Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 16

B.Tech. (ME) (2012 Onwards) (Sem.–6)

DESIGN OF MACHINE ELEMENTS-II

Subject Code : BTME-601

M.Code : 71185

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**
3. **Only PSG Design data book is allowed in the exam.**

SECTION-A

Answer briefly :

1. What are the factors upon which the coefficient of friction between the belt and the pulley depends?
2. Classify springs according to their shapes.
3. What is the main function of a flywheel in an engine?
4. List the important factors upon which the capacity of a brake depends.
5. Why it is necessary to dissipate the heat generated when clutches operate?
6. What is meant by hydrodynamic lubrication?
7. What are the advantages of pivoted shoe brake over fixed shoe brake?
8. Where are the angular contact and self-aligning ball bearings used? Draw neat sketches of these bearings.
9. What are the various forces acting on a bevel gear?
10. Differentiate between helical and worm gears.

SECTION-B

11. A pulley of 0.85 m diameter revolving at 210 rpm is to transmit 7.8 kW. Find the width of a leather belt if the maximum tension is not to exceed 150 N in 10 mm width. The tension in the tight side is twice that in the slack side. Determine the diameter of the shaft and the dimensions of the various parts of the pulley, assuming it to have six arms. Maximum shear stress is not to exceed 63 MPa.

12. Design a cast iron flywheel for a four stroke cycle engine to develop 115 kW at 160 rpm. The work done in the power stroke is 1.3 times the average work done during the whole cycle. Take the mean diameter of the flywheel as 3 metres. The total fluctuation of speed is limited to 5 per cent of the mean speed. The material density is 7300 kg / m^3. The permissible shear stress for the shaft material is 45 MPa and flexural stress for the arms of the flywheel is 25 MPa.

13. A cone clutch is to be designed to transmit 8 kW at 920 rpm. The cone has a face angle of 12°. The width of the face is half of the mean radius and the normal pressure between the contact faces is not to exceed 0.08 N/mm^2. Assuming uniform wear and the coefficient of friction between the contact faces as 0.21, find the main dimensions of the clutch and the axial force required to engage the clutch.

14. A journal bearing is to be designed for a centrifugal pump for the following data :

    Load on the journal = 14 kN ; Diameter of the journal = 76 mm ; Speed = 1460 rpm ; Atmospheric temperature of the oil = 18°C ; Operating temperature of the oil = 60°C; Absolute viscosity of oil at 60°C = 0.023 kg/m-s. Give a systematic design of the bearing.

15. Design a spur gear drive required to transmit 50 kW at a pinion speed of 820 rpm. The velocity ratio is 3.5 : 1. The teeth are 20° full-depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 MPa. Assume a safe stress of 40 MPa for the material of the shaft and key.

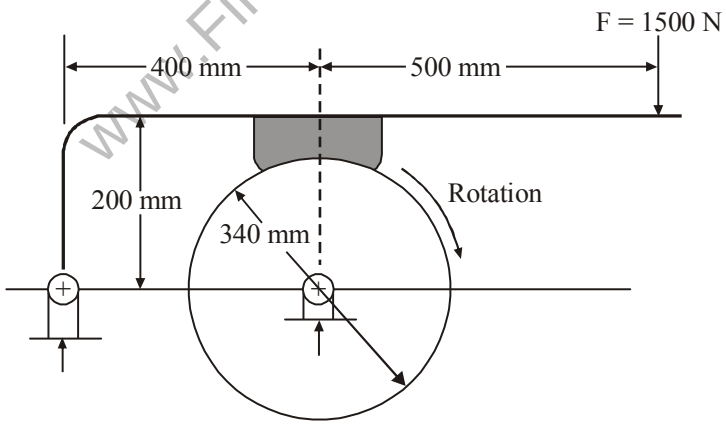
16. Figure below shows a brake with only one shoe, being applied by a 1.5 kN force. Four seconds after force F is applied, the drum comes to a stop. During this time the drum makes 110 revolutions.

    Use the short-shoe approximation and an estimated coefficient of friction of 0.35.

    a) What is the magnitude of the torque developed by the brake?

    b) How much work does the brake do in bringing the drum to a stop?

    c) What is the average braking power during the 4-second interval?



NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.