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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ME) (2011 Onwards)

B.Tech.(Marine Engg.) (2013 Onwards)

(Sem.–3)

THEORY OF MACHINES–I

Subject Code : BTME-302

M.Code : 59112

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION 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.**

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SECTION-A

1. Write briefly :

a. Write two inversions of double slider crank chain.

b. What is the difference between machine and mechanism?

c. What is the difference between Whitworth and crank and slotted quick return motion mechanisms?

d. Name **any two** lower pairs.

e. Define the term creep in belts.

f. Why cycloidal motion of follower is preferred in high speed engines?

g. What is the difference between brakes and dynamometers?

h. Why electric motors do not have flywheels?

i. What is the range of seed in governors?

j. Can a Porter governor be isochronous? Explain with the help of mathematical expression.

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SECTION-B

2. A simple quick return mechanism is shown in Fig.1. The forward to return ratio of the quick return mechanism is 2 : 1. If the radius of the crank O_1P is 125 mm, determine the distance *d*.

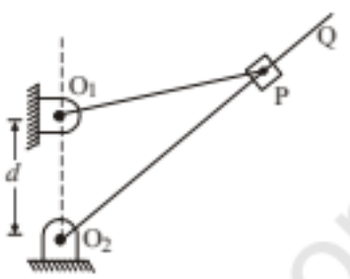


Fig.1

3. For the four-bar linkage shown in Fig.2., the angular velocity of link AB is 1 rad/sec, the length of link CD is 1.5 times the length of link AB. In the configuration shown, find the angular velocity of link CD in rad/sec.

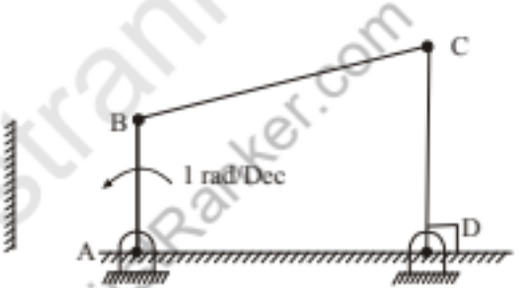


Fig.2

4. For universal joint plot maximum and minimum speeds of driven shaft in an ellipse. Write the formula used.

5. A V-belt of 6.0 cm^2 cross section has a groove angle of 40° and an angle of lap of 150°, $\mu = 0.10$. The mass of belt per meter run is 1.2 kg. The maximum allowable stress in the belt is 850 N/cm^2. Calculate the power that can be transmitted at a belt speed of 30m/sec.

6. The mean diameter of square threaded screw jack is 60 mm. The pitch of the thread is 10 mm. The coefficient of friction is 0.15. What force must be applied at the end of a 0.9 m long lever, which is perpendicular to longitudinal axis of the screw to raise a load of 20 kN and to lower it?

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SECTION-C

7. In a spring controlled governor mass of each ball is 6.8 kg and moves radially under the action of a controlling force F = $a + br$ where r is the ball path radius. If the speed range is 42.5 to 44.0 rad/sec and the corresponding values of r are 12.38 and 13.01 cm, obtain the valus of a and b.

   Find the equilibrium speed in rad/sec for r = 12.7 cm.

8. A C.I. flywheel is fitted to a punching press to run at 90 r.p.m. and must supply 12000 N.m of energy during $\frac{1}{5}th$ revolution and allow 15% change of speed. The rim speed is limited to 350 m/min. Find the mean diameter and mass of the flywheel and motor power. Assume overall efficiency as 80%.

9. The following particulars relate to a symmetrical circular cam operating a flat faced follower.

   Least radius = 25 mm, nose radius = 8 mm, lift of value = 10 mm, angle of action of cam = 120°, cam shaft speed = 1000 rpm. Determine the flank radius and maximum velocity, acceleration and retardation of the follower. If the mass of the follower and valve with which it is in contact is 4 kg, find the minimum force to be exerted by the spring to overcome inertia of the valve parts.

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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.

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