MODEL EXAM - I

Time: 3 hrs. **(Max. Marks 100)**

[Note : (i) Answer all TEN questions in each PART-A
(ii) Answer division (a) or (b) of each question in PART-B
(iii)Each question carries 3 marks in PART –A and 14 marks in PART-B]

PART-A

1. Define: Elasticity and Plasticity.

2. List the different types of cast iron.

2. Define: Modulus of rigidity and bulk modulus.

4. A mild steel bar of 1 metre length and 20mm diameter is subjected to a tensile load of 20KN. If the young's modulus of the material is $2x10^5$ N/mm², determine the elongation of the bar.

5. State and prove perpendicular axis theorem.

6. List out stresses induced in thin cylindrical shells.

7. Define polar modulus.

8. Define stiffness of spring.

9. What is shear force and bending moment?

10. What are the types of beams?

PART-B

11. A) i) List the defects in steels. (07)

(ii) List out the purpose of alloying. (07)

(OR)

B. What is hardness test? Explain any two in detail.

12. A) i) what is composite bar? (4)

ii) A bar of 30 x 30 mm section is subjected to a pull of 90KN and length of 250mm. The extension of the bar was found to be 0.125 mm, the decrease in lateral dimension is 0.00375mm. Find the Poisson's ratio and value of elastic constants. (10)

(OR)

B. A steel rod 4 m long and 20 mm diameter subjected to an axial load of 45KN . Find the change in dimensions and volume of the rod. Given E= $2x10^5$ N/mm² and 1/m = 0.25. (14)

13. A. The 'I' section with top and bottom flanges 150mm x 20mm and web 100mm x 20mm. Determine the moment of inertia about the centroidal axes X-X and Y-Y. (14)

(OR)

B. i) Distinguish between thin and thick cylinder. (4).

(ii) A channel section is of size 300 mm x 100 mm over all. The base as well as the flanges of the channel are 10mm thick. Calculate Ixx and Iyy. (10)

14. A. i) State the assumptions made in theory of torsion. (4)

ii) A solid shaft 120 mm diameter transmits 180KW at 240rpm. Calculate the maximum intensity of shear stress induced and the angle of twist in degrees for a length of 16m. Take C = 0.8 x 10^5 N/mm². (10)

(OR)

B. i) Differentiate closed coiled and open coiled helical spring. (4)

ii) The mean radius of a closely coiled helical spring is three times the wire diameter. It extends by 10mm under an axial pull of 100N. If the maximum allowable shear stress is 40N/mm². Find the size of the wire and the number of coils. C= 8 x 10^4 N/mm² . (10)

15. A) A simply supported beam 5m long carries concentrated loads of 70KN, 90KN, 50KN and 80KN at a distance 1m, 3m, 4m and 4.5m respectively from left hand support. Find the support reaction. Draw SFD and BMD. (14)

(OR)

B. i) Define moment of resistance and section modulus. (4)

ii) A cantilever beam of 5m long carries point loads of 3KN, 4KN and 5KN at a distance of 1.5m, 3m and 4.5 m from the fixed end. Draw the shear force and bending moment diagrams. (10)