

- 4[a] Prove that intensity of pressure at a point in a static fluid is equal in all direction. 5
- [b] Calculate the pressure due to a column of 0.3 m of (a) water (b) an oil of specific gravity 0.08 and (c ) mercury of specific gravity 13.6. Take density of water  $\rho = 1000 \text{ kg/m}^3$ . 9

### Part-B

- 5[a] Define any four manufacturing process. 4
- [b] Discuss the different types of allowances in casting process. 3
- [c] Discuss the basic steps of sand casting process. 7
- 6[a] Explain Arc welding process in detail with neat sketch. 7
- [b] Explain the following measuring instruments (i) Limit Gauges (ii) Micrometer. 7
- 7[a] Discuss the basic operations performed on lathe machine. 7
- [b] Draw and explain the shaper machine. 7
- 8[a] Discuss the basic principles of electric discharge machining. 7
- [b] Discuss Surface Mount technology. 4
- [c] Discuss Automated Assembly. 3

**ME-115 BASIC MECHANICAL ENGINEERING**

*Time: 3 Hours*

*Maximum Marks : 70*

**Note :** Answer any **FIVE** questions selecting at least **TWO** question from each part..  
Assume suitable missing data, if any.

**Part-A**

- 1[a] Explain and give expression for mass balance and energy balance equation in a simple steady flow process. 3
- ✓[b] Explain the equivalence of kelvin planck statement and Clausius's statement of 2nd law of thermodynamics. 3
- [c] Explain the operation of a refrigerator and define its COP. 4
- [d] Show that the COP of a heat pump is greater than the COP of a refrigerator by unity. 4
- 2[a] Explain the Carnot's theorem with block diagram. 4
- [b] A reversible engine during a cycle of operation draws 5 MJ from 400K reservoir and does 840 KJ of work. It also interacts with other two reservoirs at 200K and 300K Find the amount and direction of heat interaction with the two reservoirs. 10
- 3[a] Derive the expression for efficiency of otto cycle  
$$\eta_{otto} = 1 - \frac{1}{(r_k)^{\gamma-1}}$$
  
 $r_k$  is called compression ratio and  $\gamma = C_p/C_v$ . 4
- [b] A 15 cm diameter vertical cylinder rotates concentrically inside a another cylinder of diameter 15.10 cm Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12 N-m is required to rotate the inner cylinder at 100 rpm. Determine the viscosity of the fluid. 10