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Question Paper Code : 50878

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Sixth/Seventh Semester
Mechanical Engineering
ME 6601 – DESIGN OF TRANSMISSION SYSTEMS
(Regulations 2013)
(Common to Mechanical Engineering (Sandwich) Mechanical and Automation
Engineering)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Write the advantages of V belts over flat belts.
2. List the chain drive failures.
3. What is meant by stub tooth in gear drives ?
4. Define virtual number of teeth in helical gears.
5. What are the disadvantages of worm gear drive ?
6. What is meant by Mitre gears ?
7. Draw the ray diagram for 12 speed gear box.
8. Write any two principles to be followed to obtain optimum design in gear box.
9. Write the difference between dry and wet clutch.
10. What is meant by self-energizing brakes ?

PART – B   (5×16=80 Marks)

11. a) Design a V-belt drive to the following specifications. Power to be transmitted 75 kW, speed of driving wheel 1440 rpm, speed of driven wheel 400 rpm, diameter of driving wheel 300 mm, centre distance 2500 mm, service 16 hours/day.

(OR)

b) Select a wire rope for a vertical mine hoist to lift a load of 20 kN from a depth of 500 meters. A rope speed of 3 m/s is to be attained in 10 seconds.

12. a) Design a pair of helical gears to transmit 10 kW at 1000 rpm of the pinion. Speed ratio 5. Take 40/Ni2 Cr1 Mo28 steel as material for pinion and gear. Assume minimum number of teeth as 20 and Tabulate the results.

(OR)

b) Design a pair of spur gears to transmit 20 kW at a pinion speed of 1400 rpm. The transmission ratio is 4. Pinion and gear are made of 15 Ni2 Cr1 Mo15 and C45 steels respectively. Assume pressure angle 20° and minimum number of teeth 20.

13. a) Design a worm gear drive to transmit 22.5 kW at a worm speed of 1440 rpm. Velocity ratio is 24 : 1. An efficiency of atleast 85% is desired. The temperature rise should be restricted to 40° C. Determine the required cooling area.

(OR)

b) Design a bevel gear drive to transmit 7.36 kW at 1440 rpm for the following data. Gear ratio 3, material for pinion and gear C45 surface hardened.

14. a) Draw the kinematic diagram and speed diagram of the headstock gear box of a turret lathe having arrangement for 9 spindle speeds ranging from 31.5 rpm to 1050 rpm. Calculate the number of teeth on each gear. Minimum number of teeth on a gear is 25. Also calculate the percentage deviation of the obtainable speeds from the calculated ones.

(OR)

b) The spindle of a pillar drill is to run at 12 different speeds in the range of 100 rpm and 355 rpm. Design the gear box. Sketch the layout of the gear box, indicating the number of teeth on each gear. The gear box receives 5 kW from an electric motor running at 360 rpm. Also sketch the speed diagram.

15. a) A differential band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the maximum torque on the drum is 1000 Nm. The band brake embraces 2/3rd of the circumference. One end of the band is attached to a pin 100 mm from the fulcrum and the other end to another pin 80 mm from the fulcrum and on the other side of it when operating force is also acting. Coefficient of friction 0.3, find the operating force. Design the steel band, shaft and key. The permissible stresses may be taken as 70 MPa in tension, 50 MPa in shear and 20 MPa in bearing. The bearing pressure for the brake lining should not exceed 0.2 N/mm^2.

(OR)

b) A single dry plate clutch is to be designed to transmit 7.5 kW at 900 rpm. Find (i) diameter of the shaft (ii) mean radius and face width of the friction lining assuming the ratio of the mean radius to the face width as 4 (iii) outer and inner radii of the clutch plate (iv) Dimensions of the spring, assuming that the number of springs are 6 and spring index 6 . Shear stress for the shaft material 40 MPa. Coefficient of friction 0.25, pressure 0.07 MPa. Allowable shear stress for spring wire may be taken as 420 MPa.