

Total No. of Questions—8]

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Seat No.	
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F.E. (II Semester) Examination, 2016
BASIC MECHANICAL ENGINEERING
(2012 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) What is machine ? How are machine elements classified ? [4]
(b) Explain working of disc brake with schematic (simple) sketch. [4]
(c) How are engineering materials classified ? Write a short note on plain carbon steel. [4]

Or

2. (a) Explain the following machine elements : [6]
(i) Clutch and Coupling
(ii) Open belt drive and Cross belt drive
(iii) Spur gear drive
(b) Define mechanism, machine and state their examples. Explain the mechanism used in four stroke, spark ignition engine with neat sketch. [6]
3. (a) Draw neat sketch of sand casting process setup. State applications of the process. [4]

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- (b) Identify and explain suitable manufacturing process to join two copper tubes. [4]
- (c) Explain drilling operation performed on lathe machine and radial drilling machine. [4]

Or

- 4. (a) Explain hot forging process with neat sketch. [4]
 - (b) Draw self-explanatory sketches of various sheet metal cutting process. [4]
 - (c) Identify and explain suitable manufacturing process to impart smooth surface finish and dimensional accuracy to piston pins, balls and rollers of rolling contact bearing etc. [4]
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- 5. (a) Explain the following terms : [4]
 - (i) Zeroth law of thermodynamics
 - (ii) Extensive properties
 - (iii) Open system
 - (iv) Heat engine
 - (b) Explain measurement of pressure using simple U-tube manometer. [4]
 - (c) A heat pump is used to maintain the house at 24 degree C. The house is losing the heat at the rate of 1800 kJ/min to the surrounding. The heat pump is driven by an electric motor of power rating 12 kW. Find : [5]
 - (i) The amount of heat absorbed from surrounding.
 - (ii) COP of the heat pump.Draw the sketch of the 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 of the gas when the level of mercury, in the arm open to atmosphere is :
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 [6]

- (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 & Sink concept. [3]

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

7. (a) Draw a layout of solar power plant. What are the limitations of the plant ? [4]
- (b) Differentiate between Impulse and Reaction turbine (4 points). [4]
- (c) Explain working of reciprocating pump with neat diagram 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) Explain classification of boilers in brief. [4]
- (c) What do you mean by air-conditioning ? Draw a neat sketch of window air-conditioning system. Show the direction of hot and cool air-flow. [5]