PVP 17

Code: **17MEMD2T1**

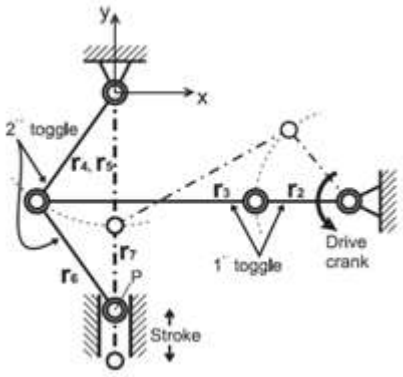
I M.Tech - II Semester – Regular/Supplementary Examinations
July 2019

MECHANISM DESIGN AND SYNTHESIS
(MACHINE DESIGN)

Duration: 3 hours Max Marks: 60

Answer the following questions

1. a) What are the mobilities of mechanism shown in Figure? 6 M

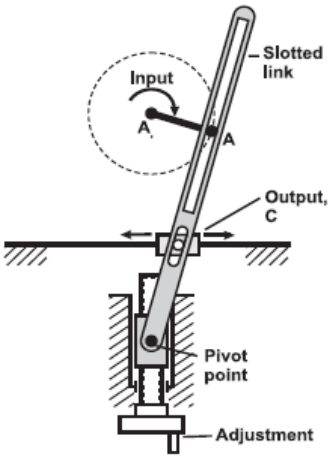


b) An adjustable slider drive mechanism consists of a crank-slider with an adjustable pivot, which can be moved up and down. 9 M

i) How many bodies (links) can be identified in this mechanism?

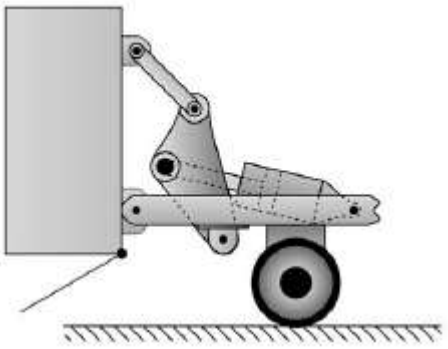
ii) Identify the type (and corresponding number) of all kinematic joints.

iii) What is the function of this mechanism and how will it be affected by moving the pivot point up and down?



(OR)

2. a) Sketch the kinematic diagrams and find their total degrees of freedom. 7 M



b) Explain the effect of additional links on the mobility of mechanism 8 M

3. Design a four link mechanism to coordinate three positions of the input and the output links for the following angular displacements: $\Theta_{12} = 60^o$, $\varphi_{12} = 30^o$, $\Theta_{13} = 90^o$ and $\varphi_{13} = 50^o$. 15 M

(OR)

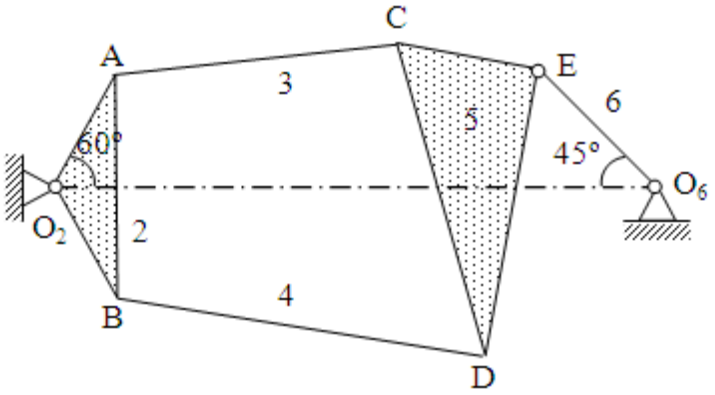
4. Explain the graphical approach for path generation of four bar mechanism for three prescribed positions without and with prescribed timing. 15 M

5. Determine the chebyshev spacing points for a function $y = x^2-x$ for the range $0 \leq x \leq 2$ where four precision points are required. Based on the above precision points, find φ_2, φ_3,φ_4 and ψ_2 ,ψ_3 ,ψ_4 if $10^0 \leq \varphi \leq 55^o$ and $30^0 \leq \psi \leq 120^o$ 15 M

(OR)

6. Design a slider crank mechanism so that displacement of the slider is proportional to cube of the crank rotation in the internal of $30^o \leq \theta \leq 100^o$. Assume initial distance of the slider equal to 15 cm and final distance to be 10 cm. Use Freudenstein equation. 15 M

7. The mechanism shown in Fig.1 is driven by link 6 with angular velocity of 0.5 rad/sec and angular acceleration of 2 rad/sec^2 both counterclockwise. Determine angular velocity and angular acceleration of link 2. 15 M



$O_2O_6 = 150$ mm
$O_2A = O_2B = 35$ mm
$O_6E = 55$ mm
$BD = ED = 90$ mm
$EC = 45$ mm
$DC = 105$ mm
$\angle AO_2B = 135°$

Fig. 1

(OR)

8. In the mechanism as shown, crank O2A rotates at 20 rpm CCW direction, determine the linear acceleration of slider D. 15 M