Code No: 07A42104 **R07** **Set No. 1**

II B.Tech II Semester Regular/Supplementary Examinations,May 2010
MECHANISMS AND MECHANICAL DESIGN
Aeronautical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Which mechanism is used as an indicator rig in order to reproduce to a small scale that displacement of the cross head of a reciprocating engine? Describe he mechanism. [16]

2. A racing car weighs 20 kN. It has a wheel base of 2m, track width 1m and height of C.G. 300mm above the ground level and lies midway between the front. and real axle. The engine flywheel rotates at 3000 rpm clockwise when viewed from the front. The moment of inertia of the flywhee is 4kg-m2 and moment of inertia of each wheel is 3kgm2. Find the reactions between the wheels and the ground when the car takes a curve of 15m radius towards right at 30 km/hr, taking into consideration the gyroscopic and the centrifugal effects. Each wheel radius is 400mm. [16]

3. AB is a link of a mechanism 120 cm long. The acceleration of A is 3 m/s^2 along AC, when angle BAC = 60^0. The acceleration of B is 9 m/s^2 along BD, where angle ABD is 70^0 and the velocity of B is 3 m/s along BE, where angle ABE is 40^0. C and D lie on the same side of AB and E on the opposite side. Find the velocity of A, the angular velocity and the angular acceleration of AB. [16]

4. The following data is related to a symmetrical circular arc cam operating a flat-faced follower:
   Least radius of the cam = 30 mm ; total lift = 20 mm ; angle of lift = 75^0, nose radius = 5 mm ; speed of cam = 300 r.p.m. Find:
   (a) Distance between cam centre and nose centre;
   (b) Radius of circular flank; and
   (c) Angle of contact on the circular flank. [16]

5. Two 20^0 involute spur gears have 25 teeth each. The arc of contact is equal to 1.6 times the circular pitch. Find the addendum required in terms of circular pitch. [16]

6. The oscillating link OAB of a mechanism shown in figure 6c. is rivoted at O and is moving at 90 rpm. (ccw). Calculate if OA = 15 cm, AB = 7.5 cm and AC = 25 cm.
   (a) the velocity of the block C.
   (b) angular velocity of the link AC and

(c) The rubbing velocities of the pins at O, A and C assuming that these pins are of equal diameters 2 cm. [16]
(Use instant centre method.)

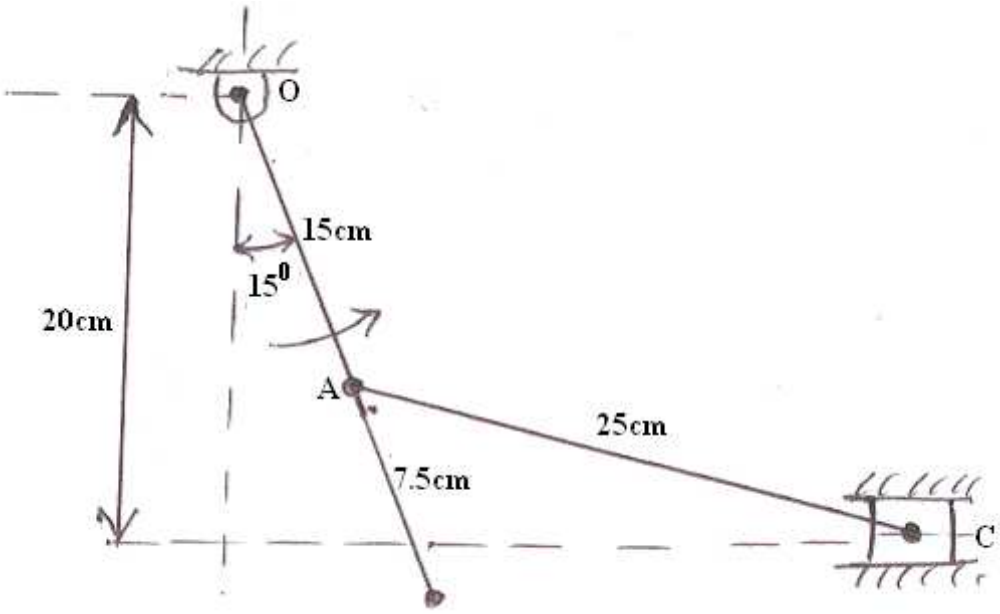

Figure 6c

7. A camrotating clockwise with a uniform speed is to give the roller-follower of 20 mm diameter the following motion:

   (a) Follower to move outward through a distance of 45 mm during 90^0 of cam rotation

   (b) Follower to dwell for 60^0 of cam rotation

   (c) Follower to return to its original position during 120^0 of cam rotation

   (d) Follower to dwell for the remaining 90^0 of cam rotation.

   The minimum radius of the cam is 50 mm and the line of stroke of the follower is offset by 20 mm from the axis of the cam and the displacement of the follower is to take place with simple harmonic motion on both the outward and return stroke. Draw the cam profile. [16]

8. The load on a valbe spring, when the valbe is in closed position is 50N, and when it is in fully open position, the load is 60 N. The spring must fit over the valbe bush of 20mm diameter, and also it must be positioned in position in space of 35 mm diameter. The valbe lift is 6 mm. Design the spring, considering variable loading on the spring. [16]

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