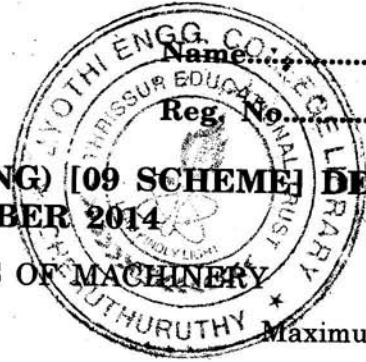**D 70319**

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# FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

## ME/PTME/AM 09 505—MECHANICS OF MACHINERY

Time : Three Hours

Maximum : 70 Marks

## Part A

*Answer all questions.*
*Each question carries 2 marks.*

1. Define Degree of freedom.

2. State Leasof's law for a four bar linkage.

3. State the expressions for maximum velocity and acceleration of a follower moves with cycloidal motion.

4. What is reverted gear train ?

5. What is kinematic synthesis ?

(5 × 2 = 10 marks)

## Part B

*Answer any four questions.*
*Each question carries 5 marks.*

1. Explain about Geneva mechanism.

2. Define and explain transmission angle of a mechanism.

3. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation.

4. Explain with sketches the different types of cams and followers.

5. Explain law of gearing.

6. Differentiate 2 position synthesis and 3 position synthesis.

(4 × 5 = 20 marks)

## Part C

*Answer all questions.*
*Each question carries 10 marks.*

1. (a) Sketch and explain in brief about the inversions of a single-slider crank chain. Mention the application of each inversion.

Or

   (b) Explain in brief about Coriolis component of acceleration.

**Turn over**

2. (a) Draw the profile of a cam to satisfy the following motion :

      (i) Follower to move outwards through 50 mm. with uniform acceleration during 120° of cam rotation.

      (ii) Dwell for 40°.

      (iii) Return with SHM in 120°.

      (iv) Dwell for 80°.

    The cam rotates with 1200 r.p.m. clockwise. The follower is offset 10 mm. towards the left. Roller diameter is 10 mm., base circle diameter is 4 cm.

*Or*

(b) A cam with a minimum radius of 25 mm. rotating clockwise at a uniform speed is to be designed for roller follower at the end of valve rod. The valve rod is raised through 50 mm. during 120° rotation. The angle of dwell is 30°. The valve is lowered through next 60°. The valve is closed during the rest of revolution. The diameter of roller is 30 mm. and the diameter of cam shaft is 25 mm.

    Draw the (i) Displacement diagram and (ii) Cam profile.

    When the line of the stroke is offset 15 mm. from the axis of the cam shaft. The displacements takes place with SHM.

3. (a) Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm., and the pitch line speed is 1.2 m/s, determine the angle turned through by pinion, when one pair of teeth is in mesh. Also calculate the maximum velocity of sliding. Take addendum as one module.

*Or*

(b) Derive an expression for the minimum number of teeth required on the pinion in order tto avoid interference in involute gear teeth.

4. (a) Obtain Freudenstein's equation for four bar mechanism.

*Or*

(b) Determine the Chebyhev spacing for function $y = x + 3x^2$ for the domain $0 \le x \le 3$. For these points determine $\theta_1$, $\theta_2$, $\theta_3$ and $\phi_1$, $\phi_2$, $\phi_3$ if $20° \le \theta \le 80°$ and $30° \le \phi \le 130°$.

                                                            (4 × 10 = 40 marks)