Seat No.

Total No. of Pages : 3

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Theory of Machine - II

Sub. Code: 66242/80754/81008

Day and Date: Monday ,15-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Figures to the right indicate full marks**
4. **Use of Scientific calculator is allowed**

Q1) Attempt the following **[10]**

a. Explain the interference phenomenon in involute gears. **[5]**
OR

b. Derive the expression for the minimum number of teeth required on pinion to avoid interference in mesh with gear. **[5]**

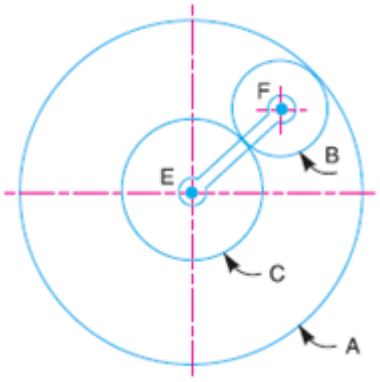
c. A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, a and the contact ratio if the pinion rotates at 100 rpm. **[5]**

Q2) Attempt the following **[12]**

a. An epicyclic gear train consists of sun, planet, arm and annular gear. Derive the equation of velocity ratio. **[4]**
OR

b. Explain the working of differential gear of an automobile. **[4]**

c. An epicyclic gear train is shown in following fig. The annular gear has 72 teeth and meshes with gear B. Gear C has 32 teeth and is engaged to gear B. Arm EF which carries gears B and C rotates at a speed of 18 r.p.m. If gear A is fixed, determine the speed of gears B and C. **[8]**



Q3) Attempt the following **[12]**

a. Explain with sketch active couple and reactive couple as related to gyroscope. **[6]**
OR

b. Derive the expression for gyroscopic couple magnitude. **[6]**

c. The turbine rotor of a ship has a mass of 8 tonnes and a radius of gyration 0.6 m. It rotates at 1800 rpm clockwise, when looking from the stern. Determine the gyroscopic couple, if the ship travels at 100 km/ h and steer to the left in a curve of 75 m radius. **[6]**

Q4) Attempt the following **[12]**

a. Explain different types of dynamic forces acting in single slider crank chain mechanism **[6]**
OR

b. Derive an expression for velocity and acceleration of the slider of slider crank mechanism. **[6]**

c. The connecting rod of a gasoline engine is 300 mm long between its centres. It has a mass of 15 kg and mass moment of inertia of 7000 kg-mm2. Its centre of gravity is at 200 mm from its small end centre. Determine the dynamical equivalent two-mass system of the connecting rod if one of the masses is located at the small end centre. **[6]**

Q5) Attempt the following **[12]**

a. Explain balancing of several masses rotating in same plane. **[4]**
OR

b. Why is balancing necessary for rotors of high speed engines? **[4]**

c. A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced **[8]**

600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance.

Q6) Attempt the following **[12]**

a. Explain Turning moment diagram for a multi cylinder Engine **[4]**
OR

b. Explain coefficient of fluctuation of speed **[4]**

c. The turning moment diagram for a multi-cylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm2 , when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m. **[8]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (101) Bachelor of Engineering (81008) Theory of Machine - II Part 3 SEM 5
2] (101) Bachelor of Engineering (66242) Theory of Machine - II Part 3 SEM 5
3] (1154) B.Tech. CBCS (80754) Theory of Machine - II Part 3 SEM 5