Roll No. | | | | | | | | |

B.E. (Part Time) End Semester DEGREE EXAMINATION, APR / MAY 2008

Third Semester

Common to Printing Technology / Industrial Engineering

4

PTME 253 / PTME 552 – DESIGN OF MACHINE ELEMENTS

(Regulation 2002 & 2005)

Time : 3 Hours | Answer ALL Questions | Max. Marks 100

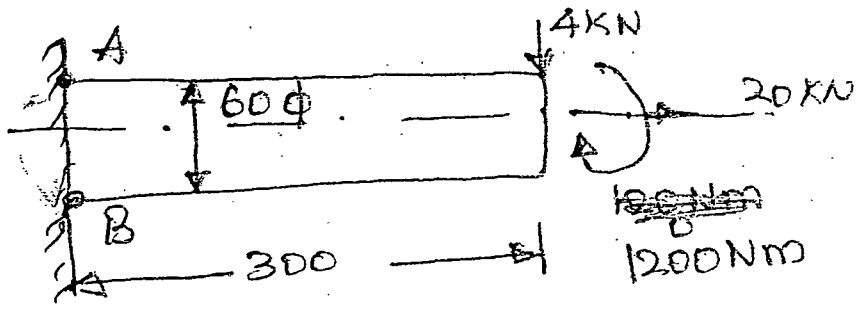
PART-A (10 x 2 = 20 Marks)

1. What is factor of safety ? Enumerate its features.
2. What are the various theories of failures?
3. Distinguish between shaft, axle and spindle from the design point of view.
4. In which situations, flexible couplings are selected.
5. What is nipping in a leaf spring?
6. Briefly explain the design of helical spring for fatigue loading.
7. Briefly discuss about hydrostatic bearings.
8. What factors should be considered when selecting rolling bearing?
9. How are the V-belts designated?
10. How are gears classified.

Part – B (5 x 16 = 80 marks)

11. A M.S shaft rotating at 720 rpm is supported between two bearings 800mm apart. It carriers two pulleys A and B at a distance of 300mm and 600mm respectively from the left bearing 10kw of power is fed into the pulley 'A' with a diameter 400mm and taken out at the pulley ' B' with a diameter of 300mm by vertical belt drives having the same ration of driving tensions, which was observed to be 2.5. Assuming the following working stresses, design the diameter of the shaft $\sigma t = 75\ N/mm^2$; $\sigma s = 45\ N / mm^2$.

12. a) A shaft as shown in fig 1 is subjected to a bending load of 4KN, pure torque of 1200 N-m and an axial pulling force of 20KN. Calculate the stresses at A & B.



OR

b) A machine component is subjected to a flexural stress which fluctuates between + 300 MN/m^2 and -150MN/m^2. Determine the value of minimum ultimate strength according to (1) Gerber relation (2) Modified Goodman relation (3) Soderberg relation.
Take yield strength = 0.55 ultimate strength
Endurance strength = 0.50 ultimate strength and factor of safety =2.

13. a) A rigid flange coupling is to be designed to transmit 20kw at 1000 rpm. Assuming the suitable allowable stresses design the coupling.

OR

b) Design a journal bearing for a centrifugal pump from the following data:
Load on the journal = 20,000N
Speed of the journal = 900 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/mm^2.
Calculate also mass of the lubricating oil required for artificial coding, if rise of temperature of oil be limited to 10°C. Heat dissicipation co-efficient =1232 $N/M^2/°C$.

14. a) A composite spring has two closed coil helical springs. The outer spring is 15 mm larger than the inner springs. The out spring has 10 coils of mean diameter 40mm and wire diameter 5mm. The inner spring has 8 coils of mean diameter 30mm and wire diameter 4mm. When the spring is subjected to an axial load of 400N. Find 1) Compression of each spring 2) load shared by each spring, and 3) shear stress induced in each spring.
The modulus of rigidity may be taken as 84 KN/mm^2.

OR

b) A car is provided with four leaf springs each having 9 leaves. The span length of the spring is 1m. The Cross-Section of the spring is 40 x 5mm. The full load is 8000N. The rear axle takes 60% of the load. Find the stiffness of the springs.

15. a) Select a suitable V-belt and design the drive for a wet grinder. Power is available from a 0.5KW motor running at 750rpm. Drum speed is to be about 100rpm. Drive is to be compact.

OR

b) Design a pair of spur gears to transmit 29 kw at a pinion speed of 1400 rpm. The transmission ratio is 4. Assume suitable materials and stresses.

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