

Model Question Papers - I

Time : 3 Hrs

Max.Marks : 100

[N.B.(1) Answer **ALL** questions i PART - A

(2) Answer division **(A)** or **(B)** of each question in PART - B.

(3) Each question carries **3 marks** in PART - A and **14 marks** in PART - B.]

PART - A

1. Define machinability.
2. What is meant by Nitriding?
3. State hooke's law.
4. Differentiate between thin cylinder and thick cylinder.
5. Write the formula for bending equation.
6. List any two non ferrous metals.
7. Define resilience and prof resilience.
8. A steel rod of 10mm diameter and 3m long is subjected to an axial pull of 10 KN. Find the stress and strain in the bar if the Young's modulus is $2 \times 10^5 \text{ KN/mm}^2$.
9. State parallel axis theorem.
10. State any two applications of laminated spring.

PART - B

- 11.A i) Draw and explain the stress-strain diagram of brittle material. (7)
- ii) Explain cooling curve for pure iron. (7)

OR

- B i) Explain cooling curve for pure iron. (7)

- ii) Explain Hexagonal closed packed structure.(7)
12. A. i) Discuss the composition, properties and automobile application of the following materials.
- a) Stainless steel
 - b) Aluminum alloy and
 - c) Copper alloy
- ii) Explain the stages of processing in metals?(7)

OR

- B. i) State the properties and application of plastics.(7)
- ii) State the properties and application of Polymer matrix composites. (7)
13. A. i) A cement concrete cube of 150 mm size crushers at a load of 330 7.5 KN determine the working stress if factor of safety is 3. (7)
- ii) A bar of length 150 mm and 50 mm in diameter it is subjected to an axial pull of 400 KN the extension in length and contraction in diameter were found to be 0.25 mm and 0.02 mm respectively. Determine the values of elastic constants. (7)

OR

- B i) Calculate the maximum stress and extension in a bar 2m long and 25mm diameter when it is subjected to suddenly applied load of 50 KN and $E = 2 \times 10^5 \text{ N/mm}^2$. (7)
- ii) A weight of 250 N is dropped on to a collar the lower end of a vertical bar 2 metre long and 25 mm in diameter from a height of 100m above calculate the maximum instantaneous stress and extension produced in the section of the bar and $E = 2 \times 10^5 \text{ N/mm}^2$. (7)

13. A. i) A cylindrical shell 3m long 500 mm in diameter is made up of 20 mm thick plate if the cylindrical shell is subjected to an internal pressure of 5 N/mm^2 find the resulting hoop stress longitudinal stress and changes in length, diameter and volume $E = 25 \times 10^5 \text{ N/mm}^2$ and $\frac{1}{m} = 0.3$. (7)

ii) An angle section of 100 mm wide and 120 mm deep overall both the flanges of the angles are 10 mm thick determine the position of centre of gravity of the section and calculate IXX and IYY. (7)

OR

B. i) In a boiler 3m internal diameter is subjected to a steam pressure of 5 bar find the hoop and longitudinal stresses if the thickness of the boiler plate is 14 mm. (7)

ii) T-section of 70 mm wide and 100 mm deep with flanges are 10 mm thick calculate IXX and IYY. (7)

14. A. i) A beam is simply supported at its ends 10m apart. The beam carries loads of 4kN, 3kN and 5kN at distances of 2m, 4.5m and 7.5m respectively from the left end. Draw the S.F and B.M diagrams. (7)

ii) State the assumptions made in theory of simple bending. (7)

OR

B. i). A cantilever beam of length 5m loaded by an udl of 2 kN/m throughout the span with a point load of 1kN at the free end. Draw SFD and BMD. (7)

ii). A cantilever beam of span 2m carries a point load of 600N at its free end. If the beam is rectangular section of 100mm wide and 150mm deep, find the maximum bending stress induced. (7)