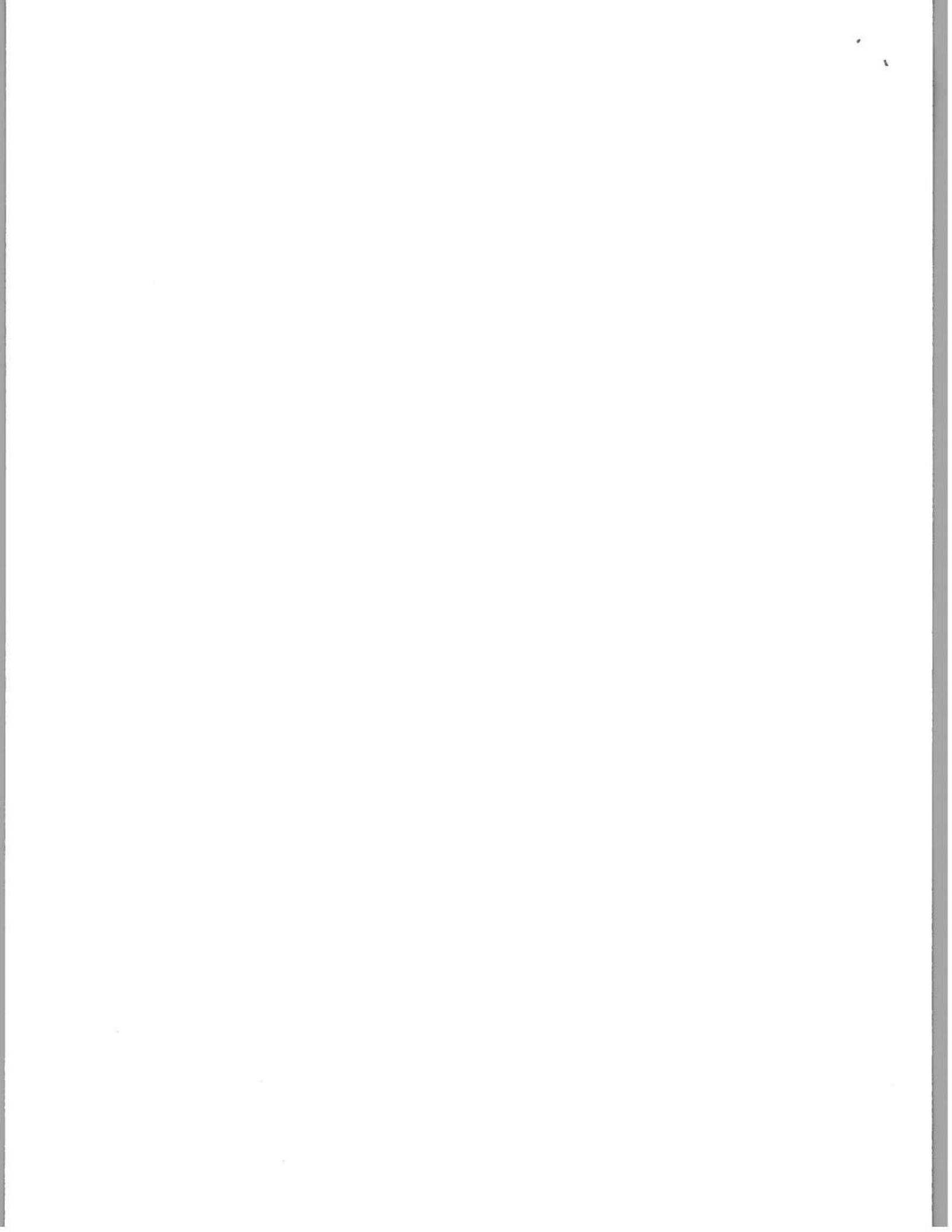


07 DEC 2023

17. A compound gear train consists of four gears A, B, C and D. Gears A and B are on the same shaft, and gears C and D are on the same shaft. Gear A has 10 teeth, B has 40 teeth, C has 20 teeth, and D has 60 teeth. If gear A is the driving gear, what is the speed ratio of the gear train?
 0.25 0.5 0.125 2
18. For a 20° full-depth involute gear, if the pressure angle at the base circle is 20° , what would be the pressure angle when the mating gears are at the point of intersection beyond the pitch point?
 Greater than 20° Less than 20°
 Remains 20° Depends on the module of the gear
19. A sun gear with 20 teeth in a planetary gear train is surrounded by three identical planet gears. If the planet gears each have 40 teeth, how many teeth does the ring gear have?
 80 100 120 140
20. The product of the diametral pitch and circular pitch is equal to
 1 $1/\pi$ π 2π



Level : B.E.
Year : II
Time : 2 hrs. 30 mins.

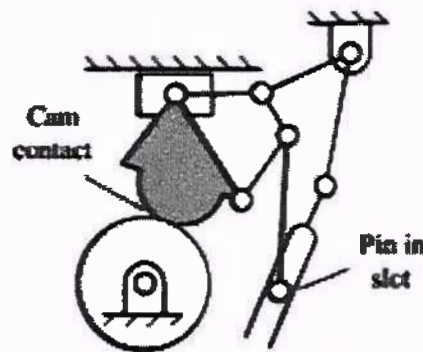
Course : MEEG 206
Semester : II
F. M. : 55

SECTION "B"

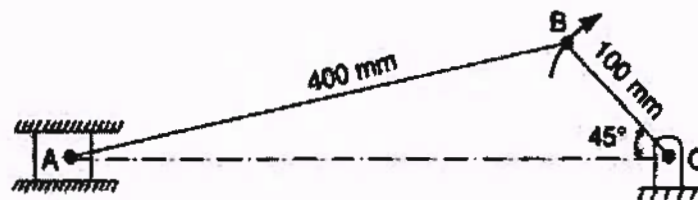
Attempt *ALL* questions. Assume data if missing.

1.

- a. Determine the degrees of freedom of the linkage shown in the figure below. [2]



- b. Determine the total number of Instantaneous centre and locate all for the mechanism shown below. [4]



- c. In a four link mechanism, the dimension of the links are as under, $AB = 50$ mm, $BC = 66$ mm, $CD = 56$ mm and $AD = 100$ mm. At the instant when angle $DAB = 60$ degrees, the link AB has an angular velocity of 10.5 rad/sec in the counter clockwise direction. Link AD is a fixed link. Draw complete configuration diagram and velocity diagram and determine the following: [8]
- Velocity of point C
 - Velocity of point E on the link BC, when $BE = 40$ mm
 - Angular velocities of the link BC and CD
 - Velocity of an offset point F in link BC if $BF = 45$ mm, $CF = 30$ mm and BCF is read clockwise.
- d. Explain double slider crank mechanism with all of its inversion [4]

2. Draw the profile of a cam operating a knife-edge follower from the following data:
- follower to move outward through a distance of 20 mm during 120° of cam rotation
 - follower to dwell for the next 60° of cam rotation
 - follower to return to its initial position during 90° of cam rotation
 - follower to dwell for the remaining 90° of cam rotation.

The cam is rotating clockwise at a uniform speed of 500 rpm. The minimum radius of the cam is 40 mm and the line of stroke of the follower is offset 15 mm from the axis of the cam and the displacement of the follower is to take place with uniform acceleration and retardation on outward stroke and with simple harmonic motion on the return strokes.

Determine: [11]

- The maximum velocity of the follower during outward and return strokes
- The maximum acceleration during outward and return strokes.

3.

- Two gear wheels mesh externally and are to give a velocity ratio of 3 to 1. The teeth are of involute form: module = 6 mm, addendum = one module, pressure angle = 20° . The pinion rotates at 90 rpm. Find [6]

- Number of teeth on pinion to avoid interference on it and the corresponding number on the wheel
- the length and arc of contact
- the number of pairs of teeth in contact
- the maximum velocity of sliding.

4.

A leather belt is required to transmit 9 kW from a pulley 120 cm in diameter running at 200 rpm. The angle embraced is 165° and the coefficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is 140 N/cm^2 , the mass of leather is 1 gm/cm^3 and the thickness of the belt is 10 mm, determine the width of the belt taking the centrifugal tension into account for i) open belt system, and (ii) Cross belt system. [6]

5.

A shaft carries four rotating masses A, B, C and D which are completely balanced. The masses B, C and D are 50 kg, 80 kg and 70 kg respectively. The masses C and D make angles of 90° and 195° respectively with mass B in the same sense. The masses A, B, C and D are connected at radius 75 mm, 100 mm, 50 mm and 90 mm respectively. The plane of rotation of masses B and C are 250 mm apart. Determine: [7]

- the mass A and its angular position
- the position of planes of A and D.

6.

In an epicyclic gear train, the internal wheels A and B, and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. Wheel E meshes with A and C, and wheel F meshes with B and D. all the wheels have the same module and the number of teeth on wheels C, D, E and F are 28, 26, 18 and 18 respectively. Determine [7]

- The number of teeth on wheel A and B
- The speed of wheel B if the arm G makes 100 rpm clockwise and A is fixed,
- Speed of wheel B if the arm G makes 100 rpm clockwise and wheel A makes 10 rpm counter clockwise.

