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Question Paper Code : 41409

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth/Seventh Semester
Mechanical Engineering
ME6601 – DESIGN OF TRANSMISSION SYSTEMS
(Common to Mechanical Engineering (Sandwich) and Mechanical and Automation Engineering)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Use of PSG design data book is permitted in the examination.
Assumptions and assumed data have to be stated clearly.
Answer ALL questions

PART – A (10×2=20 Marks)

1. Define Co-efficient of friction.
2. What are the advantages of chain drives ?
3. Specify the types of gear-failures.
4. In what ways helical gears are different from spur gears ?
5. When do we use bevel gears ?
6. In which gear-drive, self-locking is available ?
7. For what purpose we are using gear-box ?
8. What is a speed diagram ?
9. What are the types of brakes used in modern vehicles ?
10. How does the function of a brake differ from that of a clutch ?

PART – B (5×13=65 Marks)

11. a) Select a flat belt to drive a mill at 250 rpm from a 10 kW, 730 rpm motor. Centre distance is to be around 2000 mm. The mill shaft pulley is of 1000 mm diameter.

(OR)

b) Design a chain drive to actuate a compressor from a 10 kW electric motor at 960 rpm. The compressor speed is to be 350 rpm. Minimum centre distance should be 500 mm. Motor is mounted on an auxiliary bed. Compressor is to work for 8 hours/day.

12. a) Design a pair of spur gears to transmit 20 kW at a pinion speed of 1400 rpm. The transmission ratio is 4. Assume 15 Ni2Cr1Mo15 for pinion and C45 for gear.

(OR)

b) Design a helical gear drive to transmit the power of 15 kW. Speed ratio 6, pinion speed 1200 rpm, helix angle is 25°. Select 15 Ni2Cr1Mo15 for pinion and C45 for gear and design the gear pair.

13. a) Design a bevel gear drive to transmit 7 kW at 1600 rpm for the following data.

Gear ratio	= 3
Material for pinion and gear	= C45 steel
Life	= 10,000 hours

(OR)

b) The input to worm gear shaft is 18 kW and 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 the layout of a 12 speed gear box for a lathe. The minimum and maximum speeds are 100 and 1200 rpm. Power is 5 kW from 1440 rpm Induction motor. Construct the speed diagram using a standard speed ratio. Calculate the number of teeth in each gear wheel and sketch the arrangement of the gear box.

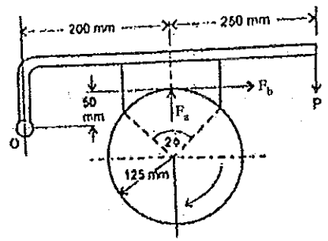
(OR)

b) Design a gear box to give 18 speeds for a spindle of a milling machine. The drive is from an electric motor of 4 kW at 1000 rpm. Maximum and minimum speeds of the spindle are to be around 650 rpm and 35 rpm respectively.

15. a) A single disk clutch having one pair of contacting surface is required to transmit 10 kW at 720 rpm under normal operating condition. Due to space limitation the outer diameter should be limited to 250 mm. The coefficient of friction is 0.25 and the permissible intensity of pressure is 0.5 N/mm^2. Use (a) uniform pressure theory and (b) uniform wear theory and determine the clutch dimensions.

(OR)

b) A single block brake as shown in fig. has the drum diameter 250 mm. The angle of contact is 90° and the coefficient of friction between the drum and the lining is 0.35. If the torque transmitted by the brake is 80,000 N-mm, find the force required to operate the brake.



PART – C **(1×15=15 Marks)**

16. a) Select a V-belt drive for 15 kW, 1440 rpm motor, which drives a centrifugal pump running at a speed of 576 rpm for a service of 8-10 hours per day. The distance between the driver and the driven shaft is approximately 1.2 m. Service factor, $K_s = 1.1$, design factor $N_a = 1.0$, $V_R = 2.5$.

(OR)

b) A temporary elevator is assembled at the construction site to raise building materials, such as cement, to a height of 20 m. It is estimated that the maximum weight of the material to be raised is 5 kN. It is observed that the acceleration in such applications is 1m/s^2, 10 mm diameter, 6 × 19 construction wire ropes with fibre core are used for this application. The tensile designation of the wire is 1570 and the factor of safety should be 10 for preliminary calculations. Determine the number of wire ropes required for this application. Neglect bending stresses.

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