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[4756]-24

F.E. (Second Semester) EXAMINATION, 2015

BASIC MECHANICAL ENGINEERING

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

N.B. :— (i) Attempt *six* questions. Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.

(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-books.

(vi) Assume suitable data, if necessary.

SECTION I

1. (a) Define thermodynamic system. Explain its types with example. [8]

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

P.T.O.

Or

2. (a) Define and explain : C_P , C_V , Enthalpy, Internal Energy. [8]
- (b) State and explain Kelvin-Plancks statement of second law of thermodynamics. A heat engine with efficiency of 30% develops 30 kW of work output. Find the heat supplied to the engine and heat rejected to atmosphere. Draw the schematic sketch of the heat engine. [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) Household Refrigerator.

Or

4. (a) Draw block diagram of : [8]
- (1) Reciprocating air compressor
- (2) Reciprocating pump.
- (b) State classification of boilers. Explain any *two* mountings and any *two* accessories. [8]

5. (a) State and explain Newton's law of cooling. [2]
- (b) Explain concept of thermal resistance in series and parallel. [8]
- (c) Explain hydro-electric power plant with neat sketch. [8]

Or

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

- (b) State Stefan-Boltzmann's law of radiation. Define emissivity and write the 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, $\sigma = 5.67 \times 10^{-8} \text{ W/m}^2\text{K}^4$.

SECTION II

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

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

Or

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

- (b) Draw neat sketches of : [8]

(1) Single plate clutch

(2) Open and Cross belt drive.

9. (a) Explain general steps in design process. [8]
(b) Explain any *four* sheet metal working process. [8]

Or

10. (a) Explain sand casting process with neat sketch. [8]
(b) State applications of any *four* engineering material. [8]

11. (a) Describe any *two* operations on lathe 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 lathe machine. [6]
(b) Explain centreless grinding process with sketch. [6]
(c) Describe any *two* operations performed on drilling machines. [6]