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CMR ENGINEERING COLLEGE: : HYDERABAD

UGC AUTONOMOUS

II-B.TECH-II-Semester End Examinations (Supply) - February- 2024

KINEMATICS OF MACHINERY

(MECH)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Classify the kinematic pairs. [2M]
- b) Distinguish between Rigid Link, flexible link, and fluid link. [2M]
- c) What is the magnitude of coriolis component of acceleration? [2M]
- d) Name all the inversions of slider-crank mechanism with one application for each Inversion. [2M]
- e) What is pantograph? How it different from straight line motion mechanism? [2M]
- f) Briefly explain Ackermann steering gear. [2M]
- g) Define base circle and pitch circle for cams. [2M]
- h) When does the maximum velocity is attained in SHM during forward stroke. [2M]
- i) Define the terms in gears: (i) Module (ii) Addendum. [2M]
- j) Define gear train. [2 M]

PART-B

(50 Marks)

2. Describe all the possible inversions of double slider crank chain mechanism. Give at least one practical application for each inversion. [10M]
- OR**
- 3.a) Sketch and describe the working of one type of quick return mechanisms. Give examples of their applications. [5M]
 - b) Derive an expression for the ratio of times taken in forward and return stroke for crank and slotted quick return motion mechanisms. [5M]
4. Define instantaneous centre of rotation. State and prove Kennedy's theorem as applicable to instantaneous centres of rotation of three bodies. [10M]
- OR**
5. In a slider crank mechanism, the lengths of the crank and the connecting rod are 200 mm and 800 mm respectively. When the crank has turned 45° from its inner dead center and it rotates at 40 rad/sec, Determine the velocity of slider and angular velocity of connecting rod. [10M]
6. Sketch a peaucellier mechanism. Prove that it can be used to trace a straight line. [10M]
- OR**
- 7.a) What is an automobile steering gear mechanism? What are its types? Which steering gear is preferred and why? [5M]
 - b) Derive the condition for correct steering of an automobile? [5M]

8. Draw the profile of a cam operating a knife-edge follower having a lift of 30 mm the cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60° . The follower descends for the next 100° rotation of the cam with uniform velocity again followed by a dwell period. The cam rotates at uniform velocity of 120 rpm and has a least radius of 20mm. [10M]

OR

- 9.a) What is a follower? Discuss about different types of followers. [5M]
b) Deduce the expressions for the velocity and acceleration of the follower when it moves with simple harmonic motion. [5M]

10. Two involute gears in a mesh have a module of 8 mm and a pressure angle of 20° . The larger gear has 57 while the pinion has 23 teeth. If the addendum on pinion and gear wheels are equal to one module, find the a) Contact ratio b) Angle of action of the pinion and the gear wheel c) Ratio of the sliding to rolling velocity at the beginning of contact, pitch point and end of contact. [10M]

OR

- 11.a) Explain the different types of gear trains. [3M]
b) Derive the expression for the velocity ratio of a compound gear train. [7M]
