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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4080 Roll No.

# B. Tech.

## (SEM. IV) EXAMINATION, 2007-08

## KINEMATICS OF MACHINE

*Time : 3 Hours]* *[Total Marks : 100*

***Note:*** *(1) Attempt **all** questions.*

*(2) **All** questions carry **equal** marks.*

*(3) Assume **suitable** value for missing **data**.*

**1** Answer any **four** parts.

(a) How many types of links you know ? Explain with examples. **5**

(b) Explain at least two constrained motion with suitable examples. **5**

(c) Sketch and explain any two inversion of a double slider crank chain. **5**

(d) What do you mean by degree of freedom of a mechanism ? Explain with examples. **5**

(e) Determine the degree of freedom in each of the following cases shown in **Fig. 1**. **5**

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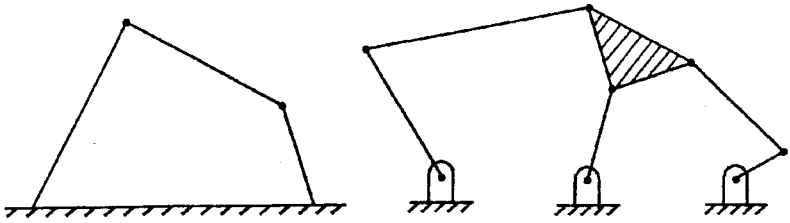



(f) Explain the methods of locating instantaneous centre.

2 Answer any **two** parts.

(a) Explain Klein's construction to draw accelerations diagram for single slider crank mechanism. **10**

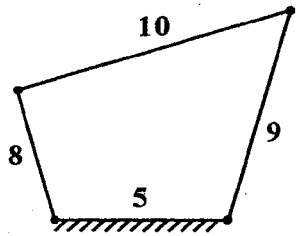
(b) What is Coriolis component of acceleration ? Derive an expressions for evaluation it and explain how the direction is fixed. **10**

(c) What are the different types of approximate straight line Motion Mechanisms ? Explain any one of them with neat diagram. **10**

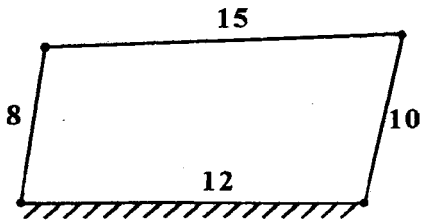
3 Answer any **four** parts :

(a) Discuss the movability of four bar mechanism if the length of the links are in arithematic progression. **5**

(b) Some four bar linkages are shown in **Fig. 2**. Where the numbers indicate in respective link length in cm. Identify the nature of each mechanism. **5**



(i)



(ii)

(c) Explain Freudenstein Equation for computing link length of a four bar mechanism. **5**

(d) Discuss the method of determining the angles for input and output link in a four bar mechanism for function generation. **5**

(e) Explain Three Portion Synthesis Slider Crank Mechanism. **5**

(f) Explailn Hart's mechanism with neat diagram. **5**

4 Answer any **two** parts :

(a) (i) With neat diagram, define the terms base circle, prime circle and pressure angle for a Cam. **5+5**

(ii) Explain with neat sketches the different types of Cam and follower.

(b) Establish a relation between pressure angle, distance of the location of the follower from the Cam Center and the angle of rotation of a Cam for a Cam follower mechanism with roller follower. Assume the follower to be an offset translating follower. **10**

(c) A cam rotating at 150 rpm, operates a reciprocating roller follower of radius 2.5 cm. The follower axis a offset by 2.5 cm to the right. The least radius of the Cam is 5 cm. and the stroke of the follower is 5 cm. Ascent and descent both take place by uniform acceleration and retardation. Ascent takes place during 75° and descent during 90° of Cam rotations. Dwell between ascent and descent is 60°. Draw velocity and acceleration diagrams. **10**

5 Answer any **two** parts :

(a) (i) Derive an expression for velocity of sliding between pair of involate teeth. **7+3**

(ii) With the neat diagram, show the followings: addendum, working depth, and Base Circle.

(b) Prove that in Sun and Planet gear train arrangement, irrespective of whichever wheel is fixed the velocity ratio is always less than or equal to unity. **10**

(c) Give the comparison between Involute and cycloidal tooth profile. **10**

Also derive the relation to obtain length of path of contact for two meshing spur gears having involute profile.

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