KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agri. Engg) 2017 Admission
II Semester Final Examination- July 2018

Fpme.1202
Theory of Machines (2+0)

Marks: 50
Time: 2 hours

I **Fill up the blanks**

(10x1=10)

1 The mechanism forms a structure, when the number of degrees of freedom (n) is equal to ....

2 The force which acts along the radius of a circle and directed towards the centre of the circle is known as ....

3 ....is the ratio of the pitch circle diameter in millimeters to the number of teeth.

4 ....is the vertical distance from the centre of the ball to a point where the axes of the arms intersect on the spindle axis in governor.

5 The collar bearings are also known as ....

Match the following

A		B
6 Whitworth quick return motion mechanism	a.	epicyclic gear train
7 Lead screw of a lathe with nut	b.	screw pair
8 Elliptical trammels	c.	inversion of single slider crank chain
9 Differential gear	d.	self closed pair
10 Cam and follower without a spring	e.	inversion of double slider crank chain

II **Write Short notes on any FIVE of the following**

(5x2=10)

1 Differentiate between machine and structure.

2 Differentiate Helical and spiral gears

3 Classify the different types of governors

4 List out the factors affecting the power transmission in belt drives.

5 Mention the advantages and disadvantages of chain drive over belt drive.

6 Write a short note on friction clutches.

7 State the laws of solid friction.

P.T.O

III   Answer any FIVE of the following.   (5x4=20)

1   Different types of constrained motions in kinematic pairs.

2   Different types of instantaneous centres.

3   Turning moment diagram with suitable examples.

4   A horizontal cross compound steam engine develops 300 kW at 90 r.p.m. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within ± 0.5% of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 metres.

5   Discuss the classification of kinematic pairs.

6   A single cylinder reciprocating engine has speed 240 r.p.m., stroke 300 mm, mass of reciprocating parts 50 kg, mass of revolving parts at 150 mm radius 37 kg. If two third of the reciprocating parts and all the revolving parts are to be balanced, find :

   a   The balance mass required at a radius of 400 mm.

   b   The residual unbalanced force when the crank has rotated 60° from top dead centre.

7   Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25?

IV   Answer any ONE of the following   (1x10=10)

1   Inversions of single slider crank chain.

2   A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the range of speed, sleeve lift, governor effort and power of the governor in the following cases

   a   When the friction at the sleeve is neglected.

   b   When the friction at the sleeve is equivalent to 10 N.

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