

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024****Subject Code:3132505****Date:10-12-2024****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) Give overview and need of learning the subject kinematics and dynamics of machine. **03**
 (b) Explain Grubler's for determining degree of freedom for mechanisms. **04**
 (c) Draw and explain four bar chain mechanism. Also describe any one inversion of mechanism. **07**
- Q.2** (a) Define (i) displacement (ii) Velocity (iii) Acceleration **03**
 (b) Write brief note on instantaneous center. **04**
 (c) State steps for finding velocity of a point in a link by relative velocity method in four bar chain mechanism.
- OR**
- (c) Describe (i) Coriolis component of acceleration (ii) Rubbing velocity **07**
- Q.3** (a) Where cams are used in actual application? **03**
 (b) Classify followers according to surface in contact. **04**
 (c) Express the effect of gyroscopic couple on stability of two wheel vehicle taking a turn. **07**
- OR**
- Q.3** (a) In power transmission state examples where rope drives are used? **03**
 (b) How chains are classified? **04**
 (c) With the figure explain various types of flat belt drives. **07**
- Q.4** (a) Define (i) Module and (ii) Pitch Circle Diameter with reference to Gears. **03**
 (b) Mention any two advantages of (i) Involute Gear and (ii) Cycloidal Gear. **04**
 (c) Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find : **07**
1. The angle turned through by pinion when one pair of teeth is in mesh ; and
2. The maximum velocity of sliding.
- OR**
- Q.4** (a) Discuss any three features of reverted gear train. **03**
 (b) With reference to gear train what is (i) Driver (ii) Follower (iii) train value? **04**
 (c) With the schematic diagram of epicyclic gear train find velocity ratio considering tabular method. **07**
- Q.5** (a) Differentiate between static balancing and dynamic balancing. **03**
 (b) Derive the following expressions, for an uncoupled two cylinder locomotive engine : **04**
 (a) Variation in tractive force (b) Swaying couple
 (c) Write short note on: Balancing Machine **07**
- OR**
- Q.5** (a) What are the causes and effect of vibrations? **03**
 (b) Explain the terms 'under damping, critical damping' and 'over damping' **04**
 (c) Explain following terms in vibrations: (i) Time Period (ii) Cycle (iii) Frequency (iv) Free vibration (v) Forced vibration **07**
