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EY-72**B.Tech. Ist Semester (CSE, IT & Elect.)****Examination, 2023-24****Basic Mechanical Engineering****Paper - BE - 104****Time : 3 Hours]****[Maximum Marks : 60**

Note :- Answer all questions. Marks allotted and internal choices are given with the questions. Use of steam table is permitted. Assume missing/misprint data suitably. Draw neat and clean diagrams, wherever necessary. Answer all parts of a

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question at one place only.

1. This questions contains five sub-questions. For each sub-question, four possible answers are given, out of which only one answer is correct. Choose the correct answer :

(a) Which one of the following is a boiler accessory ?

(i) Pressure gauge

(ii) Safety valve

(iii) Super heater

(iv) Fusible plug

(b) Mechanical efficiency for an I.C. engine is defined as :

(i) $\frac{\text{Brake Power}}{\text{Indicated Power}}$

(ii) $\frac{\text{Indicated Power}}{\text{Brake Power}}$

(iii) $\frac{\text{Friction Power}}{\text{Indicated Power}}$

(iv) $\frac{\text{Brake Power}}{\text{Friction Power}}$

(c) An ideal absorber of radiation is also an ideal emitter. It is known as :

(i) Kirchhoff's law

(ii) Wien's law

(iii) Planck's law

(iv) Lambert's law

(d) The property of a Material due to which it breaks with little permanent distortion, is called : 6/23

(i) Brittleness

(ii) Ductility

(iii) Malleability

(iv) Plasticity

(e) In arc welding, the electric arc is produced between the work and the electrode by :

(i) Voltage

(ii) Flow of current

(iii) Contact resistance

(iv) All of these

2. (a) State the function of following :

(i) Fusible plug

(ii) Pressure gauge

- (b) Find the volume, enthalpy and entropy of 7 kg of wet steam that is kept in a vessel at pressure 20 bar. The dryness fraction of steam is 0.90.

OR

- (a) Define the following :

(i) Critical point of water

(ii) Sensible heat

- (b) With the help of a neat sketch, describe the working of a Lancashire boiler.

3. (a) Compare spark Ignition (S.I.) engine with compression Ignition (C.I.) engine.

- (b) 0.5 kg of a gas at 65 kpa, 200 °C is heated in a closed rigid vessel till it reaches to 400 °C. Determine the heat required in this heating process if the change in internal energy during the process is + 11.2 KJ/kg.

OR

- (a) Define and explain a heat engine and a refrigerator.

(b) A 4-cylinder, 4-stroke diesel engine has brake mean effective pressure of 6 bar at full load speed of 600 rpm. The cylinder has bore of 20 cm and stroke of 30 cm. Determine the brake power for the engine.

(a) Define the following terms as related to air-conditioning:

(i) Net bulb temperature

(ii) Specific humidity

(b) Determine the steady state heat transfer rate through 8/23 wall, 4 m long, 3 m high and 0.15 m thick, when its two faces are maintained at 55 °C and 20 °C respectively. The thermal conductivity of the wall is 0.6 W/m-k.

OR

(a) Explain the mechanism of heat transfer in natural convection. Also write formula for convection heat transfer.

(b) For the atmospheric air at room temperature of 30 °C and relative humidity of 60%, determine the partial pressure of water vapour and humidity ratio of air. Take pressure of atmospheric air as 1.013 bar.

5. (a) Define following mechanical properties of metals :

(i) Ductility

(ii) Brittleness

(b) Explain the following defects in casting :

(i) Blow holes

(ii) Mismatch

(iii) Sponginess

OR

~~(a)~~ Explain in brief the following pattern allowances :

(i) Shrinkage allowance

(ii) Machining allowance

~~(b)~~ Give composition, properties and uses of grey cast iron.

6. ~~(a)~~ List and state the functions of main parts of a lathe.

~~(b)~~ Write a short note on Tungsten Inert Gas (TIG) welding.

OR

(a) Differentiate between soldering and brazing.

(b) How are drilling machines specified ? Explain.

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