Government College of Engineering, Amaravati

Mechanical Engineeirng Department

Class Test-I

Course Code and Course Name: ME402 Kinematics of Machines Time : 1hr

Class: SY BTech Max Marks:15

Note: 1) Solve any three questions.

2) Figures on right side indicate maximum marks.

3) Assume suitable data if necessary.

A Sketch and explain crank and slotted lever quick return motion mechanism. 5

B Define i) Degree of Freedom ii) ICR iii) Structure iv) Kinematics link v) Mechanism 5

C Explain Method of locating Instantaneous Centre. 5

D Explain with neat sketch 5

I. Watt's Indicator Mechanism

II. Beam Engine

Government College of Engineering, Amravati

W- 2017 CT-I IV Semester B.Tech. (Mechanical Engg.)

Course Name : MEU402 Kinematics of machines

Time : 1hr. **Max. Marks: 15**

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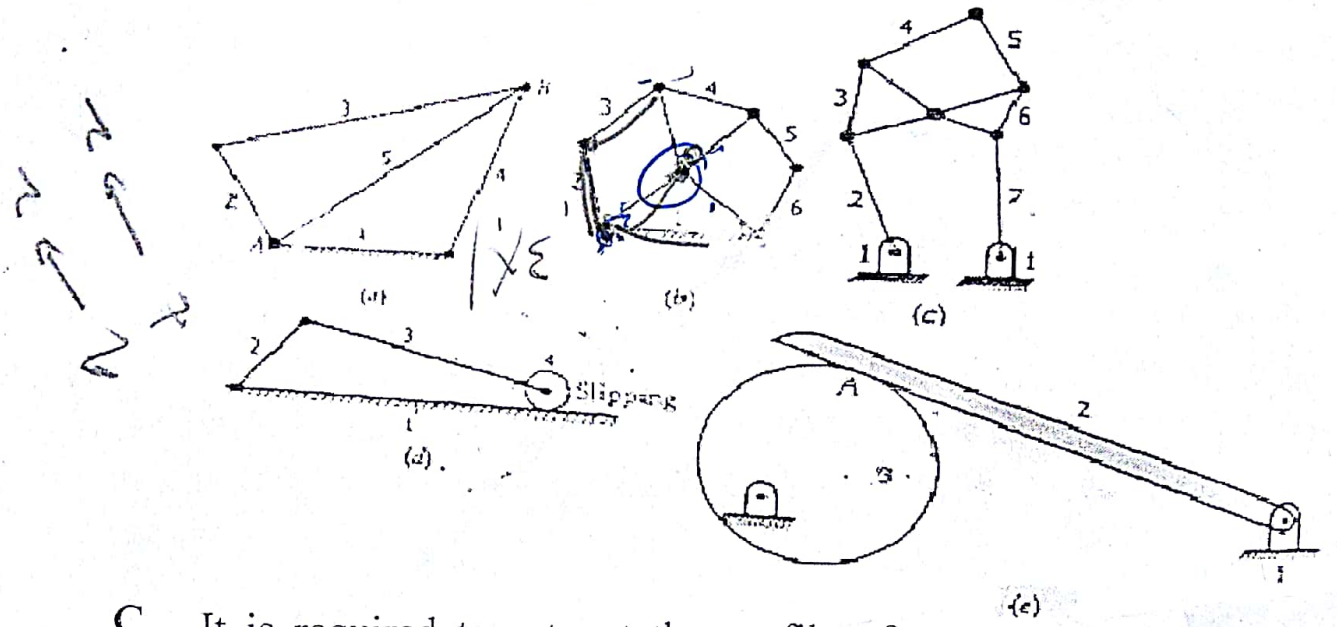
1. Solve any **Three** questions.

A Explain various inversions of single and double slider crank chains

B Determine the mobility of all devices shown in figure



C It is required to set out the profile of a cam to give the following motion to reciprocating follower with a flat mushroom contact face:

i. Follower to have a stroke of 20 mm during 120^0 of cam rotation

ii. Follower to dwell for 30^0 of cam rotation

iii. Follower to return to its initial position during 120^0 of cam rotation

iv. Follower to dwell for remaining 90^0 of cam rotation

The minimum radius of cam = 25 mm. Outstroke and return stroke of the follower are performed with simple harmonic motion.

D Draw the profile of a disc cam to give uniform motion during outstroke of 25 mm to a knife edge follower during the first half of cam revolution. The return of the cam also takes place with uniform motion during the remaining half of the cam revolution. Minimum radius of the cam, is 25 mm. Draw the shaft on which cam is mounted showing the position of the key. Shaft diameter = 25 mm. the axis of the knife edge follower passes through the axis of the cam.

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Mechanical Engineering Department

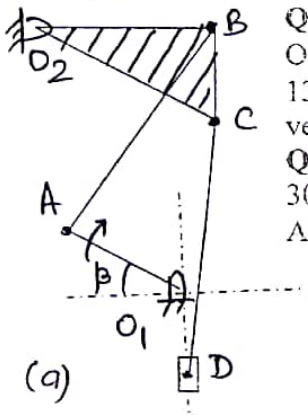
IV Semester **Marks : 15**
Time : 1.00 Hr.

CT - I Subject : Kinematics of Machine (ME 402)

Q1. Explain Kinematic Pair. **(3)**

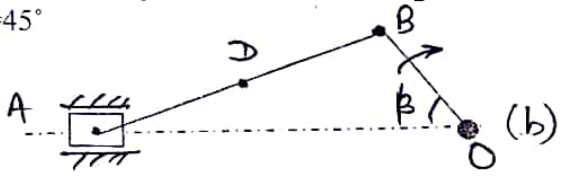
Q2. I. Define Inversion of mechanism and explain Elliptical Trammel. **(3)**

Q2. II. Define : **a.** Grashof's law **b.** Deltoid Linkage **c.** Grubler's Criterion **(3) OR**



Q2. Determine the velocity of needle D in **fig.a** The crank O_1A rotates at 400 rpm. O_1A=16mm, $\angle\beta$=45°, Vertical & Horizontal distance between O_1 and O_2 is 40mm and 13mm O_2B=25mm, AB = 35mm, $\angle O_2BC$=90°, BC=16mm, CD=40mm. Point D lies vertically below O_1. Use IC method. **(6)**

Q3. The mechanism is shown in **fig. b** If crank rotates clockwise at a constant speed of 300 rpm, determine velocity & acceleration of the midpoint D of Connecting rod AB. Assume OB=150 mm, AB=600mm & $\angle\beta$=45°



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IV Semester CT - I Subject : Kinematics of Machine (ME 402)
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Q1 & Q2 are compulsory :

Q1 Solve any two of the following a, b & c questions

a. Explain inversion of a mechanism and Elliptical trammel as a inversion (4)

b. Explain i. Cylindrical Pair ii. Configuration Diagram
iii. Kutzbach's Criterion iv. Degree of freedom (4)

c. Define Class I mechanism & Explain Crank and Slotted lever Mechanism (4)

Q2. a. State & Explain Aronhold-Kennedy Theorem (2)

Q2. b. Figure shows a wrapping machine mechanism. The dimensions of the links are O₁A = 100 mm, AC = 700 mm, BC = 200 mm, O₂C = 200 mm and O₂E = 400 mm. O₂D = 200 mm & BD = 150 mm. The crank O₁A rotates at a uniform speed of 100 rad/s. Find the velocity of point E & angular velocity of link BD. Use Instantaneous Centre method (5)