Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (ME) (Sem.–4)

THEORY OF MACHINES-II

Subject Code : ME-204

Paper ID : [A0809]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. Define 'inertia force' and 'inertia torque'.

b. Explain the term as related to balancing of reciprocating masses: primary balancing and reciprocating balancing.

c. State fundamental law of gearing.

d. Why is balancing of machines necessary?

e. Explain swaying couple.

f. Classify different types of gear train.

g. Explain the terms: module and circular pitch.

h. Draw the three planes of a gyroscopic motion along with its name.

i. What is partial balancing of locomotives?

j. What is gyroscopic couple?

SECTION-B

2. The crank and connecting rod of a steam engine are 0.3 m and 1.5 m in length. The crank rotates at 180 r.p.m. clockwise. Determine the velocity and acceleration of the piston when the crank is at 40 degrees from the inner dead centre position.

3. How do the effects of gyroscopic couple and of centrifugal force make the rider of a two wheeler to tilt to one side? Derive a relation for the limiting speed of the vehicle.

4. Explain the terms static balancing and dynamic balancing. State the necessary condition to achieve them.

5. Explain briefly the differences between simple, compound, and epicyclic gear trains. What are the special advantages of epicyclic gear trains?

6. Describe the graphical method for determining the inertia forces in a horizontal reciprocating engine.

SECTION-C

7. Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.

8. A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.

9. Explain Freudenstein's method of three point synthesis of mechanisms.