

Code No: 07A42104

R07

Set No. 2

II B.Tech II Semester Examinations, April/May 2012
MECHANISMS AND MECHANICAL DESIGN
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is the stress concentration?
(b) How will you account for stress concentration in design of the machine parts?
(c) Explain various methods to reduce stress concentration in machine parts. [5+5+6]
2. Explain the importance of special cams in detail. [16]
3. (a) Derive an expression for gyroscopic couple.
(b) An aeroplane makes a complete half circle of 60m radius, to the left when flying at 200 Kmph. The rotary engine and the propeller of the aeroplane weigh 400N with a radius of gyration 30 cm the engine runs at 2500rpm CW, when viewed from rear. Find the gyroscopic couple on the aircraft and state its effect on aeroplane. Show gyroscopic effect by a sketch. [6+10]
4. Draw the profile of a cam to give the following motion to a knife-edged follower.
(a) Out stroke during 60^0 of cam rotation.
(b) Dwell for the next 30^0 of the cam rotation.
(c) Return stroke during the next 60^0 of the cam rotation.
(d) Dwell for the remaining 210^0 of the cam rotation.

The stroke of the follower is 3c.m.and the minimum radius of the cam 5c.m. The axis of the follower is offset by 2c.m.from the axis of the cam shaft. The follower moves with uniform velocity during both the outstroke and return stroke. [16]
5. In a slider crank mechanism, the length of the crank and connecting rod are 150 mm and 675 mm respectively. The crank position is 60^0 from inner dead centre. The crank shaft speed is 300 r.p.m. clockwise. Using Klein's construction, determine
(a) Velocity and acceleration of the slider
(b) Velocity and acceleration of point D on the connecting rod which is 150 mm from crank pin C, and
(c) angular velocity and angular acceleration of the connecting rod. [16]
6. What is the difference between the slider-crank chain and the double slider-crank chain? Draw the three mechanisms which are inversions of each of the above chains and state the purpose for which each mechanism is used. [8+8]

7. Define arc of contact and deduce the expression to find its magnitude. [16]
8. The figure 6 show a variation of the Scotch-yoke mechanism. It is driven by crank 2 at $\omega_2 = 36 \text{ rad/s}$ ccw. Find the velocity of the crosshead. Link 4. Use instant centre method. $O_2A = 250 \text{ mm}$. [16]

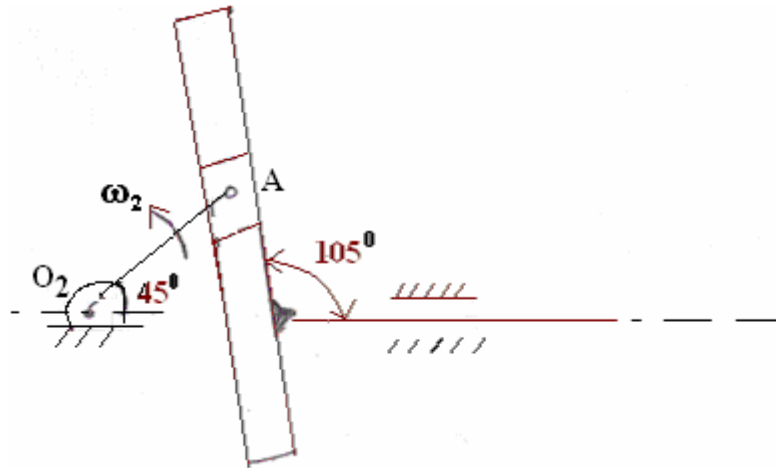


Figure 6

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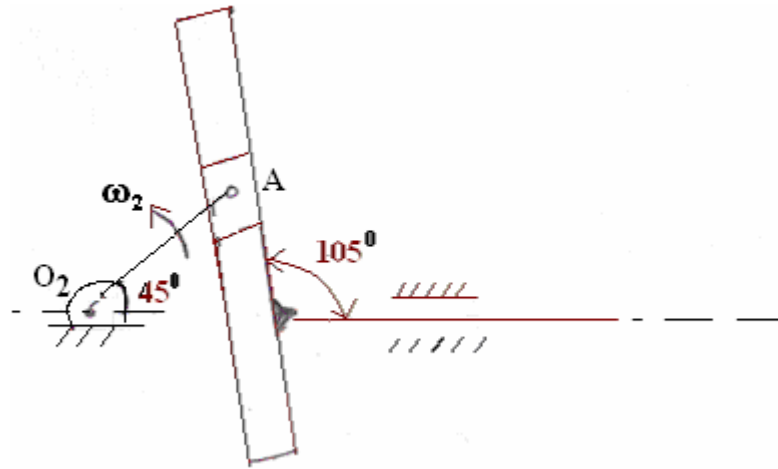


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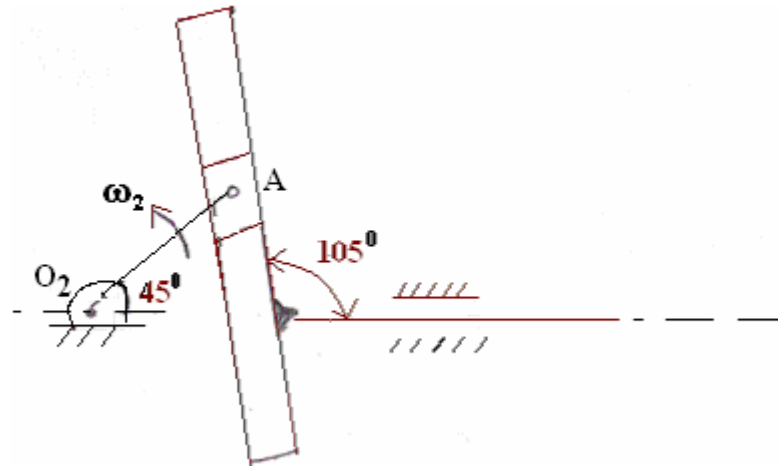


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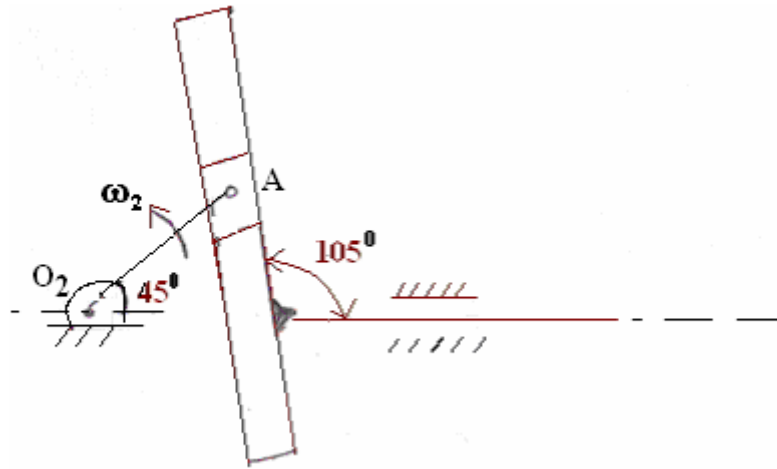


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