GUJARAT TECHNOLOGICAL UNIVERSITY
P.D.D.C. Sem- II Remedial Examination Nov / Dec. 2010

Subject code: X21902
Subject : Kinematics of Machines

Date: 30 / 11 / 2010   **Time: 10.30 am – 01.00 pm**

Total Marks: 70

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain Klein's construction method with neat sketch. **07**

(b) The crank of oscillating cylinder engine mechanism is 50 mm longhand it rotates at 300 rpm.The piston rod is 150mm long and distance between crank shaft and trunnion is 250mm. Draw velocity and acceleration diagram at the instant when crank is at 60 degree from IDC. And determine **07**

      1. velocity and acceleration of sliding piston.
      2. Angular velocity of a connecting rod.
      3.Sliding acceleration of a piston relative to cylinder walls.

Q.2 **(a)** Explain different types of joints in a kinematics chain. **07**

(b) An electric motor driven power screw moves in a horizontal plane against a force of 75kN at a speed of 300mm/min.The screw has a single square thread of 6 mm pitch on a major diameter of 50 mm.The coefficient of friction at the screw thread is 0.1.Esimate the power of the motor. **07**

OR

(b) The crank of a reciprocating engine is 10 cm long and it rotates at a uniform speed of 20 rad/sec clockwise. The connecting rod length is 40 cm.Determine the velocity and acceleration of the piston and angular velocity and angular acceleration of the connecting rod when crank is at 0 degree and 135 degree from IDC. Use Klein's construction method. **07**

Q.3 **(a)** A flat belt runs on a pulley 1m in diameter and transmits 8 kw at 200 RPM. Assuming angle of lap as 170 degree and coefficient of fricion as 0.25.find the necessary width of belt if pull is not to exceed 20 N/mm width of belt.Neglect centrifugal tension. **07**

(b) A casting having mass of 2000 kg is suspended freely from rope. The rope makes 2 turns round a drum 300 mm dia rotating at 24 rpm.The outer end of rope is pulled by man. Calculate the force required by the man, total power to raise the casting and power supplied by drum run by prime mover and by man. **07**

OR

Q.3 **(a)** The distance between two parallel shafts connected by Oldham's coupling is 20mm. The speed of the driving shaft is 240 RPM .find the maximum speed of the tongue of the intermediate piece in the grooves of the flange. **07**

(b) Aflat foot step being 225 mm in dia supports a load of 7500N.if the coefficient of friction is 0.09 and the shaft rotates at 60 RPM.calculate the power lost in friction. **07**

Q.4 **(a)** Two involutegears of 20 degree pressure angle are rotating in mesh.The speed of smaller gear is 1440 RPM.The number of teeh on penion is 20 and gear ratio is 2.If the addendum of pinion and wheel is standard and equal to one module and odule is 5mm find.lengh of path of contact,length of arc of contact, velocity of sliding at the point of contact.. **07**

(b) A two start worm rotating at 600 rpm drives a worm gear having 22 teeth. The PCD is **07** 65mm and pitch of 18mm.if co of friction is 0.06. find helix angle of worm, max efficiency, and centre distance.

OR

Q.4 **(a)** A cam operates a flat faced follower which moves with cycloidal motion during ascent **07** and descent. The further specifications are:

Min radius of cam=30 mm   Angle of ascent =120   Angle of dwell=60
Lift of follower = 40 mm   Angle of decent=90   speed of cam =300rpm

Draw cam profile .Find max velocity and acceleration during ascent and decent.

(b) Explain uniform pressure theory in cone clutch with neat sketch. **07**

Q.5 **(a)** Compare cycloidal and involute tooth gears. **07**
     (b) Derive the expression for limiting tension ratio incase of flat belt drive. **07**

OR

Q.5 **(a)** What are different types of chains?Explain with neat sketches,the power **07** transmission chains.

(b) Two shafts are connected by a Hooks joint .The angle between them is 15 **07** degree.if the driving shaft rotates at 500 RPM find speed of a driven shaft and maximum acceleration.

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