

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024

Strength of Materials

(ME)

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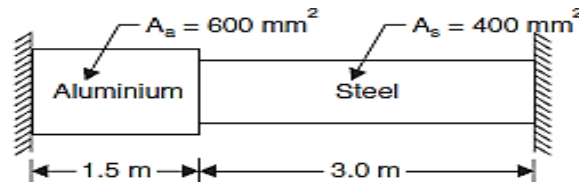
Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* Derive the relation between young's modulus and Bulk modulus [7M]
B The composite bar shown in Figure is rigidly fixed at the ends A and B. Determine the reaction developed at ends when the temperature is raised by 18°C . Given $E_a = 70 \text{ kN/mm}^2$, $E_s = 200 \text{ kN/mm}^2$, $\alpha_a = 11 \times 10^{-6}/^\circ\text{C}$, $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$. [7M]

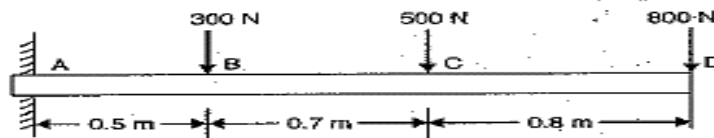


OR

- 2 *A* An axial pull of 20 kN is suddenly applied on a steel rod 2.5 m long and 1000 mm^2 in cross-section. Calculate the strain energy, which can be absorbed in the rod. Take $E = 200 \text{ GPa}$. [7M]
B A 400 mm long bar has rectangular cross-section $10 \text{ mm} \times 30 \text{ mm}$. This bar is subjected to i) 15 kN tensile force on $10 \text{ mm} \times 30 \text{ mm}$ faces, ii) 80 kN compressive force on $10 \text{ mm} \times 400 \text{ mm}$ faces, and iii) 180 kN tensile force on $30 \text{ mm} \times 400 \text{ mm}$ faces. Find the change in volume if $E = 2 \times 10^5 \text{ N/mm}^2$ and $\mu = 0.3$. [7M]

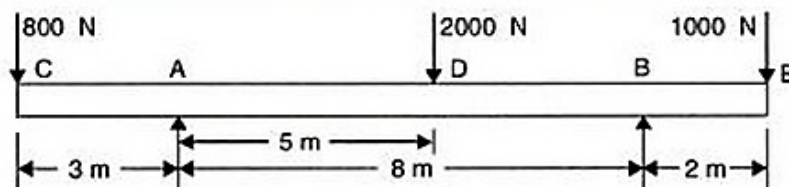
SECTION-II

- 3 Draw SFD & BMD for Given cantilever beam [14M]



OR

- 4 Draw shear force and bending moment diagrams for which is loaded as shown in figure. Determine the points of contra flexure within the span AB. [14M]



SECTION-III

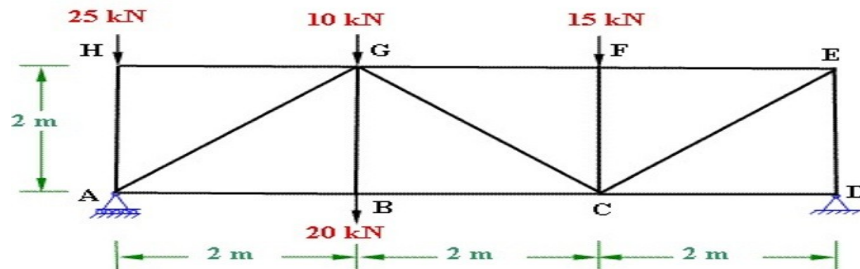
- 5 *A* Derive the section modulus for following. [7M]
 i. Rectangular section ii. Hollow rectangular sectioni.
- B* A rectangular beam 100 mm wide and 150 mm deep is simply supported [7M]
 over a span of 4 meters. if the beam is subjected to a UDL of 5 KN/m, find
 the maximum bending stress induced in the beam

OR

- 6 *A* Prove that the maximum shear stress of a rectangular section is equal to 1.5 [7M]
 times of average shear stress.
- B* Derive an expression for the shear stress at any point in the cross-section of a [7M]
 beam.

SECTION-IV

- 7 Find the support reactions and Forces in the members BC,GC,GF [14M]



OR

- 8 *A* Derive the relation between slope, deflection and radius of curvature [7M]
 B A simply supported beam of length 3 m is subjected to a central load of [7M]
 10KN. Find the maximum slope and deflection of the beam. Take $I=12 \times 10^6$
 mm^4 and $E= 200$ GPa.

SECTION-V

- 9 *A* Derive theory of pure torsion equation $T/J = G\theta/L = \tau/R$ [7M]
 B Determine the diameter of a solid shaft which will transmit 90kW at 160 rpm [7M]
 if the shear stress in the shaft is limited to 60 N/mm^2 . Find also the length of
 the shaft, if the twist must not exceed 1 degree over the entire length. Take G
 $= 8 \times 10^4 \text{ N/mm}^2$.

OR

- 10 *A* Derive a formula for the hoop stress and longitudinal stress in a thin [7M]
 cylindrical shell subjected to an internal pressure.
- B* A cylinder has an internal diameter of 230 mm, has walls 5 mm thick and is [7M]
 1 m long. It is found to change in internal volume by $12.0 \times 10^{-6} \text{ m}^3$ when
 filled with a liquid at a pressure p . If $E = 200 \text{ GN/m}^2$ and $\nu = 0.25$, and
 assuming rigid end plates, determine:
 the values of hoop and longitudinal stresses

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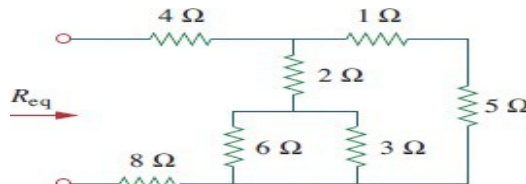
Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* Derive the expressions for delta to star conversion of resistances. [10M]
B State Ohms law. [4M]

OR

- 2 *A* State and explain the working principle of a moving iron instrument. [10M]
B [4M]



Find the Req for the circuit shown in below figure.

SECTION-II

- 3 *A* Principle of operation of a DC Generator. [7M]
B Derive the EMF equation of a DC generator. [7M]

OR

- 4 *A* Explain armature and field control methods of speed control for shunt motor. [10M]
B Discuss the classification of DC motors. [4M]

SECTION-III

- 5 *A* Derive the EMF equation of a transformer. [8M]
B Draw the equivalent circuit of the transformer. [6M]

OR

- 6 *A* How does the induction motor rotates? [10M]
B Define the slip of an induction motor. [4M]

SECTION-IV

- 7 *A* Explain the construction and working of SCR. [10M]
B Draw the circuit of a PN Junction Diode. [4M]

OR

- 8 *A* Explain the operation of a half wave rectifier with a neat sketch. [11M]
B Draw the characteristics of SCR. [3M]

SECTION-V

- 9 *A* Explain the construction and working of a Cathode Ray Tube [10M]
B Discuss Deflection and Sensitivity. [4M]

OR

- 10 *A* Discuss the measurement of voltage and current in CRO [10M]
B Discuss the applications of a CRO? [4M]

Code No: R17A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R17

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

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Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* Define 'Machine' and 'Mechanism'. How are these different from each other? [4M]
 B Describe any three inversions of quadric cycle chain with neat sketches [10M]

OR

- 2 *A* Explain the working of inversion single slider crank chains. [7M]
 B Differentiate between lower and higher pairs in kinematic pairs [7M]

SECTION-II

- 3 *A* What is a Pantograph? What is its use? [4M]
 B Explain Scot Russel mechanism with a neat sketch, Show that it generates a straight line [10M]

OR

- 4 *A* With help of neat sketch explain Conditions for correct steering [7M]
 B In a Davi's steering gear, the distance between the pivots of the front axle is 1 meter and the wheel base is 2.5 meters. Find the inclination of the track arm to the longitudinal axis of the car when it is moving along a straight path? [7M]

SECTION-III

- 5 *A* Explain the method of determining the Coriolis component of acceleration in crank and slotted lever quick return mechanism? [7M]
 B Draw the acceleration diagram of a slider crank mechanism. [7M]

OR

- 6 Determine the velocity and acceleration of the link QR and RS in a four bar mechanism in which PQRS is a four bar mechanism with fixed link PS. Crank PQ rotates uniformly and makes an angle of 60° with PS in anti-clockwise direction. The length of the links are $PQ=62.5\text{mm}$, $QR=175\text{mm}$, $RS=112.5\text{mm}$ and $PS=200\text{mm}$. Crank PQ rotates at 10 radians/ second [14M]

SECTION-IV

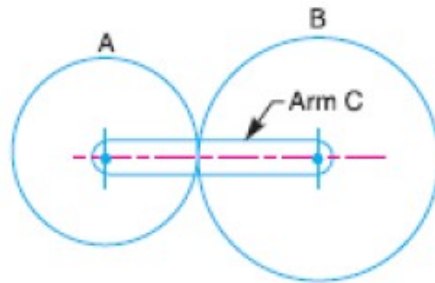
- 7 *A* Define the following terms as applied to cams with neat sketch: [4M]
 i) Base circle ii) pitch circle iii) pressure angle.
 B Draw a cam to raise a valve through a distance of 50 mm in $1/3$ of revolution with SHM, keep it fully raised through $1/12$ of revolution and lower it with harmonic motion in $1/6$ of revolution. The valve remains closed during the rest of the revolution. The diameter of the roller is 20mm and the minimum radius of the cam is 25 mm. The axis of the valve rod passes through the axis of the cam shaft [10M]

OR

- 8 Draw the profile of a cam operating a Knife-edged follower from the following data: (a) Follower to move outward through 40 mm during 60° of a cam rotation; (b) Follower to dwell for the next 30° (c) Follower to return its original position during next 90° (d) Follower to dwell for the rest of cam rotation. The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50mm. If the cam rotates at 500 r.p.m., determine the maximum velocity and acceleration of the follower during the outward stroke and return stroke. [14M]

SECTION-V

- 9 *A* What is gear train? What are its main types? [4M]
B In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 rpm in the clockwise direction, what will be the speed of gear B? [10M]



OR

- 10 An epicyclic gear train, as shown in Figure, has a sun wheel S of 30 teeth and two planet wheel P & P of 50 teeth. The planet wheels mesh with the internal teeth of a fixed annulus A. the driving shaft carrying the sun wheel, transmits 4 kW at 300 r.p.m. The driven shaft is connected to an arm which carried the planet wheels. Determine the speed of the driven shaft and the torque transmitted, if the overall efficiency is 95%. [14M]

