A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U4A04

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Fourth semester

Agricultural Engineering

21UAG404- THEORY OF MACHINES

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A mechanism is an assemblage of CO1-U

   (a) two links (b) three links (c) four links (d) all of the above

2. In a coupling rod of a locomotive, each of the four pairs is a _____ pair. CO1-U

   (a) sliding (b) rolling (c) turning (d) screw

3. Friction is a _____ CO1-U

   (a) Contact force (b)Non-contact force (c)Magnetic force (d)None of these

4. Which belt is used to transmit power at high speeds? CO1-U

   (a) Flat belt (b) V belt (c)Both (a) and (b) (d) None of the above

5. The size of a cam depends upon CO1-U

   (a) base circle (b) pitch circle (c) prime circle (d) prime curve

6. When the flat-faced follower is circular, it is then called a _____ follower. CO1-U

   (a) Roller (b) Mushroom (c)Spherical (d) Circular

7. The common point of contact between two pitch circle is called CO1-U

   (a) Pitch point (b) Addendum (c) Dedendum (d) Base point

8. The circular pitch of a gear is given by _____. CO1-U

   (a) $\pi d/t$ (b) $\pi d/2t$ (c) $2\pi d/t$ (d) $\pi d/3t$

9. The following device is used regulate the mean speed of an engine CO1-U

(a) Brake (b) Governor (c) Gear box (d) wheel

10. A hunting governor is CO1-U

(a) more stable (b) less sensitive (c) more sensitive (d) none of the above

PART – B (5 x 2= 10 Marks)

11. Classify kinematic pair. CO1-U

12. State coefficient of friction CO1-U

13. Write the different types of follower CO1-U

14. Differentiate addendum and dedendum circle. CO1-U

15. What is meant by fluctuation of speed? CO1-U

PART – C (5 x 16= 80 Marks)

16. (a) Explain in detail about inversion of single slider crank chain mechanism with neat sketches. CO1-U (16)

Or

(b) Explain in detail about the double slider crank chain and inversions with neat sketches. CO1-U (16)

17. (a) A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmits 6 kw through a belt. The belt is 100 mm wide and 10mm thick. The distance between the shafts is 4m.The smaller pulley is 0.5m in diameter. Calculate the stress in the belt, if it is an open belt drive. Take μ=0.3 CO2-App (16)

Or

(b) A body, resting on a rough horizontal plane required a pull of 180 N inclined at 30º to the plane just to move it. It was found that a push of 220 N inclined at 30º to the plane just moved the body. Determine the weight of the body and the coefficient of friction. CO2-App (16)

18. (a) A cam is designed for a knife follower with the following data. (i) Cam lift = 40 mm during 90° of cam rotation with SHM (ii) Dwell for the next 30° (iii) During the next 60° of cam rotation, the follower returns to original position with SHM. (iv) Dwell for the reaming 180° Draw the profile of the cam when the line of stoke is same as the axis of the cam shaft. CO2-App (16)

Or

	(b)	Construct the profile of a cam to suit the following specifications: Cam shaft=40mm; least radius of cam =25mm; diameter of roller= 25mm; angle of lift=120°; angle of fall=150°; lift of the follower=40mm; number of pauses are two of equal interval between motions.	CO2-App	(16)
19.	(a)	Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 rpm and the other at 120 rpm. Design the gears, if the circular pitch is to be at 25 mm.	CO2-App	(16)
		Or		
	(b)	The number of teeth on each of the two equal spur gears in mesh is 40. The teeth have 20° involute profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum	CO2-App	(16)
20.	(a)	With the neat sketches explain the Watt Governor.	CO1-U	(16)
		Or		
	(b)	With the neat sketches explain the Porter Governor.	CO1-U	(16)