University of Mumbai

Examinations Summer 2022
Program: Mechanical Engineering
Examination: SE Semester IV
Course Code: 41223 and Course Name: Kinematics of Machinery
1T01434 / / S.E.(Mechanical) Engineering)(SEM-IV)(Choice Base Credit Grading System) ((R- 19)
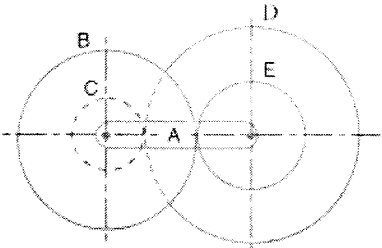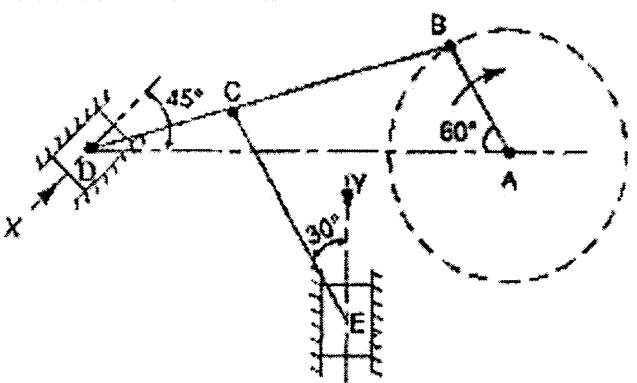(C Scheme)

Time: 2 hour 30 minutes   Max. Marks: 80

Q1. (20 Marks)	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks 02 Marks each
1.	A Crank and slotted lever mechanism used in a shaper has a center distance of 300 mm between the center of oscillation of the slotted lever and the center of rotation of the crank. The radius of the crank is 120 mm. Find ratio of the time of cutting to the time of return stroke.
Option A:	1.5
Option B:	17.2
Option C:	1.72
Option D:	1.9
2.	Cam and follower is example of
Option A:	Higher pair
Option B:	Lower Pair
Option C:	Rolling Pair
Option D:	Sliding Pair
3.	The Coriolis acceleration component
Option A:	lags the sliding velocity by 90°
Option B:	leads the sliding velocity by 90°
Option C:	lags the sliding velocity by 180°
Option D:	leads the sliding velocity by 180°
4.	In simple gear train, if there is odd number of idlers , the direction of rotation of the driver and the driven gears will be
Option A:	Opposite
Option B:	Same
Option C:	Depends upon number of teeth of the gears
Option D:	Contact ratio
5.	The total number of instantaneous centres for a mechanism consisting of n links are
Option A:	n
Option B:	n/2
Option C:	n(n-1)/2
Option D:	n(n+1)/2
6.	On which of the following factor does the moment of inertia of an object not depend upon
Option A:	Axis of rotation
Option B:	Angular velocity

Option C:	Distribution of mass
Option D:	Mass of an object
7.	The power transmitted by a belt is maximum when the maximum tension in the belt (T) is equal to
Option A:	$3T_C$
Option B:	$2T_C$
Option C:	$(1/3)$ TC
Option D:	$4T_C$
8.	In a Davis steering mechanism the distance between pivot of front axle (b) 120cm, and the length of wheel base is (l) 260cm. When the vehicle moving straight path the angle of (α) inclination of track arm to the vertical is ------------ degree.
Option A:	21.99
Option B:	32.81
Option C:	12.99
Option D:	19.33
9.	Chordal action in chain
Option A:	Changes the velocity ratio
Option B:	Increases overall length of chain
Option C:	Decreases overall length of chain
Option D:	Changes the center distance between sprockets
10.	A gear wheel turning at 20 radians per second is in mesh with pinion turning at double the speed of wheel. If the length of path of approach is 10 mm, what will be the sliding velocity at pitch point?
Option A:	600 mm/s
Option B:	60 mm/s
Option C:	6 mm/s
Option D:	0

Q2.	Solve any Four out of Six 5 marks each
A	Explain elliptical trammel
B	Compare Cycloidal and involute tooth forms.
C	Derive the expression for open belt drive
D	Describe the procedure to draw velocity and acceleration diagrams of a four-link mechanism.
E	Explain double block or shoe brake with a neat sketch.
F	Classify various types of CAM and follower
Q3	Solve any Two Questions out of Three 10 marks each
A	The following data relate to knife edge follower. Minimum radius of CAM 45 mm Lift of follower 40 mm Angle of ascent 60^0 angle of descent 120° angle of dwell for the follower in the highest position 90^0. Plot the displacement, velocity acceleration plot if the ascent and descent motion of the CAM is Simple Harmonic Motion.
B	An open belt running over two pulleys 240 mm & 600 mm diameter connects two parallel shafts 3 m apart & transmits 5 kW from the smaller pulley that rotates at 400 rpm coefficient of friction is 0.3 & the safe working tension is 10 N per mm width, Determine-i) Min width of the belt, ii) Initial belt tension, iii) Length of the belt required.

C	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.

Q4. (20 Marks)	**Solve any Two** **5 marks each**
A	What are centripetal and tangential components of acceleration? When do they occur? How are they determined?
B	Derive the equation for centrifugal tension
C	Explain successfully constrained motion with sketches of examples.
	Solve any any One **10 Marks each**
A	Two mating gears have 40 & 60 involute teeth of module 10 mm & 20^0 pressure angle. The addendum on each wheel is to be made of such a length that the line of contact on each side of the pitch point has half the maximum possible length. Determine the a) addendum height for each gear wheel, b) length of path of contact, & arc of contact & c) contact ratio.
B	The dimensions of a mechanism as shown in the figure are as follows: AB = 0.45 m, BD = 1.5 m, BC = CE =0.9 m. The crank AB turns uniformly at 180 rpm in the clockwise direction and the blocks at D and E are working in frictionless guides. Draw the velocity diagram for the mechanism and find the velocities of the sliders D and E in their guides using relative velocity method.

Compose

Mail

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Starred

Snoozed

Chat

No conversations
Start a chat

Spaces

No spaces yet
Create or find a space

Meet

Corrections in QP 93619   External   Inbox x

support@muapps.in via amazonses.com
to me

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Corrections in QP **93619**
Subject **Kinematics of machinery** ((R 19)
Q 2 c   derive the equation for length of open belt drive
Q 3 A   assume the cam is rotating at a uniform speed of 240 rpm

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