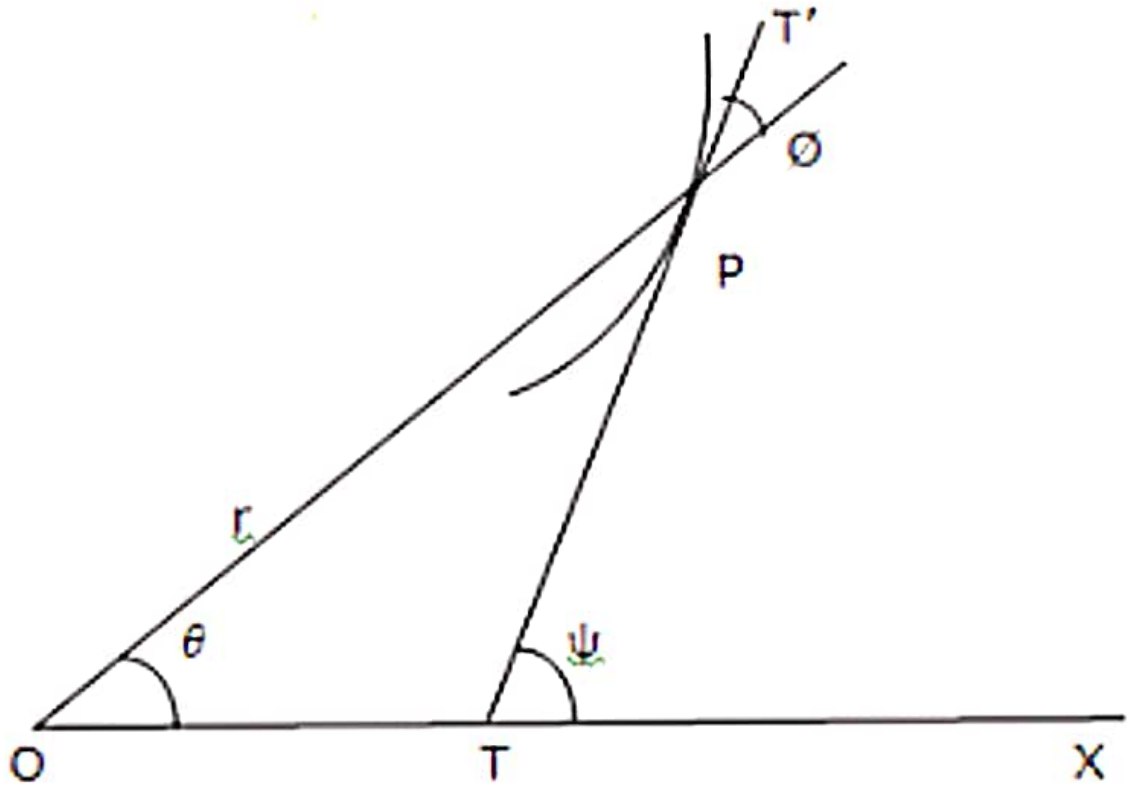
This set of Differential Calculus Multiple Choice Questions & Answers focuses on “Polar Curves”.

1. For the below mentioned figure the angle between radius vector (op) and tangent to the polar curve where r=f(θ) has the one among the following relation?



a) $tan\,\omega = \frac{tan\emptyset + tan\theta}{1 - tan\emptyset tan\theta}$

b) $tan\,\omega = \frac{tan\emptyset - tan\theta}{1 + tan\emptyset tan\theta}$

c) $tan\,\emptyset = r(\frac{dr}{d\theta})$

d) $tan\,\omega = tan\emptyset + tan\theta$

2. The angle between Radius vector r=a(1-cosθ)and tangent to the curve is ∅ given by _____

a) $\emptyset=\frac{\pi}{2}$

b) ∅=π

c) $\emptyset=-\frac{\pi}{2}$

d) ∅=0

View Answer

Answer: a

Explanation: r= a(1-cosθ)

taking logarithms on both sides we get,

logr = loga + log(1-cosθ)

differentiating w.r.t θ we get,

$\frac{1}{r}\frac{dr}{d\theta}=0+\frac{sin\theta}{1-cos\theta}$

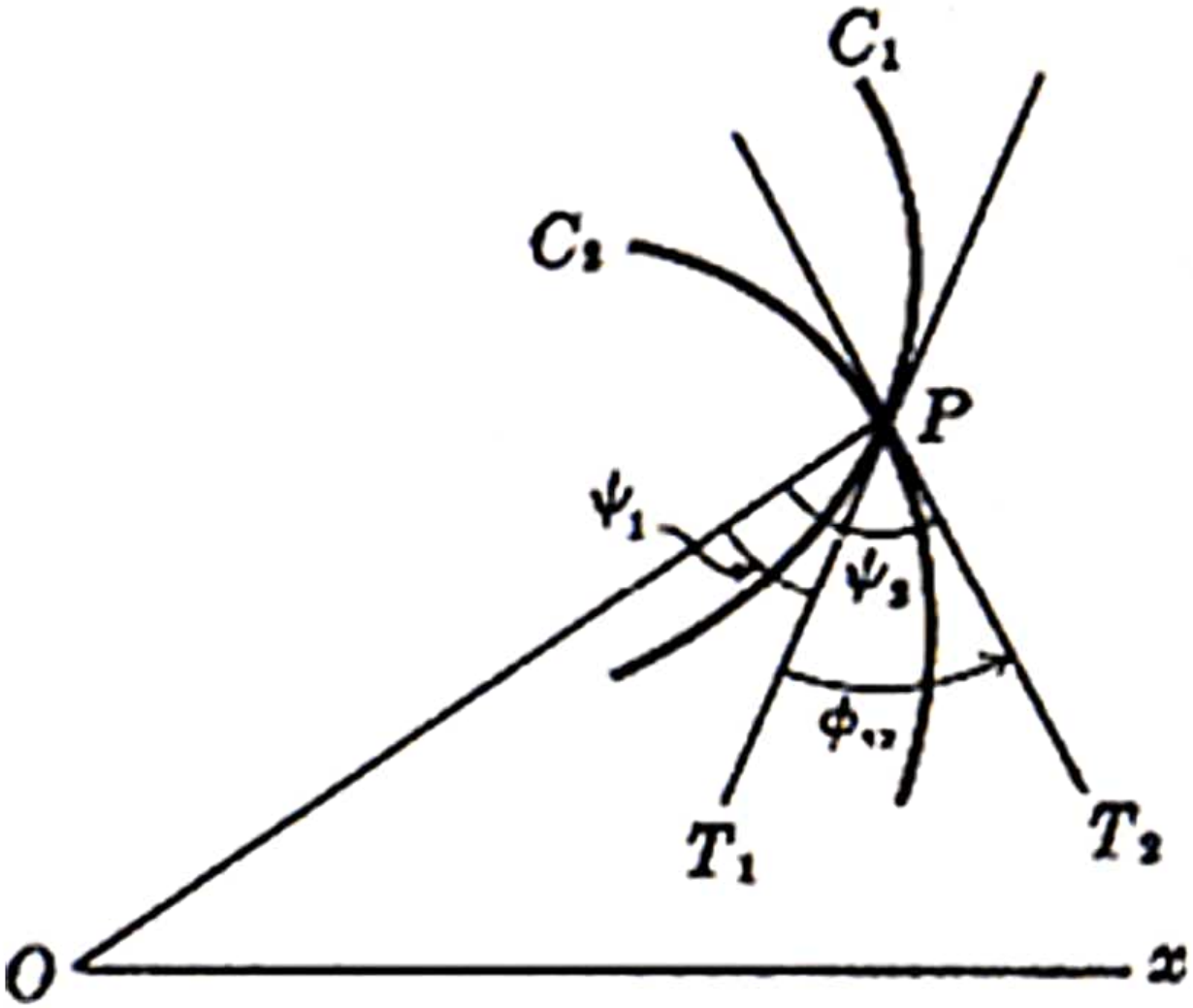
$\frac{1}{r}\frac{dr}{d\theta}=\frac{2sin\frac{\theta}{2}cos\frac{\theta}{2}}{2sin^2\frac{\theta}{2}}=cot\frac{\theta}{2}$ ..(1),

but $cot\emptyset=\frac{1}{r}\frac{dr}{d\theta}$ ....(2)

From (1)&(2)

$\emptyset=\frac{\pi}{2}$.

3. Angle of intersection of two polar curves is equal to the angle between the tangents drawn at the point of intersection of the two curves then What is the condition for the two curves intersecting orthogonally for the below mentioned figure?



a) tan φ1 . tanφ3=1

b) tanφ1 . tanφ3=-1

c) $\tan(\varphi 1+\varphi 3)=\frac{1}{\sqrt{2}}$

d) $\tan(\varphi 1-\varphi 3)=\frac{1}{\sqrt{2}}$

4. Angle of intersection between two polar curves given by r=a(1+sinθ) & r=a(1-sinθ) is given by

_____

a) $\frac{\pi}{4}$

b) $\frac{\pi}{2}$

c) Π

d) 0

View Answer

5. One among the following is the correct explanation of pedal equation of an polar curve, r=f (θ), p=r sin(∅) (where p is the length of the perpendicular from the pole to the tangent & ∅ is the angle made by tangent to the curve with vector drawn to curve from pole)is _____

a) It is expressed in terms of p & θ only

b) It is expressed in terms of p & ∅ only

c) It is expressed in terms of r & θ only

d) It is expressed in terms of p& r only

View Answer

6. The pedal Equation of the polar curve $r^n=a^n$ cosnθ is given by _____

a) $r^n=pa^n$

b) $r^{n-1}=pa^n$

c) $r^{n+1}=pa^{n+1}$

d) $r^{n+1}=pa^n$

View Answer

7. The length of the perpendicular from the pole to the tangent at the point $\theta=\frac{\pi}{2}$ on the curve. r=a $\sec^2(\frac{\pi}{2})$ is _____

a) $p = \frac{2a}{\sqrt{3}}$

b) $p = \frac{4a}{\sqrt{3}}$

c) $p = 2a\sqrt{2}$

d) p = 4a

View Answer

8. Polar equations of the circle for the given coordinate (x,y) which satisfies the equation given by $(x-a)^2+(y-b)^2=r^2$ where (a,b) is the coordinates of the centre of the circle &r is the radius.

a) $x = r\cos\theta, y = r\sin\theta$

b) $x = a+ r\cos\theta, y = b + r\sin\theta$

c) $y = a+r\cos\theta, x = b + r\sin\theta$

d) $x = r\sin\theta, y = r\cos\theta$

View Answer

9. In an polar curve r=f (θ) what is the relation between θ & the coordinates (x,y)?

a) $\tan\theta = \frac{x}{y}$

b) $(1+\sin\theta) = \frac{y}{x}$

c) $(1+\sec^2\theta) = \frac{y^2}{x^2}$

d) $(1+\cos\theta) = \frac{x}{y}$