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Register No.:

November 2022

Time – Three hours
(Maximum Marks: 100)

[N.B. 1. Answer all questions under Part-A each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B each question carries 14 marks.]

PART – A

1. Define Elasticity.
2. Write the uses of non ferrous metals.
3. State Hooke's Law.
4. What is suddenly applied load? Write the formula to calculate stress for suddenly applied load.
5. Define Moment of Inertia.
6. Define thick cylindrical shell. Give an example.
7. Write the advantages of hollow shafts over solid shafts.
8. A closely coiled helical spring made of 12mm steel wire having 12 turns of mean radius 60mm elongates by 15mm under a load. Find the magnitude of the load. Take C = $7.5X10^4 N/mm^2$.
9. Define Bending Moment.
10. Define moment of resistance.

PART – B

11. (a) What are the types of cast iron? Explain any three types of cast iron.

(Or)

(b) Draw and explain the stress-strain diagram of mild steel with its salient points.

[Turn over.....

12. (a) A steel bar of 25mm diameter and a length of 1m is subjected to a pull of 25kN. If $E=2 \times 10^5$ N/mm^2, find the elongation, change in diameter and the increase in the volume of the bar. Take 1/m = 0.25.

(Or)

(b) A reinforced concrete column 300mm X 450mm has six steel rod of 25mm diameter. Calculate the safe load for the column,if the allowable stress in the concrete is 5 N/mm^2 and $E_S = 15E_C$.Also find stress in the steel bar.

13. (a) Find I_{xx}, I_{yy}, K_{xx} and K_{yy} of a T-Section with flange 150mm X 50mm thick and web 150mm X 50mm thick.

(Or)

(b) A cylindrical shell 3m long 500mm in diameter is made up of 20mm thick plate. If the cylinder is subjected to an internal pressure of 5 N/mm^2, find the resulting hoop stress, longitudinal stress, change in diameter, change in length and change in volume. Take $E=2\times 10^5$ N/mm^2, and 1/m =0.3.

14. (a) A shaft transmits 100kW at 180 r.p.m. if the allowable stress in the material is 60 N/mm^2. Determine the suitable diameter for the shaft. The shaft should not twist more than 1° in a length of 3 meters. Take C=80kN/mm^2.

(Or)

(b) A weight of 150 N is dropped on to a compression spring with 10 coils made of 12mm diameter steel wire closely coiled to a diameter of 150mm. If the compression is 140mm, calculate height of drop. Take $N = 0.8 \times 10^5$ N/mm^2.

15. (a) A simply supported beam of effective span 6 meters carries three point loads of 30kN, 25kN and 40kN at 1m, 3m and 4.5m respectively from the left support. Draw the SFD and BMD indicating values at salient points.

(Or)

(b) A wooden beam of rectangular section 100mm X 200mm is simply supported over a span of 6 m. Determine the U.D.L it may carry, if the bending stress is not to exceed 7.5 N/mm^2. Estimate the concentrated load it may carry at the centre of the beam with the same permissible stress.
