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Code No: NR220304 **NR** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
KINEMATICSOFMACHINERY/MACHINES OF MACHINERY
Common to Mechanical Engineering, Mechatronics, Production Engineering, Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A Watt 'walking – beam' mechanism is shown in Figure 1. Determine the velocity and acceleration of the slider if the crank O_2A rotates with a speed of 1 cycle/sec in a clockwise direction. Given O_2A = 2cm, AB = 8.5 cm, BC=7.5 cm, CD=5.25 cm, and O_5C = 7 cm. [16]

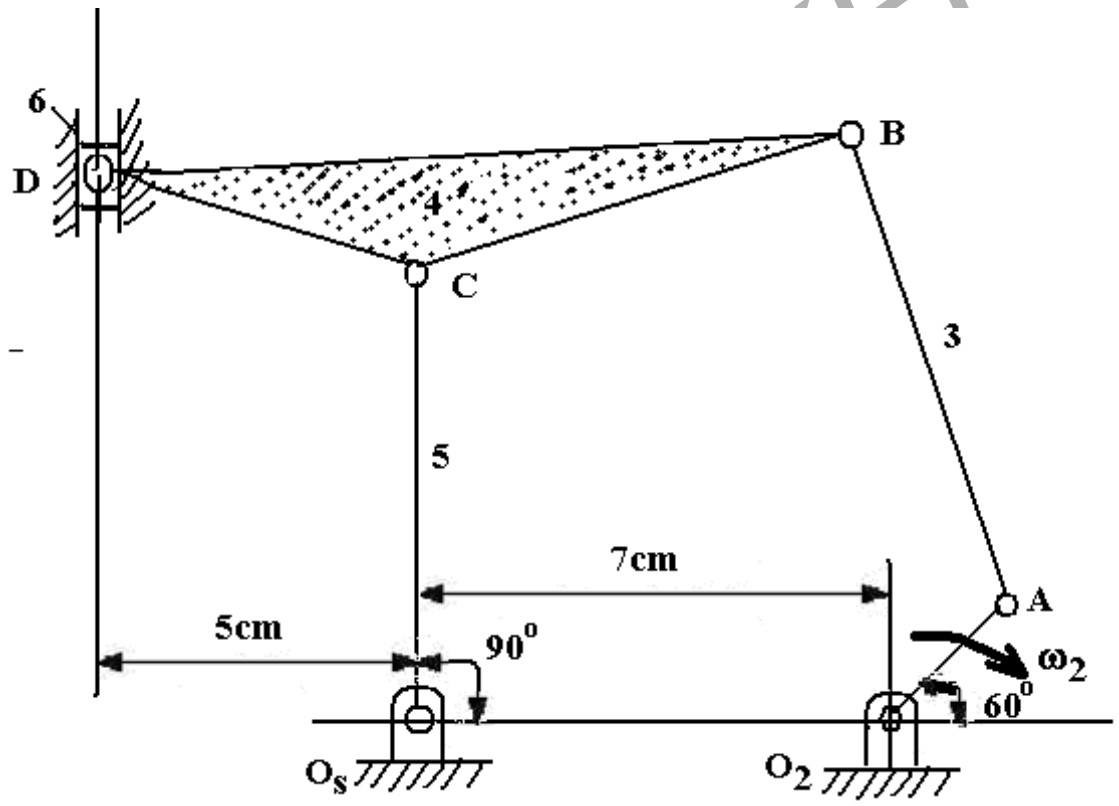

Figure 1

2. A pinion 120 mm PCD meshes with a gear wheel 400 mm PCD. The teeth are of involute form, 2 mm module pitch and 25^0 angle of obliquity. Addendum for each wheel is 6 mm. Find the angle that the pinion turns through while any one pair of teeth continue to maintain contact. If the pinion is the driven and rotates at 200 rpm, find the velocity of sliding at the instant contact ceases. Prove any formula you use in this latter part. [16]

3. For two shafts connected by a Hooke's joint show that if shaft 1 has uniform angular velocity ω_1, the angular acceleration of shaft 2 is given by:

$$\frac{\partial \omega_2}{\partial t} = \frac{\omega_1^2 \cos\alpha . \sin^2 \alpha . \sin^2 \theta_1}{\left(1 - \sin^2 \alpha . \cos^2 \theta_1\right)}$$

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where θ_1 is the angle of rotation of shaft 1 from the position where its forked end in the plane containing the shaft, and α is the angle of deviation of the drive. [16]

4. Explain the Klein construction for finding the velocity and acceleration in the following mechanisms.
   (a) Single slider crank chain
   (b) Four bar chain. [8+8]

5. (a) Discuss various types of Kinematic links with examples.
   (b) Explain different types of constrained motions with examples. [8+8]

6. A grass hopper straight line mechanisms gets its motion from a crank OA. The end A of the crank in joined to a long rod PQ such that Q A is 6cm. The end Q is further joined to along vertical link O_1 Q, 24 Cm long moving with centre O_1. The length of rod PQ is also 24 Cm and its end P describes an approximate vertical straight line. Determine the radius of crank OA. Find also the maximum deviation of P from the vertical straight line in a travel of 6 Cm on each side of its mean position. [16]

7. Draw full size profile of a cam which will lift a 2.5 cm diameter knife edged follower through 4 cm. The centre line of the follower passes through the centre of rotation of the cam. Ascent of follower takes place with S.H.M. in 0.1 second, followed by a period of rest of 0.025 sec. The follower then descends with uniform acceleration and retardation in 0.075 second. The cam rotates at a uniform speed of 120 r.p.m. and the least radius of the cam is 10 cm. Also plot velocity and acceleration diagrams of the follower during one revolution of the cam and mark important values thereon. [16]

8. (a) What are the different types in an epicyclic gear trains.
   (b) A pinion A has 15 teeth and is rigidly fixed to a motor shaft. The wheel B has 20 teeth and gears with A and also with the fixed annular wheel D. The pinion C has 15 teeth and is fixed to the wheel B and gears with annular wheel E which is keyed to a machine shaft. B and C can rotate together on a pin carried by an arm, which rotates about the shaft on which A is fixed. If the motor runs at 1000 rpm, find the speed of the machine. [16]

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Code No: NR220304 **NR** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
KINEMATICSOFMACHINERY/MACHINES OF MACHINERY
Common to Mechanical Engineering, Mechatronics, Production Engineering, Aeronautical Engineering

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

Answer any FIVE Questions
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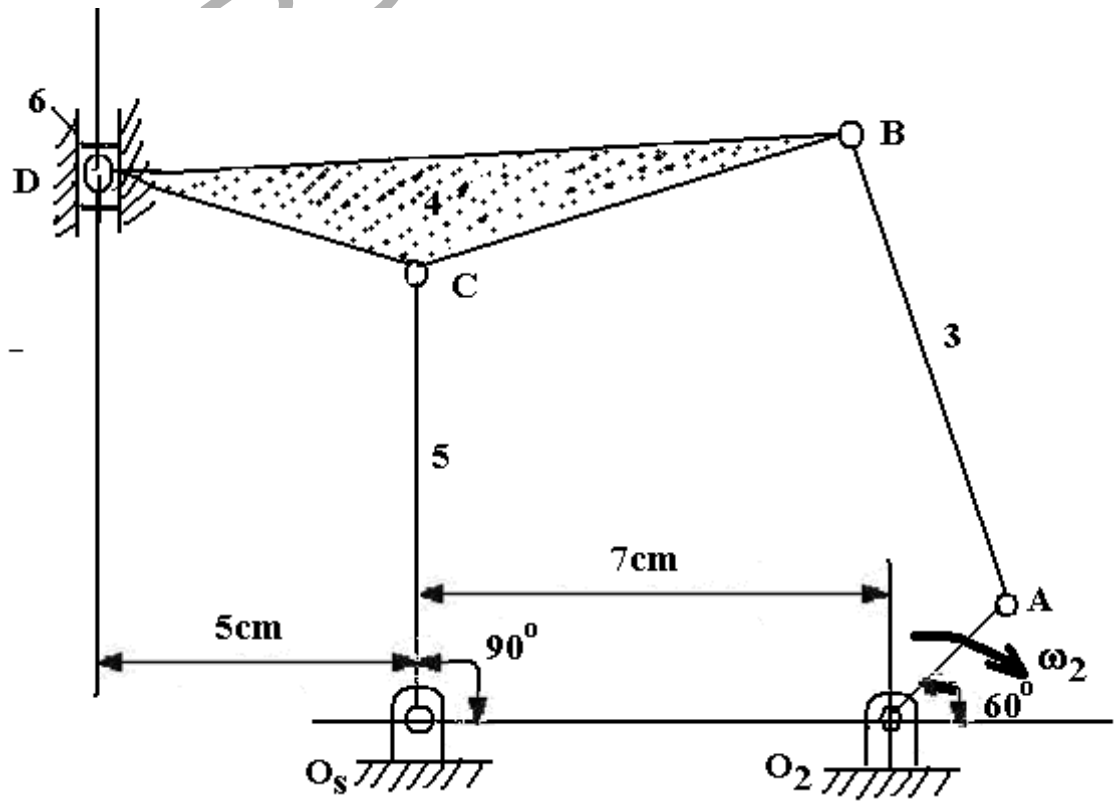

Figure 1

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4. Explain the Klein construction for finding the velocity and acceleration in the following mechanisms.
   (a) Single slider crank chain
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Code No: NR220304 **NR** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
KINEMATICSOFMACHINERY/MACHINES OF MACHINERY
Common to Mechanical Engineering, Mechatronics, Production Engineering, Aeronautical Engineering

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

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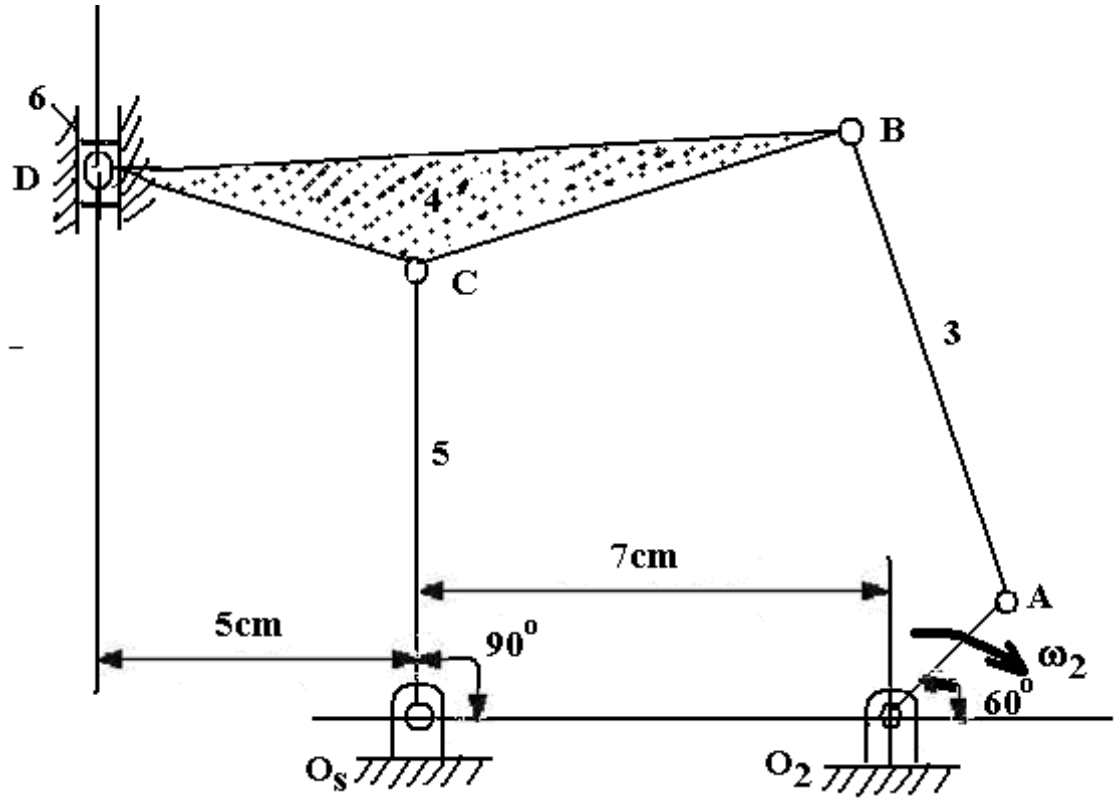

Figure 1

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Code No: NR220304 **NR** **Set No. 3**

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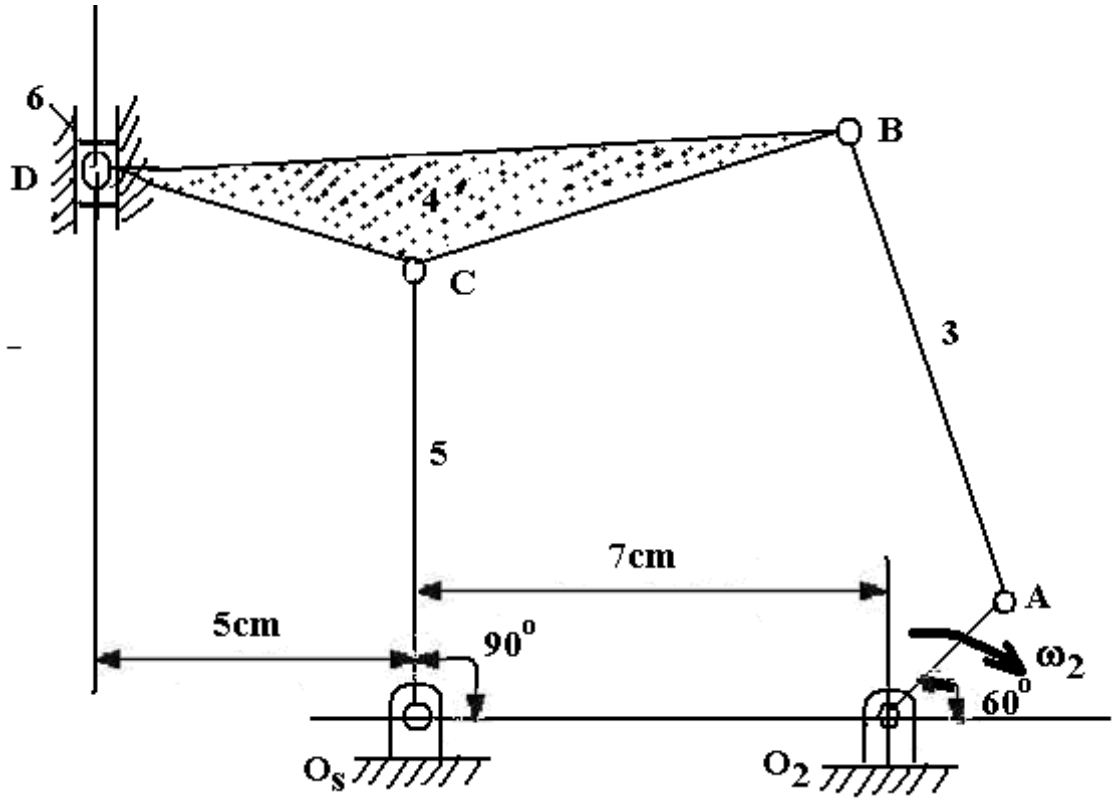

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