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

Total No. of Questions : 18

B.Tech. (Mechanical Engg.) (Sem.–5)

DESIGN OF MACHINE ELEMENTS

Subject Code : BTME-502-18

M.Code : 78248

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1) What are the conditions under which the power rating of a belt is done?
2) Why is it necessary to dissipate the heat generated when brakes operate?
3) What is the function of clutch in an automobile?
4) What is the function of center bolt in leaf springs?
5) How do you designate the wire ropes?
6) What are the applications of welded joints?
7) Explain the Module and Pressure angle in terms of gears.
8) Why V-belts are made endless?
9) Differentiate between Simplex and Duplex chain.
10) What is the function of a bearing?

SECTION-B

11) A motor drives a machine shaft on which a pulley is mounted. The motor is placed vertically below the pulley having 1500 mm diameter, having belt tensions as 5400 N and 1800 N on the tight side and slack side respectively and are assumed to be vertical. The pulley is 400 mm overhung from the center line of the bearing. Taking the maximum allowable shear stress as 42 MPa, calculate the standard diameter of the shaft.

12) What do you mean by Equalized Stresses in leaf springs? How these are achieved? Explain with the help of neat sketch.

13) A compression coil spring made of an alloy steel is having the following specifications :

Mean diameter of coil = 50 mm ; Wire diameter = 5 mm ; Number of active coils = 20. If this spring is subjected to an axial load of 500 N ; calculate the maximum shear stress (neglect the curvature effect) to which the spring material is subjected.

14) The brake drum of a simple band brake is 750 mm in diameter and is fitted with a steel band 4 mm thick lined with brake lining having a coefficient of friction as 0.25 when not sliding. The arc of contact is 245 degrees. The brake drum is attached to a 600 mm hoisting drum that sustains a rope load of 8200 N. The operating force has a moment arm of 1500 mm and the band is attached 125 mm from the pivot point.

a) Determine the force required to just support the load.

b) What force will be required if the direction of rotation is reversed from the clockwise direction?

c) What width of the steel band is required if the tensile stress is limited to 52.5 MPa.

15) What are the different basis on which the gears are classified? Explain in detail.

SECTION-C

16) Power is transmitted between two pulleys mounted on the parallel shafts rotating in the opposite direction. The pulleys are separated apart at a distance of 1950mm having 0.45m and 0.2m diameter respectively. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension on the tight side of the belt is 1000 N, and the value of μ between the belt and pulley is 0.25? Design the length of the belt required and the angle of contact between the belt and each pulley.

17) A sliding contact bearing is operating at 65°C is proposed for a centrifugal pump. The length of the journal is 0.24m and the load on it is 40 kN. The speed may be taken is 900 rpm. Calculate the heat generated and heat dissipated in the bearing.

18) An automobile compressor is running at 280 rpm is driven by 12.5 kW motor having 1000 rpm. The centre distance between the gears were assumed to be 300mm. Assuming the material of both the gears, design the drive completely. Take pressure angle as 14.5°.

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.