Total No. of Pages -2

Roll No. .....

IIND SEMESTER (A Group)

B.Tech.

END SEMESTER EXAMINATION

MAY-2015

PAPER CODE :ME-115; TITLE OF PAPER: BASIC MECHANICAL ENGINEERING

Time: 3:00 Hours

Max. Marks: 70

**Note :** Attempt *five* questions from "Part A" and *five* questions from "Part B". All questions carry equal marks. Assume suitable missing data, if any.

## Part A

Q.1(a). Show that Energy is a property of a system. (3.5)

Q. 1(b). A domestic refrigerator is loaded with food and the door is closed. During a certain period, the machine consumes 1kWh of electricity and internal energy of the system drops by 5000kJ. Find the net heat transfer for the system. (3.5)

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

Q. 2(b). Using SFEE, what will be the velocity of a fluid leaving a nozzle, if the velocity of approach is very small. (3.5)

Q. 3 (a). What is the qualitative difference between heat and work? Why are heat and work are not completely interchangeable forms of energy? (3.5)

Q3 (b). Show that the efficiency of a reversible engine operating between two given constant temperature is maximum. (3.5)

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

Q.5. (a) State and prove Pascal's law. (3.5)

Q.5. (b) State the Newton's law of viscosity and give examples of its application. (3.5)

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Q.6. The water is flowing through a pipe having diameter 20 cm and 10 cm at section 1 and 2 respectively. The rate of flow through pipe is 35 litre/s. The section 1 is 6 m above datum and section 2 is 4 m above the datum. If the pressure at the section 1 is 39.24 N/ $cm^2$. Find the intensity of pressure at section 2. (7)

## Part B

Q1a). *Explain, Hot Chamber Die Casting with a neat sketch.* (3.5)
Q1b). *Write down the basic steps in casting process.* (3.5)
Q2a). Define pattern. Write any five types of pattern. (3.5)
Q2b). Define term chills, chaplets, and core in casting. (3.5)
Q3a). What is the principle of Resistance welding? Write down types of Resistance welding. (5)
Q3b). Write different types of flames used in Gas welding. (2)
Q4a). What are different operations performed on Lathe Machine? (3)
Q4b). Explain briefly, the drilling and milling operation. (4)
Q5a). Explain, with the neat sketch, process of centrifugal casting?(5)
Q5b). Write the principle of Arc welding. (2)
Q6. Write short notes on any ***three:*** (7)
i) Pattern allowance, ii) Casting defect, iii) shaper and planer, iv)Vernier calliper, v)Edge preparation in welding, vi)Micrometer and its working

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