Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[4856]-25

F.E. (Second Semester) EXAMINATION, 2015

BASIC MECHANICAL ENGINEERING

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

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*) Answers of the *two* sections should be written in separate answer-book.

(*vi*) Attempt *six* questions 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**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12**,

Section I

1. (*a*) Explain Joules experiment with neat sketch and state the various statements of first law of thermodynamics. [8]

(*b*) Explain heat engine and heat pump using the concept of heat source and heat sink. Draw neat sketch of the system and write formula of efficiency and COP. [8]

P.T.O.

Or

2. (*a*) Define and explain : C_p, C_v, Open system, Closed system. [8]

(*b*) State and explain Clausius statement of second law of thermodynamics. A household refrigerator with a COP of 1.5 removes heat from the refrigerated space at a rate of 90 kJ/min. Find electric power consumed by the refrigerator and rate of heat transfer to the kitchen air. Draw the sketch of the Refrigerator. [8]

3. (*a*) Explain working of four-stroke petrol engine with neat sketch. [8]

(*b*) Draw block diagram of : [8]

(1) Open Cycle Gas Turbine

(2) Packaged Boiler.

Or

4. (*a*) Explain working of window air-conditioner with neat sketch. [8]

(*b*) Draw block diagram of : [8]

(1) Reciprocating air compressor

(2) Reciprocating pump.

5. (*a*) Explain Fourier's law of heat conduction and derive an expression for heat conduction through thick wall. Explain insulating material with example. [6]

(*b*) Explain nuclear power plant with neat sketch. [8]

(*c*) Draw a layout of wind power plant and explain energy conversion. [4]

Or

6. (*a*) Explain hydro-electric power plant with neat sketch. State its any *two* advantages and disadvantages. [10]

(*b*) State Stefan-Boltzman's law of radiation. Define emissivity and write formula for heat radiation by a grey body. [8]

A black body of temperature 1000 degree C is kept in the surrounding of 200 degree C. Find the heat loss per unit area by radiation from black body.

Given : Stefan-Boltzmann's constant, $\sigma = 5.67 \times 10^{-8}$ W/m^{2}K^4.

Section II

7. (*a*) Explain open belt drive and cross belt drive. [8]

(*b*) How bearings are classified ? Explain ball bearing with neat sketch. [8]

Or

8. (*a*) How are couplings classified ? Explain any *one* coupling with neat sketch. [8]

(*b*) Draw neat sketches of spur gear, helical gear, bevel gear, rack and pinion gear. [8]

9. (*a*) Explain general steps in design process. [8]

(*b*) State applications of any *four* engineering material. [8]

Or

10. (*a*) Explain any *four* sheet metal working process. [8]

(*b*) Explain arc welding process with neat sketch. [8]

11. (*a*) Describe any *two* operations on drilling machines. [6]

(*b*) Explain cylindrical grinding process with neat sketch. [6]

(*c*) Draw neat sketches of any *three* operations performed on milling machines. [6]

Or

12. (*a*) Draw a block diagram of any drilling machine. [6]

(*b*) Explain surface grinding process with neat sketch. [6]

(*c*) Describe any *two* operations performed on lathe machines. [6]