Roll No. .....

24355

B. Tech. 6th Semester (ME)

Examination – May, 2014

Mechanical Machine Design - II

Paper : ME-304-F

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, 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 : Question 1 is ***compulsory***. Attempt any *five* questions selecting at least ***one*** question from each Section. Use of PSG design data book is permitted.

1. (a) Define index of sensitivity. $2.5 \times 8 = 20$

(b) What is meant by Basic hole and basic shaft ?

(c) What are the types of springs ?

(d) What do you mean by surging ?

(e) Define bearing modulus.

(f) Define Sommerfeld number.

(g) What do you mean by stalling load ?

(h) Define circular pitch.

SECTION – A

2. (a) Discuss the role of processing in design. 10

(b) Discuss the Erogonomic and value engineering consideration in design. 10

3. (a) Determine the maximum stress produced in a stepped shaft stepped down from 40 mm to 30 mm with a fillet radius of 6 mm. It is subjected to a turning moment of 100 Nm. 10

(b) Write short notes on : 10

(i) Stress concentration,

(ii) Fatigue design,

(iii) Reliability factor.

SECTION – B

4. A mild carbon steel shaft transmitting 11.25 kW at 210 rpm is supported on two bearings 0.58 m apart and has keyed to it two gears. An 18 tooth 20 deg. involute 10 mm module gear is located 0.125 m to the right of the right hand bearing and delivers power to a gear directly below the shaft. An 80 tooth, 6 mm module gear is located 0.15 m to the right of left hand bearing and receives power from a gear directly over it. Calculate the diameter of the shaft assuming f_s=84

5. A helical compression spring made of oil tempered carbon steel, is subjected to a load which varies from 500 N to 800 N. The spring index is 6 and the design factor of safety is 1.43. If the yield shear stress is 700 MPa and the endurance stress is 350 MPa, find the size of spring wire and mean diameter of the spring coil. 20

SECTION – C

6. Discuss the design considerations of Journal bearings. 20

7. A bearing is required for 35 mm shaft. It is to operate for 8 hours per day, 5 days per week for 5 years and is carry a stationary radial load of 2250 N at 2000 rpm, inner ring rotating. There is possibility of light shock. Select a suitable bearing. 20

SECTION – D

8. Design a bevel gear derive between two shafts whose axis are at right angles. Speed of the pinion shaft is 240 rpm and that of the gear shaft is 120 rpm. Pinion is to have 21 teeth of involute profile with module of 20 mm and a pressure angle of 20° and is to be of suitable material. Gear is of cast iron. Power of the shaft is 75 kW. 20

9. Discuss the design consideration of spur gear. 20