(DME 213)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - III : Kinematics of Machines

Time : 3 Hours   Maximum Marks : 75

Answer question No. 1 is compulsory   *(15 x 1 = 15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   Explain the following.

   a)   Types of instantaneous centres for a mechanism.

   b)   Path generation.

   c)   Law of gearing.

   d)   Inversion.

   e)   Kennedy's theorem.

   f)   Classification of Kinematic chains.

   g)   Body centrode & space centrode.

   h)   Kutzbach mobility criterion.

   i)   Normal pitch of helical gear.

   j)   What is a prime circle?

   k)   Velocity of rubbing.

   l)   Kinematic link.

   m)   Torques in Epicyclic gear train.

   n)   Sketch Roller cam profile.

   o)   Types of followers.

Unit – I

2) a) Define kinematic pair. Explain about their classification.

b) Explain any two inversions of double slider crank chain.

OR

3) Prove that Harts and peacellier mechanisms are exact straight line motion mechanisms.

Unit – II

4) In the slider crank mechanism shown in the figure the crank OA rotates with a uniform speed of 60 rpm. Determine the linear velocity of the slider B. Determine also the linear velocity of point Q located at a distance of 5 cm on the connecting and extended.
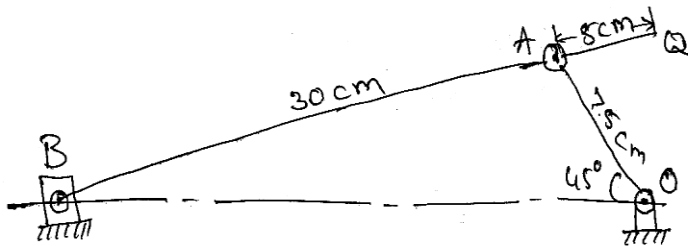
OR

5) a) What is coriolis acceleration? In which cases does it occur? How is it determined?

b) Explain the relative velocity method for the determination of velocities in a mechanism.

c) Explain slider – crank mechanism.

Unit – III

6) Set out the profile of a cam to give the following motion to a flat mush-room contact face follower.

Follower to rise through 24 m during 150° of cam rotation with 5 H.M.

Follower the dwell for 30° of the cam rotation.

Follower to return to the initial position during 90° of the cam rotation with 5 H.M.

Follower to dwell for the remaining 90° of cam rotation.

Take minimum radius of the cam as 30 mm.

OR

7) Design a four-link mechanism when the motions of the input and the output links are governed by a function $y - 2 \log_{10}^{x}$ in and x varies from 2 to 4 with an interval. Assume θ to vary from 30° to 70° and ϕ from 40° to 100°.

Unit – IV

8) Explain the following :

a) What is a differential gear of an automobile? How does it function.

b) How are the centre distance and efficiency of worm gears found?

OR

9) a) Explain the procedure to analyse epicyclic gear train.

b) Two spur gears in mesh have a module of 8 mm and a pressure angle of 20°. The larger gear has 57 while the pinion has 23 teeth. If the addenda on pinion and gear wheels are equal to one module, find

   i)   The number of pairs of teeth in contact.

   ii) The angle of action of the pinion and the gear wheel.

   iii) the ratio of the sliding to rolling velocity at the pitch point.

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