



Printed Pages : 4

TME - 402

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

PAPER ID : 4080

Roll No.

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B. Tech.

(SEM. IV) EXAMINATION, 2008-09

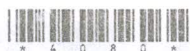
KINEMATICS OF MACHINE

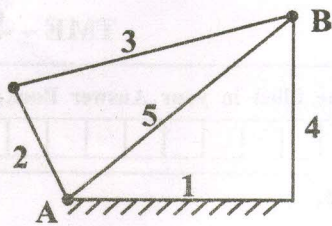
Time : 3 Hours]

[Total Marks : 100

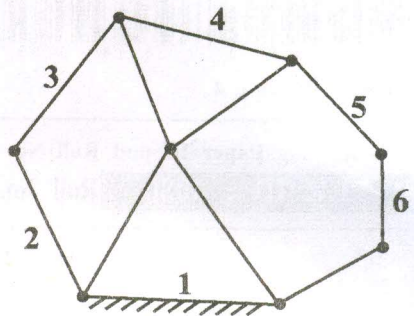
- Note :
- (1) Answer **all** the questions.
 - (2) All questions carry **equal** marks.
 - (3) Assume suitable value for missing data.

- 1 Answer any **four** parts:
- (a) Explain the difference between machine and structure with example. 5
 - (b) Explain at least two types of joints which are usually found in chain. 5
 - (c) Sketch and describe the four-bar chain mechanism. Why it is considered to be the basic chain ? 5
 - (d) State Gruebler's criterion for ascertaining the degree of freedom of planner mechanisms having turning pairs only.
 - (e) Determine the mobility of the devices shown in Fig.1. 5





(i)



(ii)

Fig.1.

- (f) Explain the law of three centre method to determine the velocity of a point. 5

2 Answer any two parts:

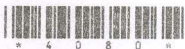
- (a) What are the different types of Exact Straight Line Motion mechanism? Explain any one of them with neat diagram. 10
- (b) In a mechanism, a slider is guided along a slot of rotating lever. Explain the various acceleration terms involved. Derive an expression for Coriolis component of acceleration. 10
- (c) The crank of a slider crank mechanism rotates at constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. Calculate angular acceleration of the connecting rod, at a crank angle of 45° from inner dead enter positon. 10



- 3 Answer any **four** parts:
- (a) Explain Grashof's law. What do you mean by inversion of Grashof's linkage? 5
 - (b) Explain limit positions of a four-bar mechanism. 5
 - (c) Explain synthesis of mechanisms with examples. 5
What do you mean by type of synthesis and number synthesis?
 - (d) Describe the methods for designing a four-bar mechanism as a function generation. 5
 - (e) Explain Two position synthesis of Slider Crank Mechanism. 5
 - (f) Explain the term Coriolis component of acceleration and write down the equation involved. 5

4 Answer any two parts :

- (a) (i) Why a roller follower is preferred to that of knife-edge follower?
- (ii) Draw the displacement, velocity and acceleration diagram for a follower when it moves with simple harmonic motion.
- (b) Derive an expression for velocity and acceleration during outstroke and return stroke of the follower when it moves with uniform acceleration and retardation.



- (c) A Cam is to be designed for a knife edge follower with following data:
- (i) Cam lift = 40 mm during 90° of Cam rotation with S.H.M.
 - (ii) Dwell for next 30°
 - (iii) During the next 60° of Cam rotation, the follower returns to its original position with S.H.M.
 - (iv) Dwell during the remaining 180° . Draw only the displacement diagram. Also determine the maximum velocity and acceleration of the follower during its ascent and descent, if the Cam rotates at 240 rpm and having radius of base circle 40 mm.

5 Answer any **two** parts:

- (a) State and prove Law of Gearing. Also explain the following for the gears :
Circular pitch, Arc of contact, Path of recess. 7+3
- (b) Derive an expression for the minimum no. of teeth required on the pinions in order to avoid interference. 10
- (c) Explain with neat sketch the 'Sun and Planet Wheel'. How the velocity ratio of epicyclic gear train is determined ? 3+7

