Chettinad College of Engineering & Technology
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

Department of Mechanical Engineering

ME 8492 – Kinematics of Machinery

UNIT- II - Kinematics of Linkage Mechanisms - MCQ Bank

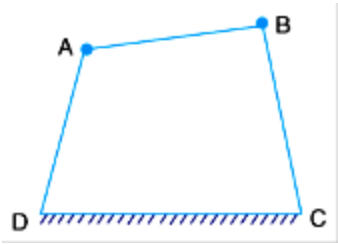
1. The direction of linear velocity of any point on a link with respect to another point on the same link is
(*a*) parallel to the link joining the points
(*b*) perpendicular to the link joining the points
(*c*) at 45° to the link joining the points
(*d*) none of these
Answer: (*b*)

2. The magnitude of linear velocity of a point *B* on a link *AB* relative to point *A* is
(*a*) $\omega.AB$
(*b*) $\omega\,(AB)^2$
(*c*) $\omega^2\,.\,AB$
(*d*) $(\omega\,.\,AB)^2$
where ω = Angular velocity of the link *AB*.
Answer: (*a*)

3. The two links *OA* and *OB* are connected by a pin joint at *O*. If the link *OA* turns with angular velocity ω_1 rad/s in the clockwise direction and the link *OB* turns with angular velocity ω_2 rad/s in the anti-clockwise direction, then the rubbing velocity at the pin joint *O* is
(*a*) $\omega_1.\omega_2.r$
(*b*) $(\omega_1 - \omega_2)\,r$
(*c*) $(\omega_1 + \omega_2)\,r$
(*d*) $(\omega_1 - \omega_2)\,2\,r$
where *r* = Radius of the pin at *O*
Answer: (*c*)

4. In the above question, if both the links *OA* and *OB* turn in clockwise direction, then the rubbing velocity at the pin joint *O* is
(*a*) $\omega_1.\omega_2.r$
(*b*) $(\omega_1 - \omega_2)\,r$
(*c*) $(\omega_1 + \omega_2)\,r$
(*d*) $(\omega_1 - \omega_2)\,2\,r$
Answer: (*b*)

5. In a four bar mechanism, as shown in Fig., if a force FA is acting at point *A* in the direction of its velocity vA and a force FB is transmitted to the joint *B* in the direction of its velocity vB, then the ideal mechanical advantage is equal to



(*a*) $F_B \cdot v_A$ (*b*) $F_A \cdot v_B$

(*c*) $\frac{F_B}{v_B}$ (*d*) $\frac{F_B}{F_A}$

Answer: (*d*)

6. The component of the acceleration, parallel to the velocity of the particle, at the given instant is called
(*a*) radial component
(*b*) tangential component
(*c*) coriolis component
(*d*) none of these
Answer: (*b*)

7. A point *B* on a rigid link *AB* moves with respect to *A* with angular velocity ω rad/s. The radial component of the acceleration of *B* with respect to *A*,

(*a*) $v_{BA} \times AB$ (*b*) $v^2_{BA} \times AB$ (*c*) $\frac{v_{BA}}{AB}$ (*d*) $\frac{v^2_{BA}}{AB}$

where *v*BA = Linear velocity of *B* with respect to *A* = ω × *AB*
Answer: (*d*)

8. A point *B* on a rigid link *AB* moves with respect to *A* with angular velocity ω rad/s. The angular acceleration of the link *AB* is

(*a*) $\frac{a^r_{BA}}{AB}$ (*b*) $\frac{a^t_{BA}}{AB}$ (*c*) $v_{BA} \times AB$ (*d*) $\frac{v^2_{BA}}{AB}$

Answer: (*c*)

9. A point *B* on a rigid link *AB* moves with respect to *A* with angular velocity ω rad/s. The total acceleration of *B* with respect to *A* will be equal to
(*a*) vector sum of radial component and coriolis component
(*b*) vector sum of tangential component and coriolis component
(*c*) vector sum of radial component and tangential component
(*d*) vector difference of radial component and tangential component
Answer: (*c*)

10. The coriolis component of acceleration is taken into account for
(*a*) slider crank mechanism
(*b*) four bar chain mechanism
(*c*) quick return motion mechanism
(*d*) none of these
Answer: (*c*)

11. A machine raised a load of 360 N through a distance of 200 mm. The effort, a force of 60 N moved 1.8 m during the process. Calculate mechanical advantage.
a) 6
b) 7
c) 8
d) 9
Answer: a

12. A machine raised a load of 360 N through a distance of 200 mm. The effort, a force of 60 N moved 1.8 m during the process. Calculate velocity ratio.
a) 6
b) 7
c) 8
d) 9
Answer: d

13. A machine raised a load of 360 N through a distance of 200 mm. The effort, a force of 60 N moved 1.8 m during the process. Calculate efficiency at this load.
a) 44.44%
b) 55.55%
c) 66.66%
d) 77.77%
Answer: c

14. A machine raised a load of 360 N through a distance of 200 mm. The effort, a force of 60 N moved 1.8 m during the process. Calculate effect of friction.
a) 10 N
b) 20 N
c) 30 N
d) 40 N
Answer: b

15. There are two points P and Q on a planar rigid body. The relative velocity between the two points
a) should always be along PQ
b) can be oriented along any direction
c) should always be perpendicular to PQ
d) should be along QP when the body undergoes pure translation
Answer: c

16. In a four-bar linkage, S denotes the shortest link length, L is the longest link length, P and Q are the lengths of other two links. At least one of the three moving links will rotate by 360^0 if
a) S + L < P + Q
b) S + L > P + Q

c) S + P < L + Q
d) S + P > L + Q
Answer: a

17. When a slider moves on a fixed link having curved surface, their instantaneous centre lies
a) on their point of contact
b) at the centre of curvature
c) at the centre of circle
d) at the pin joint
Answer: b

18. What is the direction of velocity of a point in a link relative to another point on the same link rotating in a specific direction.
a) Perpendicular to line joining both the links
b) Parallel to line joining both the links
c) Perpendicular to the surface of the link
d) Parallel to the surface of the link
Answer: a

19. The direction of velocity is parallel if the rotation is anticlockwise and perpendicular to the line joining links if the rotation is clockwise.
a) True
b) False
Answer: b

20. What is the correct representation of velocity of point A with respect to B in a link?
a) Vab
b) Vba
c) Va-b
d) Vb-a
Answer: a

21. The angular velocity of a rotating body is expressed in terms of
a) revolution per minute
b) radians per second
c) any one of the mentioned
d) none of the mentioned
Answer: b

22. The linear velocity of a rotating body is given by the relation
a) $v = r\omega$
b) $v = r/\omega$
c) $v = \omega/r$
d) $v = \omega^2/r$
Answer: a

23. The linear acceleration of a rotating body is given by the relation
a) $a = r\alpha$
b) $a = r/\alpha$
c) $a = \alpha/r$
d) $a = \alpha^2/r$
Answer: a

24. The relation between linear velocity and angular velocity of a cycle
a) exists under all conditions
b) does not exist under all conditions
c) exists only when it does not slip
d) exists only when it moves on horizontal plane
Answer: a

25. The velocity of piston in a reciprocating pump mechanism depends upon
a) angular velocity of the crank
b) radius of the crank
c) length of the connecting rod
d) all of the mentioned
Answer: d

26. The linear velocity of a point B on a link rotating at an angular velocity ω relative to another point A on the same link is
a) ω^2AB
b) ωAB
c) $\omega(AB)^2$
d) ω/AB
Answer: b

27. The linear velocity of a point relative to another point on the same link is ……. to the line joining the points.
a) perpendicular
b) parallel
c) at 45^0
d) none of the mentioned
Answer: a