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Roll No.....

FIRST SEMESTER

B.TECH [Ist YEAR]

END SEMESTER EXAMINATION

NOV- 2018

ME 101; Basic Mechanical Engineering

Time: 3:00 Hours

Max. Marks: 50

Note: Write Part A and Part B separately in the same answer book. Answer any FIVE questions from each Part. Assume suitable missing data, if any

Part A

Q- 1) Define the followings –

- a) Thermal energy reservoirs and Mechanical energy reservoirs. (2)
- b) COP of reversible refrigerator and reversible heat pump (2)
- c) Streamlines and equation of streamline (1)

Q-2 a) A piston- cylinder assembly contains 5 kg of steam. The steam having an internal energy of 2709.9 kJ/kg expands to a state where the internal energy is 2659.6 kJ/kg. During the process, there is heat transfer of 80 kJ to the steam and also a paddle-wheel work transfer of 18.5 kJ. Neglecting the kinetic and potential energies of steam, determine the amount of energy transfer by work from the steam to the piston and the decrease in system energy. (2.5)

Q-2 b) Derive the Steady Flow Energy Equation(SFEE). (2.5)

Q-3a) At steady state, a refrigerator whose COP is 2.5, removes energy by heat transfer from freezer cabinet at 0°C at the rate of 8000 kJ/hr and discharges energy by heat transfer to the surroundings at 20°C. Determine the power input (W_{in}) required by this refrigerator and power input required ($W_{in, rev}$) by a reversible refrigerator cycle operating between same temperature reservoirs. (2.5)

Q- 3b) Prove the equivalence of Kelvin-Planck and Clausius statement. (2.5)

Q-4a) With the help of suitable shear stress and velocity gradient diagram, explain the various types of fluids. (2.5)

P.T.O.

Q-4b) Define: Rotational flow, irrotational flow, uniform flow, non-uniform flow, compressible flow. (2.5)

Q-5a) An engine having the cylinder of bore 15 cm and a stroke of 45 cm operates on an Otto cycle. If the clearance volume is 2000 cm^3 , determine the air standard efficiency of cycle ($\gamma = 1.4$). (2.5)

Q-5b) Using suitable P-v and T-s diagram, explain the various processes of Diesel Cycle. (2.5)

Q-6a) With the help of suitable diagram, explain the working of Pressurized Heavy Water Reactor. (2.5)

6b) Draw the suitable schematic diagram thermal power plant. List the four advantages and four disadvantages of coal based thermal power plant. (2.5)

PART B

Q. 7) Name the various allowances provided on the pattern for a sand casting and state the reasons why are they provided? (5)

Q. 8) Explain the working of the following welding processes with the help of neat sketches. Also Give the applications and advantages of each: (a) Shielded metal arc welding (SMAW) (b) Resistance seam welding (5)

Q.9) With the help of neat sketches discuss the following sheet metal operations: (a) Blanking (b) Punching (c) Metal spinning (d) Bending (e) Drawing (5)

Q.10) Draw the block diagram of a lathe machine and also discuss about its important parts. (5)

Q.11) Sketch and explain the following machining operations:

(a) Taper turning (b) Gang milling (c) Counter boring (d) Reaming (e) Horizontal shaping (5)

Q.12) With neat sketches discuss the following measuring instrument/gauges briefly: (a) Vernier height gauge (b) Plug and ring gauges (5)

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