

Test I (MEPC 209)

[Max. Marks: 15]

[Duration: 50 Min.]

[Date: 20/02/2025]

Note: Attempt Any two questions out of three questions.

Assume suitably and state, additional data required, if any.

1. A proving ring is 250 mm mean diameter, 38 mm wide and 6.35 mm thick. The maximum stress permitted is 550 N/mm^2 . Find the load to cause this stress, and the load to give a 1 mm deflection in the direction of loading. Take $E = 206 \text{ GN/m}^2$. [Marks 7.5]
2. A beam of uniform section is built-in at each end and has a span of 10 m. It carries a uniformly distributed load of 10 kN/m on the left half portion of the beam together with a 100 kN point load at the mid-span. Find the end reactions and the fixing moments. Also, determine the magnitude and position of the maximum deflection. Take $E = 210 \text{ kN/mm}^2$; $I = 5 \times 10^7 \text{ mm}^4$. [M.7.5]
3. A steel tube of 5 cm internal diameter, 1 meter long and 2 mm thick has closed ends and is filled with water. Neglecting any distortion of the end plates, determine the alteration of pressure when an additional volume of 4 cm^3 of water is pumped into the tube. Take $E_{\text{steel}} = 20 \text{ MN/cm}^2$; Poisson's ratio = 0.3; Bulk Modulus for water = 0.2 MN/cm^2 . [Marks 7.5]