Problem of Practices
on
Mechanical Engineering Design
Chapter-11 Bevel Gears

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1. Two cast-iron bevel gears connect shafts at 90° and transmit a tangential force of 1350 N. The teeth are 20° FD and are carefully cut. Take pitch line velocity about 3 m/s and the face width as 50 mm. Calculate the dynamic load F_d.
2. A 50 hp power motor running at 750 r.p.m. drives another shaft at right angle through 90° bevel gearing. The velocity ratio is 3:1. The pinion, mounted on the power motor is of 20° full depth involute. Design the bevel gear drive providing minimum number of teeth on pinion to be 20.
3. A straight bevel gear mesh for shafts intersecting perpendicularly transmits 4 kW with a gear ratio of 3. The pinion speed is 15 rev/ sec, normal pressure angle is 20° and has 20 teeth with a net face width of 26 mm. Estimate the safety factor against bending and wear for the pinion if the allowable stress levels are 80 MPa in bending and 900 MPa in contact stress. The module at the large end is 4 mm.
4. A 20° full depth straight teeth bevel gear rotates at 600 rpm and transmits 10 kW power to other gear rotating at 200 rpm. The outer module is 3.5 mm and the number of teeth on pinion is 24. Ratio between the cone distance and face width is 3. Check the safety of design for steady loading if allowable static stress in bending is 105 MPa.

5. A pair of high grade cast iron bevel gears having shaft at right angles are to have an angular velocity ratio of driver to driven of 2 to 3. The driver is to rotate at 180 rpm and is to transmit 9.75 kW. It is 0.30 m is pitch diameter. Take the width of face as about one third of the length of the pitch element and determine the pitch of the gear. Assume 24 hour/day operation.

6. Design two C.I bevel gears having pitch diameter of 7.5 cm and 10 cm respectively are to transmit 2 kW at 1100 rpm of the pinion. The teeth profiles are 14.5° system. Assume light shock load conditions with 8-10 hours per day service.