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Subject Code

- Any - ▼

Chapter Name

- Any - ▼

Apply

Examination: 2017 SUMMER

Que.No	Marks	
Q 1 f)	2	<p>Question: Classify the cam.</p> <p>Answer: Classification of cam: 1. Radial or disc cam: In radial cams, the follower reciprocates or oscillates in a direction perpendicular to the cam axis. The cams as shown in above Fig. are all radial cams. 2. Cylindrical cam: In cylindrical cams, the follower reciprocates or oscillates in a direction parallel to the cam axis. The follower rides in a groove at its cylindrical surface. A cylindrical grooved cam with a reciprocating and an oscillating follower is shown in Fig. below (a) and (b) respectively.</p> <p>-----</p>

Que.No	Marks	
Q 1 g)	2	<p>Question: Define following terms with respect to cam and follower : (i) Prime circle (ii) Pitch circle (iii) Pressure angle (iv) Trace point</p> <p>Answer: i. Prime circle: It is the smallest circle that can be drawn from the centre of the cam and tangent to the pitch curve. For a knife edge and a flat face follower, the prime circle and the base circle are identical. For a roller follower, the prime circle is larger than the base circle by the radius of the roller. ii. Pitch circle: It is a circle drawn from the centre of the cam through the pitch points. iii. Pressure angle: It is the angle between the direction of the follower motion and a normal to the pitch curve. This angle is very important in designing a cam profile. If the pressure angle is too large, a reciprocating follower will jam in its bearings. iv. Trace point: It is a reference point on the follower and is used to generate the pitch curve. In case of knife edge follower, the knife edge represents the trace point and the pitch curve corresponds to the cam profile. In a roller follower, the centre of the roller represents the trace point.</p> <p>-----</p>
Q 1 h)	2	<p>Question: What are the limitations of knife edge follower ?</p> <p>Answer: Limitations of knife edge follower are: 1. Excessive wear due to small area of contact between cam & follower surfaces. 2. In this follower a considerable thrust exists between the follower and guide.</p> <p>-----</p>

Que.No	Marks	
Q 2 c)	4	<p>Question: Draw and explain in short, types of followers used in cam and follower.</p> <p>Answer: Types of followers : The followers may be classified as discussed below: 1. According to the surface in contact. (a) Knife edge follower. When the contacting end of the follower has a sharp knife edge, it is called a knife edge follower. (b) Roller follower. When the contacting end of the follower is a roller, it is called a roller follower. (c) Flat faced or mushroom follower. When the contacting end of the follower is a perfectly flat face, it is called a flat faced follower and when the flat faced follower is circular, it is then called a mushroom follower. 2. According to the motion of the follower. (a) Reciprocating or translating follower. When the follower reciprocates in guides as the cam rotates uniformly, it is known as reciprocating or translating follower. (b) Oscillating or rotating follower. When the uniform rotary motion of the cam is converted into predetermined oscillatory motion of the follower, it is called oscillating or rotating follower. 3. According to the path of motion of the follower. (a) Radial follower. When the motion of the follower is along an axis passing through the centre of the cam, it is known as radial follower (b) Off-set follower. When the motion of the follower is along an axis away from the axis of the cam centre, it is called off-set follower.</p> <p>-----</p>

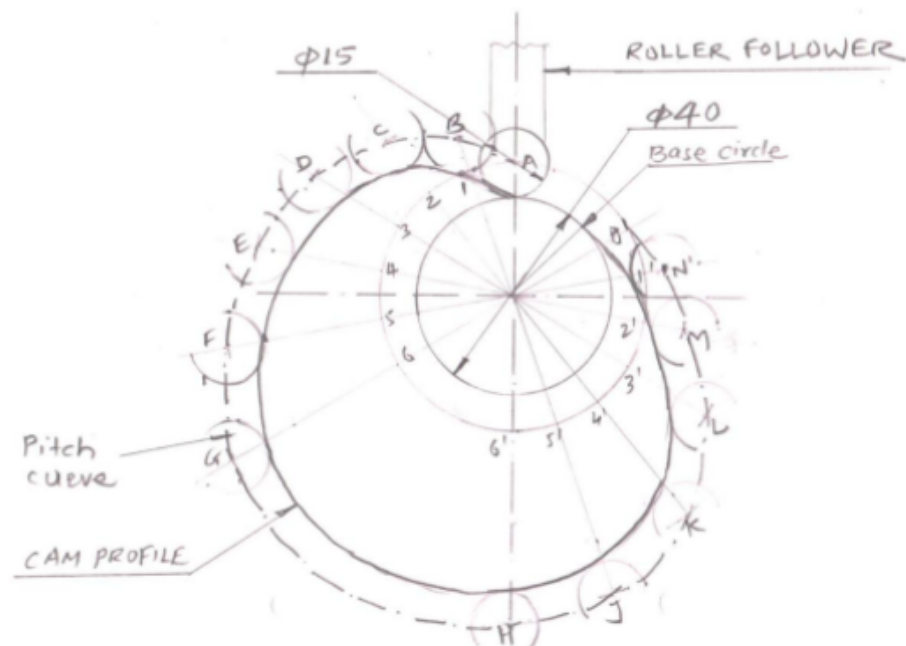
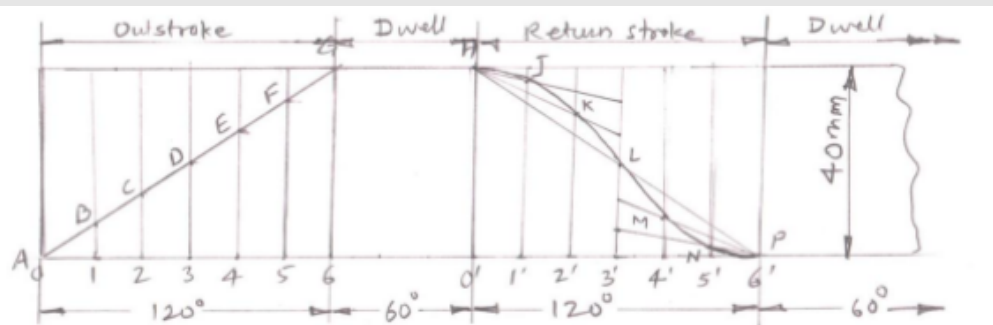
Que.No

Marks

Question:

A cam with 40 mm minimum diameter rotates in clockwise at uniform speed and has to give the following motion to a roller follower 15 mm diameter : (i) Follower to complete outward stroke of 40 mm during 120° of cam rotation with uniform velocity. (ii) Follower to dwell for 60° of cam rotation. (iii) Follower will return to its initial position during 120° of cam rotation with uniform acceleration and retardation. (iv) Follower will dwell for remaining 60° of cam rotation. Draw the profile of cam, if the axis of follower passes through the axis of cam.

Answer:



Examination: 2017 WINTER

Que.No	Marks	
Q 1a)(b)	2	<p>Question: State types of cams.</p> <p>Answer: b) Types of cam: 1. Radial or disc cam 2. Cylindrical cam</p> <hr/>
Q 2 e)	4	<p>Question: Draw the labelled displacement, velocity and acceleration diagrams for a follower when it moves with uniform velocity.</p> <p>Answer:</p> <p>(a) Displacement diagram</p> <p>(b) Velocity diagram</p> <p>(c) Acceleration diagram</p> <hr/>

Que.No	Marks	
Q 3 f)	4	<p>Question: Give detailed classification of followers.</p> <p>Answer: Types of followers The followers may be classified as discussed below: 1. According to the surface in contact. (a) Knife edge follower. When the contacting end of the follower has a sharp knife edge, it is called a knife edge follower. (b) Roller follower. When the contacting end of the follower is a roller, it is called a roller follower. (c) Flat faced or mushroom follower. When the contacting end of the follower is a perfectly flat face, it is called a flat faced follower and when the flat faced follower is circular, it is then called a mushroom follower. (d) Spherical faced follower. When the contacting end of the follower is of spherical shape, it is called a spherical faced follower. 2. According to the motion of the follower. (a) Reciprocating or translating follower. When the follower reciprocates in guides as the cam rotates uniformly, it is known as reciprocating or translating follower. (b) Oscillating or rotating follower. When the uniform rotary motion of the cam is converted into predetermined oscillatory motion of the follower, it is called oscillating or rotating follower. 3. According to the path of motion of the follower. (a) Radial follower. When the motion of the follower is along an axis passing through the centre of the cam, it is known as radial follower (b) Off-set follower. When the motion of the follower is along an axis away from the axis of the cam centre, it is called off-set follower.</p> <p>-----</p>

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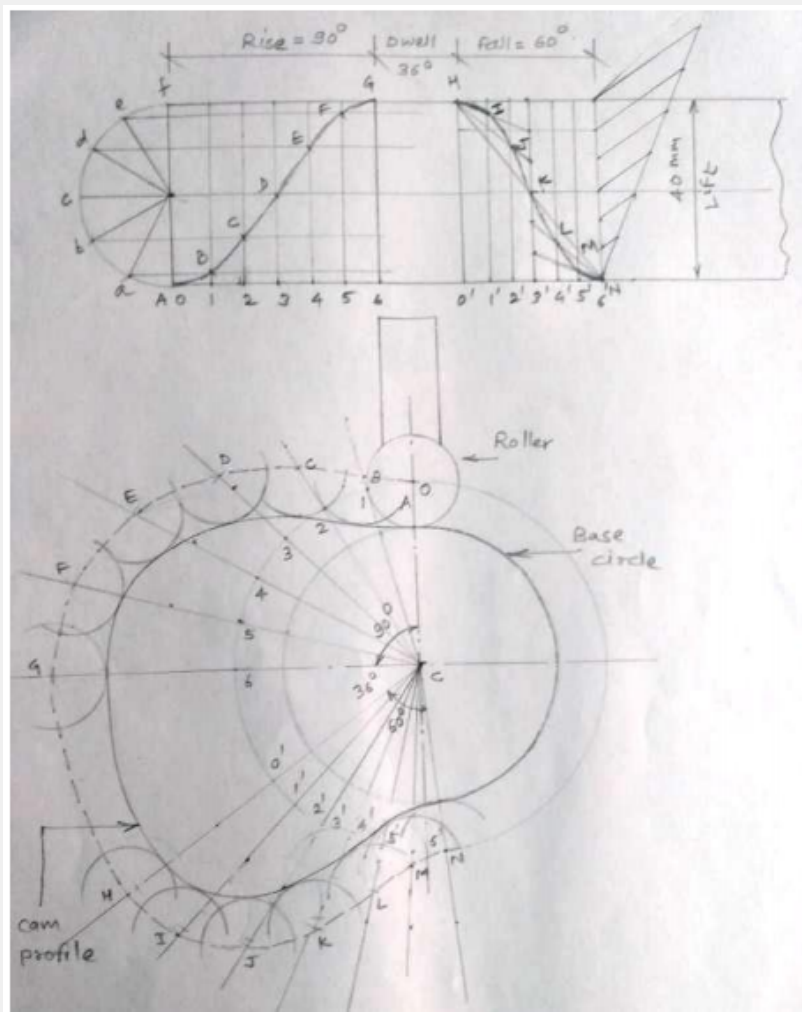
Marks

Question:

Draw the profile of a cam to raise a valve with S.H.M. through 40 mm in of revolution, keep it fully raised through 1/10 th 1 th 4 revolution and to lower it with uniform acceleration and retardation in 1/6 th revolution. The valve remains closed during the rest of the revolution. The diameter of roller is 20 mm and minimum radius of cam to be 30 mm. The axis of the valve rod passes through the axis of cam shaft.

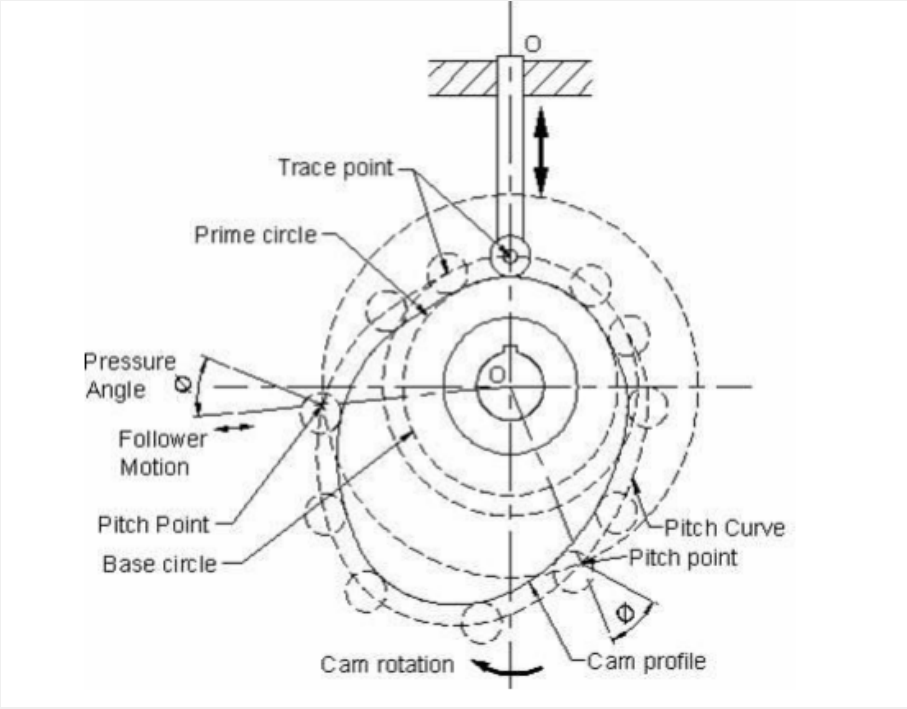
Answer:

Fig shows a displacement diagram and a cam profile for the roller follower.



Q 5 b) 8

Examination: 2016 SUMMER

Que.No	Marks	
Q 1a)(ii)	2	<p>Question: Define (i) Pressure angle (ii) Pitch point related to cam.</p> <p>Answer: (i) Pressure angle: It is the angle between the direction of the follower motion and a normal to the pitch curve. This angle is very important in designing a cam profile. If the pressure angle is too large, a reciprocating follower will jam in its bearing. (ii) Pitch point: It is point on pitch curve having the maximum pressure angle. -----</p>
Q 2 e)	4	<p>Question: Draw neat sketch of radial cam with follower and show on it (i) Base circle. (ii) Pitch point. (iii) Prime Circle. (iv) Cam profile</p> <p>Answer:</p>  <p>-----</p>

Que.No

Marks

Q 3 f)

4

Question:

What are the different types of follower motion ? Also draw displacement diagram for uniform velocity.

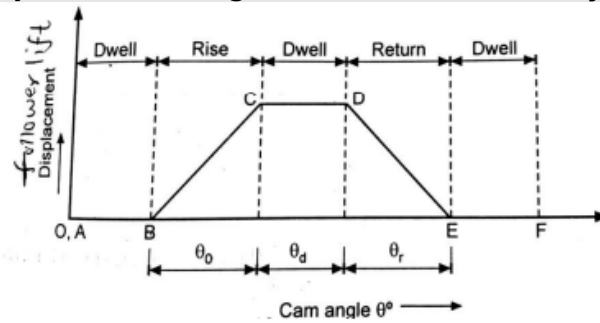
Answer:

Different types of follower motions –

The follower during its travel may have one of the following motions:-

Uniform velocity, Simple harmonic motion, Uniform acceleration and retardation, Cycloidal motion.

Displacement Diagram of Uniform Velocity:



In above displacement diagram, abscissa (base) represents angular displacement of Cam in degrees (Cam Angle) and ordinate represents lift or stroke of follower in mm. In uniform velocity, slope is constant. The lines AB, CD and EF represent dwell period (no follower motion) and lines BC and DE represent rise and return stroke respectively, with uniform velocity. [2M]

Que.No

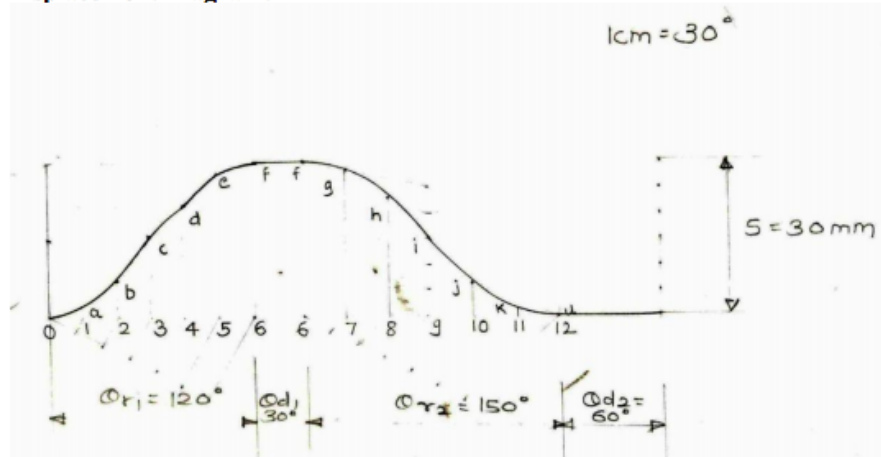
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Question:

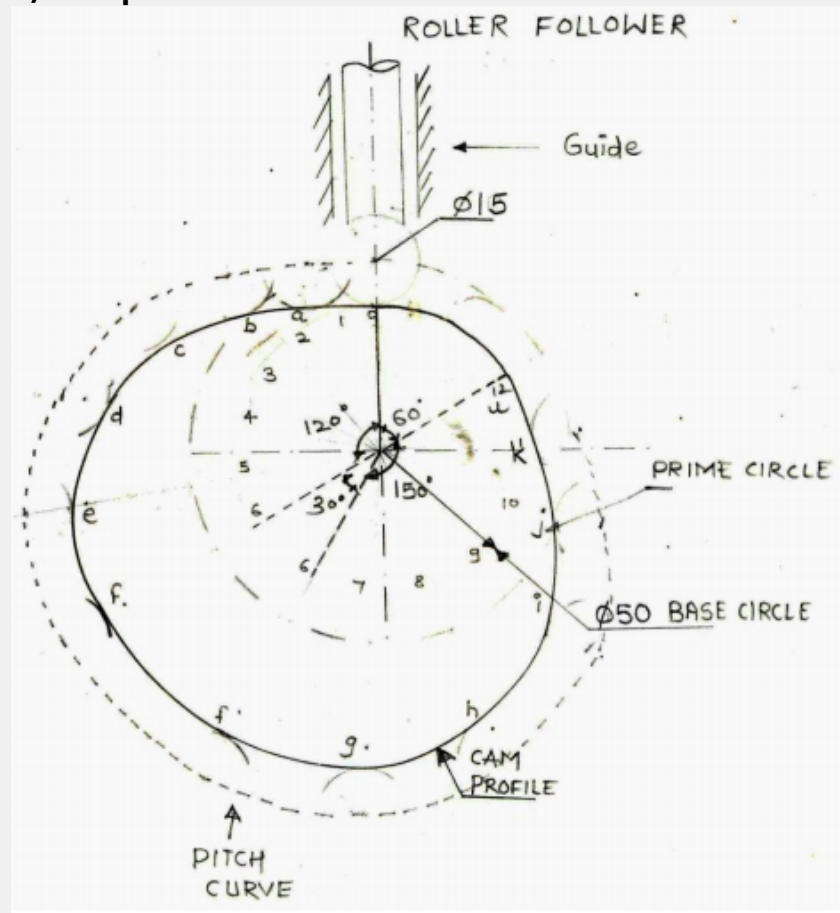
Draw the profile of cam operating a roller reciprocating follower with the following data : Minimum radius of cam = 25 mm lift = 30 mm Roller diameter = 15 mm The cam lifts the follower for 120° with SHM followed by a dwell period of 30°. Then the follower lowers down during 150° of the cam rotation with uniform acceleration and deceleration followed by a dwell period.

Answer:

i) Displacement Diagram:



ii) cam profile:



Q 5 b) 8

Que.No	Marks	
Q 1a)(iii)	2	<p>Question: State the advantages of roller follower over knife edge follower.</p> <p>Answer: Advantages of roller follower over knife edge follower a) Roller follower has less wear and tear than knife edge follower. b) Power required for driving the cam is less due to less frictional force between cam and follower.</p>
Q 2 d)	4	<p>Question: Explain with neat sketch different types of follower.</p> <p>Answer:</p> <p>Different types of follower</p> <p>Knife edge follower – Simple in construction, sliding motion between cam and follower. Roller follower – Less wear and tear. Rolling motion between cam and follower. Flat faced follower – High wear and tear, high surface stresses. Spherical follower – High wear and tear, high surface stresses are reduced by spherical follower.</p> <p>According to type of shape</p> <p>Reciprocating follower – Cam rotates and follower reciprocates. Oscillating follower – Cam rotates and follower is oscillating.</p> <p>According to type of motion of follower</p> <p>Radial follower – The motion of follower passes through the axis of the cam. Offset follower – The line of action of follower is away (eccentric) from axis of the cam.</p> <p>According to line of motion of follower</p>

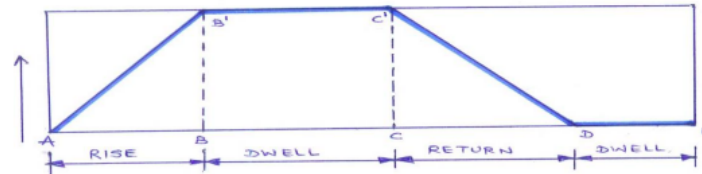
Question:

Discuss the following motion of the follower by drawing the displacement velocity and acceleration diagram. (i) Uniform Velocity (ii) Simple Harmonic Motion (iii) Uniform acceleration and retardation

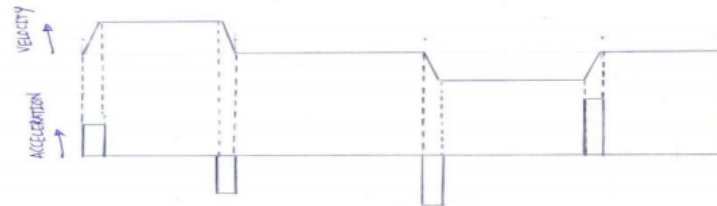
Answer:

i) uniform velocity.

displacement diagram:

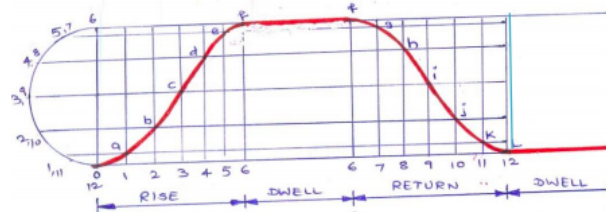


Velocity and acceleration diagram:

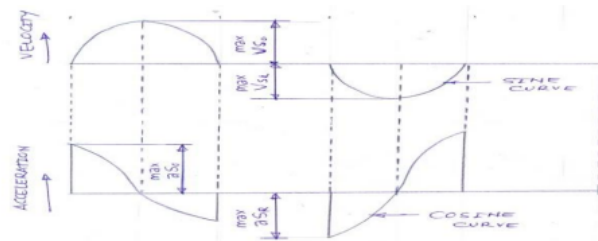


ii) simple harmonic motion.

Displacement diagram:

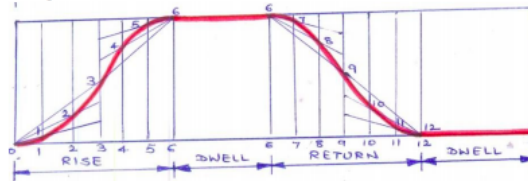


Velocity and acceleration diagram:

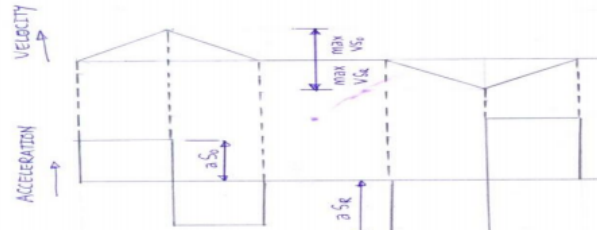


iii) uniform acceleration and retardation.

Displacement diagram:



Velocity and acceleration diagram:



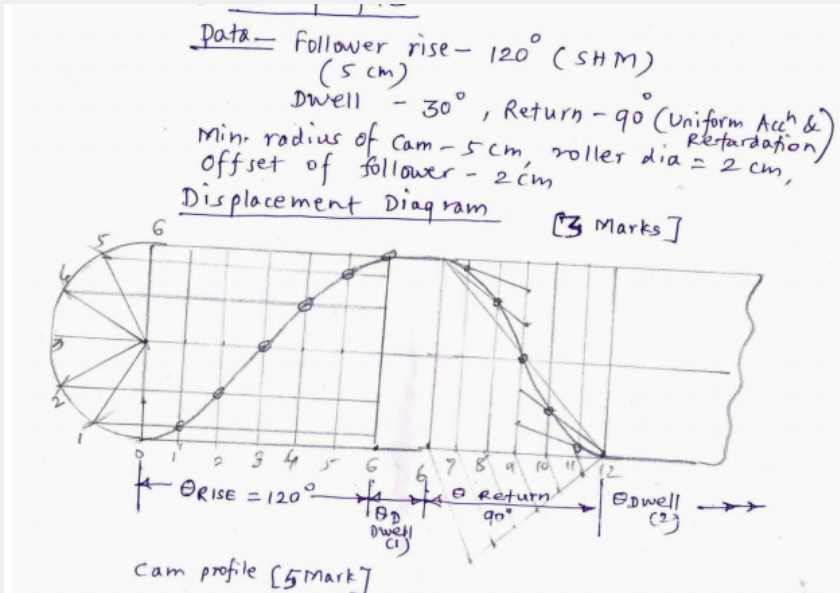
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Question:

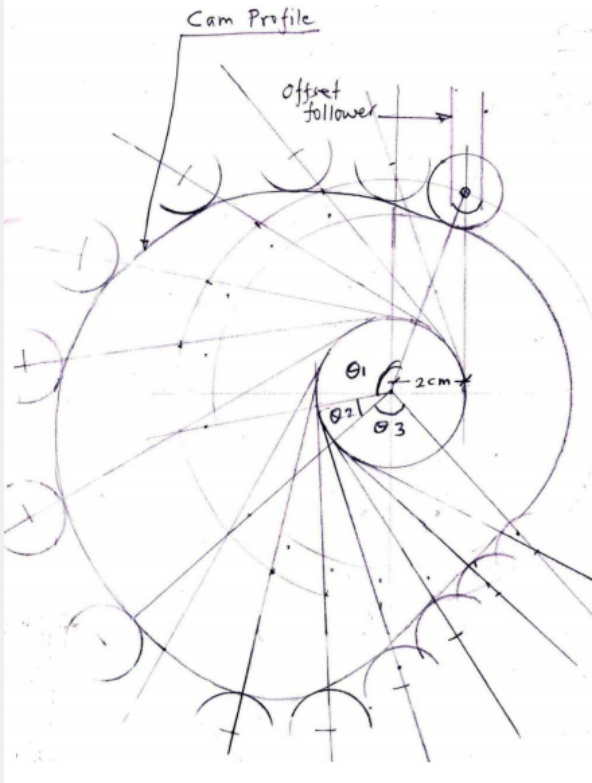
Draw profile of cam to raise the valve with S.H.M. through 5cm in 120° of revolution, keep it fully raised through 30° and lower it with equal uniform acceleration and retardation through 90° of rotation. The valve remain closed during the rest of rotation. The diameter of the roller is 2 cm and the minimum radius of the cam is 5cm. The axis of the valve rod is offset 2cm from the axis of the shaft. Assume the cam rotating in clockwise direction.

Answer:



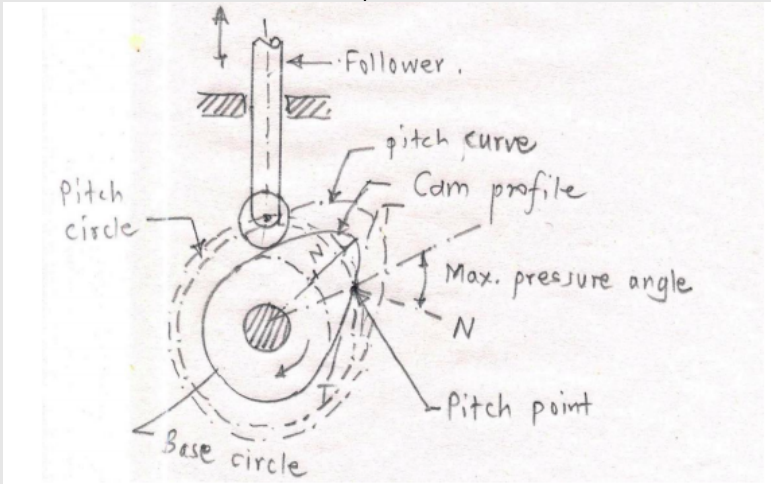
Displacement diagram3 Marks

Cam profile5 Marks



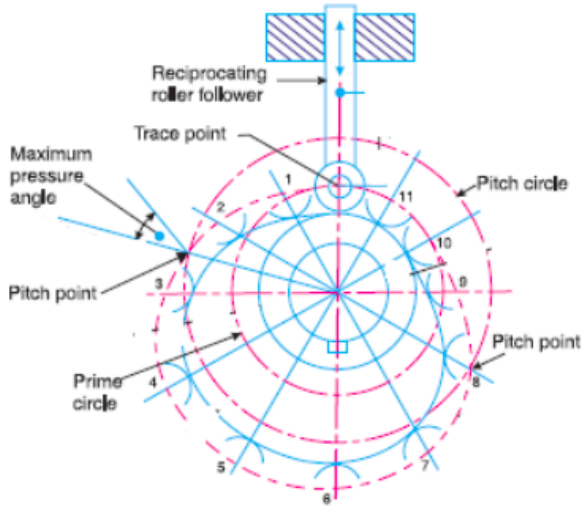
Q 5 b)

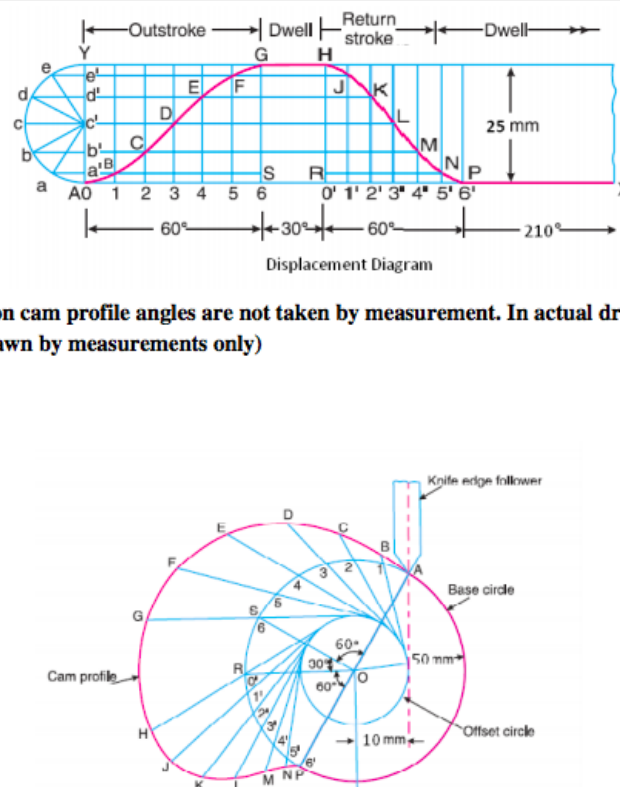
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Que.No	Marks	
Q 6a)(i)	4	<p>Question: Define the following terms as applied to cam with neat sketch. (1) Pitch circle (2) Pressure angle (3) Stroke of follower (4) Module</p> <p>Answer: (1) Pitch circle- Circle drawn from centre of cam through pitch points. (2) Pressure angle- Angle between direction of follower motion and normal to pitch curve. (3) Stroke- Maximum travel of follower from its lowest position to top most position. (4) Module -(Gears) - Ratio of pitch circle diameter in mm to No. of teeth on gear.</p> 

Examination: 2015 SUMMER

Que.No	Marks	
Q 1a)(b)	2	<p>Question: Enlist the different type of follower motion.</p> <p>Answer: Motion of the Follower :</p> <div style="display: flex; justify-content: space-between;"> <div> 1. Uniform velocity, motion, 3. Uniform acceleration and retardation, and </div> <div> 2. Simple harmonic 4. Cycloidal motion. </div> </div>

Que.No	Marks	
Q 2 e)	4	<p>Question:</p> <p>Draw a neat sketch of radial cam with roller follower and show the following on it : (i) Pitch point (ii) Pressure angle (iii) Prime circle (iv) Trace point</p> <p>Answer:</p> <p>(e) Radial cam with roller follower (04 marks for diagram with names)</p> 
Q 3 b)	4	<p>Question:</p> <p>Why roller follower is preferred over a knife follower ? State two advantages and application of roller follower.</p> <p>Answer:</p> <p>In case of knife edge follower there is sliding motion between the contacting surface of cam and follower. Because of small contact area, there is excessive wear; therefore it is not frequently used. Whereas in roller follower there is rolling motion between contacting surfacing and more contact area, therefore rate of wear is greatly reduced.</p> <p>Advantages: i) Less wear, more life ii) Less side thrust as compared to knife edge follower.</p> <p>Application: Used in stationary oil and gas engines</p>

Que.No	Marks	
Q 5 b)	8	<p>Question:</p> <p>Construct a cam profile with knife edge follower having an offset of 10 mm for the following data : Outstroke = 60° with SHM Dwell = 30° Return = 60° with uniform velocity and remaining is dwell period. Minimum radius of cam = 50 mm Lift of follower = 25 mm Consider the rotation of cam in clockwise direction.</p> <p>Answer:</p>  <p>The diagram shows the displacement diagram and the resulting cam profile. The displacement diagram is a graph of follower displacement (0 to 25 mm) against cam angle (0 to 210 degrees). It consists of four segments: Outstroke (0-60 degrees, SHM), Dwell (60-90 degrees), Return stroke (90-150 degrees, uniform velocity), and Dwell (150-210 degrees). The cam profile is a circular shape with a base circle of 50 mm radius and an offset circle of 10 mm radius. The cam profile is constructed by projecting the displacement diagram onto the cam circle, resulting in a profile that is a combination of a circular arc and a straight line segment.</p> <p>Note: In solution cam profile angles are not taken by measurement. In actual drawing in answer books it should be drawn by measurements only)</p>

Examination: 2015 WINTER

Que.No	Marks	
Q 1a)(ii)	2	<p>Question:</p> <p>State any two types of motion of the follower.</p> <p>Answer:</p> <p>The follower during its travel may have one of the following motions.</p> <ol style="list-style-type: none"> 1. Uniform velocity, 2. Simple harmonic motion, 3. Uniform acceleration and retardation, 4. Cycloidal motion.

Que.No	Marks	
Q 2 e)	4	<p>Question: Define the following terms related to cams.</p> <p>Answer:</p> <p>i) Trace point : It is a reference point on the follower and is used to generate the pitch curve. In case of knife edge follower, the knife edge represents the trace point and the pitch curve corresponds to the cam profile. In a roller follower, the centre of the roller represents the trace point.</p> <p>ii) Pitch curve: It is the curve generated by the trace point as the follower moves relative to the cam. For a knife edge follower, the pitch curve and the cam profile are same whereas for a roller follower, they are separated by the radius of the roller.</p> <p>iii) Prime circle: It is the smallest circle that can be drawn from the centre of the cam and tangent to the pitch curve. For a knife edge and a flat face follower, the prime circle and the base circle are identical. For a roller follower, the prime circle is larger than the base circle by the radius of the roller.</p> <p>iv) Lift of stroke: It is the maximum travel of the follower from its lowest position to the topmost position.</p> <p>-----</p>
Q 3 f)	4	<p>Question: Give detailed classification of followers.</p> <p>Answer:</p> <p>The followers may be classified as below :</p> <ol style="list-style-type: none"> 1. According to the surface in contact. <ol style="list-style-type: none"> (a) Knife edge follower. When the contacting end of the follower has a sharp knife edge, it is called a knife edge follower. (b) Roller follower. When the contacting end of the follower is a roller, it is called a roller follower (c) Flat faced or mushroom follower. When the contacting end of the follower is a perfectly flat face, it is called a flat-faced follower (d) Spherical faced follower. When the contacting end of the follower is of spherical shape, it is called a spherical faced follower 2. According to the motion of the follower. The followers, according to its motion, are of the following two types: <ol style="list-style-type: none"> (a) Reciprocating or translating follower. When the follower reciprocates in guides as the cam rotates uniformly, it is known as reciprocating or translating follower. (b) Oscillating or rotating follower. When the uniform rotary motion of the cam is converted into predetermined oscillatory motion of the follower, it is called oscillating or rotating follower. 3. According to the path of motion of the follower. The followers, according to its path of motion, are of the following two types: <ol style="list-style-type: none"> (a) Radial follower. When the motion of the follower is along an axis passing through the centre of the cam, it is known as radial follower. (b) Off-set follower. When the motion of the follower is along an axis away from the axis of the cam centre, it is called off-set follower. <p>-----</p>

Que.No

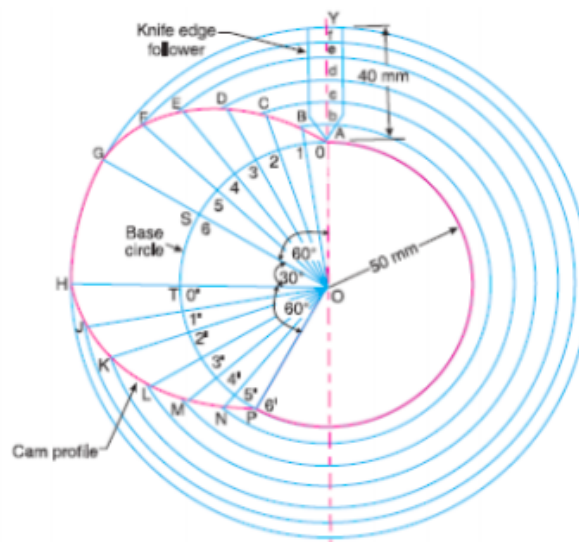
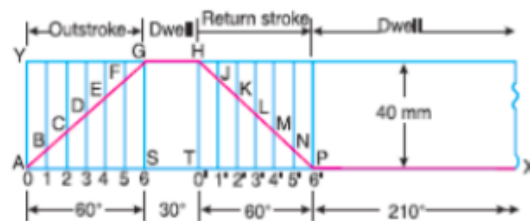
Marks

Question:

A cam is to give the following motion to a knife edged follower :
 (i) Outstroke during 60° of cam rotation. (ii) Dwell for the next 30° of cam rotation. (iii) Return stroke during next 60° of cam rotation. iv) Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return stroke. Draw the profile of the cam when the axis of the follower passes through the axis of the camshaft.

Answer:

Displacement Diagram



Q 5 b) 8