



## Department of Mechanical Engineering

### ME 8492 – Kinematics of Machinery

#### UNIT- III - Kinematics of Cam Mechanisms - MCQ Bank

1. The size of a cam depends upon

- (a) base circle
- (b) pitch circle
- (c) prime circle
- (d) pitch curve

Answer: (a)

2. The angle between the direction of the follower motion and a normal to the pitch curve is called

- (a) pitch angle
- (b) prime angle
- (c) base angle
- (d) pressure angle

Answer: (d)

3. A circle drawn with centre as the cam centre and radius equal to the distance between the cam centre and the point on the pitch curve at which the pressure angle is maximum, is called

- (a) base circle
- (b) pitch circle
- (c) prime circle
- (d) none of these

Answer: (b)

4. The cam follower generally used in automobile engines is

- (a) knife edge follower
- (b) flat faced follower
- (c) spherical faced follower
- (d) roller follower

Answer: (c)

5. The cam follower extensively used in air-craft engines is

- (a) knife edge follower
- (b) flat faced follower
- (c) spherical faced follower
- (d) roller follower

Answer: (d)

6. In a radial cam, the follower moves

- (a) in a direction perpendicular to the cam axis

- (b) in a direction parallel to the cam axis
- (c) in any direction irrespective of the cam axis
- (d) along the cam axis

Answer: (a)

**7.** A radial follower is one

- (a) that reciprocates in the guides
- (b) that oscillates
- (c) in which the follower translates along an axis passing through the cam centre of rotation.
- (d) none of the above

Answer: (a)

**8.** Offset is provided to a cam follower mechanism to

- (a) minimise the side thrust
- (b) accelerate
- (c) avoid jerk
- (d) none of these

Answer: (a)

**9.** For low and moderate speed engines, the cam follower should move with

- (a) uniform velocity
- (b) simple harmonic motion
- (c) uniform acceleration and retardation
- (d) cycloidal motion

Answer: (b)

**10.** For high speed engines, the cam follower should move with

- (a) uniform velocity
- (b) simple harmonic motion
- (c) uniform acceleration and retardation
- (d) cycloidal motion

Answer: (d)

**11.** Which of the following displacement diagrams should be chosen for better dynamic performance of a cam-follower mechanism ?

- (a) simple harmonic motion
- (b) parabolic motion
- (c) cycloidal motion
- (d) none of these

Answer: (c)

**12.** For a given lift of the follower of a cam follower mechanism, a smaller base circle diameter is desired.

- (a) because it will give a steeper cam and higher pressure angle.
- (b) because it will give a profile with lower pressure angle
- (c) because it will avoid jumping
- (d) none of the above.

Answer: (d)

13. The linear velocity of the reciprocating roller follower when it has contact with the straight flanks of the tangent cam, is given by

- (a)  $\omega(r_1 - r_2) \sin \theta$
- (b)  $\omega(r_1 - r_2) \cos \theta$
- (c)  $\omega(r_1 + r_2) \sin \theta \sec^2 \theta$
- (d)  $\omega(r_1 + r_2) \cos \theta \operatorname{cosec}^2 \theta$

where  $\omega$  = Angular velocity of the cam shaft,

$r_1$  = Minimum radius of the cam,

$r_2$  = Radius of the roller, and

$\theta$  = Angle turned by the cam from the beginning of the displacement for contact of roller with the straight flanks.

Answer: (c)

14. The displacement of a flat faced follower when it has contact with the flank of a circular arc cam, is given by

- (a)  $R(1 - \cos \theta)$
- (b)  $R(1 - \sin \theta)$
- (c)  $(R - r_1)(1 - \cos \theta)$
- (d)  $(R - r_1)(1 - \sin \theta)$

where  $R$  = Radius of the flank,

$r_1$  = Minimum radius of the cam, and

$\theta$  = Angle turned by the cam for contact with the circular flank.

Answer: (c)

15. The retardation of a flat faced follower when it has contact at the apex of the nose of a circular arc cam, is given by

- (a)  $\omega^2 \times OQ$
- (b)  $\omega^2 \times OQ \sin \theta$
- (c)  $\omega^2 \times OQ \cos \theta$
- (d)  $\omega^2 \times OQ \tan \theta$

where  $OQ$  = Distance between the centre of circular flank and centre of nose.

Answer: (a)

16. When the flanks of the cam are straight and tangential to the base circle and nose circle, then the cam is known as a \_\_\_\_\_

- a) **Tangent cam**
- b) Reciprocating cam
- c) Roller cam
- d) Radial cam

Answer: a

17. Tangent cam with reciprocating follower is an example of cams with specified contours.

- a) **True**
- b) False

Answer: a

18. Tangent cams are symmetric about \_\_\_\_\_

- a) **Centre line of cam shaft**
- b) Tangent line of cam shaft
- c) Radial line of cam shaft
- d) Along the roller

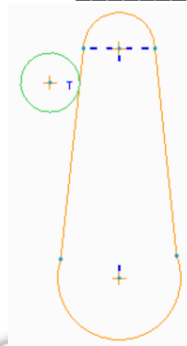
Answer: a

19. What is the use of tangent cams?

- a) **To operate inlet and exhaust valves of I C engines.**
- b) To operate the inlet valve of I C engines
- c) To operate the exhaust valve of I C engines
- d) To operate the crankshaft of an IC engine

Answer: a

20. In the given figure, the cam has contact with \_\_\_\_\_



- a) Nose
- b) **Straight flank**
- c) Arm
- d) Shaft

Answer: b

21. If  $\theta$  is the angle turned by the cam from the beginning of the roller displacement, then minimum acceleration of the follower occurs at what value of  $\theta$  in degrees?

- a) **0**
- b) 30
- c) 45
- d) 60

Answer: a

22. From the given data, calculate the acceleration of follower in  $\text{m/s}^2$  at the beginning of the lift for a symmetrical tangent cam operating a roller follower.

Least radius of the cam is 30 mm; Roller radius is 17.5 mm. The angle of ascent is  $75^\circ$  and the total lift is 17.5 mm. The speed of the cam shaft is 600 r.p.m.

- a) **187.6**
- b) 185.5
- c) 183.2
- d) 190.1

Answer: a

23. Maximum acceleration of the follower is independent of the angle theta.

a) True

**b) False**

Answer: b

24. If  $\theta$  is the angle turned by the cam from the beginning of the roller displacement, how the velocity changes with the change in theta?

**a) Increases with increase in theta**

b) Decreases with increase in theta

c) Increases with negative change in theta

d) Independent of theta

Answer: a

25. In the given figure, the cam has contact with \_\_\_\_\_



a) Base circle

**b) Nose**

c) Straight flank

d) Shaft

Answer: b