IV Semester Diploma Examination, May 2012
MECHANICAL ENGINEERING BOARD
THEORY OF MACHINES

ne : 3 Hours]   [Max. Marks : 10

tructions : (1) Question No. 1 is compulsory.
             (2) Answer any two full questions from each of the remaining sections.

(a) Fill in the blanks :   5 × 1 =
     (i)   A link which does not undergo any deformation is called _____ .
     (ii)   _____ is the example for inversions of double slider crank chain.
     (iii) For friction liner in brakes _____ materials is used.
     (iv)   For uniform velocity of follower motion, the displacement diagram is a
            _____ .
     (v)   Cam & follower is the example for _____ pair.

(b) Explain stepped cone pulley with a neat sketch.

SECTION – I

(a) Explain the types of constrained motions with sketch.
(b) What are the difference between machine & structure ?

(a) What is inversion ? Explain scotch yoke mechanism.
(b) Leather belt 10 mm × 260 mm is used to drive C. I. pulley 600 mm in dia at
     250 rpm. The arc of contact is 120° & stress in tight side is 1.9 N/mm². Find
     the power capacity of the belt. The density of the leather may be taken as
     990 kg/m³ and the co-efficient of friction of leather is 0.3.

(a) What are the advantages of chain drive over belt drive ?
(b) Explain slip and creep in belt drive.
(c) A rope drive transmits 1000 kW from a pulley of effective diameter 5 mts. runs
     at a speed of 100 rpm. The angle of lap is 160°. The angle of groove is 45°. The
     co-efficient of friction is 0.28. The mass of rope is 1.5 kg/metre and the tension
     in each rope is 2500 N. Find the number of ropes required.

SECTION – II

(a) What are the laws of solid frictions ?
(b) Explain Bank brake.

[Turn over

(c) Determine the number of teeth for two meshing gears with following data. Velocity ratio = 1/3, module = 4 mm, Pressure angle = 20°, centre distance = 00 mm.

6. (a) Explain Internal Expanding mechanical actuated brake.
   (b) A conical pivot bearing carries a load of 80 kN. The angle of cone is 120°. The intensity of pressure is 0.5 N/mm². The outer diameter is 3 times the inner diameter. Find the diameter of the bearing surfaces. If the power lost is 2.5 kW at 160 rpm. Find the coefficient of friction.

7. (a) A single plate clutch transmits 25 kW at 300 rpm. the maximum pressure intensity between the plates is 0.85 N/mm². The inner diameter of the plate is 380 mm. Both the sides of the plate are effective & coefficient of friction is 0.25. Find (i) Outer diameter of the plate (ii) The axial force.
   (b) Explain with neat sketch the working of single plate clutch.

SECTION-III

8. (a) Explain simple and compound gear train.
   (b) Explain Balancing of rotating masses in a single plane.
   (c) Five masses M_1, M_2, M_3, M_4 & M_5 revolving in the same plane at equal rad mass M_1, M_2, M_3 are 2000 N, 1000 N & 1600 N respectively. The ang between successive masses from M_1 are 60°, 75°, 75° & 60°. Find the mass M_4 & M_5 for complete balance.

9. (a) Name the classification of cams & follower.
   (b) A cam with 30 mm as minimum radius is rotating clockwise at a uniform sp of 1200 rpm and has to give the motion to the knife edge follower as below.
   (i) Follower to move outward through 30 mm during 120° of cam rota with S.H.M.
   (ii) Dwell for the next 60°.
   (iii) Follower to return to its intial position during the next 90° with UARM
   (iv) Dwell for remaining period. Draw the cam profile with follower a offset to the right by 10 mm.

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10. Write short notes (Any three).
   (a) Epicylic gear train
   (b) Types of free vibrations
   (c) Centrifugal governor
   (d) Dynamometer
   (e) Four bar chain