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Roll No.

E31

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B. Scheme) (Re-appear Only)

(ME)

ME301B

KINEMATICS OF MACHINES

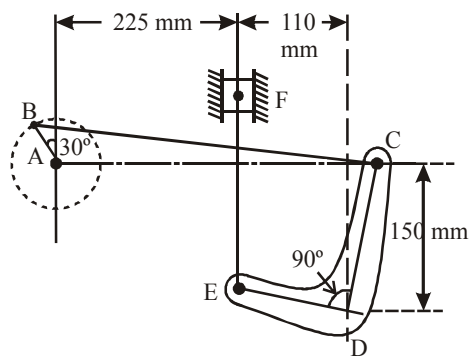
Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. Sketch and explain various inversion of slider crank mechanism.
2. Explain Grubler's criterion for determining degree of freedom for mechanism. Using Grubler's criterion for plane mechanism, prove that minimum number of binary links in a constrained mechanism with simple hinge is four.
3. The dimension of various links in the mechanism, as show in Fig. below are as follows :
 $AB = 60 \text{ mm}$; $BC = 400 \text{ mm}$; $CD = 150 \text{ mm}$;
 $DE = 115 \text{ mm}$; and $EF = 225 \text{ mm}$



Find the velocity of the slider F when the crank AB rotates uniformly in clockwise direction at a speed of 60 r.p.m.

4. Derive an expression for the magnitude and the direction of Coriolis components of acceleration.
5. Two gear wheels mesh externally and are to give velocity ratio of 3. The teeth are of involute form of module 6, and standard addendum is 1 module. If the pressure angle is 18° , and pinion rotates at 90 r.p.m. Find :
 - (a) The number of teeth on each wheel, so that interference is just avoided.
 - (b) The length of the path of contact.
 - (c) Maximum velocity of sliding between the teeth.
6. What do you understand by gear train ? How the velocity ratio of gear train is obtained using tabular method.
7. A cam rotating clockwise at a uniform speed of 200 r.p.m. is required to move an offset roller follower with a uniform and an equal acceleration and retardation on both the

outward and return stroke. The angle of ascent, dwell and decent are 120° , 60° and 90° respectively. The follower dwells for rest of the cam rotation. The least radius of the cam is 50 mm, the lift of the follower is 25 mm, and the diameter of the roller is 10 mm. The line of the stroke of the follower is offset by 20 mm from the axis of the cam. Draw the cam profile, and find the maximum velocity and acceleration of the follower during the outstroke.

8. Discuss briefly the various types of the belts used for the transmission of power. Explain also the phenomenon of slip and creep in belt drive.