

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech (ME) (Sem.-4)**  
**THEORY OF MACHINES-II**

**Subject Code : BTME-405-18**

**M.Code : 77550**

**Date of Examination : 21-05-2024**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN Multiple Choice 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 gravitational force.
- (b) What do you understand by "Interference" with reference to gears?
- (c) List the different power transmission elements.
- (d) What is hammer blow?
- (e) Explain the term circular pitch.
- (f) Why is the reciprocating masses not completely balanced? Explain briefly.
- (g) Explain the term as related to balancing of reciprocating masses : primary balancing and reciprocating balancing.
- (h) Classify different types of gear train.
- (i) What do you understand by swaying couple?
- (j) What do you mean by path of contact?

## SECTION-B

2. What are the free body diagrams of a mechanism? Explain the implementation of this concept for a slider crank mechanism.
3. 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  $45^\circ$ ,  $75^\circ$ , and  $135^\circ$ . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.
4. 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.
5. Describe the graphical method for determining the inertia forces in a horizontal reciprocating engine.
6. Write in detail about three position synthesis for four bar mechanism.

## SECTION-C

7. Discuss how a single revolving mass is balanced by two masses revolving in different planes?
8. Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel.
9. A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with  $20^\circ$  pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**