

UNIT– III: BEVEL, WORM AND CROSS HELICAL GEARS (PART - A)

1. Define the following terms: (a) cone distance (b) face angle. (May/ June 2014)

Soln. cone distance (R): it is the length of the pitch cone element mathematically, cone distance (R)

$$R = \frac{\text{pitch radius}}{\sin \delta}$$

Tip or face angle: it is the angle subtended by the face of the tooth at the cone centre mathematically,

$$\text{Tip angle} = \text{pitch angle} + \text{addendum angle}$$

2. What is virtual number of teeth in bevel gears? (May/ June 2014)

Soln. Soln. on order to simplify the design calculation and analysis, bevel gears are replaced equivalent spur gear. An imaginary spur gear considered in a plane perpendicular to the tooth at the larger end, is known as virtual or formative or equivalent spur gear.

3. Where do we use worm gears? (May/June 2013)

Soln.

When we require to transmit power between nonparallel and non-intersecting shafts and very high

Velocity ratio, of about 100, worm gears, can be employed. Also worm-gears provide self-locking Facility

4. What is helical angle of worm? (May/ Jun 2016)

Soln. Helical angle is the angle between any helix and an axial line on its right, circular cylinder or cone. Common applications are screws, helical gears, and worm gears. The helical angle is measured in degrees.

5. What are the main losses in the worm gear drive? (May/June 2012)

Soln.

Merits

- 1) Used for very high velocity ratio of about 100
- 2) Smooth and noiseless operation.
- 3) Self-locking facility is available.

Demerits

- 1) Low efficiency.
- 2) More heat will be produced and hence this drive can be operated inside an oil reservoir or extra

Cooling fan is required in order to dissipate the heat from the drive.

- 3) Low power transmission.

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6. How Bevel gears are manufactured? (May/Jun 2016)

Soln. Bevel gears are manufactured by following methods. They are

- a) Gear Milling
- b) Gear Hobbing
- c) Gear Shaping
- d) Bevel Gear Cutting

7. A pair of worm gears is designated as R2/54/10/5. Find the gear ratio (Nov/Dec 2012)

Soln. for example, R2/54/10/5 worm drive means, a right hand worm of star 2, meshes with a worm wheel of 54 teeth and of diameter quotient 10, and with module 5mm

8. Why is phosphor bronze widely used for worm gear? (Apr/May2015)

Soln. The phosphor bronze is widely used for worms drive in order to reduce wear of the worms which will be excessive with cast iron or steel.

9. What are the forces acting on bevel gears?

Soln. the components of the resultant forces are:

- 1. tangential or useful component (F_t), and
- 2. Separating force (F_s): it is resolved into two components. They are
 - (i). Axial force (F_a), and
 - (ii). Radial force (F_r).

10. List out the main types of failure in worm gears. (Apr/May2011)

Soln. the different worm gear tooth failures are:

- (i). Seizure
- (ii). Pitting and rupture