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EW-70

B.Tech. Ist Semester (CSE, IT & Electronics) Examination, 2021-22

Basic Mechanical Engineering

Paper - BE - 104

Time : 3 Hours] **[Maximum Marks : 60**

Note : -Attempt all questions. Marks allotted and internal choice are given with the questions. Answer all parts of a questions at one place only. Use of steam table is permitted. Assume missing/Misprint data appropriately.

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

(i) Which one of the following is a water tube boiler ?

(a) Cochran boiler

(b) Locomotive boiler

(c) Lancashire boiler

(d) Babcock & Wilcox boiler

(ii) First law of thermodynamics refers to conservation of.

(a) Mass

(b) Momentum

(c) Energy

(d) Force

(iii) The mode of heat transfer between a solid surface and the adjacent fluid, that is in motion is known as

(a) Conduction

(b) Convection

(c) Radiation

(d) None of these

(iv) The ability of metal to withstand elongation or bending is known as

(a) Plasticity

(b) Ductility

(c) Hardness

(d) Brittleness

(v) A metal cutting operation performed by means of a rotating abrasive tool, is known as

(a) Grinding

(b) Drilling

(c) Milling

(d) Planing

2. (a) State the function of below listed accessories :

(i) Superheater

(ii) Economiser and

(iii) Air preheater

(b) Find the specific volume, specific enthalpy and specific entropy of wet steam at 15 bar pressure and 0.80 dryness fraction.

OR

(a) Define the following terms with reference to steam :

(i) Dryness fraction

(ii) Critical point.

(b) With the help of a neat sketch describe the working of a cochran boiler.

3. (a) Give a comparison between a 2-stroke and a 4-stroke internal combustion engine.

(b) A stationary mass of gas is compressed without friction from an initial state of $0.4m^3$ and 0.1 M pa to a final state of $0.2m^3$ and 0.1 Mpa, the pressure remaining constant during the process. If there is a transfer of 45 KJ of heat from the gas during the process, calculate the change in the internal energy of the gas.

OR

(a) Define the following terms with reference to thermody namics -

(i) Open system

(ii) Cycle

(iii) Property

(b) The torque developed during the testing of a 4-stroke petrol engine is 56 Nm at a speed of 3000 rpm. The calonfic value of the petrol used is 44000 KJ/kg. deter mine.

(i) Brake power

(ii) Brake thermal efficiency and

(iii) Specific fuel consumption

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

(i) Dew point temperature

(ii) Relative humidity

(b) A plane wall of 10 cm thickness and $3m^2$ area is made of a material, whose condictivity (thermal) is 8.5 W/M-k. The temperatures of the wall surfaces are steady at 100^0C and 30^0C respectively. Find the temperature gradient and heat flow across the wall.

OR

(a) What is difference between natural convection and forced convection ?

(b) Air at 17°C and 60% relative hunidity has been supplied to an air-conditioned room. Calculate the specific humidity and dew point temperature of the air under these conditionss. Assume barometeric pressure to be 1.01325 bar.

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

(i) Elasticity

(ii) Ductility and

(iii) Hardness

(b) List and state the characteristics of a good moulding sands.

OR

(a) List the various types of tools and equipments used in boundary.

(b) What is a pattern ? With the help of neat sketches, de scribe various allowance whcih are usually provided on a pattern.

6. (a) List common operations, which can be carried out on a lathe.

(b) Explain in brief the following types of flames with the help of neat sketches :

(i) Neutral flame

(ii) Casburising flame

(iii) Oxidising flame

OR

(a) Define soldering name types of solder.

(b) Name and describe the principal parts of a milling machine.

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