Roll No. .....

24355

B. Tech 6th Semester (ME) Examination – May, 2018

MECHANICAL MACHINE DESIGN - II

Paper : ME-304-F

Time : Four 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 : Students have to attempt **5** questions in total with least one question from each section and Q. No. **1** is ***compulsory***. The use of following Design Data book is permitted :

(i) Design Data Handbook (In SI and Metric Units) for Mechanical Engineers by Mahadevan (ii) Design Data Book PSG College of Technology Coimbatore.

1. (a) Define Modulus of rigidity.

(b) What do you mean by undercutting in gears ?

(c) What is surface factor ?

(d) How gears are classified ?

(e) What do you mean by surging ?

(f) What is value engineering ?

(g) What is form factor for gear ?

(h) What are the types of springs ?

(i) What is Soderberg's Criterion ?

(j) Define index of sensitivity. 20

SECTION – A

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

(b) Describe the different types of fluctuating/ variable stresses in detail. 10

3. Write short notes on :

(a) Ergonomic and value engineering considerations in design. 10

(b) Design considerations for Forging. 10

SECTION – B

4. A carriage spring 800 mm long is required to carry a proof load of 5000 N at the center. The spring is made of plates 80mm wide and 7.5mm thick. If the maximum permissible stress for the material of the plates is not to exceed 190 MPa, determine: 1. The no. plates required 2. The deflection of the spring & 3. The radius to which the plates must be initially bent. The modulus of elasticity may be taken as 205 KN/mm^2. 20

5. Explain the procedure and steps involved in designing the shafts under static and dynamic loading. 20

SECTION – C

6. Design a journal bearing for a centrifugal pump from the following data :

Load on the bearing = 20 kgf;

Speed of the journal = 900 r.p.m;

Type of oil = SAE 10

Maximum bearing pressure for the Pump : 14 kgf/cm^2. Calculate the mass of lubricating oil required for artificial cooling, if the rise of temperature of oil be limited to 10 °C. Heat dissipation coefficient = 1232 W /m^2/°C. 20

7. (a) Explain different types of lubrication - Boundary, mixed and hydrodynamic lubrication. 10

(b) Discuss the properties that must be considered in selecting the best material for sliding bearings. 10

SECTION – D

8. (a) Give different classification of Gears and what are the various terms used in spur gear terminology ? 10

(b) What is interference in gears ? How can you overcome it ? Explain. 10

9. It is required to design a two-stage spur gear reduction unit with 20° full depth, involute teeth. The input shaft rotates at 1440 r.p.m. and receives 10 kW power through a flexible coupling. The speed of the output shaft should be aproximately 180 rpm. The gears are made of plain carbon steel 45 C8 (S_u = 700N/mm^2) and heat treated to surface hardness of 240 BHN. The gears are to be machined to the requirement of Grade 10. The service Factor is 1.5. Assume dynamic load to be proportional to the pitch line velocity,

(a) Estimate required value of module .

(b) Select first preference value of module

(c) Determine the correct value of F.S. for pitting.

(d) Give a list of gear dimensions.