Total No. of Questions—8] [Total No. of Printed Pages—4+1

Seat No.	

[4756]-203

F.E. (Second Semester) EXAMINATION, 2015

BASIC MECHANICAL ENGINEERING

(2012 Pattern)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Attempt *four* questions out of eight. Q. No. 1 *or* Q. No. 2, Q. No. 3 *or* Q. No. 4, Q. No. 5 *or* Q. No. 6, Q. No. 7 *or* Q. No. 8.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of non-programmable electronic calculator is permitted.

(*v*) Assume suitable data, if necessary.

1. (*a*) Explain the following machine elements : [4]

(1) Axle and Shaft

(2) Open belt drive and Cross belt drive.

(*b*) Differentiate between mechanism and machine. [4]

P.T.O.

(*c*) How engineering materials are classified ? Write a short note on plain carbon steel. [4]

Or

2. (*a*) Explain working of disc brake with schematic (simple) sketch. [4]

(*b*) Differentiate between V-belt drive and Gear drive. [4]

(*c*) Explain any *four* mechanical properties of engineering material. [4]

3. (*a*) Identify and explain suitable process to join two copper tubes. [4]

(*b*) Draw self-explanatory sketches of any *four* sheet metal cutting process. [4]

(*c*) Explain boring operation performed on lathe machine and radial drilling machine. [4]

Or

4. (*a*) Draw neat sketch of sand casting process setup. State advantages, limitations and engineering applications of the process. [6]

(*b*) Explain taper turning, parting and knurling operation performed on lathe machine. [6]

5. (*a*) Explain the following terms : [4]

(1) Zeroth law of thermodynamics

(2) Intensive properties

(3) Open system

(4) Heat Engine

(*b*) Explain measurement of pressure using simple U-tube manometer. [4]

(*c*) A refrigeration system is used to maintain a cold storage at 4 degree C. The heat leakage from surrounding into the cold storage is estimated to be 1800 kJ/min. If COP of the refrigeration system is 1.5. Find : [5]

(1) The amount of heat rejected to the surrounding and

(2) Power required to drive the refrigeration system

Draw the sketch of system.

Or

6. (*a*) The pressure of gas flowing through a pipe is to be measured with simple U-tube mercury manometer. Left arm of the U-tube is connected to gas pipe while right arm is open to atmosphere.

Calculate the absolute pressure to the gas when the level of mercury, in the arm open to atmosphere is : [6]

Case A) 300 mm higher than the level of mercury in left arm and

Case B) 200 mm lower than the level of mercury in left arm.

Draw sketch of the system for Case A) and Case B).

Given : Atmospheric pressure = 10 m of water column

Acceleration due to gravity = 9.81 m/sec^2

Density of mercury = 13600 kg/m^3

(*b*) Explain "Kelvin-Planck and Clausius" statement of second law of thermodynamics. [4]

(*c*) Draw a sketch of Heat Pump and Refrigerator using Heat source and Sink concept. [3]

Prove that : $(COP)_{Heat\ Pump} = 1 + (COP)_{Refrigerator}$

7. (*a*) Draw a layout of solar power plant. State the limitations of the plant. [4]

(*b*) Differentiate between impulse and Reaction turbine (4 points). [4]

(*c*) What do you mean by refrigeration ? Draw a neat sketch of vapour compression refrigeration system and state its application. [5]

Or

8. (*a*) Draw a layout of hydro-electric power plant and explain the energy extraction (energy conversion) process. [4]

(*b*) Differentiate two-stroke and four-stroke cycle engine (4 points). [4]

(*c*) What do you mean by air-conditioning ? Draw a neat sketch of window air-conditioning system. Show the direction of hot & cool air-flow. [5]