



ACE Engineering College

(An Autonomous Institution)

Question Paper Code:

ME402PC

ACE-R20

Semester End Examination II B. Tech- II Semester- AUGUST/SEPTEMBER -2022 KINEMATICS OF MACHINERY MECHANICAL ENGINEERING

Time: 3 Hours

Max. Marks: 70

H. T. No									
----------	--	--	--	--	--	--	--	--	--

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1. a)	Explain any two inversions of double slider crank chain with neat sketches.	7
b)	What do you mean by degree of freedom of a kinematic pair? How are pairs classified? Give examples.	7
2.	<p>For the mechanism shown in figure, determine the velocities of the points C, E and F and the angular velocities of the links BC, EF and point C.</p> <div style="text-align: center;"> <p style="text-align: center;">(mm)</p> </div>	14
3.	<p>Figure shows a six link mechanism. The dimensions of the links are OA=220mm, AB=485mm, BQ=310mm, BC=590mm and CD=400mm. For the position when the crank OA makes an angle of 60° with vertical, using instantaneous center method find the velocity of the slider D. The crank OA rotates clockwise at 150 rpm.</p> <div style="text-align: center;"> <p style="text-align: center;">(mm)</p> </div>	14

4. a)	What is pantograph? Show that it can produce paths exactly similar to the ones traced out by a point on a link on an enlarged or a reduced scale	7
b)	Derive the condition for correct steering gear mechanism?	7
5. a)	Derive an expression for the ratio of angular velocities of the shafts of a Hook's joint.	7
b)	The driving shaft of a Hook's joint has a uniform angular speed of 280 rpm. Determine the maximum permissible angle between the axes of the shafts to permit a maximum variation in speed of the driven shaft by 8% of the mean speed.	7
6.	A cam, with a minimum radius of 25 mm, rotating clockwise with simple harmonic motion is to be designed to give a roller follower, at the end of a valve rod, motion described below : i). To raise the valve through 50 mm during 120° rotation of the cam ; ii). To keep the valve at dwell position through next 30°; iii). To lower the valve during next 60°; and iv). To keep the valve closed during rest of the revolution i.e. 150°; The diameter of the roller is 20 mm. Draw the profile of the cam when the line of stroke of the valve rod passes through the axis of the cam shaft.	14
7.	The number of teeth on the gear and the pinion of two spur gears in mesh are 30 and 18 respectively. Both the gears have a module of 6 mm and a pressure angle of 20°. If the pinion rotates at 400 rpm, what will be the sliding velocity at the moment the tip of the tooth of pinion has contact with the gear flank? Take addendum equal to one module. Also, find the maximum velocity of sliding.	14
8. a)	Explain with a neat sketch the sun and planet wheel.	7
b)	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 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 rpm clockwise.	7

