

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2142504

Date:05-07-2024

Subject Name:Theory 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) | What is the importance of Theory of Machine? | 03 |
| (b) | Give an example of (i) plane motion (ii) Rectilinear motion and (iii) Curvilinear Motion | 04 |
| (c) | How kinematic pairs are classified? Write detail classification with suitable example. | 07 |

- Q.2**
- | | | |
|-----|---|-----------|
| (a) | Sketch a pantograph and explain its working. | 03 |
| (b) | With the neat sketch of heart's straight line mechanism prove that it produces an exact straight line motion. | 04 |
| (c) | Explain why two Hook's Joints are used to transmit motion from the engine in automobile. | 07 |

OR

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|-----|---|-----------|
| (c) | The crank of the slider-crank mechanism rotates clockwise at a constant speed of 300 RPM. The crank is 150 mm and the connecting rod is 600 mm long. Determine:
1. Linear velocity and acceleration of the midpoint of the connecting rod, and
2. Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from the inner dead centre position | 07 |
|-----|---|-----------|

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Define (i) Displacement (ii) Velocity (iii) Acceleration | 03 |
| (b) | Illustrate coriolis component of acceleration. | 04 |
| (c) | What is instantaneous centre? Also give its types and properties. | 07 |

OR

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Discuss number synthesis in kinematic synthesis of mechanism. | 03 |
| (b) | Describe (i) Path Generation and (ii) Function Generation | 04 |
| (c) | With the help of inversion method explain two point synthesis of four bar chain mechanism. | 07 |

- Q.4**
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|-----|---|-----------|
| (a) | State the examples where friction is necessary. | 03 |
| (b) | Draw and explain open belt drive and crossed belt drive. | 04 |
| (c) | When conditions like (i) Self energizing brake and (ii) Self-locking brake will arise in block brake? | 07 |

OR

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Enlist types of brakes. | 03 |
| (b) | Discuss the concept of initial tension in the belt. | 04 |
| (c) | Considering uniform pressure condition deduce an expression for total frictional torque for single disc clutch. | 07 |
