

SECTION-B

2. Explain the differences between a machine and a structure by citing suitable examples.
3. Draw and explain approximate straight line mechanisms.
4. Describe the principles of working of brakes of various types.
5. Derive an expression for ratio of driving tensions in rope drive in terms of angle of groove of pulley.
6. Explain the graphical method used for designing the cam profile with SHM.

SECTION-C

7. A shaft which rotates at a constant speed of 160 *r.p.m.* is connected by belting to a parallel shaft 720 mm apart, which has to run at 60, 80 and 100 *r.p.m.* The smallest pulley on the driving shaft is 40 mm in radius. Determine the remaining radii of the two stepped pulleys for a crossed belt and later for an open belt. Neglect belt thickness and slip.
8. A shaft fitted with a flywheel rotates at 250 *r.p.m.* and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000 N-m uniformly during 1/2 revolution and remains constant for the following revolution. It then falls uniformly to 750 N-m during the next 1/2 revolution and remains constant for one revolution, the cycle being repeated thereafter. Determine the power required to drive the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg with radius of gyration of 600 mm.
9. A Proell governor has equal arms of length 300 mm. The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 kg and the mass of the central load is 100 kg. Determine the range of speed of the governor.