

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (Sem.-4)
THEORY OF MACHINES – II
Subject Code : BTME-402
M.Code : 59130
Date of Examination : 05-07-22

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. Write the need of balancing in machines.
- b. Differentiate between static and dynamic balancing.
- c. Define pressure angle.
- d. What is a circular pitch of spur gear?
- e. What do you mean by gyroscope?
- f. State D'Alembert's principle.
- g. State fundamental law of gearing.
- h. Describe the condition of balancing in multicylinder inline V-Engines.
- i. Write down the Freudenstein equation in reference to kinematic synthesis.
- j. What do you mean by hammer blow?

SECTION-B

2. What do you understand by interference phenomena in gears? Also, explain various methods to eliminate the same.
3. An aeroplane makes a complete half circle of 50 meters radius towards left, when flying at 200 km/hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.
4. Explain the analytical and graphical methods for balancing of several masses rotating in the same plane.
5. A pair of spur gears with involute teeth is to give a gear ratio of 4:1. The arc of approach is not to be less than die circular pitch and smaller wheel is the driver. The angle of pressure is 14.5° . Find:
 - a) the least number of teeth that can be used on each wheel and
 - b) the addendum of the wheel in terms of the circular pitch.
6. Write the classification of kinematic synthesis problem. Explain each of them in detail.

SECTION-C

7. An internal wheel B with 80 teeth is keyed to the shaft F. A fixed internal wheel C with 82 teeth is concentric with B. A compound wheel D-E gears with the two internal wheels; D has 28 teeth and gears with C while E gears with B. The compound wheels revolve freely on a pin which projects from a disc keyed to a shaft A co-axial with F. If the wheels have the same pitch and the shaft A makes 800 r.p.m., what is the speed of the shaft F? Sketch the arrangement.
8. A pair of locomotive driving wheels with the axle, have a moment of inertia of 180 kg-m^2 . The diameter of the wheel treads is 1.8 m and the distance between wheel centers is 1.5 m. When the locomotive is travelling on a level track at 95 km/h, defective ballasting causes one wheel to fall 6 mm and to rise again in a total time of 0.1s. If the displacement of the wheel takes place with simple harmonic motion, find:
 - a) The gyroscopic couple set up and
 - b) The reaction between the wheel and the rail due to this couple.
9. Explain the following:
 - a) Gyroscopic effect on four wheeled vehicles.
 - b) Least square technique.

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.