F 7107 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Fifth Semester

Branch : Mechanical Engineering

THEORY OF MACHINES—II (M)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Define the terms inertia force and inertia couple. How is their magnitude and direction found ?
2. Explain the principle of virtual work.
3. Explain what is meant by radius of rotation of a governor ?
4. What do you mean by Hunting of governors ?
5. Explain the term coefficient of fluctuation of speed.
6. What are the forces acting on an IC engine connecting rod ?
7. Explain the gyroscopic effects on a two wheeled vehicle.
8. What is an epicyclic gear train ? How will you find the velocity ratio of the same ?
9. Sketch any *four* types of cam followers.
10. How the cams are classified based on follower motion ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each full question carries 12 Marks.

11. Explain the procedure to perform static force analysis of a shaper mechanism with suitable free body diagram of various links.

Or

12. What do you mean by dynamic equivalent system ? State the important role played by such system for determining the line of action of inertia force.

Turn over

13. A Hartnell governor has a speed range of 390 r.p.m. to 410 r.p.m. for a lift of 2 cm. The sleeve arm and the ball arm are 10 cm. and 15 cm. respectively. The radius of rotation of the balls is 15 cm. from the governor axis when the ball arm is vertical and the speed of the governor is minimum. If the mass of each ball is 2 kg, determine:

    (a) Load on the spring for minimum and maximum speeds

    (b) Spring rate.

Or

14. With the help of a neat proportional sketch, explain the working of a Hartnell governor.

15. Derive an expression for inertia force due to reciprocating mass in reciprocating engine, neglecting the mass of the connecting rod.

Or

16. Determine the maximum and minimum speeds of a flywheel of mass 25 kg. and radius of gyration of 10 cm. when the fluctuation of energy is 54.5 Nm. The mean speed of the engine is 1500 r.p.m.

17. Explain the gyroscopic applied torque and reaction torque. Which one is more significant as regards the reaction on the bearing of a shaft on which spinning disc is rotating.

Or

18. Design a compound gear train for an exact train ratio of 180 : 1. Determine a combination of gears which will give this ratio. The minimum number of teeth on any gear shall not be less than 12 being the under cutting of interference limit for 25° pressure angle gear sets. The limit of gear ratio for one stage gear set is 10 : 1.

19. Derive an expression for displacement, velocity and acceleration of a tangent cam with roller follower when (a) Roller is in contact with flank ; and (b) Roller is in contact with nose.

Or

20. Give a comparison between the cams and Lower paired mechanisms.

(5 × 12 = 60 marks)