Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

EN3ES18 Basic Mechanical Engineering

Programme: B.Tech. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. The ability of materials to develop a characteristic behaviour under repeated loading known as _____. **1**

(a) Toughness (b) Resilience (c) Hardness (d) Fatigue

ii. The ability of a material to resist plastic deformation known as _____. **1**

(a) Tensile strength (b) Yield strength

(c) Modulus of elasticity (d) Impact strength

iii. If 315 cal of heat is given to the system, and the system does 20 cal of work, find the change in internal energy. **1**

(a) 295 cal (b) 335 cal (c) 0 cal (d) 335 J

iv. 20J of heat energy is extracted from a cold reservoir when 30J of work is done on a refrigerator. What is the coefficient of the refrigerator? **1**

(a) 2/3 (b) 5/3 (c) 3/5 (d) 1/3

v. What is the degree of crank rotation during the completion of a four-stroke cycle? **1**

(a) 90° (b) 279° (c) 180° (d) 360°

vi. Which is the third port, apart from exhaust and suction ports used in two-stroke engine? **1**

(a) Transfer port (b) Transport valve

(c) Top dead centre (d) Bottom dead centre

vii. On what basis fire and water tube boilers are classified? **1**

(a) Depending on the combustion products formed

(b) Depending on the state of fuel

(c) Depending on the steam formation rate

(d) Depending on the tubular heating surface

P.T.O.

viii. By what natural draught is produced? **1**
(a) Air duct (b) Chimney
(c) Locomotive exhaust (d) Air blower

ix. The point through which the whole weight of the body acts is called _____. **1**
(a) Inertial point (b) Centre of gravity
(c) Centroid (d) Central point

x. Where will be the centre of gravity of a uniform rod lies? **1**
(a) At its end
(b) At its middle point
(c) At its centre of its cross sectional area
(d) Depends upon its material

Q.2 i. Define accuracy and precision of measuring instrument. **2**

ii. Discuss any three mechanical properties of engineering materials. **3**

iii. Sketch the iron-carbon equilibrium diagram and state their salient features. **5**

OR iv. A steel bar 1.5 m long , 50 mm wide and 20 mm thick is subjected to an axial tensile load of 120 KN. If the extension in the length of the bar is 0.9 mm, make the calculations for the intensity of stress, strain and modulus of elasticity of the bar material. **5**

Q.3 i. Define and formulate: **3**
(a) Enthalpy of wet steam (b) COP
(c) Dryness fraction

ii. Explain the working of VCRS system in detail with neat and clean diagram. **7**

OR iii. Explain the formation of steam with temperature-enthalpy diagram at different pressure. **7**

Q.4 i. Define: **3**
(a) Stroke length (b) Compression ratio
(c) swept volume

ii. Derive the expression for air standard efficiency of Otto cycle with its P-V & T-S diagram. **7**

OR iii. Explain the working of four stroke diesel engine in detail. **7**

Q.5 i. What is steam boiler? How they are classified? **4**

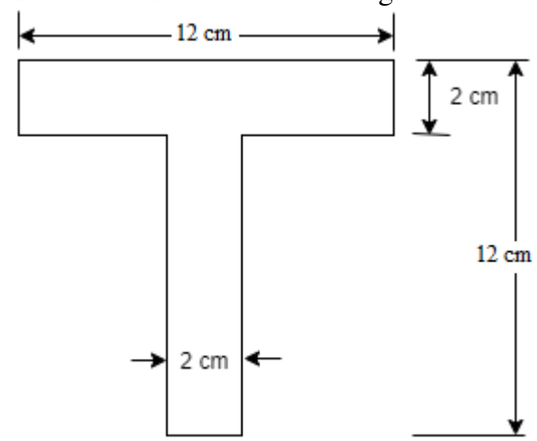
ii. Explain construction and working of Cochran boiler with the help of neat sketch. **6**

OR iii. Derive the expression for draught produced by chimney in mm of water column. **6**

Q.6 Attempt any two:

i. State and prove parallel axis theorem. **5**

ii. Find the C. G. of the T-section shown in figure **5**



iii. Derive an expression for moment of inertia of a triangular section about its centroid axis parallel to base. **5**

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