the propped end
   h) In a fixed beam, the moment at the internal hinge is
   i) What is the shape of influence line diagram for maximum bending moment in respect of simply supported beam.
   j) What will be the shape of ILD curve for vertical reaction

PART-B

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

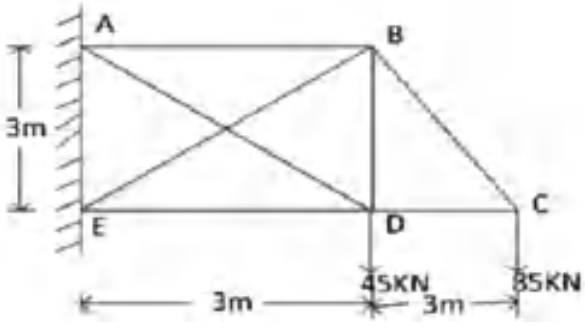
UNIT-I

2. A truss is shown in fig. Find the forces in all the members of the truss and indicate it in tension or compression. 12



(OR)

3. Find the forces in the members of the truss as shown. The cross-sectional area and young's modulus of all the members are the same. 12



UNIT-II

4. A symmetrical three hinged circular arch has a span of 16m and a rise of central hinge is 4m. It carries a vertical load of 16 kN at 4m from the left end. Find
   a. The magnitude of the thrust at the springing
   b. The reaction at supports c. Bending moment at 6m from the left hinge
   d.The maximum positive and negative bending moment

   12

(OR)

5. A parabolic arch hinged at the springings and crown has a span of 20m. the central rise of the arch is 4m. it is loaded with a UDL of intensity 2kN/m on the left 8m length. Calculate
   a. The direction and magnitude of reactions at the hinges
   b. The bending moment, normal thrust and radial shear at 4m and 15m from the left end.
   c. Maximum positive and negative bending moments.

   12

UNIT-III

6. A propped cantilever beam of length *l* is subjected to uniformly distributed load of *w*/m length over three fourth of its span from the fixed support. Determine the prop reaction and sketch the BMD 12

(OR)

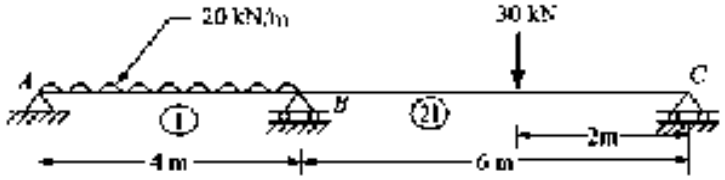
7. A fixed beam carries a point load W at mid span of the beam. Show that the deflection at the midpoint of the is one- fourth of the deflection of a simply supported beam of same span 12

UNIT-IV

8. A continuous beam ABC is simply supported at A and C and continuous over support B with AB = 7m and BC = 6m. A uniformly distributed load of 14kN/m is acting over the beam. The moment of inertia is I throughout the span. Analyze the continuous beam and draw BMD 12

(OR)

9. Analyze the continuous beam as shown fig by using three moment equation. Draw Bending moment diagram



12

UNIT-V

10. An overhanging beam DABC , 16m long is supported at A and B . DA=BC=3m; AB=10m. Draw the influence lines for the reactions at A and B, shear and bending moment at section 3m from A. Hence obtain their values for a uniformly distribute load of 10kN/m, 5m long acting from A. 12

(OR)

11. Two-wheel loads of 12 and 6kN, at a fixed distance of 4.5m, cross a beam of 16m span. Draw the influence line for bending moment and shear force for a point 6 m from the left abutment, and find the maximum bending moment and shear force at that point 12

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AR13

CODE: 13EE2009 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, October-2021

CONTROL SYSTEMS

(Electrical and Electronics Engineering)

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

PART-A

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

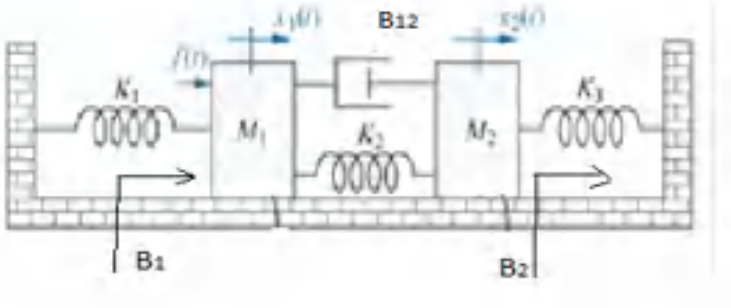
1. a) Classify the following as open or closed loop system with valid reasons (i) An electrical On-Off switch, (ii) Room air-conditioner.
   b) Why do you need a feedback controller? Justify your answer with an example
   c) What are the effects of integral control action?
   d) Define peak overshoot for unit step response of the system.
   e) Outline the Bode plot for a Proportional Integral controller
   f) Compare between absolute stability, conditional stability and relative stability
   g) What is a Phase Lag compensator and why is it used?
   h) What are the advantages of State variable model of dynamic system?
   i) How do you determine the system eigen values and what is its role in the system response?
   j) Define polar plot

PART-B

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

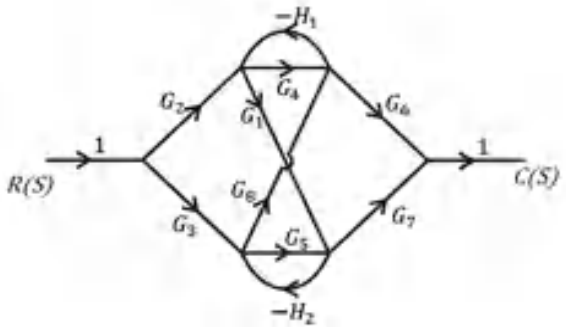
UNIT-I

2. Find the transfer function $X_1(s)/F(s)$, where M=mass, K = stiffness of spring, V=viscous friction coefficient 12M



(OR)

3. Compute the closed loop TF C(S)/R(s), by using Mason's gain formula. 12M



UNIT-II

4. Derive the following time domain specifications 12M
(i) Peak time (ii) Rise time (iii)Peak overshoot (iv) 2% settling time.

(OR)

5. Describe the construction and operating principle of synchro transmitter with neat diagrams. 12M

UNIT-III

6. Construct Routh array, determine stability and find the location of roots for the systems represented by the following characteristic equations. 12M

$S^5+S^4+2S^3+2S^2+3s+5=0$

(OR)

7. Draw the complete root locus of a unity feedback system whose open loop transfer function 12M

$$\boldsymbol{G(S)=\frac{K}{s\,(s+4)(s^2+4s+13)}}$$

UNIT-IV

8. a) Consider a feedback system with the open loop transfer function given by $G(s)=\frac{16}{s(s+4)}$. Find out resonant frequency and resonant peak 6M

b) Consider a feedback system with the open loop transfer function given by $G(s)=\frac{1}{s(s+1)}$. Find out gain margin and phase margin . 6M

(OR)

9. Consider a system with an open loop transfer function 12M

$G(s)H(s)=\frac{4s+1}{s^2(s+1)(2s+1)}$ using Polar plot the stability of closed loop system .

UNIT-V

10. a) Derive the expression for transfer function of lag compensator. 6M

b) Draw the Bode and Polar plot for lead compensator 6M

(OR)

11. Let the state model of a system be given as 12M

$$[\dot{x}]=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

$$[y]=[3 \quad 4]\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$

Under zero initial conditions find (i) State transition matrix (ii)Transfer function of the system.

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CODE: 13ME2009 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, October-2021
KINEMATICS OF MACHINERY
(Mechanical Engineering)

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

PART-A

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

1. a) Distinguish between machine and mechanism.
   b) Explain Lower pair.
   c) What is the purpose of a Pantograph?
   d) Why two Hooke's joints are used to transmit motion from the engine to the differential of an automobile.
   e) How do you locate Instantaneous centre (I-centre) of a rolling pair?
   f) What is rubbing velocity?
   g) Which type of cam follower generally used in automobile engines?
   h) What is the purpose of offset provided to cam follower mechanism?
   i) Explain Gear Train value.
   j) Explain Contact Ratio.

PART-B

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

UNIT-I

2. a) Derive Gruebler's criterion from Kutzback's criterion for degree of freedom of plane mechanisms. [6M]
   b) Sketch and explain the working of an Oldham coupling. [6M]

(OR)

3. a) Identify the number of links and kinematic pairs (as well as its nature) and calculate the degree of freedom for the Kinematic linkage shown in figure. [6M]

   b) Describe, with a neat sketch, the working of an Elliptical trammel as an inversion of the double slider crank chain. Prove that the path traced by a link of the mechanism is an ellipse. [6M]

UNIT-II

4. a) Classify approximate straight line mechanisms and explain any one of them. [6M]
   b) Derive the condition for correct steering and distinguish between Ackerman and Davis steering gear mechanisms. [6M]

(OR)

5. a) Draw neat sketch of the Peaucellier straight line motion mechanism, and prove that it produces an exact straight line motion. [6M]

   b) A Hooke's joint is used to connect two shafts, which are having 160 degrees as included angle. The driving shaft rotates uniformly at 1400 rpm. Find the maximum acceleration of driven shaft and max torque required if the driven shaft carries a fly wheel of mass 12 kg and 80 mm of radius of gyration. [6M]

UNIT-III

6. Locate all the instantaneous centres of the slider crank mechanism as shown in fig. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: 1. Velocity of the slider A and 2. Angular velocity of the connecting rod AB. [12M]

(OR)

7. a) Draw and explain the acceleration diagram of a slider crank mechanism. [6M]
   b) Explain what is meant by Coriolis Acceleration? How will you find the direction of Coriolis component of acceleration? [6M]

UNIT-IV

8. Draw the profile of a cam operating a knife-edge follower from the following data: [12M]
   (i) follower to move outward through a distance of 30 mm during 90º of the cam rotation,
   (ii) follower to dwell for the next 60º of cam rotation.
   (iii) follower to return to its original position during 120º of cam rotation and
   (iv) follower to dwell for the remaining 90º of cam rotation.
   The cam is rotating clockwise at uniform speed of 375 r.p.m. The minimum radius of the cam is 40 mm and the line of stroke of the follower is offset 15 mm from the axis of the cam and the displacement of the follower to take place with uniform and equal acceleration and retardation on both the outward and the return strokes. Determine: (i) maximum velocity of the follower during outstroke and return strokes (ii) maximum acceleration during outstroke and return stroke.

(OR)

9. Derive the expressions for displacement, velocity and acceleration for a circular arc cam operating a flat-faced follower [12M]
   (i) when the contact is on the circular flank and (ii) when the contact is on circular nose.

UNIT-V

10. a) Classify the different Gear Trains with neat sketches. [6M]
    b) A Pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20º Pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. [6M]

(OR)

11. a) Explain the terminology used in gear. And Classify Different gears. [6M]
    b) An epicyclic train as shown in fig. is composed of a fixed annular wheel A having 150 teeth. Meshing with a wheel B which drives wheel D through an idle wheel C, D being concentric with A. Wheel B and C are carried on an arm which revolves clockwise at 100 r.p.m. about the axis of A or D. If the wheels B and D are having 25 teeth and 40 teeth respectively, find the number of teeth of C and the speed and sense of rotation of C. [6M]