Seat No.	

[5056]-20

F.E. EXAMINATION, 2016

BASIC MECHANICAL ENGINEERING

(2015 PATTERN)

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

N.B. :— (*i*) Assume suitable data, if necessary.

(*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*) Attempt *four* questions out of eight. Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** and Q. **7** or Q. **8**.

1. (*a*) What is machine design ? Explain various steps involved in design process.   [6]

(*b*) Draw diagrams of parallel key, Open belt drive with ldler pulley, simple gear train.   [6]

Or

2. (*a*) What is a machine ? Describe function of any *five* machine elements.   [6]

(*b*) Draw neat labeled diagram of four bar mechanism and slider crank mechanism. State their applications.   [6]

3. (*a*) Draw self-explanatory sketches of blanking, forming and drawing operation on sheet metal. [6]

(*b*) Explain reaming, counter sinking and tapping operations on drilling machine. [6]

Or

4. (*a*) Compare arc-welding, brazing and soldering process. [6]

(*b*) Draw sketches of cylindrical and centreless grinding process. State their applications. [6]

5. (*a*) Explain working principle of barometer and thermocouple. State their application. [6]

(*b*) Explain the concept of Heat Engine and Refrigerator with neat sketch.

A reversible heat engine develops 30 kW of work output with efficiency of 30%. Find the heat supplied to the engine and heat rejected from the engine. If the engine is reversed to act as refrigerator with same rate of energy transfer, find its COP. [7]

6. (*a*) Explain the following : [6]

    (1) Any *two* statements of first law of thermodynamics

    (2) COP of Heat Pump and COP of Refrigerator

    (3) System, surrounding and boundary.

(*b*) Define and explain atmospheric pressure, gauge pressure and absolute pressure. The pressure of oil flowing through a pipe is to be measured with simple U-tube mercury manometer. Left arm of the U-tube is connected to pipe while right arm is open to atmosphere. Calculate the absolute pressure of the oil in pipeline when 50 cm of mercury column in right-arm is balanced by 100 cm of oil column in left arm of manometer. Draw the sketch of the setup.

    Given :   Atmospheric pressure = 100 kPa

                 Specific gravity of the oil = 0.8

                 Density of mercury = 13600 kg/m^3. [7]

7. (*a*) Explain working principle of impulse and reaction steam turbine with sketch. [6]

(*b*) Explain working of centrifugal pump with neat diagram and state its application. [7]

Or

8. (*a*) Draw a block diagram of :   [6]

   (1)   Wind power plant, and

   (2)   Solar power plant.

   (*b*) Explain working of reciprocating pump with neat diagram and state its application.   [7]