

Total No. of Questions—8]

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<b>Seat No.</b>	
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**[5151]-110**

**F.E. EXAMINATION, 2017**

**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. 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.

1. (a) Draw neat diagrams of : [6]
- (i) Ball bearing and
  - (ii) Disc brake.
- (b) Define the following mechanical properties of material : [6]  
Strength, Toughness, Hardness, Creep, Plasticity and Elasticity.

P.T.O.

*Or*

2. (a) Draw sketches of V belt drive, chain drive and spur gear drive. [6]
- (b) Compare mechanism and machine (*four* points). Draw a schematic sketch of reciprocating compressor. [6]
3. (a) What is sand casting process ? Draw neat sketch of sand casting process setup and explain steps involved in the process. [7]
- (b) Draw a block diagram of a radial drilling machine and explain tapping operation with sketch. [6]

*Or*

4. (a) Draw neat sketch of soldering process setup. Explain the process in brief. State application of the process. [6]
- (b) Draw a block diagram of lathe machine. Explain function of headstock, tailstock and carriage. [7]
5. (a) State any *two* statements and limitations of first law of thermodynamics. [4]
- (b) Draw schematic sketches of : [4]
- (i) Barometer
  - (ii) U-Tube Manometer
  - (iii) Thermocouple
  - (iv) Isolated system.

(c) A fish freezing plant is to be maintained at  $-10$  degree C. If power required to drive the plant is 30 kW and COP of refrigeration system is 3. Find : [5]

(i) heat sucked (absorbed) from the freezing plant and

(ii) heat rejected to the surrounding.

Draw sketch of the system.

*Or*

6. (a) Explain the following : [4]

(i) System, surrounding and boundary

(ii) Kelvin Plank's statement of second law of thermodynamics.

(b) Draw sketches of heat pump and refrigerator system. Derive the relation between COP of Heat Pump and COP of Refrigerator. [4]

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

Calculate the absolute pressure of the kerosene in pipeline and mercury level in right-arm above datum when kerosene level in left arm is 60 cm above datum. Draw the sketch of the setup.

Given :

Atmospheric Pressure = 10 m of water column

Gauge Pressure of kerosene = 22 kPa

Acceleration due to gravity,  $g = 9.81 \text{ m/s}^2$

Specific gravity of the kerosene = 0.8

Density of mercury =  $13600 \text{ kg/m}^3$ . [5]

7. (a) Draw a sketch of wind power plant. Explain energy transfer (extraction) in the power plant and state its limitations. [6]
- (b) Draw neat sketch of four stroke cycle spark ignition engine. Compare two stroke and four stroke cycle engines. (*Four Imp Points*). [6]

*Or*

8. (a) Draw a sketch of hydro-electric power plant. Explain energy transfer (extraction) in the power plant and state its limitations. [6]
- (b) Explain construction and working of centrifugal pump. [6]