DRONACHARYA GROUP OF INSTITUTIONS, GREATER NOIDA

Mechanical Engineering Department

Unit V

Q-1 Derive the fractional torque relation considering uniform wear for conical clutch.

Q-2 Differentiate between the functions of (i) a clutch and a brake (ii) a brake and dynamometer. Also discuss briefly classification of friction clutches.

Q-3 Explain the working of a multi plate friction clutch with the help of neat sketch.

Q-4 Derive the frictional torque relation considering uniform wear for a flat pivot bearing.

Q-5 What are different types of friction? Explain with suitable examples. Deduce an expression for the radius of the journal and the angle of friction.

Q-6 Describe with a neat sketch the working of a single plate friction clutch. Establish a formula for the maximum torque transmitted by a single plate clutch. Assume that the pressure intensity on the contact faces is uniform.

Q-7 Derive expression for frictional torque considering uniform wear in the case of single plate clutch.

Q-8 Derive the expression for velocity ratio in the case of flat belt.

Q-9 Explain uniform pressure theory giving its application.

Q-10 Determine the minimum pressure in a plate clutch when the axial force is 5 KN. The inside and outside radii of the contact surface are 50 mm and 100 mm respectively. Assume uniform wear
(p = 0.212 MPa)

Q-11 Derive the expression for the length of a crossed belt drive.

Q-12 A pulley is driven by a flat belt; the angle of lap being 125 ^{o}, the belt is 100 mm wide by 6 mm thick and density 1000 kg /m^{3}. If the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and the corresponding speed of belt.
(P = 9.18 KW. V = 25.82 m/s).

Q-13 A flat belt running on an 80 cm diameter pulley is required to transmit 10 kW power at a speed of 200 rpm. Taking angle of lap as 170 ^{o} and coefficient of friction 0.25 find the necessary width of the belt if pull is not to exceed 200 N/ cm width of belt. Neglect centrifugal tension and thickness of belt.
(11.4 cm)

Q-14 Determine for an open belt drive the width of a 9.5 mm thick leather belt required to transmit 15 HP from a motor running at 750 rpm. Diameter of driving pulley of the motor is 30 cm. The driven pulley runs at 250 rpm and the distance between the centers of the two pulleys is 3 m. neglect the sag of the belt and assume no slip. Mass of leather = .0001 kg/ cm ^{3}, Maximum tension allowable in leather = 246 N/ cm ^{2}, μ = 0.30
(70 cm)

Q-15 A rough rule for leather belting is that the difference between the tight side and slack side tensions should not exceed 100 N/ cm of width for a belt of 5 mm thickness. If this rule is applied under the following conditions, what is the maximum stress on the tight side of the belt? θ = 170 ^{o}, μ = 0.3, v = 240 m/ min, ρ = 0.15 N/ cm^{3}.
(363.8 N/ cm2)

Q-16 A belt drive consists of two V-belts in parallel on grooved pulleys of the same size. The angle of groove is 30 ^{o}, the cross- sectional area 0f each belt is 750 mm^{2} and, μ = 0.15, the density of belt material is 1.2 Mg/ m^{3} and the maximum safe stress in the material is 7 MPa. Calculate the power that can be transmitted between pulleys 300 mm diameter, rotating at 1500 rpm. Find also the shaft speed in rpm at which the power transmitted is to be maximum. (P = 187.6 KW, n = 2807.5 rpm.)

Q-17 The semi cone angle of a cone clutch is 12.5 ^{o} and contact surfaces have a mean diameter of 80 mm. The coefficient of friction is 0.32. (i) What is the minimum torque required to produce slipping of the clutch for an

(Brakes & Dynamometers- Mechanical type)

Q-1 Explain the working for any transmission type dynamometer.

Q-2 Describe the construction and operation of a prony brake or rope brake absorption dynamometer. Explain its practical examples.

Q-3 Describe with the help of neat sketch the working of an external shoe brake.

Q-4 Explain the working of any transmission dynamometer with the help of neat sketch.

Q-5 How is dynamometers classified? What is the difference between absorption and transmission type of dynamometers? Explain with the help of diagram, any one absorption type of dynamometer.

Q-6 A differential band brake has force of 220 N applied at the end of pedal as shown in fig( ) . The coefficient of friction between the band and the drum is 0.4. Angle of lap = 180 ◦. What is the maximum torque the brake may sustain for counter clockwise rotation?

(33.03 N.m)

Q-7 An internal expanding shoe brake actuated mechanically by cam and lever arrangement has the following dimensions: Diameter of drum = 27 cm, distance between the fulcrum centers and that of cam axis =- 10 cm, distance between the points where the cam acts on the two brake shoes = 3.2 cm. Each shoe subtends an angle of 90 ◦ at the drum centre. If the braking force is 500 N and coefficient of friction is 0.3, find the braking torque on the drum. Assume that the reactions between the brake shoes and the drum pass through the point bisecting the contact angle. Also assume that the forces exerted by the cam ends on the two shoes are equal.

(527.25 N.m)