Total No. of Printed Pages:3

SUBJECT CODE NO:- H-542
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (MECHANICAL)
Theory Of Machine-II
(REVISED)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
1. Q.No.1 & 6 are compulsory.
2. From remaining four questions, attempt any two questions from each section.
3. Assume suitable data, wherever necessary.
4. Use of non-programmable calculator is permitted.

Section A

Q.1   Attempt any five: 10
   a) State "Law of gearing".
   b) Define circular pitch. Give its formula.
   c) Define compound gear train.
   d) Define pressure angle. State the significance of pressure angle.
   e) Define gyroscope. State application of it.
   f) Define steering and pitching of ship.
   g) What do you mean by axis of precession?

Q.2   a) Explain in details interference and undercutting in involute gears.   05

   b) The following data refers to two mating involute gears of 20^0 pressure angle. No of teeth on   10
      pinion = 20, gear ratio = 2, speed of pinion = 250 r.p.m, module = 12mm. if the addendum of
      each wheel is such that the path of approach and path of recess on each side are half the
      maximum possible length, find.'
      a) Addendum for both the wheels
      b) Length of arc of contact.
      c) Maximum sliding velocity during approach and recess.

Q.3   a) Derive an expression for centre distance for a pair of spiral gears with neat sketch.   06

   b) Two shafts inclined at an angle of 65^0 and with a least distance between them of 175 mm are   09
      to be connected by spiral gears of normal pitch 15 mm to give reduction ratio 3:1. Find
      suitable diameter and no. of teeth. Also determine the efficiency, if the spiral angle are
      determined by the condition of maximum efficiency. The friction angle is 7^0.

Q.4   a) Explain effect of gyroscopic couple on four wheeler.   06

   b) The turbine rotor of a ship having a mass of 200 kg at 2000 r.p.m and its radius of gyration is   09
      0.30 m. if the rotation of the rotar is clockwise looking from the aft, determine the

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gyroscopic couple set by the rotar when
i)   Ship takes a left hand turn at a radius of 300m at a speed of 30 km/hr.
ii)   Ship pitches with a bow rising at an angular velocity of 1 rad/sec.
iii)   Ship rolls at an angular velocity of 0.1 rad/sec.

Q.5   a)   Derive an expression for gyroscopic couple   05
         b)   Explain merits and demerits of helical gears over spur gears.   05
         c)   Differentiate between involute and cycloidal tooth profile.   05

Section B

Q.6   Attempt any five: 10
         a)   What do you mean by centrifugal tension in belts?
         b)   Enlist applications of v-belts
         c)   Differentiate between flat belt drive and v-belt drive.
         d)   What is the function of governor? How does it differ from that of a flywheel?
         e)   What is meant by effort and power of a governor?
         f)   Define the term vibration isolation.
         g)   What is meant by longitudinal vibration? Draw a sketch of it.

Q.7   a)   Define and explain.   08
            i)   Stability
            ii) Sensitiveness
            iii) Hunting
            iv) Isochronism

         b)   A proell governor has a arms of 300 mm length. The upper arms are hinged on the axis of   07
            rotation. Whereas the lower arms are pivoted at a distance of 35mm from the axis of rotation.
            The extensions of lower arms to which the balls are attached are 100 mm long. The mass of
            each ball is 8kg and the mass on the sleve is 60kg. At the minimum radius of rotation of 200
            mm, the extensions are parallel to the governor axis. Determine the equilibrium speed of the
            governor for the given configuration. What will be the equilibrium speed for the maximum
            radius of 250 mm?

Q.8   a)   What do you mean by initial tension in the belt? Derive an expression for it.   06

         b)   A chain drive is used for reduction of speed from 240 r.p.m. to 120 r.p.m. the number of   09
            teeth on driving sprocket is 20. Find the number of teeth on the driven shaft. If the pitch
            circle diameter on the given sprocket is 600 mm and centre to centre distance between two
            sprockets is 800 mm. determine the pitch and length of chain.

Q.9   a)   Derive an equation of motion and natural frequency for a simple pendulum using energy method.   07

       b)   In a single degree damped vibrating system. A suspended mass of 8kg makes 30 oscillations   08
in 18 seconds. The amplitude decreases to 0.25 of the initial value after 5 oscillations.
Determine.

   i) Stiffness of the spring

   ii) Logarithmic decrement

   iii) Damping factor

   iv) Damping coefficient

Q.10   a)   What do you mean by free vibration? Explain different types of free vibration.   07

       b)   Explain slip and creep of belt. Also derive an expression for velocity ratio of belt drive in terms of slip.   08