



(Time : 3 Hrs.)

(Marks:80)

- N.B. i) Question **No.1** is compulsory
 ii) Solve any **three** questions from the remaining
 iii) Assume suitable data wherever necessary
 iv) Figure to the right indicates marks
- Q.1 Solve any **four** questions from following
- Write the factors on which capacity of brakes depends. (05)
 - Explain how a governor differs from a flywheel? (05)
 - Explain the term steering, pitching and rolling? (05)
 - Explain reverted gear train with neat sketch? (05)
 - Draw and explain the turning moment diagram for four stroke I.C. engine. (05)
- Q.2
- With a neat sketch explain the working of a centrifugal clutch. (06)
 - Explain the working of an internal expanding shoe brake. (04)
 - A cone clutch is used to transmit 80 KW power at 1440 rpm. The cone angle of clutch is 40° and coefficient of friction is 0.3. If the mean diameter of the bearing surface is 350 mm and allowable normal pressure is 0.2 N/mm², determine the dimensions of conical bearing surface and the axial load. (10)
- Q.3
- Derive an expression for tensions in case of band and block brakes. (10)
 - An epicyclic train is composed of a fixed annular wheel A having 150 teeth. Meshing with A is a wheel B, which drives wheels D through an ideal wheel C, D being concentric with A. Wheels B and C are carried on an arm which revolves clockwise at 100 rpm about the axis of A and D. If the wheels B and D have 25 and 40 teeth respectively, find i) the number of teeth on C and ii) Speed and sense of rotation of C also draw the diagram. (10)
- Q.4
- Explain Proell governor with neat sketch; also derive an expression for height of a Proell governor. (10)
 - An I.C. engine running at 2000 rpm has the following data: (10)
 Crank radius = 60 mm, length of connecting rod = 240, diameter of piston = 100 mm, mass of the reciprocating parts = 1.5 Kg, pressure on the piston during power stroke = 0.9 N/mm², displacement of piston from I.D.C. = 15 mm. Find
 i) Net load on the gudgeon pin ii) Thrust in the connecting rod iii) Piston side thrust iv) The engine speed at which the above value becomes zero.
- Q.5
- What are the various types of gear boxes? Explain any one of them in details? (10)
 - Considering gyroscopic couple, derive the equation for the stability of a four wheel drive moving in a curve path. (10)

- Q.6 a) A Hartnell governor having a central sleeve spring and two right angle bell crank lever moves between 290 rpm and 310 r.p.m. for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and 120 mm resp. The levers are pivoted at 120 mm from the governor axis and the mass of each ball is 2.5 Kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed. Determine (10)
- i) loads on the spring at the lowest and the highest equilibrium speeds &
 - ii) Stiffness of the spring.
- b) What is dynamometer? Explain belt transmission dynamometer? (10)
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