

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY2026****Fourth Semester*****Mechanical Engineering*****UMET24402 - KINEMATICS OF MACHINERY****(A3 Sheet may be provided)****Regulations - 2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BTL	CO	Marks
1.	Classify mechanisms based on the type of motion.	L1	1	2
2.	Define transmission angle in a four-bar mechanism.	L1	1	2
3.	Distinguish between velocity and acceleration.	L2	2	2
4.	Identify the advantages of analytical methods over graphical methods.	L1	2	2
5.	State any four functions of a follower in a cam system.	L1	3	2
6.	List any four parameters considered while designing cams.	L1	3	2
7.	Compare spur gear over helical gear	L2	4	2
8.	Write the application of Bevel gear in automobiles.	L1	4	2
9.	Mention any four factors affecting friction between contacting surfaces.	L1	5	2
10.	State the advantages of rope drives in machines.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a	Describe Kutzbach criterion for the mobility of a mechanism with suitable example.	L2	1	16
Or				
b	Sketch and explain the various inversions of a slider crank chain.	L2	1	16
12. a	PQRS is a four-bar chain with link PS fixed. The lengths of the links are PQ=62.5 mm; QR = 175 mm; RS = 112.5 mm; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS.	L3	2	16
Or				
b	The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. Determine - Linear velocity and acceleration of the midpoint of the connecting rod, and - Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.	L3	2	16
13. a	A cam is to give the following motion to a knife-edged follower: - Outstroke during 60° of cam rotation; - Dwell for the next 30° of cam rotation; - Return stroke during next 60° of cam rotation, and - Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft.	L3	3	16

Or

- | | | | | |
|--|--|----|---|----|
| b | Draw the profile of the cam when the roller follower moves with cycloidal motion during out stroke and return stroke, as given below:
1. Out stroke with maximum displacement of 31.4 mm during 180° of cam rotation,
2. Return stroke for the next 150° of cam rotation,
3. Dwell for the remaining 30° of cam rotation.
The minimum radius of the cam is 15 mm and the roller diameter of the follower is 10mm. The axis of the roller follower is offset by 10 mm towards right from the axis of cam shaft. | L3 | 3 | 16 |
| 14. a | Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find:
1. The angle turned through by pinion when one pair of teeth is in mesh; and
2. The maximum velocity of sliding. | L3 | 4 | 16 |
| <p style="text-align: center;">Or</p> | | | | |
| b | In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 rpm. in the clockwise direction, what will be the speed of gear B ? | L3 | 4 | 16 |
| 15. a | A Conical pivot supports a load of 25 kN, the cone angle being 120°, and the intensity of normal pressure does not exceed 0.35 Mpa. The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 180 rpm and the coefficient of friction is 0.05. Find the power lost in friction assuming uniform pressure. | L3 | 5 | 16 |
| <p style="text-align: center;">Or</p> | | | | |
| b | 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? | L3 | 5 | 16 |