Total No. of Questions : 8] *[Total No. of Printed Pages : 4*

Roll No .....

AU/ME-3003 (CBGS)

B.E. III Semester

Examination, May 2018

Choice Based Grading System (CBGS)

Theory of Machines and Mechanisms

Time : Three Hours

Maximum Marks : 70

Note: i) Solve any five questions.

ii) All questions carry equal marks. rgpvonline.com

iii) Assume suitable data wherever needed.

1. a) Explain the completely constraint, in completely constraint and successfully constraint motion. 6

   b) Explain how are Whitworth quick return mechanism and crank and slotted lever mechanism are different from each other? 8

2. a) State and explain Three center in line theorem. 4

   b) A reciprocating engine has a stroke of 40cm and connecting rod four times the crank. At the instant, the crank has turned through an angle of 30° from the inner dead centre. The crank rotates at 240 rpm clockwise and has an acceleration of 1140 cm/sec^2. Determine: 10

      i) Velocity and acceleration of the piston

      ii) The angular velocity and angular acceleration of the connecting rod

3. a) Give the comparison between involute and cycloid tooth profile. 4

   b) A pinion of 20 teeth having an involute profile and a module pitch of 4 drives a rack. The addendum of both pinion and rack is 6mm. What is the least pressure angle which can be used to avoid undercutting? With this pressure angle, find the length of the arc of contact and minimum number of teeth in the contact at a time. 10

4. a) What is reverted gear train state its advantage. 4

   b) Determine the number of teeth and pitch for two toothed wheels to transmit a velocity ratio of 4 to 1 between two parallel shafts, the centre of which are at a distance of 676mm approximately. The drive must satisfy the following conditions: 10

      i) The standard pitch in module (mm) must be chosen from the following:

         24, 22, 18, 16, 15, 14, 13, 12 and 11

      ii) The actual distance between shaft centres must not very by more than percent from that given above

      iii) The number of teeth must be as small as possible

5. Draw the profile of a cam to satisfy the following motion: 14

   i) Follower to move outwards through 3cm with SHM during 160 degree of cam rotation

   ii) Dwell for 20 degree

   iii) Return with SHM in 160 degree and

   iv) Dwell for 20 degree

The cam rotates with 1200 rpm clockwise. The follower is offset 0.75cm towards the left. Roller diameter is 1cm, base circle diameter is 4cm. Calculate the velocity and acceleration during the outstroke of the follower, when the cam rotates at 1000 rpm.

6. The turbine rotor of ship has a mass of 4200kg. It has a radius of gyration at 0.45m and speed 3600 rpm clockwise when looking from stern. Determine the gyroscopic couple and its effect on ship: 14

   i) When the ship is steering to the left on a curve of 100m radius of 36km/h

   ii) When ship is pitching in a simple harmonic motion the bow falling with its maximum velocity. The period of pitching is 40 sec. and the total angular displacement between the two extreme positions or pitching is 12 degrees.

7. a) Explain the centrifugal tension in belt. 4

   b) An open belt drive connects two pulleys 120cm and 50cm diameters, on parallel shafts 4m apart. The maximum tension in the belt is 1855.3N. The co-efficient of friction is 0.3. The driver pulley of diameter 120cm runs at 200 r.p.m. Calculate: 10

      i) The power transmitted and

      ii) Torque on each of the two shafts

8. Write short notes on any three: 14

   a) Klens Construction

   b) Epicyclic Gear Train

   c) Stability of Two Wheeler

   d) Chain Drive

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