R18 Regulation *Subject code: 2P3CC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Semester Supplementary Examinations, March/April 2023

KINEMATICS OF MACHINERY
(MECHANICAL ENGINEERING)

Maximum Marks: 70 Date:01.04.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Differentiate rigid and flexible links.
2 When a linkage becomes mechanism?
3 Define rubbing velocity at a pin point.
4 Name the three types of instantaneous centers for a mechanism.
5 Define pantograph.
6 Define Ackermann steering theory.
7 Classify cams based on their physical shapes.
8 What is a pressure angle of cam?
9 State law of gearing.
10 What is the interference in involute gear and how is it prevented?

Part-B

Answer All the following questions. (5X10M=50Marks)

11 What is constrained motion and what are the different types of constrained motions? Give one example for each with suitable sketch. (10M)

OR

12 What is a kinematic inversion? Discuss any three applications of inversions of slider crank mechanism with suitable sketches. (10M)

13 A. What do you understand by the instantaneous centre of rotation in kinematic of machines? Answer briefly. (5M)
B. Explain the following terms: (a) Instantaneous center (b) Body center and space. (5M)

OR

14 An engine mechanism is shown in Fig.1. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s2. Find: 1. Velocity of G and angular velocity of AB, and 2. acceleration of G and angular acceleration of AB. (10M)

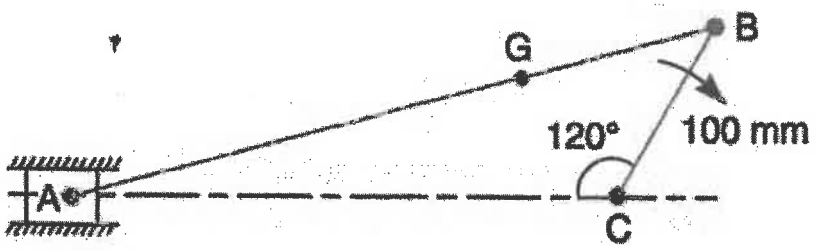

Fig.1

15 A. Sketch and explain the working of Grasshopper straight line mechanism. (5M)
B. Sketch and Describe the Tchebichef mechanism. (5M)

OR

16 With neat sketch, explain the Davis steering gear of an automobile. (10M)

17 Define the following terms (i). Cam (ii). Follower (iii) Offset follower (iv) Radial follower (v) Mushroom follower (10M)

OR

18 A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below :

1. To raise the valve through 50 mm during 120° rotation of the cam;
2. To keep the valve fully raised through next 30°;
3. To lower the valve during next 60°; and
4. To keep the valve closed during rest of the revolution i.e. 150°;

The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when the line of stroke of the valve rod passes through the axis of the cam shaft. The displacement of the valve, while being raised and lowered, is to take place with simple harmonic motion. Determine the maximum acceleration of the valve rod when the cam shaft rotates at 100 r.p.m. (10M)

19 The number of teeth on each of the two equal spur gears in mesh is 40. The teeth have 20° in volute profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum. (10M)

OR

20 Explain briefly the differences between simple, compound, and epicyclic gear trains. What are the special advantages of epicyclic gear trains? (10M)