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DEPARTMENT OF MECHANICAL ENGINEERING
COLLEGE OF ENGINEERING, GUINDY-ANNA UNIVERSITY: CHENNAI
ME 9305 – DESIGN OF MACHINE ELEMENTS
IV th Semester Industrial Engineering
End Semester Examination, May / June 2013.

Time: 3 hrs

Max.Marks: 100

1. Assume any missing design data suitably
2. Use of Approved Design Data Book is permitted

PART A

(10 X 2 = 20)

Answer all the questions.

1. What do you mean by “factor of safety”? List the important factors that influence the magnitude of factor of safety.
2. Write short notes on the term “Stress Concentration”
3. Discuss the socket and spigot cotter joint.
4. Enumerate different types of riveted joints and rivets.
5. What is Clamp or Compression Coupling?
6. Define “equivalent twisting moment” and “equivalent bending moment”.
7. Define “coefficient of fluctuation of speed” and “coefficient of steadiness”.
8. What is surge in springs?
9. What is Thin film bearings and Thick film bearings?
10. Define flash point.

PART B

5 X 16=80 Marks

11. A shaft is supported by two bearings placed 1.2 m apart. A 600 mm diameter pulley is mounted at a distance of 300 mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.5kN. another pulley 400 mm diameter is placed 200mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is 180 and $\mu = 0.24$. Determine the suitable diameter for a solid shaft, allowing working stress of 70 Mpa in tension and 50 Mpa in shear for the material of shaft. Assume that the torque on one pulley is equal to that on the other pulley.
12. (a). Design a journal bearing for a centrifugal pump from the following data: Load on the journal = 25 kN, speed of the journal = 1000 rpm. Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.017 kg / m-s, ambient temperature of oil = 15.5°C, maximum bearing pressure for the pump = 1.5 N/mm². Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. heat dissipation coefficient = 1232 W/m²/°C

(OR)

- (b). Design a cast iron protective type flange coupling to transmit 20 kW at 1000 rpm from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:

Shear stress for shaft, bolt and key material	= 40 Mpa
Crushing stress for bolt and key	= 80 Mpa
Shear stress for cast iron	= 8 Mpa

Draw a neat sketch of the coupling.

- b) Explain the following representation scheme in solid modelling
 - (i) Generalized Sweep (4)
 - (ii) Constructive Solid Geometry (6)
 - (iii) Boundary Representation (B-rep) (6)

- 14. a) Briefly write about QFD and FMEA with suitable sketches wherever necessary. (8+8)

(OR)

- b) Explain Production Flow Analysis method used in grouping parts into part families. (16)

- 15. a) Explain the five steps involved in implementing BPR. (16)

(OR)

- b) Define Lean Production and write about seven forms of waste in manufacturing. (16)
