Time: 3 Hours **Marks:80**

N.B: 1) Question No. 1 is **compulsory.**
2) Attempt any **three** questions out of remaining **five** questions
3) Assume suitable data wherever necessary but justify the same
4) Figures to the right indicate Marks.

Q1 Solve Any Four [20]

1. State and explain Kennedy theorem.
2. What is instantaneous centre of rotation? Classify ICR. How to find number of instantaneous centres in mechanism?
3. Explain CAM Terminology
4. Explain Gear terminology.
5. Compare open and cross belt drive arrangements.

Q 2 A) A pulley is driven by a flat belt, the angle of lap being 120˚. The belt is 100 mm wide by 6 mm thick and density 1000 kg/m^3. If the coefficient of friction is 0.3 and the maximum stress in the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and the corresponding speed of the belt. [10]

Q2 B) DErivet the equation for ration of tension in flat belt drive. [10]

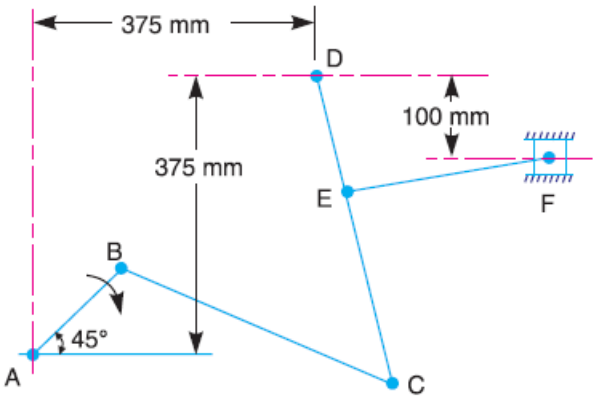
Q 3 A) A pair of gears, having 40 and 20 teeth respectively, are rotating in mesh, the speed of the smaller being 2000 r.p.m. Determine the velocity of sliding between the gear teeth faces at the point of engagement, at the pitch point, and at the point of disengagement if the smaller gear is the driver. Assume that the gear teeth are 20° involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pairs of teeth are in contact. [10]

Q 3 B) Derive the equation for length of path of approach [10]

C542D9FA9EB6D738654BE6E38D9B4539

Q 4 A) The mechanism, as shown in Fig. has the dimensions of various links as follows :

AB = DE = 150 mm ; BC = CD = 450 mm ; EF = 375 mm



The crank AB makes an angle of 45° with the horizontal and rotates about A in the clockwise direction at a uniform speed of 120 r.p.m. The lever DC oscillates about the fixed point D, which is connected to AB by the coupler BC. The block F moves in the horizontal guides, being driven by the link EF. Determine: 1. velocity of the block F, 2. angular velocity of DC, and 3. rubbing speed at the pin C which is 50 mm in diameter. [14]

Q 4 B) Explain Coriolis component of acceleration [6]

Q 5 A) A follower moves outward 5cm with UARM when cam comes to 180º. The follower is to return with SHM during next 150 º of rotation and then dwell for remaining period. Plot displacement, velocity and acceleration diagram if cam rotates at 120 rpm. [12]

Q 5 B) Explain conditions for correct steering. [8]

Q 6 Attempt any **four** [20]

a. Explain law of gearing.

b. Explain types of motion with suitable example.

c. With neat sketch explains Types of ICR.

d. Explain Dalembert's Principle

e Explain epi-cyclic gear train

****

C542D9FA9EB6D738654BE6E38D9B4539