

Ana University Important Questions *
ME2203 KINEMATICS OF MACHINERY
3rd Sem MECH
Unit I-V

1. With the help of a neat sketch explain the working of Whitworth quick return mechanism
2. With the help of a neat sketch explain the working of Single slider and double slider crank chain mechanism
3. Explain any two inversion of four bar chain
4. With the help of a neat sketch explain the working of Oldham's coupling.
5. In a four link mechanism, the dimensions of the links are $AB=200$ mm, $BC=400$ mm, $CD=450$ mm and $AD=600$ mm. At the instant when $\angle DAB=90^\circ$, the link AB has angular velocity of 36 rad/s in the clockwise direction. Determine (i) The velocity of point C, (ii) The velocity of point E on the link BC When $BE = 200$ mm (iii) the angular velocities of links BC and CD, iv) acceleration of link of link BC
6. PQRS is a four bar chain with fixed link PS. The length of the links are : $PQ = 62.5$ mm, $QR = 175$ mm, $RS = 112.5$ mm and $PS = 200$ mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity diagram and acceleration diagram when angle $\angle QPS = 60^\circ$ and find the angular velocity and angular acceleration of the links QR and RS
7. Derive the expression for Coriolis component of acceleration with neat sketch
8. In a steam engine mechanism shown in figure a) the crank AB rotates at 200 rpm. The dimensions of various links are $AB = 12$ cm, $BC = 48$ cm, $CD = 18$ cm and $DE = 36$ cm, $EF = 12$ cm and $FP = 36$ cm. Find the velocities of C,D,E,F and P.
9. A tangent cam to drive a roller follower through a total lift of 12.5 mm for a cam rotation of 75° . The cam speed is 600 rpm . The distance between cam centre and follower centre at full lift is 45 mm and the roller is 20 mm in diameter. Find the cam proportions and plot displacement, velocity and acceleration for one full cycle
10. Draw the profile of a cam operating a roller reciprocating follower and with the following data: Minimum radius of cam = 25 mm; lift = 30 mm; Roller diameter = 15 mm. The cam lifts the follower for 120° with SHM, followed by a dwell period of 30° . Then the follower lowers down during 150° of cam rotation with uniform acceleration and retardation followed by a dwell period. If the cam rotates at a uniform speed of 150 RPM. Calculate the maximum velocity and acceleration of follower during the descent period

11. Draw the profile of a cam operating a Knife-edged follower from the following data: (a) Follower to move outward through 40 mm during 60° of a cam rotation; (b) Follower to dwell for the next 45° (c) Follower to return its original position during next 90° (d) Follower to dwell for the rest of cam rotation. The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50mm. If the cam rotates at 300 r.p.m., determine the maximum velocity and acceleration of the follower during the outward stroke and return stroke
12. Briefly explain the undercutting in cam mechanisms.
13. The sun planet gear of an epicyclic gear train, the annular D has 100 internal teeth, the sun gear A has 50 external teeth and planet gear B has 25 external teeth. The gear B meshes with gear D and gear A. The gear B is carried on arm E, which rotates about the centre of annular gear D. If the gear D is fixed and arm rotates at 20 rpm, then find the speeds of gear A and B.
14. The arm of an epicyclic gear train rotates at 100 rpm in the anticlock wise direction. The arm carries two wheels A and B having 36 and 45 teeth respectively. The wheel A is fixed and the arm rotates about the centre of wheel A. Find the speed of wheel B. What will be the speed of B, if the wheel A instead of being fixed, makes 200 rpm (clockwise).
15. An open belt drive is used to connect two parallel shafts 4 m apart. The diameter of the bigger pulley is 1.5 m and that of the smaller pulley is 0.5 m. The mass of the belt is 1 kg/m length. The maximum tension is not to exceed 1500 N. The coefficient of friction is 0.25. The bigger pulley which is the driver runs at 250 rpm. Due to the slip, the speed of the driven is 725 rpm. Calculate the power transmitted and power lost in friction
16. An open belt running over two pulley of 1.5 m and 1.0 m diameters connects two parallel shafts 4.8 m apart. The initial ten in the belt is 3000 N. The smaller pulley is rotating at 600 rpm. The mass of belt is 0.6703 kg/m length. The coefficient of friction between the belt and pulleys is 0.3. Find (1) the exact length of the belt required (2) the power transmitted taking c.f tension into account
17. A vertical shaft 140 mm in diameter rotating at 120 rpm rests on a flat end footstep bearing. The shaft carries a vertical load of 30 KN. The coefficient of friction is 0.06. Estimate the power lost in friction assuming (1) Uniform Pressure and (2) Uniform wear
18. Two shaft whose centers are 1m apart are connected by a V belt drive. The driving pulley is supplied with 100 KW and has an effective diameter of 300 mm. It runs at 375 rpm. The angle of groove on the pulley is 40° The permissible

tension in 400 mm² cross sectional area of the belt is 2.1 MPa. The density of the belt is 1100 kg/ mm³ coefficient of friction is 0.28. Estimate number of belts required

19. Single plate clutch, effective on both sides is required to transmit 25KW at 3000 rpm. Determine the outer and inner radius of frictional surface if the coefficient of friction is 0.2555. The ratio of radius is 1.25 and the maximum pressure is not to exceed of 0.1 N/mm². Also determine the axial thrust to be provided by springs. Assume uniform wear.
20. The mean diameter of the screw jack having pitch of 10 mm is 50 mm. A load of 20 KN is lifted through a distance of 170 mm. Find the work done in lifting the load and efficiency of the screw jack when (i) the load rotates with the screw, and (ii) the load rests on the loose head which does not rotate with screw. The external and internal diameter of the bearing surface of the loose head is 60 mm and 10mm respectively. The coefficient of friction for the screw as well as the bearing surface .

- Keep in mind – the above questions are only a reference to prepare yourself for the exam , not in any way giving you the assurance to be asked in the exam .