KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.) 2022 & Previous Admissions
II Semester Final Examination – September 2023

Fpme.1202   **Theory of Machines (2+0)**   **Marks: 50**
                                                                       Time: 2 hours

I   **Fill in the blanks**   **(10x1=10)**

1. .... mechanism has six links.
2. The instantaneous centres for a mechanism are of the ....types.
3. The standard pressure angles are ....and ....
4. Belt, chain and rope are called .... drives.
5. The height of a Watt's governor (in metres) in equal to.................
   Answer the following
6. Define Static Balancing.
7. Let the disturbing mass be 100 kg and the radius of rotation be 20 cm and the rotation speed be 50 rad/s, then calculate the centrifugal force in kN.
   **State True or False**
8. The co-efficient of fluctuation of energy is the ratio of maximum energy to the minimum energy.
9. The size of a gear is usually specified by pitch circle diameter.
10. Fixed and permanent instantaneous centres are together known as Secondary instantaneous centres.

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**

1. Difference between Kinematic Pair and Kinematic Chain.
2. What are the advantages and disadvantages of gear drive?
3. Prove that the maximum fluctuation of energy, $\Delta E = E \times 2C_S$.
4. State the function of flywheel in I.C. Engine.
5. Explain Laws of dry friction.
6. State terms used in Chain Drive
7. Explain Sensitiveness of Governors.

III   **Answer ANY FIVE of the following**   **(5x4=20)**

1. Sketch and explain any two inversions of a Four Bar Chain or Quadric Cycle Chain.
2. In a pin jointed four bar mechanism, as shown in Fig.1, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC.

Figure.1
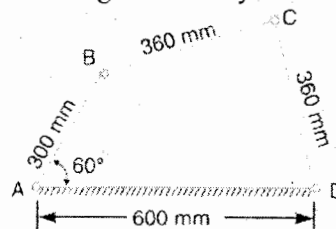
3. A single reduction gear of 120 kW with a pinion 250 mm pitch circle diameter and speed 650 r.p.m. is supported in bearings on either side. Calculate the total load due to the power transmitted, the pressure angle being 20°.
4. Derive equation friction torque for Flat Pivot bearing assuming uniform pressure condition.

5. Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 r.p.m. The coefficient of friction between the belt and the pulley is 0.25, angle of lap 160° and maximum tension in the belt is 2500 N.

6. Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.

7. Write short note on Epicyclic Gear Train.

IV   **Write an essay on ANY ONE of the following**   (1x10=10)

1. Centrifugal Governors.
2. Material used for Belts.

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