KUMARAGURU
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fourth Semester

MECHANICAL ENGINEERING

U18MET4003**:** Kinematics of Machinery

COURSE OUTCOMES

CO1: Apply the fundamental concepts in developing various mechanisms.
CO2: Analyze velocity and acceleration in planar mechanisms.
CO3: Synthesize simple mechanisms such as 4-bar and slider crank mechanisms.
CO4: Construct the cam profile for specific follower motion.
CO5: Determine appropriate gears for requirements.
CO6: Compute the parameters in gear trains and determine the speeds in gear boxes.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	State Grashoff's Law of four bar mechanism.	CO1	[K_2]
2.	Differentiate between Machine and Structure.	CO2	[K_2]
3.	What is meant by general plane motion?	CO2	[K_2]
4.	Define Instantaneous Centre of rotation.	CO2	[K_2]
5.	What is meant by synthesis of mechanisms?	CO3	[K_2]
6.	List the types of followers.	CO4	[K_2]
7.	Discuss about pressure angle in cam mechanism.	CO4	[K_2]
8.	Name the various types of gears.	CO5	[K_2]
9.	Explain pressure angle in gears.	CO5	[K_2]
10.	What is meant by compound gear train?	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	Draw and explain the working of crank and slotted lever quick return motion mechanism with neat sketch.	16	CO1	[K2]

12.	In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD=80 mm oscillates about D. BC and AD are of equal length, find the angular velocity of link CD when angle BAD =60°.	16	CO2	[K3]

13.	Design graphically a four bar mechanism such that $\theta_{12} = 120°$, $\theta_{13} = 160°$, $\phi_{12} = 70°$, $\phi_{13} = 110°$. Input moves anticlockwise and output moves in clockwise direction.	16	CO3	[K3]

14.	Design a cam for operating the exhaust value of an oil engine. It is required to give equal uniform acceleration during opening and closing of the value each of which corresponds to 60º of cam rotation .The valve must remain in the fully open position for 20º of cam rotation. The lift of the valve is 37.5 mm and the least radius of the cam is 40 mm. The follower is provided with a roller of radius 20 mm and its line of stroke passes through the axis of the cam.	16	CO4	[K3]

15.	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	16	CO5	[K3]

16.	In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise.	16	CO6	[KL]

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