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Roll No. XAS/ME/054

SECOND SEMESTER

B. TECH. (Group A)

MID SEMESTER EXAMINATION

MARCH-2011

ME-115 BASIC MECHANICAL ENGINEERING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer any ***FIVE*** questions from each part.
All questions carry **TWO** marks each.
Assume suitable missing data, if any.

Part-A

Answer any FIVE of the following;

1[a] (i) Define thermodynamic equilibrium.

(ii) What is quasi-static process? What are the causes of irreversibility in a process?

[b] A fluid at a pressure of a 3 bar and with specific volume of 0.18m^3/kg is contained in a cylinder behind a piston. The fluid expands reversibly to a pressure of 0.6 bar according to law $p = \frac{C}{v^2}$ where C is constant. Calculate the work done by the fluid on the piston.

[c] A closed rigid vessel containing 10 kg of oxygen at 290 K is supplied heat until its pressure becomes two-fold that of initial value. Identify the process and calculate the final temperature, change in internal energy and enthalpy and heat interaction across the system boundary. Take C_v = 0.65 KJ/kgK.

[d] A centrifugal air compressor deliver's 15 kg of air per minute. The inlet and outlet condition's are given :

At inlet

Velocity = 5 m/s, enthalpy = 5 KJ/kg

At outlet

Velocity = 7.5 m/s, enthalpy = 173 KJ/kg. Calculate the power of motor required to drive compressor.

[e] State the Kelvin-plank and Clausis statements of the second law of thermodynamics.

[f] A reversible heat engine receives heat from two thermal reservoirs at 870K and 580 K and rejects 50 KW of heat to a sink at 290 K. If the engine output is 85KW. Calculate the engine efficiency and heat supplied by each reservoir.

Part-B

Answer any FIVE of the following:

2[a] Explain various types of manufacturing process with examples.

[b] (i) What are basic steps involved in any casting process?

(ii) What are the different types of pattern? Explain any TWO.

[c] What are the common allowances provided on pattern and why? Enlist various types of tools and equipments used in foundry shop.

[d] What is the principle of electric arc welding? Explain the term polarity indicating the advantages and disadvantages of having different polarities.

[e] Explain different types of lathe machines. Also enlist various operations that can be performed on this machine.

[f] Briefly explain the working principle of shaper machine. Also explain principal parts of shaper.