ME 221 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 02

II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

Second Semester

MECHANICAL ENGINEERING

STRENGTH OF MATERIALS - II

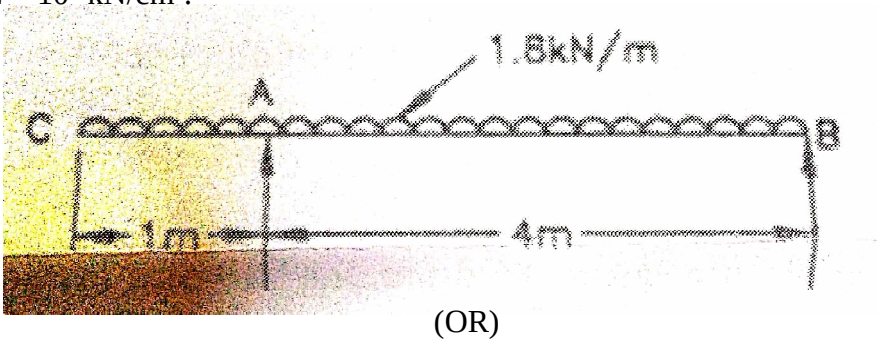
Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit.

All Questions carry equal marks. 5x14=70 M

UNIT - I

1. Find the deflection of a rectangular beam 10 cm X 6 cm at the free end C shown as below. Take E = 10^4 kN/cm^2.



(OR)

2. A beam of length 6m is simply supported at its ends and carries a point load of 40KN at a distance of 4m from the left support. Find the deflection under the load and maximum deflection. Also calculate the point at which maximum deflection takes place, given moment of inertia of the beam is I = 7.33 x 10^7 mm^4 and E = 2.55 x 10^5 N/mm^2.

UNIT - II

3. Derive an expression for the Euler's critical buckling load of a column with hinged-hinged ends.

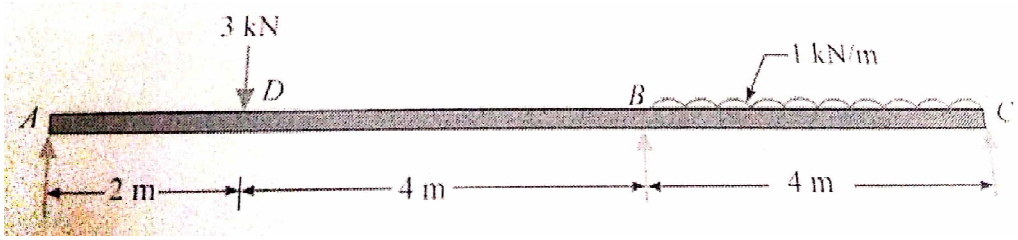
(OR)

4. A 1.2 m long column has a circular cross-section of 45 mm diameter one of the ends of the column is fixed in direction and position and the other end is free. Taking the factor of safety as 3, calculate the safe load using (i) Rankine's formula and take yield stress=560 N/mm^2 and a = I/1600 for pinned ends. (ii) Euler's formula, Young's modulus for cast iron = 1.2 x 10^5N/mm^2.

P.T.O.

UNIT - III

5. A continuous beam ABC 10m long rests on three supports A, B and C at the same level and is loaded as shown in Fig. Determine the moments over the beam and draw the bending moment diagram. Also, calculate the reactions at the supports and draw the shear force diagram.



(OR)

6. A beam AB of uniform section and 6 m span is built-in at the ends. A uniformly distributed load of 3 kN/m runs over the left half of the span and three is in addition a concentrated load of 4 kN at the right quarter as shown in Fig. Determine the fixing moments at the ends and the reactions. Sketch neatly the bending moment and shearing force diagram marking thereon salient values.

UNIT - IV

7. Derive Lami's equation of thick cylinders.

(OR)

8. A crane hook carries a load of 5 kN the line of load being at a horizontal distance of 32 mm from the inside edge of a horizontal section through the center of curvature; and the center of curvature being 38 mm from the same edge. The horizontal section is a trapezium whose parallel sides are 13 mm and 26 mm and whose height is 32 mm. Determine the greatest tensile and compressive stresses in the hook.

UNIT - V

9. Locate the position of the shear centre for a thin channel section having total depth of 500 mm, width of flange 150 mm and thickness of web and flange is 10 mm each.

(OR)

10. A steel disc of uniform thickness and of diameter 900 mm is rotating about its axis at 3000 r.p.m. Determine the radial and circumferential stresses at the centre and outer radius. The density of material is 7800 kg/m^2 and Poisson's ratio = 0.3.