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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 $0^{o}C$ at the rate of 8000 kJ/hr and discharges energy by heat transfer to the surroundings at $20^{o}C$. 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 (γ =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)

END

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Old

Roll No.....

FIRST SEMESTER [OLD SCHEME] B.TECH [Ist YEAR]

END SEMESTER EXAMINATION NOV- 2018

PAPER CODE: ME-115; TITLE OF PAPER: Basic Mechanical Engineering

Time: 3:00 Hours *Max. Marks: 70*

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

Part A

Q.1. Describe the followings:

i) Thermodynamic equilibrium

ii) Quasi-static process

iii)Zeroth law of thermodynamics

iv) Newton's law of viscosity (1.75x4 =7)

Q. 2(a). A certain water heater operates under steady flow conditions receiving 4.2 kg/s of water at 75^{0}C temperature and enthalpy 313.93 kJ/kg. The water is heated by mixing with steam which is supplied to the heater at temperature of 100.2^{0}C and enthalpy 2676 kJ/kg. The mixture leaves the heater as liquid water at temperature 100^{0}C and enthalpy 419 kJ/kg. How much steam must be supplied to the heater per hour. (3.5)

Q. 2 (b). Using SFEE, derive the expression of work done for well insulated turbines and compressors. (3.5)

Q. 3 (a). What are the refrigerators and heat pumps? Show that COP of a heat pump is greater than the COP of refrigerator by unity. (3.5)

Q.3 (b) Describe the Electrical and stirring work. (3.5)

Q. 4a) With the help of suitable P-v, T-s diagram, describe the various processes of Dual cycle. (3.5)

Q.4 (b). Show that the efficiency of the Otto cycle depends only on the compression ratio. (3.5)

Q. 5 a). A plate which is at a distance of 0.025 mm from a fixed plate moves at 60 cm/s and requires a force of 2 N per square meter to maintain this speed. Determine the viscosity of fluid between the plates. (3.5)

Q. 5b) With the help of suitable P-v and T-s diagram, describe the various processes of diesel cycle. (3.5)

Q.6) The water is flowing through a pipe having diameter 20 cm and 10 cm at section A and B respectively. The rate of flow through pipe is 35 litre/s. The section A is 6 m above the datum and section B is 4 m above the datum. If the pressure at the section A is 39.24 N/ cm^2. Find the pressure at section B. (7)

Q. 7. (a) State and prove Pascal's law. (3.5)

Q. 7. (b)Describe: specific volume, specific gravity and specific weight. (3.5)

Part B

Q.1 Name the various types of patterns. Discuss the construction, working and applications of any two. 7

Q.2 Explain the principle of resistance Spot welding with a neat sketch. Also discuss its advantages, disadvantages and applications. 7

Q.3 Explain the following terms briefly

(a) Foundry (b) Riser (c) Oxidising flame (d) Nuts and bolts (e) Smithing and forging (f) Boring (g) Electric arc 7

Q.4 With a neat sketch explain the construction and working of an upright pillar drilling machine. 7

Q.5 What is Machining? With the help of neat sketches discuss the following machining operations.

(a) Taper turning (b) Counter Sinking (c) Shaping 7

Q.6 With neat sketches discuss the working of the following.

(a) Dial indicators (b) Vernier height gauge

Q.7 Write short notes **any two** on the following. 7

(a) Line standards and end standards (b) Limit gauges (c) Milling operations

END