R20 Regulation

Subject code: 3P4CC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

Kinematics of Machinery

(Mechanical Engineering)

Maximum Marks: 70

Date:19.09.2023 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 What are the important applications of a single slider crank mechanism?
2 Define Degrees of Freedom?
3 What are the important concepts in velocity analysis?
4 Define speed?
5 What are the different types of cams?
6 What do you know about Nomogram?
7 What are the advantages and limitations of gear drive? Write any two?
8 Write down the difference between involute and cycloidal tooth profile?
9 Why lubrication reduces friction?
10 List out the commonly used breaks?

Part-B

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

11 A. Distinguish between completely constrained motion and incompletely constrained motion with examples. (5M)
B. Write the inversions of single slider crank mechanism and explain any two of them with neat sketches. (5M)

OR

12 A. Define mechanism and explain any two types of mechanism with neat sketches. (5M)
B. Classify the pairs based on nature of contact with neat sketches. (5M)

13 In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. (10M)

OR

14 Explain with neat sketch the Coriolis component of acceleration with magnitude and motion. (10M)

15 A. Explain Scott-Russell straight line mechanism with neat sketch. (5M)
B. Explain watt indicator mechanism with sketch. (5M)

OR

16 What are the conditions for correct steering and explain with a neat sketch the working of Davis steering gear. (10M)

17 A. With a neat sketch explain the nomenclature of cams. (5M)
B. Explain the four different types of followers with sketches. (5M)

OR

18 A flat-faced mushroom follower is operated by a uniformly rotating cam. The follower is raised through a distance of 25 mm in 120° rotation of the cam, remains at rest for the next 30° and is lowered during further 120° rotation of the cam. The raising of the follower takes place with cycloidal motion and the lowering with uniform acceleration and deceleration. The least radius of the cam is 25 mm and this rotates at 300 r.p.m. Draw the

(i) Cam profile

(ii) Determine the values of the maximum velocity and maximum acceleration during rising and

(iii) Maximum velocity and uniform acceleration and deceleration during the lowering of follower. (10M)

19 A pair of gears having 40 and 30 teeth respectively are 25^0 involutes form. The addendum length is 5mm and module pitch is 2.5mm. If the smaller wheel is driver and rotates at 1500 rpm, find the velocity of sliding (i) at the point of engagement (ii) at the point of disengagement (iii) at the pitch point. (10M)

OR

20 Write about Law of gearing with neat sketch. (10M)