# **Question Paper**

Exam Date & Time: 09-May-2023 (09:30 AM - 12:30 PM)



# MANIPAL ACADEMY OF HIGHER EDUCATION

## INTERNATIONAL CENTRE FOR APPLIED SCIENCES END SEMESTER THEORY EXAMINATION - MAY 2023 II SEMESTER B.Sc (Applied Sciences) in Engg.

Strength Of Materials [IME 123 - S2]

Duration: 180 mins.

#### Marks: 50

### Answer all the questions.

#### Missing data, if any, may be suitably assumed

- Draw the stress strain diagram of mild steel and explain the salient points. <sup>(3)</sup>
  A)
  B) A steel rod of length 10 m initially at a temperature of 20°C. Find the free <sup>(4)</sup> expansion of the rod when the temperature is raised to 80°C. Also find the temperature stress and stress when the free symposium of the rod is
  - the temperature stress and strain when the free expansion of the rod is prevented. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and coefficient of thermal expansion of steel 0.000012/ °C.
  - C) Derive expression for strain energy for uniaxial loading. (3)
- <sup>2)</sup> A simply supported beam is subjected to a combination of loads as shown <sup>(7)</sup> in figure. Sketch the shear force and bending moment diagram.
  - A)



- B) A circular pipe of external diameter 70 mm and thickness 8 mm is used as <sup>(3)</sup> simply supported beam over effective span of 2.5 m. Find the maximum concentrated load that can be applied at the centre of the span if the permissible stress in the tube is 150MPa.
- A composite shaft has aluminium tube of external diameter 60 mm and (5) internal diameter 40 mm closely fitted to a steel rod of 40 mm. If the