Code No: RR-222105/
NR-220304

Set No: **4**

II-B.Tech II-Semester Regular Examinations April/May, 2004

KINEMATICS OF MACHINERY
(RR-Aeronautical Engineering)
(NR- Common to Mechanical Engineering, Production Engineering, Mechatronics)

MECHANICS OF MACHINERY
(NR-Aeronautical Engineering)

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

Answer any FIVE questions
All questions carry equal marks

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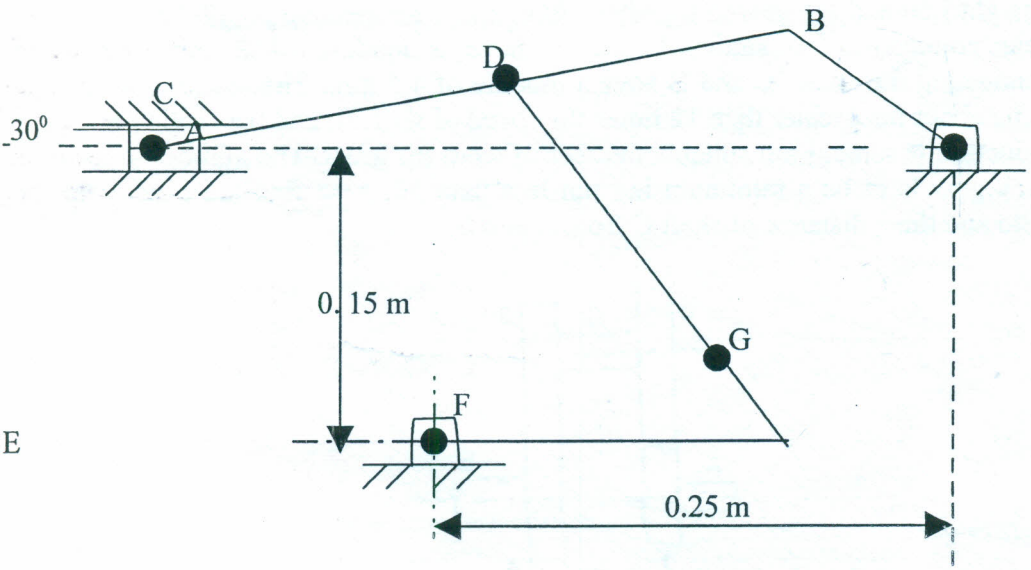
1. a) Explain the terms :
   (i) Lower pair (ii) Higher pair (iii) Kinematic chain
   b) In what way a mechanism differ from a machine?
   c) Giving a neat sketch explain any one inversion of a simple slider mechanism.

2. Describe any approximate straight-line motion mechanism with necessary equations.

3. In a mechanism as shown in Figure, the link AB rotates with a uniform angular velocity of 30 rad/S. The lengths of various links are; AB = 100mm; BC = 300 mm; BD = 150 mm; DE = 250 mm; EF = 200 mm; DG=165 mm. Determine the velocity and acceleration of G for the given configuration.



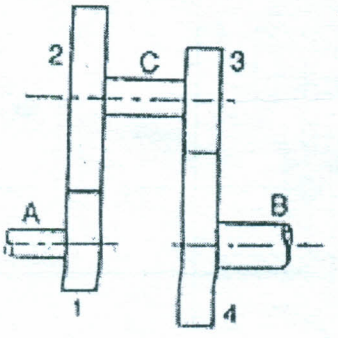
4. a) Explain the term 'axode'.
   b) A reciprocating engine has connecting rod 20 cm long and crank 5 cm long. By using Klein's construction determine the velocity and acceleration of piston, angular acceleration of connecting rod, velocity and acceleration of a point X on connecting rod located at its mid point when the crank has turned through 45^0 from IDC clockwise and is rotating at 240 r.p.m.

5. a) Derive the condition for correct steering.
   b) Sketch and explain Ackermann's Steering gear mechanism.
   c) List the merits and demerits of Ackermann and Davis Steering gear mechanism.

6. a) Explain the procedure for drawing the displacement, velocity and acceleration diagrams for a radial cam with uniform acceleration and retardation of the follower.
   b) Give the expressions for maximum velocity and acceleration of the follower during ascent and descent with respect to the above motion.

7. a) If the interference between two involute gears is to be avoided then prove that the maximum length of arc of contact will be equal to $(R+ r) \tan\Phi$ where R and r = Pitch circle radius of wheel and pinion, Φ = Pressure angle
   b) Two 20^0 involute spur gear having a velocity ratio of 2.5 meshes externally. Module is 4 mm and the addendum is equal to 1.23 module. Pinion rotates at 150 rpm. Find (i) the minimum number of teeth on each wheel to avoid interference (ii) the number of pairs of teeth in contact.

8. a) Explain reverted gear train with the help of a sketch.
   b) In a reverted gear train, as show in fig.3 two shafts A and B are in the same straight line and are geared together through an intermediate parallel shaft C. The gears connecting the shafts A and C have a module of 2 mm and those connecting the shafts C and B have a module of 4.5 mm. The speed of shaft A is to be about but greater than 12 times the speed of shaft B, and the ratio at each reduction is same. Find suitable number of teeth for gears. The number of teeth of each gear is to be a minimum but not less than 16. Also find the exact velocity ratio and the distance of shaft C from A and B.



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