

Code: MEMD1T6B

I M.Tech - I Semester - Regular Examinations – February-2016

**GEAR ENGINEERING
(MACHINE DESIGN)**

Duration: 3 hours

Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1. a) Describe method used to calculate the dynamic load on gears using M.F. spots equation of mechanics. 8 M
b) Compare involute and cycloidal tooth profiles. 6 M

2. A reciprocating compressor is to be connected to an electric motor with the help of spur gears. The distance between the shafts is to be 500 mm. The speed of the electric motor is 900 r.p.m. and the speed of the compressor shaft is desired to be 200 r.p.m. The torque, to be transmitted is 5000 N-m. Taking starting torque as 25% more than the normal torque, determine: i) Module and face width of the gears using 20° stub teeth, and ii) Number of teeth and pitch circle diameter of each gear. Select suitable values of velocity factor and Lewis form factor. 14 M

3. A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500 r.p.m. If the gear has 24 teeth,

determine the necessary module, pitch diameter and face width for 20° full depth teeth. The static stress for cast steel may be taken as 56MPa. The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? 14 M

4. A 25 kW motor running at 1200 rpm drives a compressor at 880 rpm through a 90° bevel gearing arrangement. The pinion has 30 teeth. The pressure angle of the teeth is 14.5° . The face width may be taken as $1/4^{\text{th}}$ the cone distance. Both pinion and gear made of heat treated cast steel with static strength of 200 MPa. Determine the module, pitch and face width of the gears. 14 M

5. a) Why is the center distance an important parameter in the design of worm and worm gear? 5 M

b) Design 20° involute worm and gear to transmit 10 kW with worm rotating at 1400 r.p.m. and to obtain a speed reduction of 12 : 1. The distance between the shafts is 225 mm. 9 M

6. a) What are the different types problems faced while using gears? Explain them briefly. 8 M

b) What is Gear noise? How it effects the gear system? 6 M

7. Design the layout of a gear box for a milling machine to provide twelve output speeds ranging from 160 rpm to 2000rpm. Input speed 1440 rpm. Choose standard speed ratio and construct the structural diagram and kinematic arrangement. Show the number of teeth for all the gears in the kinematic arrangement. 14 M

8. Describe the Effect of Gear Design Variables on the Dynamic Stress of a Multistage Gears. 14 M