(b)   A single dry plate clutch transmits 7.5 kW at 900 r.p.m. The axial pressure is limited to 0.07 N/mm². If the co-efficient of friction is 0.25, find

    (a)   Mean radius and face width of the friction lining assuming the ratio of the mean radius of the face width as 4 and.

    (b)   Outer and inner radii of the clutch plate.

SECTION – II

5.   (a)   With a neat sketch, explain compound gear train and write velocity ratio equation.

A drive connects two pulleys 1.2 m and 0.5 m diameter, on parallel shafts 4 metres apart. The mass of the belt is 0.9 kg per metre length and maximum tension is not to exceed 2000 N. The coefficient of friction is 0.3 The 1.2 m pulley, which is the driver, runs at 200 r.p.m. Due to belt slip on one of the pulleys, the velocity of the driven shaft is only 450 r.p.m. Calculate the

    (i)   Torque on each of the two Shafts

    (ii)   Power Transmitted

    (iii)   Power lost in friction

    (iv)   Efficiency of the drive.

6.   (a)   Write the classification of Cam. Explain with a neat sketch any one type Cam.

    (b)   Two parallel shafts about 600 mm apart are to be connected by spur gears. shaft is run at 360 r.p.m. and other at 120 r.p.m. Design the gears, if the circ pitch is to be 25 mm.

7.   (a)   Define the following terms with respect to cam and follower :

    (i)   Trace point

    (ii)   Pitch circle

    (iii)   Base circle

    (iv)   Pressure angle

    (v)   Stroke

    (b)   A cam is to be designed for a knife edge follower with the following data :

        1.   Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.

        2.   Dwell for the next 30°.

        3.   During the next 60° of cam rotation, the follower returns to its o position with simple harmonic motion.

        4.   Dwell during the remaining 180°.

            Draw the profile of the cam when the line of stroke is offset from the axis of cam shaft.

            The radius of the base circle of cam is 40 mm, determine ma velocity and acceleration of the follower during its ascent and des the cam rotates at 240 r.p.m.

SECTION – III

(a) Explain with a neat sketch the working of centrifugal governor. **5**

(b) What is critical or whirling speed of a shaft ? Explain briefly. **4**

(c) With a neat sketch, explain three types of Free vibration. **6**

(a) Define the terms with respect to governor : **5**

    (i) Equilibrium speed

    (ii) Sleeve lift

    (iii) Sensitiveness

    (iv) Stability

    (v) Height of governor

(b) Differentiate between static and dynamic balancing. **5**

(c) Explain with a neat sketch watt governor. **5**

9 (a) Explain with a neat sketch, balancing of single rotating mass by a single mass rotating in the same plane. **5**

(b) Four masses m_1, m_2, m_3, and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m. **10**

Register
Number

IV Semester Diploma Examination, April/May 2013

THEORY OF MACHINES

[Max. Marks : 100

ne : 3 Hours]

e : (i) Question No. 1 is compulsory.

(ii) Answer any two full questions from each of the remaining sections.

(iii) Any missing data may be suitably assumed.

(a) Fill in the blanks with appropriate word/words.   5 × 1 = 5

(i)   The relation between number of pairs (P) forming a kinematic chain and the number of links (L) is _____.

(ii) Offset is provided to a cam follower mechanism to _____.

(iii) Due to slip of the belt, the velocity ratio of the belt drive _____.

(iv) The balancing of rotating and reciprocating parts of an Engine is necessary when it runs at _____.

(v)   The frictional Torque transmitted in a pivot bearing, considering uniform pressure is _____.

5

(b) Explain with a neat sketch Scotch yoke mechanism.

SECTION – I

2

(a) Define the term Theory of Machines.   6

(b) Explain three different types of links with one example each.   7

(c) Explain with a neat sketch Whith worth quick Return motion mechanism.

5

(a) List any five differences between brake and clutch.   5

(b) Explain Dynamometer.

(c) A conical pivot supports a load of 20 kN, the cone angle is 120° and the intensity of normal pressure is not to exceed 0.3 N/mm². The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 200 r.p.m. and the coefficient of friction is 0.1, find the power absorbed in friction. Assume uniform pressure.

3 + 3 =

(a) (i)   Differentiate between machine and structure.

(ii) Differentiate between higher pair and lower pair with two examples each.