Code No: R1622031 **R16** SET - 1

II B. Tech II Semester Supplementary Examinations, April - 2021
KINEMATICS OF MACHINARY
(Com to ME, AME, MIN)

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 **FOUR** Questions from **Part-B**

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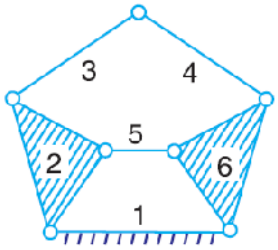
PART –A

1. a) Write down Kutzbach criterion to find the mobility of a planar mechanism. (3M)
   b) Explain about pantograph (2M)
   c) Define the following terms for a cam mechanism: pressure angle, base circle, angle of ascent and offset. (2M)
   d) What are the various types of motions of follower (3M)
   e) What is a differential gear? Where is it used? (2M)
   f) Explain the phenomena of 'slip' and 'creep' in a belt drive. (2M)

PART –B

2. Describe the following mechanisms with neat sketches and state on which kinematic chain each one is based: (i) Beam engine (ii) Whitworth quick return mechanism (iii) Scott Russel mechanism (iv) oldham coupling (14M)

3. a) Determine the mobility (degrees of freedom) of the mechanism shown in Fig. using Kutzbach mobility criterion . (7M)



   b) Crank of a slider crank mechanism rotates clockwise at a constant speed of 300rpm, crank and connecting rod are of lengths150mm and 600 mm respectively. Determine the following; at a crank angle of 45°from inner dead centre position (i)Linear velocity and acceleration of the midpoint of connecting rod (ii)Angular Velocity and angular acceleration of the connecting rod**.** (7M)

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4. A mechanism consists of a four bar chain as shown in figure 1. The connecting rod 'ACB' making an isosceles triangle is a rigid body. Find the velocity of point C, the acceleration of B, when the crank OA rotates, in the counter clock wise direction at 30 rad/sec at constant speed (14M)

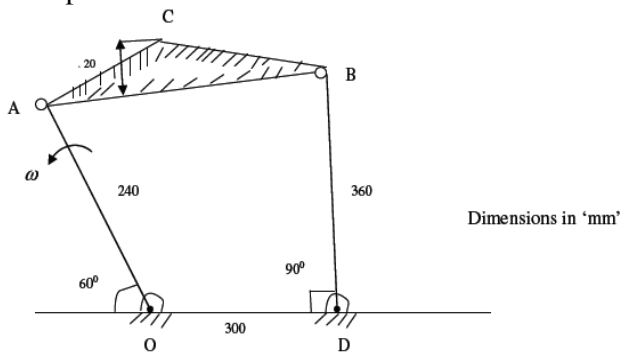
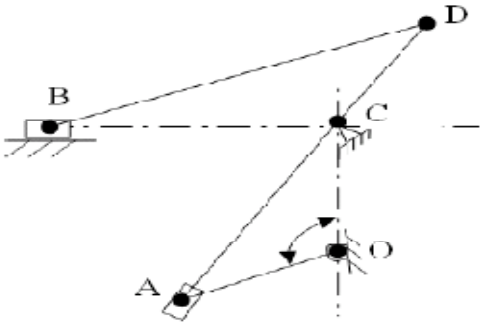


Fig.1

5. A shaper mechanism is shown in figure. The crank OA rotates at uniform speed of 20 rpm clockwise. The guide block A slides along the slotted lever AD that has its fulcrum at 'C'. The connecting rod BD connects the tool head B to AD. The tool head is constrained to move along BC perpendicular to OC. Find the velocity and acceleration of 'B'. OA= 200 mm; OC=400 mm; CD=200 mm; BD=500mm and angle AOC= 120o. (14M)



6. a) A pair of gears, having 40 and 20 teeth respectively, are rotating in mesh, the speed of the smaller being 2000 r.p.m. 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° involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pairs of teeth are in contact (7M)

   b) Define are of contact and deduce the expression to determine its magnitude. (7M)

7. a) Carry out the motion analysis for a sun and planet gear when the sun wheel is fixed using tabular method. (7M)

   b) A flat belt transmits 15 kW power from a pulley of 80 cm diameter which runs at 300 r.p.m. The angle of embrace of belt and pulley is 150 degrees and coefficient of friction between belt and pulley is 0.25. The thickness of the belt is 8 mm and has a density of 1 g/cm3.Determine the minimum width of the belt for a maximum stress of 180 N/cm2. (7M)