Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 18

B.Tech (ME) (2018 Batch)   (Sem.–4)

THEORY OF MACHINES-II
Subject Code : BTME-405-18
M.Code : 77550

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

Write briefly :

1. What do you understand by free body diagrams?

2. Describe the need for balancing of rotating parts.

3. Explain backlash in gears.

4. Define Velocity Ratio in context to gear train.

5. Define Axial Pitch of a helical gear?

6. Write least square techniques in reference to kinematics synthesis.

7. Why is the reciprocating mass not completely balanced? Explain briefly.

8. Write the gyroscopic couple equation explaining all its terms.

9. Explain the transmission angle in reference to kinematic synthesis of mechanism.

10. Explain the term of point of concurrency.

SECTION-B

11. What are the free body diagrams of a mechanism? Explain the implementation of this concept for a four link mechanism.

12. What do you understand by balancing of reciprocating masses? Find out the primary and secondary unbalanced forced for slider crank mechanism.

13. The inertia of the connecting rod can be replaced by two masses concentrated at two points and connected rigidly together. How to determine the two masses so that it is dynamically equivalent to the connecting rod? Show this.

14. Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m. and the other at 360 r.p.m., find the number of teeth on each wheel, if the module is 8 mm. Also determine the exact distance apart of the shafts.

15. For the four bar linkage, the following data are given :

$\theta_2 = 60°$, $\theta_4 = 90°$, $\omega_2 = 3$ rad/sec, $\alpha_2 = -1$ rad/sec^2, $\omega_4 = 2$ rad/sec, $\alpha_4 = 0$. Determine the link length ratios with the help of freudenstein's equation.

SECTION-C

16. A four cylinder vertical engine has cranks 150 mm long. The planes of rotation of the first, second and fourth cranks are 400 mm, 200 mm and 200 mm respectively from the third crank and their reciprocating masses are 50 kg, 60 kg and 50 kg respectively. Find the mass of the reciprocating parts for the third cylinder and the relative angular positions of the cranks in order that the engine may be in complete primary balance.

17. What do you understand by gyroscope? Discuss the effect of the gyroscopic couple on a two wheeled vehicle when taking a turn with neat and clean diagram.

18. a) Two shafts, inclined at an angle of 65° and with a least distance between them of 175 mm are to be connected by spiral gears of normal pitch 15 mm to give a reduction ratio 3:1. Find suitable diameters and numbers of teeth. Determine, also, the efficiency if the spiral angles are determined by the condition of maximum efficiency. The friction angle is 7°.

    b) 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.

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.