

Machine Design-II
(ME-302, DEC 2006)

Time: 3 Hrs
Max Marks: 60

Note: Section A is compulsory. Attempt any four questions from Section B and any two from Section C.

Section-A

1. a) Chain drives are not suitable for timing applications, why?
b) Specify the conditions which must be satisfied for the hydrodynamic lubrication to be possible.
c) Enlist approximate values of efficiencies of worm drive with different number of starts.
d) In a flywheel, the major axis of the elliptical section of the arm in the plane of rotation. Write down the reason for this arrangement.
e) Design of a disc clutch is based on uniform wear condition, why?
f) What do you mean by 'Surge' in springs?
g) Sketch a 6 x 19 wire rope and name its parts.
h) What does morphology mean when applied to CAD process?
i) What is 3D CAD?
j) What is the general structure of CAD software?

Section-B

2. A V-belt drive transmits 25 HP from a 250 mm diameter V-pulley, operating at 1800 rpm to a 900 mm diameter pulley. The centre distance is 1 m and the groove angle is 40° . Take $\mu = 0.2$. If the weight of the belt is 0.01 N/cm^3 and allowable stress is 2 N/mm^2 for belt material, what will be the number of belts required if C size V belts having 2.3 cm^3 cross sectional area used?
3. A band brake has to absorb 4.5 kW at 150 rpm. For long life, the maximum pressure between lining and drum is 0.7MPa. The width of band is 50 mm and $\mu = 0.12$. Find the angle of wrap if the brake drum diameter is 300 mm.
4. A punching press pierces 35 holes per minute in a plate using 10 k N-m of energy per hole during each revolution. Each piercing takes 40% of the time needed to make one revolution. If the motor efficiency is 80%. Find the fluctuation of energy.
5. Discuss the roles of computers in Design process.
6. Write short notes on the lubrication in the gear transmission system.

Section-C

7. A compressor running at 250 rpm is driven by a 15 kW, 870 rpm motor through a $14\frac{1}{2}^\circ$ full depth spur gears. Estimate the module, the beam width and number of teeth on each gear. Assume suitable materials for pinion and gear, Sketch the teeth.
8. A compressor spring is required to exert a minimum force of 250 N and maximum force 600 N. The deflection for this change of load is to be 15 mm. The spring must be fit in a hole of 300 mm diameter. The load is essentially static. Design appropriate spring and sketch the same.
9. Design a journal bearing for a centrifugal pump. The load on the bearing is 3.5 k N and the journal diameter is 7.5 mm. The shaft runs at 900 rpm. The ambient temperature may be taken as 25°C .