

Total No. of Questions: 4



Enrollment No.....
Faculty of Engineering
Mid Sem I Examination April -2022
EN3ES18 Basic Mechanical Engineering

Programme: B. Tech.
Duration: 2 Hrs.

Branch/Specialisation: All
Maximum Marks: 40

- Q.1
- i. The internal Resistance force per unit Actual Area is known as: 1
a) Engineering Stress b) Engineering Strain
c) True Stress d) True Strain
 - ii. Melting point of pure iron is (Degree centigrade): 1
a) 1404 b) 1539 c) 1600 d) 704
 - iii. Failure of material due to constant load at high temperature is called: 1
a) Creep b) Fatigue c) Stress Concentration d) Corrosion
 - iv. Area under stress strain diagram up to elastic limit represent 1
a) toughness b) hardness
c) resilience d) brittleness
 - v. Alpha ferrite has a crystal structure 1
a) BCC b) HCP
c) FCC d) None of these
 - vi. At critical point latent heat of vaporization becomes 1
a) Zero b) Maximum
c) Minimum d) None
 - vii. Which one of the property is an extensive property 1
a) Pressure b) Temperature
c) Volume d) density
 - viii. Which part of the Refrigeration system produces refrigeration effect 1
a) Condenser b) throttle valve
c) evaporator d) compressor
 - ix. Hot/coffee stored in well insulated thermos flask is an example of: 1
a) Isolated system b) Closed system
c) Open system d) None
 - x. Heat and Work are : 1
a) Point function b) System Properties
c) Path function d) Intensive Properties

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- Q.2 i. What are the factors which are considered while selecting the materials. 2
 ii. Draw the stress-strain diagram for ductile material (Mild Steel). 3
 iii. Define Strength, Elasticity, Plasticity, Proof resilience and resilience. 5
 iv. Draw and explain Iron carbon diagram with its significance. 5
- OR
- Q.3 i. What is system and surrounding. 2
 ii. Give the Statement of First Law of Thermodynamics. 3
 iii. Explain the working of VARS cycle with diagram. 5
 iv. Explain Second law of thermodynamics. 5
- Q.4 i. A steel bar 1.5 m long, 50 mm wide and 20 mm thick is subjected to axial tensile load of 120 kN. Find stress and strain on the bar if the extension in the bar is 0.5 mm. 5
 ii. A wire 2m long and 2mm in diameter, when stretched by a load of 8 kg has its length increased by 0.24 mm. Find the stress, strain and Young's modulus of elasticity of the material of the wire. $g = 9.8 \text{ m/s}^2$ 5
 iii. A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C . What is the least rate of heat rejection per KW net output of the engine? 5
 iv. An automobile vehicle of 1500 kg is running at a speed of 60 km/hr. The brakes are suddenly applied and vehicle is brought to rest. Calculate the rise in temperature of brake shoe, if their mass is 15 kg. Take specific heat of brake shoe material as 0.46 KJ/kg-K .

$$T_{\text{source}} = 800^\circ\text{C}$$

$$T_{\text{sink}} = 30^\circ\text{C}$$

$$W = \frac{Q_1 - Q_2}{Q_1} = \frac{T_2 - T_1}{T_2} = \frac{800 - 30}{800}$$