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SECOND SEMESTER B. TECH(All Branches)

END SEMESTER EXAMINATION May 2019

ME104: Basic Mechanical Engineering

Time: 3 Hour Max. Marks: 50

Note: Answer any five questions from Part -A and five questions from Part-B. Assume suitable missing data, if any. Part-A & Part-B should be written in the same answer book separately

PART-A

Q- 1) Explain the followings –

a) Thermodynamic equilibrium (1.5)

b) Perpetual motion machine of first and second kind (1.5)

c) Specific weight, specific volume and specific gravity, Newton's law of viscosity (2)

Q-2 a) A turbine operates under steady flow conditions, receiving steam at the following state: pressure 1.2MPa, temperature 188°C, enthalpy 2785 kJ/kg, velocity 33.3m/s and elevation 3m. The steam leaves the turbine at the following state: pressure 20 kPa, enthalpy 2512 kJ/kg, velocity 100 m/s and elevation is zero. Heat is lost to the surroundings at the rate of 0.29kJ/s. If the steam flow through the turbine is 0.42kg/s, determine the power output of turbine in kW. (2.5)

Q-2 b) If a gas of volume 6000 cm^3 and at pressure of 100kPa is compressed quasi-statically according to PV^2 = constant until the volume becomes 2000cm^3. Determine the work done. (2.5)

Q-3a) A reversible heat engine operates between two reservoirs at temperature of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoir at temperature of 40°C and -20 °C. The heat transfer to the engine is 2000 kJ and network output of the combined engine refrigerator plant is 360 kJ. Evaluate the heat transfer to the refrigerant and net heat transfer to the reservoir of 40°C. (2.5)

Q- 3b) Prove that energy is a property of the system. (2.5)

Q-4a) With the help of suitable P-V and T-s diagrams, explain the four processes of Otto cycle. Also derive the expression of efficiency of Otto cycle in term of its compression ratio. (2.5)

Q-4b) State and prove the Pascal's law. (2.5)

Q-5a) Water is flowing through a pipe having a diameter of 20cm and 10cm at section 1 and section 2 respectively. The rate of flow through the pipe is 35L/s. The section 1 is 6m above the datum and section 2 is 4m above the datum. If the pressure at section 1 is 39.24 N/cm^2, find the pressure at section 2. (2.5)

Q-5b) What are the factors that are considered while selecting the site of thermal power station. Explain them. (2.5)

Q-6a) With the help of suitable diagram, explain the working of Pressurized Water Reactor. Also discuss the advantages and disadvantages of the same. (2.5)

6b) Draw the suitable layout of Hydro power plant. List the four advantages and four disadvantages the same. (2.5)

PART-B

Q- 7-a) Explain briefly the following defects-blow holes, misrun, cold shut, hot tear, scab, in casting process with neat sketches. (2.5)

Q- 7-b) Explain briefly the investment casting process with neat sketch and its application. (2.5)

Q- 8-a) Define the term "welding" and name the various welding techniques. Differentiate between straight polarity and reverse polarity in electric arc welding. (2.5)

Q- 8-b) Explain briefly the neutral flame, carburizing flame and oxidizing flame in gas welding with its application. (2.5)

Q- 9-a) List the five common lathe operations which can be carried out on a lathe Machine with neat sketches. (2.5)

Q- 9-b) Differentiate between drilling and boring operation with neat sketches. (2.5)

Q- 10-a) Explain briefly bending, drawing and metal spinning in metal forming processes. (2.5)

Q- 10-b) list the different types of comparator. Describe working principle of Sigma comparator (Mechanical type) with a neat sketch. (2.5)

Q- 11-a) Classify the composite materials. Distinguish between particle reinforced and fibre reinforced composite. (2.5)

Q- 11-b) Describe briefly spot resistance welding with a neat sketch and its application. (2.5)

Q- 12-a) Describe the different type of Plain carbon steel with their composition and its applications. (2.5)

Q- 12-b) Draw a systematic diagram of a milling machine. Explain the difference between face milling and peripheral milling. (2.5)