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

Total No. of Questions : 07

B.Tech (ME) (Sem–6)

DESIGN OF MACHINE ELEMENTS-II

Subject Code : BTME-601

M.Code : 71185

Date of Examination : 30-05-2023

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. **Select suitable design data from the data book wherever applicable.**

SECTION-A

1. Write briefly :

a) How are ends of belts joined? For horizontal belts which side (tight or slack) of the belt should run on the top and why?

b) When a split pulley is used and how it is tightened on a shaft?

c) What are the advantages of a wire rope over fibre rope?

d) Distinguish between simplex, duplex and triplex chains.

e) What is a heiringbone gear? Where they are used?

f) Define hydrodynamic lubrication.

g) What do you understand by 'fluctuation of energy' and 'maximum fluctuation of energy'?

h) What is the function of a spring? In which type of spring the behaviour is non-linear?

i) Why a positive clutch is used?

j) What is a self-energizing brake? When a brake becomes self-locking?

SECTION-B

2. A rope drive is required to transmit 750 kW from a pulley of 1 m diameter running at 450 r.p.m. The safe pull in each rope is 2250 N and the mass of the rope is 1 kg / m length. The angle of lap and the groove angle is 150° and 45° respectively. Find the number of ropes required for the drive if the coefficient of friction between the rope and the pulley is 0.3.

3. A pair of helical gears with 30° helix angle is used to transmit 15 kW at 10000 r.p.m. of the pinion. The velocity ratio is 4 : 1. Both the gears are to be made of hardened steel of static strength 100 N/mm^2. The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module. Find the module and face width from the standpoint of strength and check the gears for wear.

4. Design a journal bearing for a centrifugal pump. The load on the bearing is 4 kN and the journal diameter is 75mm. The shaft runs at 950 r.p.m. and the heat of friction is to be dissipated from the bearing housing. The ambient temperature may be taken as 27°C.

5. A single cylinder internal combustion engine working on the four stroke cycle develops 75 kW at 360 r.p.m. The fluctuation of energy can be assumed to be 0.9 times the energy developed per cycle. If the fluctuation of speed is not to exceed 1 per cent and the maximum centrifugal stress in the flywheel is to be 5.5 MPa, estimate the mean diameter and the cross-sectional area of the rim. The material of the rim has a density of 7200 kg/m^3.

6. A single plate clutch with-berth sides of the plate effective is required to Transmit 25 kW at 1600 r.p.m. The outer diameter of the plate is limited to 300 mm and the intensity of pressure between the plates not to exceed 0.07 N/mm^2. Assuming uniform wear and coefficient of friction 0.3, find the inner diameter of the plates and the axial force necessary to engage the clutch.

7. Design a helical compression spring for a maximum load of 1000 N and deflection of 25mm taking Wahl's factor into consideration. Assume spring index as 5, maximum permissible shear stress for spring wire as 420 MPa and modulus of rigidity as 84 kN/mm^2.

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.