Paper code - U 229-151 (BE-F&Fs)

Total No. of Questions – [08] Total No. of Printed Pages 03

G.R. No.	

DECEMBER 2019/ENDSEM – Backlog Exam

S. Y. B. TECH. (Mechanical Engineering) (SEMESTER - II)

COURSE NAME: Kinematics of Machinery

COURSE CODE: MEUA22171

(PATTERN 2017)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) Explain with neat sketch Davis steering gear mechanism [6]

OR

b) Determine DOF of following mechanism shown in figure 1 [6]

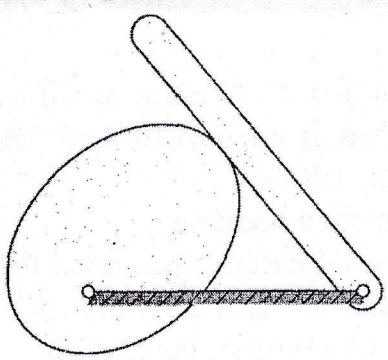

Figure 1

Q.2) a) In a slider crank mechanism length of crank is 100 mm and obliquity ratio is 4.5. The crank rotates with uniform speed of 100 rpm. Determine maximum velocity of piston. (Use analytical method) [6]

OR

b) State loop closure equation and derive it for single slider crank mechanism [6]

Q.3) a) Find the angular velocities of link AB and AO using relative velocity method for mechanism shown in figure 2. [6]

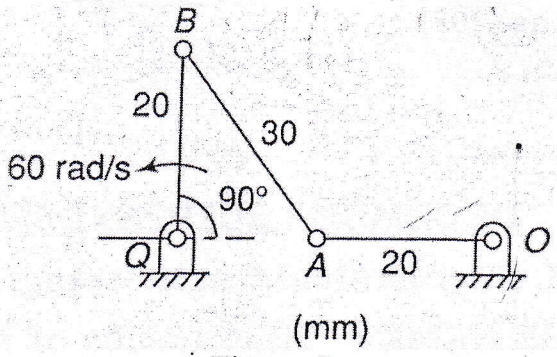

Figure 2

OR

b) For the single slider crank mechanism illustrated in figure 3, Determine velocity of slider using ICR method if crank rotates with 40 rad/sec in clockwise direction. [6]

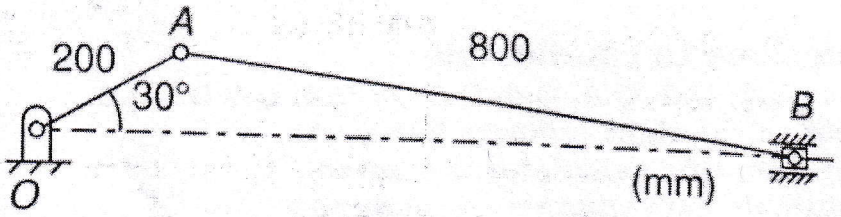

Figure 3

Q.4) a) Write a short note on acceleration image principle. [4]

OR

b) Write a short note on Coriolis component of acceleration [4]

Q.5) a) For the function $y = x^3$. Where, x varies from 0 to 4. Angle of driving link varies from 40° to 105° and angle of driven link varies from 50° to 150°. [6]
Determine Chebychev spacing.

b) Solve K using Freudenstein's equation for **Q. 5. a**. [4]

c) Assume length of fixed link as unity; calculate lengths of various links of four bar mechanism for **Q. 5 b**. [4]

OR

Q.6) a) Coordinates of three successive position are given in the following table: [6]

	A	B
Position 1	2, 1	5, 1
Position 2	2, 3	5, 3
Position 3	1.5, 5	1.5, 8

Synthesis a four bar mechanism to move AB through the given position using body guidance graphical approach.

b) Apply three position inversion method to synthesize a four bar mechanism, for the following given data: [4]
θ for three precision positions are 45°, 75° and 135°
Ø for three precision positions are 20°, 40° and 60°

c) Determine lengths of various links for **Q. 6. b.** [4]

Q.7) a) A cam operating a knife-edge follower having a lift of 30 mm. The cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60°. The follower descends for the next 100° rotation of the cam uniform velocity, again followed by dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20 mm. [6]

Represent displacement diagram for the given data.

b) Show required cam terminology. [4]

c) Draw the desired cam profile. [4]

OR

Q.8) a) A cam with a minimum radius of 25 mm is to be designed for a knife-edge follower with the following data: [6]

To raise the follower through 35 mm during 60° rotation of cam. Dwell for next 40° of the cam rotation. Descending of the follower during the next 90° of the cam rotation. Dwell during the rest of the cam rotation. Assume ascending and descending of the cam is with SHM and line of stroke of the follower is offset 10 mm from the axis of the cam shaft.

Draw Displacement diagram with suitable scale.

b) Draw required cam and follower arrangement. [4]

c) Draw the desired cam profile. [4]