

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E. DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026***Third Semester**Mechanical Engineering***ME3491 - THEORY OF MACHINES***(Common to Agricultural Engineering)***Regulations – 2021****Duration: 3 Hrs****Maximum: 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BTL	CO	Marks
1.	Differentiate between Machine and Structure.	L2	1	2
2.	Name the methods of finding acceleration in a mechanism.	L2	1	2
3.	What is the advantage when arc of recess is equal to arc of approach in meshing gears?	L1	2	2
4.	Where epicyclic gears are used?	L1	2	2
5.	Define coefficient of friction.	L1	3	2
6.	Mention the advantage of wire ropes over fabric ropes.	L2	3	2
7.	Define dynamic force analysis.	L1	4	2
8.	State D'Alembert's principle.	L2	4	2
9.	State the necessary conditions to achieve static balancing and dynamic balancing.	L2	5	2
10.	What is mean by resonance?	L2	5	2

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

Q.No	Questions	BLT	CO	Marks
11. a	Describe various inversions of double slider crank-mechanism with sketches.	L3	1	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 10 mm. The axis of the roller follower is offset by 10 mm towards right from the axis of cam shaft.	L3	1	16
12. a	A pair of involute spur gears with 16° pressure angle and module 6 mm is in mesh. The number of teeth on pinion is 16 and its rotational speed is 240 rpm. When the gear ratio is 1.75, find in order that the interference is just avoided; 1. the addenda on pinion and gear wheel; 2. the length of path of contact; and 3. the maximum velocity of sliding of teeth on either side of the pitch point.	L2	2	16
Or				
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?	L2	2	16

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| 13. | a | A square threaded bolt of root diameter 22.5 mm and pitch 5 mm is tightened by screwing a nut whose mean diameter of bearing surface is 50 mm. If coefficient of friction for nut and bolt is 0.1 and for nut and bearing surface 0.16, find the force required at the end of a spanner 500 mm long when the load on the bolt is 10 kN. | L2 | 3 | 16 |
| Or | | | | | |
| | b | A leather belt is required to transmit 7.5 kW from a pulley 1.2 m in diameter, running at 250 rpm. The angle embraced is 165° and the coefficient of friction between the belt and the pulley is 0.3. If the safe working stress for the leather belt is 1.5 MPa, density of leather 1 Mg/m^3 and thickness of belt 10 mm, determine the width of the belt taking centrifugal tension into account. | L2 | 3 | 16 |
| 14. | a | Enumerate the steps involved in determining the various forces on the links and torque applied, when a four-bar mechanism is subjected to an external force F on any one of its links. | L3 | 4 | 16 |
| Or | | | | | |
| | b | A horizontal gas engine running at 210 rpm. has a bore of 220 mm and a stroke of 440 mm. The connecting rod is 924 mm long and the reciprocating parts weigh 20 kg. When the crank has turned through an angle of 30° from the inner dead centre, the gas pressures on the cover and the crank sides are 500 KN/m^2 and 60 KN/m^2 respectively, Diameter of the piston rod is 40 mm, Determine
(i) turning moment on the crank shaft
(ii) thrust on the bearings
(iii) acceleration of the flywheel which has a mass of 8 kg and radius of gyration of 600 mm while the power of the engine is 22 kW. | L3 | 4 | 16 |
| 15. | a | A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. | L4 | 5 | 16 |
| Or | | | | | |
| | b | An instrument vibrates with a frequency of 1 Hz when there is no damping. When the damping is provided, the frequency of damped vibrations was observed to be 0.9 Hz. Find 1. the damping factor, and 2. logarithmic decrement. | L4 | 5 | 16 |
