Roll No.

Total No. of Questions: 09 **Total No. of Pages: 03**

B. Tech. (AE/ME) (Sem. 3)
THEORY OF MACHINES-I
Subject Code: ME-203
Paper ID: A0802

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

1. a) What are the condition for carioles acceleration?

b) Describe the working of pantograph.

c) Explain creep in belt.

d) Which type of motion of follower is preferred for high speed engineer?

e) Why uniform velocity motion of follower not preferred?

f) Define stability of governor.

g) Show difference between porter and propel governor with the help of diagrams.

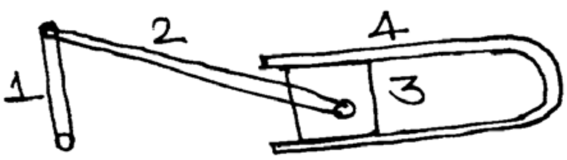
h) What is the difference between brake and dynamometer?

i) Why the mass of flywheel is conserved in rims only?

j) What is the application of cone clutch?

SECTION B

2. In Fig-1a four bar linkage is shown. Fig. 1



Draw the diagrams of the mechanisms obtained by fixing link 4.

3. A V-belt of 6.0 cm^2 cross-section has a groove angle of 40^0 and an angle of lap of 150^0, μ=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 30 m/s.

4. A Hooke's joint connects two shafts axes out of line by 25^0. The driving shaft runs at uniform speed of 150 rpm. The driven shaft has attached a mass of 200 kg at radius of gyration of 150 mm. If a steady torque of 500 N.M resists the rotation of the driven shaft, calculate the toque required at driving shaft when $Q=45^0$, and (b) maximum angular acceleration of the shaft.

5. A single plate clutch, with both side effective has outer and inner diameters 300mm and 200mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 10^5 N/M^2. Determine the power transmitted by a clutch at a speed 2500 r.p.m. Take μ =0.30.

6. A machine punches 3.5cm diameter holes in a 3cm thick plate 60 N-M of work per square cm of sheared area. The punch has a stroke of 10 cm and punches one hole every 10 seconds. The maximum speed of the flywheel at the radius of gyration is 27m/sec. Find the mass of the flywheel if the speed at this radius is not to fall below 24 m/sec during each punch.

SECTION C

7. Foe the configuration of slider crank mechanism shown in Fig-2, determine the acceleration of the slide. The crank OA rotates at 200 r.p.m. Clockwise OA=500mm, AB=1500mm, AE=450mm

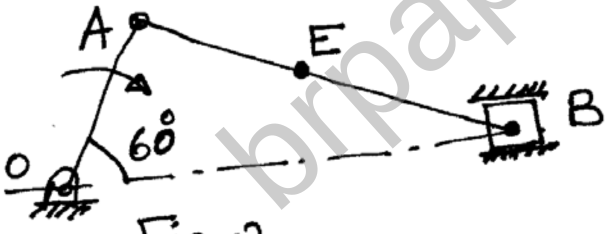


Fig-2.

8. In the propel governor shown in Fig-3, the mass of each ball is 3 kg and the central load on the sleeve 25 kg. The arms are of 20 cm length and pivoted about axes displaced from the central axis of rotation by 3.75 mm, y=2.38 mm ,x=303.5, CE=85mm, MD=142.5 mm. Find equilibrium speed.

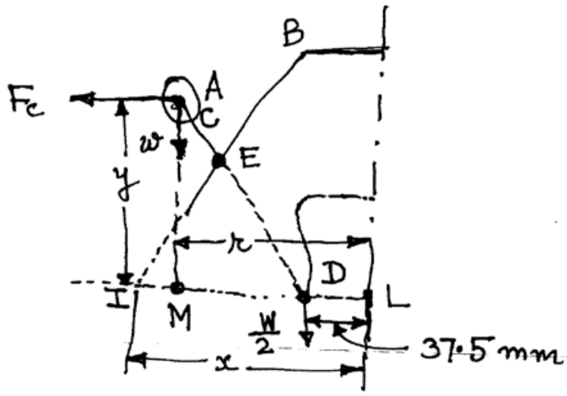


Fig-3

9. Draw the profile of a can with an oscillating roller follower to the following specification"

a) Follower to move outwards through an angular displacement of 20^0 during 120^0 of cam rotation with SHM.

b) Follower to return to its initial position during 120^0 of cam rotation with SHM.

c) Follower to dwell during the remaining 120^0 of cam rotation.

The pivot of the oscillating follower is 12cm from the axis of rotation of the cam the roller center is 11 cm, the roller is 3 cm diameter and the minimum radius of the cam is 4.5 cm.