QUESTION BANK

VI Semester

B.E., MECHANICAL ENGINEERING

19ME601-DESIGN OF TRANSMISSION SYSTEM

Regulations 2019

Design a V-belt drive to the following specifications: Power to be transmitted = 7.5 kW Speed of driving wheel = 1440 r.p.m. Speed of driven wheel = 400 r.p.m. Diameter of driving wheel = 300 mm Centre distance =1000 mm Service = 16 hours/ day

Design a V-belt drive for a centrifugal pump running at 340 rpm is to be driven by a100 Kw motor running at 1440 r.p.m. The drive is to work for at least 20 hours every day. The center distance between the motor shaft and the pump shaft is 1200 mm Suggest a suitable multiple V-belt drive for this application.

Design a Flat-belt drive for a fan running at 360 r.p.m.which is driven by a 10 kw, 1440 r.p.m. motor. The belt drive is open-type and space available for a centre distance of 2 m approximately. The diameter of a driven pulley is 1000 mm.

Design a flat belt it is required to transmit 35 kW from a pulley of 1.5 m effective diameter running at 300 r.p.m. The angle of lap is 165° and u = 0.3. Determine, taking centrifugal tension into account, width of the belt required. It is given that the belt thickness is 9.5 mm, density of its material is 1.1 Mg/m" and the related permissible working stress is 2.5 MPa.

Design a spur gear drive to transmit 22.5 kw at 900 r.p.m., Speed reduction is 2.5 Materials for pinion and wheel are C I5 steel and cast-iron grade 30 respectively. Take pressure angle of 20° and working life of the gears as 10000 hrs.

Design a spur gear drive it transmit 8 kw from a shaft rotating at 1200 r.p.m, to a low-speed shaft, with a reduction of 3:1 Assume that the teeth are 20° full depth involute, with 24 teeth on the pinion. The pinion is to be of 40 C 8 normalized steel and gear of 30 C 8 normalized steel. Assume that the starting torque is 130% of the rated torque. Design a spur gear drive

Design a cast iron bevel gear drive for a pillar drilling machine to transmit 1875 W at 800 r.p.m to a spindle at 400 r.p.m The gear is to work for 40 hours per week for 3 Years Pressure angle is 20°

A steel worm gear running at 240 r.p.m receives 1.5 kw from its shaft. The speed reduction is 10:1.Design the drive so as to have an efficiency of 80%. Also determine the cooling area required, if the temperature rise is restricted to 45°C. Take overall heat transfer coefficient as 10 W/m^2°C.

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

A hardened steel worm rotates at 1440 r.p.m and transmits 12 kW to a phosphor bronze gear. The speed of the worm wheel should be 60 ± 3% r.p.m. Design the worm gear drive if an efficiency of at least 82% is desired.

Design a 12-speed gear box for an all-geared headstock of a lathe. Maximum and minimum speeds are 600 r.p.m and 25 r-p.m. respectively. The drive is from an electric motor giving 2.25 kW at 1440 rpm.

Design a gear drive to give 18 speeds for a spindle of a milling machine. The drive is from an electric motor of 3.75 kW at 1440 r.p.m Maximum and minimum speeds of the spindle are to be around 650 and 35 r.p.m respectively.

Design a 12-speed gear box for an all-geared headstock of a lathe. Maximum and minimum speeds are 750 r.p.m and 25 r-p.m. respectively. The drive is from an electric motor giving 5.50 kW at 2000 rpm.

Design a gear drive to give 18 speeds for a spindle of a milling machine. The drive is from an electric motor of 7.75 kW at 2500 r.p.m Maximum and minimum speeds of the spindle are to be around 950 and 40 r.p.m respectively.

A single plate friction clutch, with both sides of the plate being effective, is used to transmit power at 1440 rpm. It has outer and inner radii 80 mm and 60 mm respectively. The maximum intensity of pressure is limited to 10×10^4 Nm^2. If the coefficient of friction is 0.3. Determine Total pressure exerted on the plate, and Power transmitted.

A multiplate clutch consisting of 6 plates, each plate of external diameter 150 mm and internal diameter 100 mm, is to transmit 7.5 kW at 900 rpm Assuming u=0.1. Determine the pressure on each effective pair of surfaces in contact.

A multiplate clutch has 3 discs on the driving shaft and two on the driven shaft. The outside diameter of the contact surfaces is 240 mm and inside diameter is 120 mm. Assume uniform wear coefficient of friction as 0.3. Find the maximum axial intensity of pressure between the discs for transmitting 25 kW at 1575 rpm.

An automotive single plate clutch consists of two pairs of contacting Surfaces. The inner and outer radii of friction plate are l20 mm and 250 mm respectively. The coefficient of friction is 0.25 and the total axial force is 5 KN. Calculate the power transmitting capacity of the clutch plate at 500 rpm using Uniform wear theory, and Uniform pressure theory.

A multiplate disc clutch transmits 55 kW of power at 1800 r.p.m. Coefficient of friction for the friction surfaces is 0.1 Axial intensity at pressure is not to exceed 160 $kN/m^{2.}$ The internal radius is80 mm and is 0.7times the external radius. Find the number of plates needed to transmit the required torque.