Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ANE)/(Aerospace Engg.) (2012 Onwards) (Sem.–4)

THEORY OF MACHINES – I

Subject Code : ME-203

M.Code : 60517

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION–A

Q1. Answer briefly :

(a) Distinguish between Machine and structure.

(b) What is four bar chain mechanism? Explain briefly.

(c) Explain the initial tension in a belt drive mathematically.

(d) Distinguish between flat belts and V- belts on the basis of forces acting on them.

(e) What do you mean by Coefficient of fluctuation of energy and Coefficient of speed of a Flywheel?

(f) Classify the Followers in reference to Cams.

(g) What is pressure angle in reference to Cam & Followers?

(h) What do you mean by Effort of a Governor? Write it mathematically for Porter governor.

(i) What do you understand by sensitivity and Isochronism of a governor?

(j) How will you apply Instantaneous centre method to determine velocities?

SECTION-B

2. Explain the Inversion of Slider-Crank Chain mechanism with neat sketch.

3. Design a four link mechanism to coordinate three positions of input and output of links as follows :

   θ_1 : 20° φ_1: 35°

   θ_2 : 35° φ_2 : 45°

   θ_3 : 50° φ_3 : 60°

4. A flywheel of a steam weighs 2000 N and has got a radius of gyration of 76 cm. The starting torque of steam engine is 130 Kg.m and is assumed constant. Determine the angular acceleration of flywheel along with speed and kinetic energy after 10 seconds.

5. Derive the expression for Braking Torque in Band brake system with neat sketch.

6. A belt 100 mm wide and 10 mm thick is transmitting power at 1000 m/min. The net driving tension is 1.8 times the tension on slack side. If the safe permissible stress on the best section is 1.6 N/mm^2. Calculate the maximum power that can be transmitted at this speed. Assume density of leather as 1mg/m^3. Also calculate the absolute maximum power that can be transmitted by this belt and the speed at which this can be transmitted.

SECTION-C

7. A Cam with convex flanks operating a flat faced follower has base circle diameter of 7.5 cm and nose radius of 1 cm. The lift of the follower is 1.9 cm. The cam is symmetrical about a line drawn through the center of nose and Centre of cam shaft. The total angle of action is 120°. Determine maximum velocity acceleration retardation of the follower when the cam shaft rotates at 600 r.p.m.

8. A Hartnell type spring loaded governor rotates about a vertical axis. The two rotating masses are 1 kg each and move at a radius of 12 cm. When the speed is 550 r.p.m., the arms are 10 cm and 7.5 cm vertical and horizontal respectively. The equilibrium speed is 575 r.p.m. when the rotating masses are at their maximum radius of 14.5 cm. Determine the stiffness rate of spring, the compression of spring at 550 r.p.m. and the radius at which the masses rotate when the equilibrium speed is 525 r.p.m.

9. What are the two methods of providing straight line motions? Explain both types of mechanisms with neat sketches.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.