H.T.No. | | | | | | | | | | |

Code No: ME1908 **GEC-R14**

M. Tech I Semester Regular/Suppl. Examinations, January 2017

GEAR ENGINEERING

(Machine Design)

Time: 3 Hours **Max. Marks: 60**

Note: Answer any Five Questions. All questions carry equal marks.

5 × 12 = 60M

1. a) What are the advantages of cycloidal teeth gears and Involute teeth gears? (6M)

   b) Explain gear Tooth failures. (6M)

2. a) Discuss the design procedure for spur gears. (6M)

   b) A bronze spur pinion rotating at 600 r.p.m drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20º full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength. (6M)

3. A pair of helical gears is to transmit 15 kW. The teeth are 20º stub involute and have a helix angle of 45º. The pinion runs at 10,000 r.p.m. Determine suitable centre distance, module and face width from strength considerations and check the gears for wear. (12M)

4. a) What are the various forces acting on a bevel gear? (4M)

   b) A pair of 20º full depth involute teeth bevel gears to connect two shafts at right angles having velocity ratio 3:1. The gear is made of cast steel having allowable static stress as 70 MPa and the pinion is of steel with allowable static stress as 100 MPa. The pinion transmits 37.5 kW at 750r.p.m. Determine Module, face width and pitch diameters. (8M)

5. a) Define the terms Lead, Lead angle, Normal pitch and Helix angle used in worm gearing. (4M)

   b) A worm drive transmits 15 kW at 2000 r.p.m to a machine carriage at 75 r.p.m. The worm is triple threaded and has 65 mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to be 20º full depth involute. The coefficient of friction between the mating teeth may be taken as 0.1. Calculate: 1. Tangential force acting on the worm; 2. axial thrust and separating force on worm; and 3. Efficiency of the worm drive. (8M)

6. Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. The gear G is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear G assuming that all gears have the same module. If the shaft A rotates at 110 r.p.m., find the speed of shaft B. (12M)

7. a) How to use the optimization techniques to design gears. (4M)

   b) What are the applications of traditional and non traditional optimization techniques? (8M)

8. Explain the following in detail

   a) Ray Diagram & Gear box problems. (6M)

   b) Design procedure for a gear box. (6M)

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