

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2024

Subject Code:3132505

Date:06-07-2024

Subject Name:Kinematics and Dynamics of Machines

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define kinematics and dynamics. **03**
(b) Write a short note on four bar chain mechanism. **04**
(c) Give a brief classification of kinematic pair. **07**

- Q.2** (a) What is displacement, velocity and acceleration? **03**
(b) Write a brief note on instantaneous center and its properties. **04**
(c) Draw a slider crank mechanism assuming suitable dimensions. Write a procedure for finding velocities in slider crank mechanism. **07**

OR

- (c) Draw a four bar chain mechanism assuming suitable dimensions. Write a procedure for finding accelerations in four bar chain mechanism **07**

- Q.3** (a) Give a brief classification of chain drive. **03**
(b) Classify followers according to the surface in contact. **04**
(c) Draw a nomenclature diagram of radial cam and follower. Show following terms in the diagram and define them (i) Base Circle (ii) Trace Point (iii) Prime Circle (iv) Pitch Circle **07**

OR

- Q.3** (a) Explain the phenomenon of slip and creep in belt drive. **03**
(b) What are the different conditions for which a displacement diagram of follower can be prepared? **04**
(c) It is stated that the speed at which a belt or rope should be run to transmit maximum power is that at which the maximum allowable tension is three times the centrifugal tension in the belt or rope at that speed. Prove the statement. **07**

- Q.4** (a) Draw and discuss simple gear train. **03**
(b) Describe in brief any two types of gears. **04**
(c) Draw a nomenclature diagram of gear teeth. Show following terms in the diagram and define them. (i) Addendum (ii) Dedendum (iii) Tooth thickness (iv) Circular Pitch **07**

OR

- Q.4** (a) What are the methods for reducing vibration? **03**
(b) Derive an expression for the length of arc of contact in a spur gear. **04**
(c) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? **07**

- Q.5** (a) Differentiate between static and dynamic balancing of rotating masses. **03**
(b) Write a brief note on gyroscope. **04**
(c) Derive the following expressions, for an uncoupled two cylinder locomotive engine (a) Variation in tractive force (b) Swaying couple **07**
- OR**
- Q.5** (a) Explain types of free vibrations. **03**
(b) Explain the effect of gyroscopic couple on aero plane. **04**
(c) Describe magnification factor, vibration isolation and transmissibility. **07**
