

Roll No.

24008

B. Tech. 1st Semester

Examination – December, 2013

BASICS OF MECHANICAL ENGG.

'F' Scheme

Paper : ME-101-F

Time : Three hours] [Maximum Marks : 100

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions and at least *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Explain : 5 × 4 = 20

- (i) Third law of thermodynamics,
- (ii) Dryness fraction,
- (iii) Effective head of turbine,
- (iv) Pure torsion.

SECTION – A

2. (i) Distinguish between a heat engine, a heat pump and a refrigerator. 10

- (ii) Explain Carnot cycle with its sequence of operation. 10
3. (i) Draw a well-labelled neat sketch of lathe machine and state the functions of its different parts. 10
- (ii) State the difference between a planer and a shaper. 10

SECTION - B

4. (i) A perfect reversed heat engine is used for making ice at -5°C from water available at 25°C . The temp. of freezing mixture is -10°C . Calculate the quantity of ice formed per kwh. For ice specific heat = $2.1 \text{ KJ/kg}^{\circ}\text{K}$ & latent heat = 335 kJ/kg . 10
- (ii) State and briefly explain the various techniques of producing cooling. 10
5. (i) Define and set up the following expression for the specific speed of a hydraulic turbine. 10

$$NS = \frac{N\sqrt{P}}{H^{5/4}}$$

What are the range of specific speed for Pelton, Francis and Kaplan turbine.

- (ii) Explain how does a hydraulic reaction turbine different from a hydraulic impulse turbine. 10

SECTION - C

6. A engine turning 250 rev/min. drives a 40 cm diameter shaft with the help of belt drive system. If the diameter of engine pulleys is 60 cm determine the speed of the shaft. How would the shaft speed be attached if a belt thickness of 10 mm is accounted for. 20

7. (i) A straight bar 450 mm long is 10 mm in diameter for the first 200 mm length and 20 mm in diameter for the remaining length. If the bar is subjected to an axial push of 10 KN, determine, decrease in length of the bar Take $E = 2 \times 10^5$ N/mm². 10

- (ii) State and explain Hook's law. Distinguish between limit of proportionality and elastic limit. 10

SECTION - D

8. (i) Draw a neat diagram showing the main elements of a NC machine and state the function served by each element. 10

(ii) What are the absolute and incremental methods of positioning in Nc and CNC machine tools. 10

9. (i) How a CNC machine differs from a NC machine? 10

(ii) Name & explain main components of a CNC system. 10