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**Question Paper Code : X60854**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020  
Sixth Semester

Mechanical Engineering

ME 2352/ME 1352/10122 ME 603/ME 61 – DESIGN OF TRANSMISSION  
SYSTEMS

(Regulations 2008/2010)

(Common to PTME 2352 – Design of Transmission for B.E. (Part-Time)  
Fifth Semester – Mechanical Engineering – (Regulations 2009))

Time : Three Hours

Maximum : 100 Marks

Approved Design Data Books is permitted to use in examination.

Any missing data may be suitably assumed.

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is the condition to transmit maximum power in a flat belt drive ?
2. How the wire ropes are designated ?
3. Define Module.
4. Differentiate double helical and herringbone gears.
5. What are the forces acting on bevel gear ?
6. Where do we use worm gears ?
7. What is step ratio ?
8. State any three basic rules to be followed while designing a gear box.
9. If a multidisc clutch has 6 discs in driving shaft and 7 discs in driven shaft, then how many number of contact surfaces it will have.
10. Why in automobiles, braking action when traveling in reverse is not as effective as when moving forward ?

PART – B

(5×16=80 Marks)

11. a) A centrifugal pump running at 340 rpm is to be driven by a 100 kW motor running at 1440 rpm. The drive is to work for at least 20 hours every day. The centre distance between the motor shaft and the pump shaft is 2000 mm, suggest a suitable multiple V-belt drive for this application. Also calculate the actual belt tensions and stress induced. (16)

(OR)



b) The transporter of a heat treatment furnace is driven by a 4.5 kW, 1440 rpm induction motor through a chain drive with a speed reduction ratio of 2.4. The transmission is horizontal with bath type of lubrication. Rating is continuous with 3 shifts per day. Design the complete chain drive.

12. a) Design a spur gear drive to transmit 8 kW at 720 rpm and the speed ratio is 2. The pinion and wheel are made of the same surface hardened carbon steel with 55 RC and core hardness less than 350 BHN. Ultimate strength is  $720 \text{ N/mm}^2$  and yield strength is  $360 \text{ N/mm}^2$ .

(OR)

b) Design a helical gear drive to transmit the power of 14.7 kW. Speed ratio 6, pinion speed 1200 rpm, helix angle is  $25^\circ$ . Select suitable materials and design the gear.

13. a) Design a straight bevel gear drive between two shafts at right angles to each other. Speed of the pinion shaft is 360 rpm and the speed of the gear wheel shaft is 120 rpm. Pinion is of steel and wheel of cast iron. Each gear is expected to work 2 hours/day for 10 years. The drive transmits 9.37 kW.

(OR)

b) The input to worm gear shaft is 18 kW at 600 rpm. Speed ratio is 20. The worm is to be of hardened steel and the wheel is made of chilled phosphor bronze. Considering wear and strength, design worm and worm wheel.

14. a) Design a gear box for a drilling machine, to give speed variation between 100 and 500 rpm in six steps. The input shaft speed is 560 rpm. The intermediate shaft is to have three speeds.

(OR)

b) A gear box is to be designed to provide 12 output speed ranging from 160 to 2000 rpm. The input speed of motor is 1600 rpm. Choosing a standard speed ratio, construct the speed diagram and the kinematic arrangement.

15. a) An automobile single plate clutch consists of two pairs of contacting surfaces. The inner and outer radii of friction plate are 120 mm and 250 mm respectively. The coefficient of friction is 0.25 and the total axial force is 15 kN. Calculate the power transmitting capacity of the clutch plate at 500 rpm using

- i) Uniform wear theory and
- ii) Uniform pressure theory.

(OR)

b) Describe with the help of a neat sketch the design procedure of an internal expanding shoe brake. Also deduce the expression for the braking torque.