

STRUCTURAL ANALYSIS-I**(Civil Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

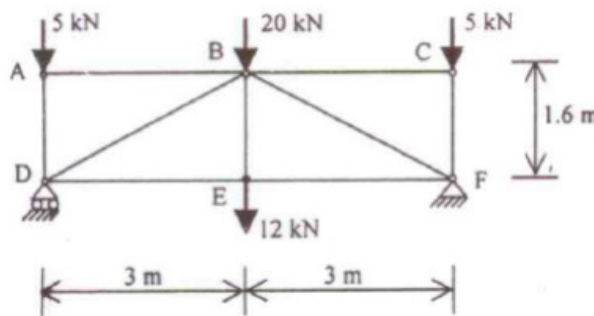
All parts of the Question must be answered at one place

UNIT-I

1. a) What are the Assumptions in analysis of trusses? Explain Briefly. 6 M
- b) Write types of to find the forces of the members in the trusses with a brief discussion about each method. 6 M

(OR)

2. Using method of joints, determine the forces in the members of the trusses shown. 12 M

**UNIT-II**

3. Draw the shear force and bending moment diagrams for propped cantilever beam ABC. Fixed at A, Hinge at B and Cantilever at C. the point load 25kN is acting at C and 50 kN point load is acting 3m from Fixed end. The lengths AB-5m and BC-2m 12 M

(OR)

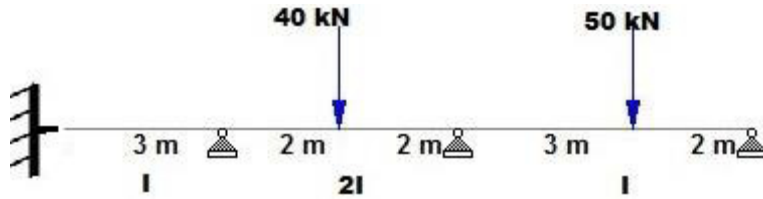
4. A fixed beam 8m span carries a point load of 40 kN acting at 4m of length starting from left end and a concentrated load of 80 kN at a distance of 7 m from the left end. Determine the Fixed end moments and Draw the SF and BM Diagrams. 12 M

UNIT-III

5. A Beam ABCD, AB- 4m, BC-3m and CD – 4m. A point load of 2kN is acting 2.5 m from Support A, another Point Load 3kN is acting middle of the span BC and an UDL of 5kN/m is acting on CD. Determine the support moments by using by Clapeyron's Theorem of three moment equation method. Take EI=Constant. 12 M

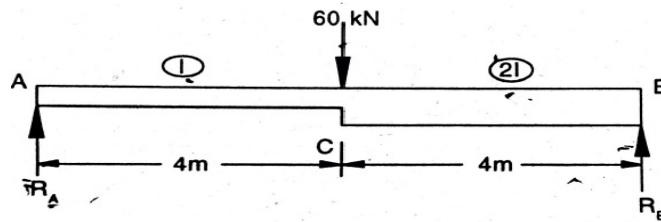
(OR)

6. Analyze the continuous beam as shown in the figure by theorem of three moment equation 12 M
method. Draw also the SFD and BMD. Take $EI = \text{Constant}$.



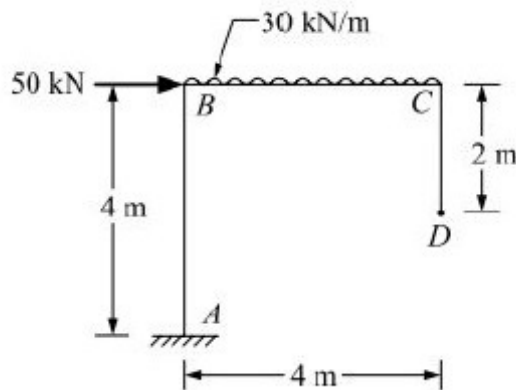
UNIT-IV

7. a) State and explain the Maxwell's theorem of reciprocal deflection 6 M
b) Explain the Castigliano's first and second theorems. 6 M
(OR)
8. Determine the deflection at point "C" of the beam shown in Figure below. Use Strain 12 M
Energy Method.



UNIT-V

9. A truss of ABC of height 4.5 mtrs and width 12mtr and load 9kN acting at peak point 12 M
i.e., at C. Find the horizontal deflection of the joint C, the area of the horizontal
member 150 mm^2 and the area of AC and BC are 200 mm^2 .
(OR)
10. Determine the vertical and horizontal displacements at the free end D in the frame. 12 M
Take $EI = 12 \times 10^{13}$. Use Castigliano's theorem.



AR18

CODE: 18EET209

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, January-2022

CONTROL SYSTEMS (Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 60

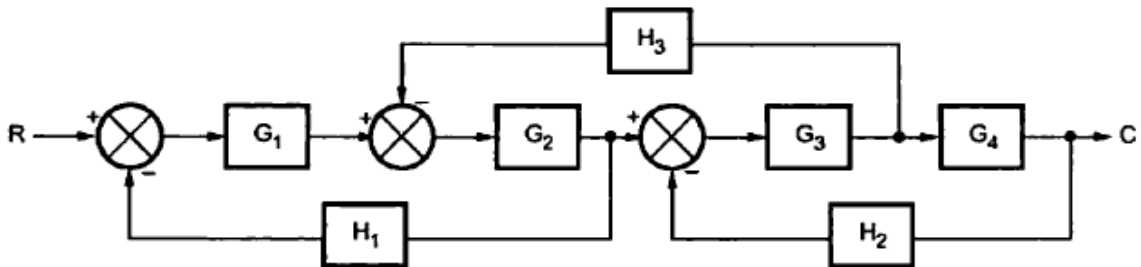
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

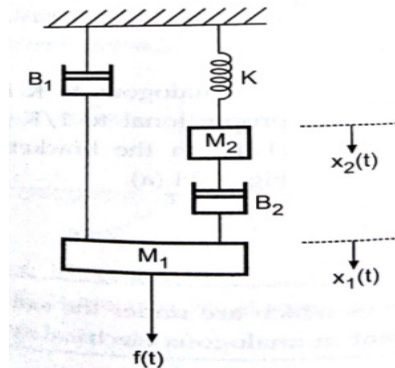
UNIT-I

1. Find the Transfer function $C(s)/R(s)$ for the given system using block diagram reduction technique. 12M

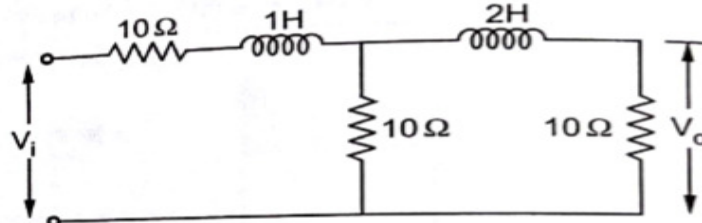


(OR)

2. a) Determine the transfer function from the given mechanical system. 6M



- b) Derive the transfer function of the following network given below 6M

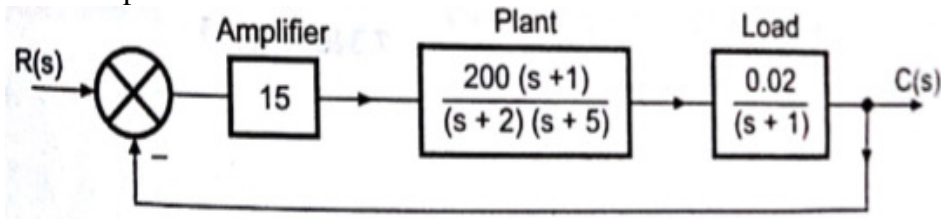


UNIT-II

3. Derive the expression for transfer function of Armature controlled DC servo motor? 12M

(OR)

4. a) Explain the effect of “ ζ ” on second order system performance? 6M
b) For the system shown in fig. Find the error using dynamic error coefficient method 6M
for the input of $6+5t+6t^2/2$.



UNIT-III

5. a) Compare the Stability, absolute stability, conditional stability and relative stability. 4M
b) Determine the stability of the closed-loop transfer function using R-H criteria 8M

$$G(S) = \frac{K}{S^5 + 2S^4 + 3S^3 + 6S^2 + 5S + 3}.$$

(OR)

6. Consider the unity feedback system shown with transfer function 12M
 $G(S) = \frac{K}{S(S+3)(S+5)}$. Draw the root locus and identify the stability.

UNIT-IV

7. a) Express M and N circles in detail. 4M
Determine the Phase angle of the given transfer function 8M

b) $G(S) = \frac{10}{S(1+0.4S)(1+0.1S)}.$

(OR)

8. Draw the Bode plot for a given system whose 12M
 $G(S) = \frac{1000}{S(1+0.1S)(0.5S+1)}$

UNIT-V

9. a) System is characterized by the Transfer function $\frac{Y(S)}{U(S)} = \frac{3}{S^3 + 5S^2 + 11S + 6}.$ 6M
Express whether or not the system is completely controllable and observable.

- b) Find the transfer function of the system having state model, 6M
 $\dot{X} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U$ and $Y = [1 \ 0] X$

(OR)

10. a) What do you mean by compensation? Classify the different types of compensators? 6M
b) What is a lag compensator, obtain the transfer function of lag compensator and draw pole-zero plot? 6M

AR18

CODE: 18CST208

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, January-2022

**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. Write the asymptotic notations used for best case, average case and worst case analysis of algorithms. Write an algorithm for finding maximum number in an array. Give best, worst and average case complexities. 12M

(OR)

2. a) In what way amortized analysis is used for performance analysis of algorithms? Explain. 6M
b) Write Pseudo-code for finding the factorial of a given number using recursion and without using recursion. 6M

UNIT-II

3. a) Write recursive binary search algorithm with an example and analyze time complexity. List the applications of binary search. 8M
b) Represent a high-level description of job sequencing algorithm. 4M

(OR)

4. a) Show that the average case time complexity of quick sort algorithm is $O(n \log_e n)$. 6M
b) Describe the greedy method control abstraction for the subset paradigm. 6M

UNIT-III

5. a) Write about principle of optimality in shortest path problem. 3M
b) What is matrix chain multiplication problem. Consider the matrices $A_1=4 \times 10$, $A_2=10 \times 3$, $A_3=3 \times 12$, $A_4=12 \times 20$ and $A_5=20 \times 7$, find the optimal sequence for matrix multiplication. 9M

(OR)

6. a) Describe the Travelling sales person problem and discuss how to solve it using dynamic programming. 8M
b) Distinguish Greedy method and Dynamic Programming. 4M

UNIT-IV

7. a) Explain backtracking. Illustrate N-Queens problem using backtracking to solve 4-Queens problem. 8M
b) Compare BFS and DFS algorithm. 4M

(OR)

8. a) Solve subset sum problem for the following example, $s = \{3, 5, 6, 7\}$ and $d = 15$. Construct a state space tree. 8M
b) Explain the Hamiltonian Circuit Problem with an example. 4M

UNIT-V

9. a) Explain how the travelling salesperson problem is solved by using LC Branch and Bound. 8M
b) Differentiate between Backtracking and Branch & Bound techniques. 4M

(OR)

10. Give the methods for establishing lower bounds. 12M

AR18

CODE: 18MET207

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, January-2022

**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) With a neat sketch explain the measurement system in detail. 6M
b) Classify various errors and explain them in detail. 6M
- (OR)**
2. a) An Accelerometer has a damping ration of 0.6. calculate the value of frequency ratio so that ratio of steady of relative displacement to amplitude of input displacement is 0.95 6M
b) Explain briefly construction and working of piezoelectric accelerometer with a neat sketch. 6M

UNIT-II

3. a) A strain gauge experiences 2.5 % change in resistance when subjected to a uniaxial strain of 2000 Micro-strain. determine the gauge factor. what would be the sense and magnitude of error if a values of 1.5 is assumed for the gauge factor. 6M
b) What is strain gauge? Derive the expression for gauge factor. 6M
- (OR)**
4. a) With a neat sketch explain the working of strain gauge Torque meter. 6M
b) With a neat sketch explain the working of strobe scope for speed measurement. 6M

UNIT-III

5. a) A platinum thermometer has a resistance of 125Ω at 25°C . 6M
i) Calculate it's resistance at 50°C if the platinum has a resistance temperature coefficient of $0.00392/^{\circ}\text{C}$.
ii) Calculate temperature of RTD if it has resistance of 125Ω
b) Explain the working of an optical pyrometer with a neat sketch. 6M
- (OR)**
6. a) Explain the working of Bourdon tube pressure gauge with the help of a diagram. 6M
b) What is a thermistor? How is it used for temperature measurement? 6M

UNIT-IV

7. a) With the help of a neat sketch explain the principle of operation of Magnetic flow meter. 6M
b) With a neat sketch explain the working of Absorption psychrometer for Humidity measurement. 6M

(OR)

8. a) With a neat sketch explain the working of Rotameter for flow measurement and also derive expression flow discharge. 6M
b) What is a dew point? Explain the working of a Dew point recorder. 6M

UNIT-V

9. 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) List out various advantages and disadvantages of open loop control system. 6M

(OR)

10. a) Give the significance of Bode plots. 6M
b) With a neat sketch explain the block diagram of closed loop control system. 6M

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AR16

CODE: 16EE2013

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, January-2022

**CONTROL SYSTEMS
(Electrical & Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

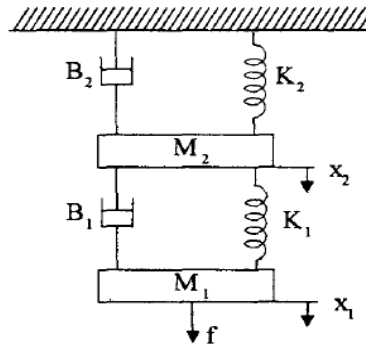
All parts of the Question must be answered at one place

UNIT-I

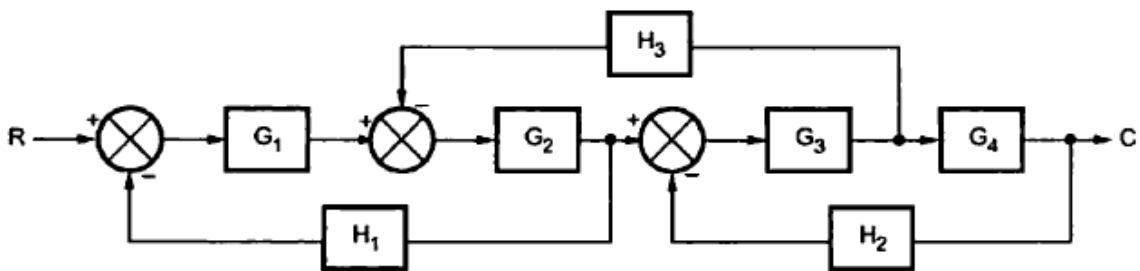
1. a) Write the differences between Open Loop and Closed Loop Systems. 7M
b) Explain the effects of feedback in closed loop control systems. 7M

(OR)

2. a) Determine the Transfer function for the given mechanical system 7M



- b) Find the Transfer function $C(s)/R(s)$ for the given system using block diagram reduction technique. 7M



UNIT-II

3. Derive an expression for the transfer function of an DC Servo motor. 14M

(OR)

4. Find the step, ramp and parabolic error coefficients and their corresponding steady state errors for unity feedback control system 14M
having the transfer function $G(S) = \frac{14(S+3)}{S(S+5)(S^2+2S+5)}$

UNIT-III

5. a) Construct the Routh array and determine the stability of the system whose characteristic equation is $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$. Also comment on the number of poles located on S-plane. 10M
- b) Explain qualitative stability and conditional stability. 4M
- (OR)**
6. Sketch Root Locus for the unity feedback system whose open loop transfer function is 14M
- $$G(S) = \frac{K}{S(S+1)(S+2)}$$

UNIT-IV

7. a) Derive the expressions for Resonant peak, Resonant frequency and Bandwidth in frequency domain analysis. 10M
- b) State the advantages and disadvantages of frequency response 4M
- (OR)**
8. Draw the Bode plot for a given system whose 14M
- $$G(S) = \frac{1000}{S(1+0.1S)(0.5S+1)}$$

UNIT-V

9. a) Explain the design procedure of lag compensator 7M
- b) Obtain the time response of the system represented by state model 7M
- $$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}; B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; C = [1 \quad 0] \text{ Initial state vector } X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$
- (OR)**
10. a) Mention any four advantages of state variable representation 4M
- b) A feedback system is characterized by the closed loop transfer function $T(S) = \frac{8}{S^3 + 2S^2 + 3S + 1}$. Draw the state diagram and obtain the state model. 10M

**STRUCTURAL ANALYSIS-I
(Civil Engineering)****Time: 3 Hours****Max Marks: 70**

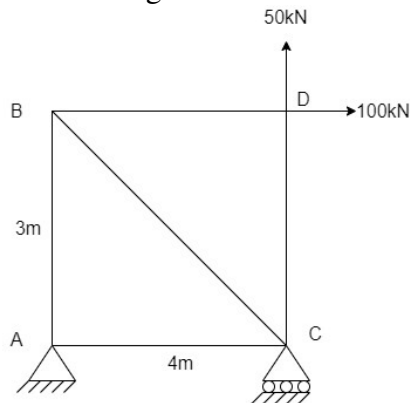
Answer ONE Question from each Unit

All Questions Carry Equal Marks

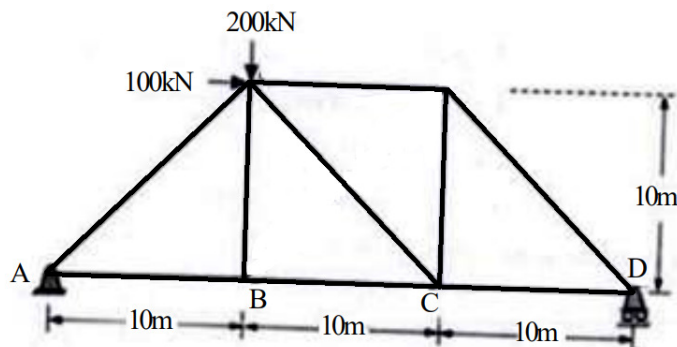
All parts of the Question must be answered at one place

UNIT-I

1. Determine forces in members for the given truss. Assume constant Axial Rigidity 14M

**(OR)**

2. Find the forces in the various members of the truss shown in fig. The ratio of length to cross sectional area for all the member is same. The frame is pinned at A and rests on roller at D 14M

**UNIT-II**

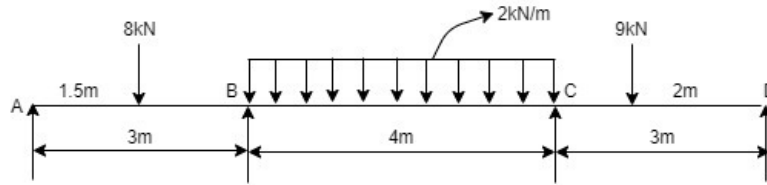
3. a) A Propped Cantilever of length 3m carries a uniform distributed load of 2.5kN/m length over the whole length. Draw SFD and BMD for the cantilever 7M
b) A propped cantilever of span 6 m is subjected to a u.d.l. of 2kN/m over a length of 4 m from the fixed end. Determine the prop reaction and draw the shear force and bending moment diagrams 7M

(OR)

4. A Fixed beam AB is fixed at A and B, the span of AB is 6m. The span AB subjected to a point load 20kN at midpoint of AB, a UDL 10kN/m throughout AB. The support A settles by 10mm and the support B settles by 20mm. Take $EI = 7 \times 10^5 \text{ kN-mm}^2$, analyze the structure and draw SFD and BMD 14M

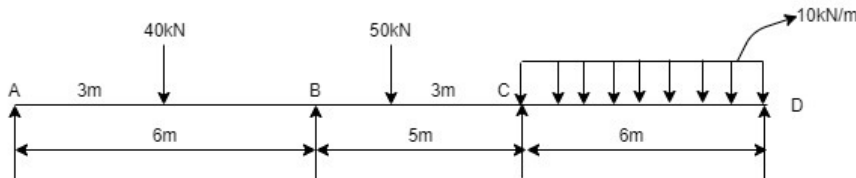
UNIT-III

5. Analyze the continuous beam loaded as shown in fig using three moment theorem. 14M
Draw the bending moment and shear force diagrams.



(OR)

6. Analyze the continuous beam loaded as shown in fig using Three moment theorem. 14M
Draw the bending moment and shear force diagrams.



UNIT-IV

7. Analyze a continuous beam ABC simply supported at A and C. The span AB is 6m and BC is 8m. The span AB is carrying an udl of 30kN/m and span BC carries a load of 40kN at a distance of 3m from B. Use Slope Deflection method. Draw the B.M.D 14M

(OR)

8. A beam of span 6m fixed at one end and simply supported at the other end carries a uniformly distributed load of 50kN/m. Analyse the beam using Energy method. 14M
Draw the shear force and bending moment diagram and determine point of contraflexure.

UNIT-V

9. a) Using strain energy theorem calculate slope θ_A and θ_B and deflection at the center of a simple supported beam (AB) of span L carrying a clockwise couple M kN-m at the center of the beam. Also, draw BMD and SFD. 10M
b) Explain the Castiglianos theorem-I 4M

(OR)

10. A simply supported beam is having a span of 8m. A point load of 48 kN acts on the beam at a distance of 2m from left end. A UDL of 10 kN/m also acts over a distance of 4m from right end. Take $E = 200 \text{ kN/mm}^2$ and $I = 6.50 \times 10^8 \text{ mm}^4$. Using Strain Energy Method, Find the 14M
i) Slope at left end
ii) Deflection under point load

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 process of compilation. 7 M
- b) Explain the Art of Language Design along with the categories of Programming Language 7 M

(OR)

2. a) Explain in brief about regular Expressions and context -free Grammars . 7 M
- b) Explain the Derivation of parse trees . 7 M

UNIT-II

3. a) **Explain the role** of Semantic Analyzer. 7 M
- b) Explain in detail about Evaluating Attributes about Action Routines 7 M

(OR)

4. Explain in brief about Object Lifetime and principal storage allocation mechanisms. 14 M

UNIT-III

5. a) Define Data type .Write the differences between Records (Structures) and Variants (Unions). 7 M
- b) Define Recursion. Explain it with an example. 7 M

(OR)

6. Explain in detail about expression evaluation with suitable examples. 14M

UNIT-IV

7. What is exception handling? Explain in detail about Exception Propagation with suitable example 14 M

(OR)

8. Explain in detail about Review of stack Layout, Calling Sequences 14 M

UNIT-V

9. a) What is multiple inheritance. Explain in detail with an example. 7 M
- b) What is Encapsulation. Explain in detail with an example. 7 M

(OR)

10. a) Explain about Dynamic Method Binding with example. 7 M
- b) What is Object Oriented programming .List out all the Object Oriented Programming features 7 M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****II B.Tech II Semester Supplementary Examinations, January-2022****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 structure.
b) Explain Higher pair.
c) Write the equation of condition for correct steering.
d) Give any examples for an exact straight line mechanism.
e) State Kennedys theorem of instantaneous centers.
f) Distinguish between body centrode and space centrode.
g) Which type of cam follower extensively used in air-craft engines?
h) What is the purpose of offset provided to cam follower mechanism?
i) How to avoid interference in gears?
j) Write down any one application of Epicyclic gear train.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Classify kinematic pairs with a neat sketch. [6M]
b) Explain all the inversions of single slider crank chain. [6M]
- (OR)
3. a) Discuss various types of constrained motions with a neat sketch. [6M]
b) Enumerate any two inversions of double slider-crank mechanism giving examples. [6M]

UNIT-II

4. a) Classify exact straight line mechanisms and explain any one of them. [6M]
b) Two shafts are connected by a Hooke's joint. The driving shaft revolves uniformly at 500 r.p.m. If the total permissible variation in speed of a driven shaft is not to exceed $\pm 6\%$ of the mean speed, find the greatest permissible angle between the centre lines of the shafts. Also determine the maximum and minimum speed of the driven shaft. [6M]
- (OR)
5. a) Derive the condition for correct steering and distinguish between Ackerman and Davis steering gear mechanisms. [6M]
b) Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram depicting the salient features of driven shaft. [6M]

UNIT-III

6. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are equal length. Find the angular velocity of link CD when angle BAD = 60° . [12M]

(OR)

7. PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ = 62.5 mm; QR = 175 mm; RS = 112.5 mm; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS. [12M]

UNIT-IV

8. A cam is to give the following motion to a knife-edged follower 1. Outstroke during 60° of cam rotation 2. Dwell for the next 30° of cam rotation 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when (a) the axis of the follower passes through the axis of the cam shaft, and (b) the axis of the follower is offset by 20 mm from the axis of the cam shaft. [12M]

(OR)

9. Derive expressions for displacement, velocity and acceleration for a tangent cam operating on a radial-translating roller follower: [12M]
(i) when the contact is on straight flank, and (ii) when the contact is on circular nose.

UNIT-V

10. a) Classify Gear trains and explain the importance of idle gears in simple gear train. [6M]
b) Two gear wheels mesh externally and are to give a velocity ratio of 4. The teeth are of involute form of module 8 mm. The standard addendum is 1 module. If the pressure angle is 20° and pinion rotates at 120 r.p.m., Calculate : (i). the number of teeth on each wheel, so that the interference is just avoided & (ii) the length of the path of contact. [6M]

(OR)

11. a) Differentiate Involute & Cycloidal profiles. [6M]
b) An epicyclic gear consists of three gears A, B and C as shown in Figure below. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF. The arm rotates about the centre of A at 18 r.p.m.. If the gear A is fixed, determine the speed of gears B and C. [6M]

