Code No: RT21211   **R13**   SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2017
MECHANISMS AND MECHANICAL DESIGN
(Aeronautical Engineering)

Time: 3 hours   Max. Marks: 70
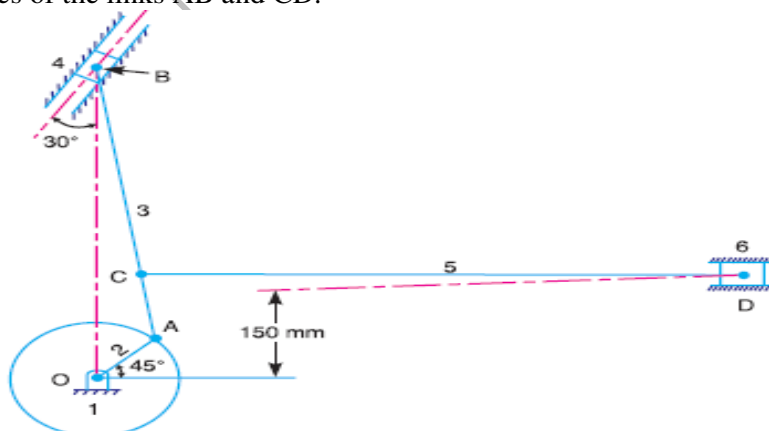
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1. a) What is a Pantograph? What is its significance?   (4M)
   b) What are the applications of velocity and acceleration analysis?   (4M)
   c) How we can find velocity of rubbing? Explain.   (4M)
   d) Briefly explain the effect of Precision on the Stability of moving vehicles.   (4M)
   e) Define the following terms as applied to cam with a neat sketch   (3M)
      i)Pitch circle ii)Stroke of the follower
   f) Explain the following terms: (3M)
      i) Velocity ratio ii) Coupling

PART –B

2. a) A crank and slotted lever mechanism used in a shaper has a center distance of 400   (8M)
      mm between the centre of oscillation of the slotted lever and the centre of rotation
      of the crank. The radius of the crank is 140 mm. Find the ratio of the time of
      cutting to the time of return stroke.
   b) Sketch and explain various inversions of slider crank mechanism.   (8M)

3. a) The crank OA of a mechanism, as shown below rotates clockwise at 150 r.p.m.   (8M)
      The lengths of various links are OA = 110 mm; AB = 480 mm; AC = 110 mm and
      CD = 770 mm. Find the velocity of point C, velocity of slider D and angular
      velocities of the links AB and CD.
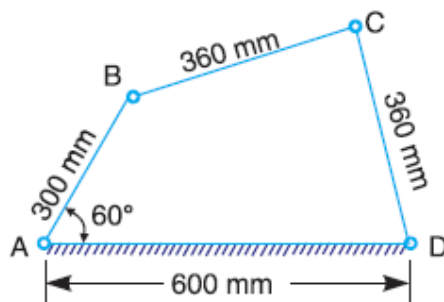

   b) Explain how the Coriolis component of acceleration arises when a point is rotating   (8M)
      about some other fixed point and at the same time its distance from the fixed point
      varies.

4.   In a pin jointed four bar mechanism, as shown below, AB = 300 mm, BC = CD =   (16M)
     360 mm and AD = 600 mm. The angle BAD = 60^0. The crank AB rotates
     uniformly at 100 rpm. Locate all the instantaneous centres and find the angular
     velocity of the link BC.

5. a) Discuss gyroscopic effects on naval ships.   (7M)
    b) A two wheeler motor vehicle and its rider weight 225 kg and their combined   (9M)
        center of gravity is 600 mm above the ground level, when the vehicle is upright.
        Each road wheel is of 600 mm diameter and has a moment of inertia of 1 kgm^2
        The rotating parts of the engine have a moment of inertia of 0.175 kgm^2. The
        engine rotates at 5.5 times the speed of the road wheels and in the same sense.
        Determine the angle of heel necessary, when the vehicle is rounding a curve of
        30 m radius at a speed of 55 km/hr.

6. a) Explain with sketches different types of cams and followers.   (10M)
    b) Discuss the different kind of motions with which a follower can move.   (6M)

7. a) What is the function of spring? Define following terms used in compression   (6M)
        spring: i) Solid length ii) Free index iii) Spring index iv) Spring rate
    b) A pair of gears, having 40 and 20 teeth respectively, is rotating in mesh, the speed   (10M)
        of the smaller being 2000 rpm. Determine the velocity of sliding between the gear
        teeth faces at the point of engagement, at the pitch point and at the point of
        disengagement if the smaller gear is the driver. Assume that the gear teeth are 20^0
        involute form, addendum length is 5 mm and module is 5 mm. Also find the
        angle through which gear and pinion turns while any one pairs of teeth are in
        contact.