DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Winter Semester Examination – December - 2019

Branch: B. Tech Mechanical **Sem.:- V**
Subject with Code: - Theory of Machine -II (BTMEC504) **Marks: 60**
Date:- 16/12/2019 **Time:- 3 Hr.**

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately Assume it and should mention it clearly

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(Marks)

Que.1. **(2×6=12)**

A) A pulley is driven by a flat belt, angle of lap being 120^0. The belt is 100 mm wide by 6 mm thick and density 1000 kg/m^3. If coefficient of friction is 0.3 & maximum stress in belt is not exceed 2 MPa. Find greatest power which the belt can transmit & corresponding speed of belt.

B) Explain centrifugal Tension in belt.

Que.2. **(2×6=12)**

A) What do you understand by the term 'Interference' & 'undercutting' as applied to gears

B) A pinion of 20 involutes teeth and 125mm pitch circle diameter drives a rack. The addendum of both pinion and rack is 6.25mm. What is the least pressure angle which can be used to avoid interference? With this pressure angle, find the length of the arc of contact and the minimum numbers of teeth in contact at a time.

Que.3. Attempt the following

A) Explain compound gear train with neat sketch. (6)

B) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 rpm in the clockwise direction, what will be the speed of gear B. (6)

Que. 4. **(2×6=12)**

A) The turning moment diagram for a petrol engine is drawn to the following scales : Turning moment, 1 mm = 5 N-m Crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm^2 . The rotating parts are equivalent to a mass of 36kg at a radius of gyration of 150mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m.

B) Explain the terms. i) Sensitiveness of governor. ii) Stability of governor.

iii) Isochronism. iv) Hunting of governor.

Que. 5. **(2×6=12)**

A) The mass of the turbine rotor of a ship is 20 tonnes and has a radius of gyration of 0.6m Its speed is 2000 r.p.m. The ship pitches 6° above and 6° below the horizontal position. The complete oscillation takes 30 seconds and the motion is simple harmonic. Determine the following. i) Maximum gyroscopic couple. ii) Maximum angular acceleration of the ship during pitching and iii) The direction in which the bow will tend to turn when rising, if the rotation of the rotor is clockwise when looking from the left.

B) The turbine rotor of ship has a mass of 2000kg and rotates at a speed of 3000r.p.m. clockwise when looking from a stern. The radius of gyration of the rotor is 0.5m. Determine the gyroscopic couple and its effect upon the ship when the ship is steering to the right in curve of 100m radius at a speed of 16.1 knots (1 knot = 1855 m/h) calculate also the torque and its effects when the ship is pitching in simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 50 seconds and the total angular displacement between the two extreme positions of pitching is 12°. Find the maximum acceleration during pitching motion.

Que. 6. Solve the following.

A) Explain Rayleigh's method. **(6)**

B) Explain and derive expression for critical or whirling speed of a shaft. **(6)**

*******End Paper*******