St. Michael Polytechnic College

College Code : 769

St. Santhiyagappar Nagar

Kalayarkoil-630 551.

DEPT: **BASIC ENGGYEAR/SEMESTER**: **I /I**

SUB.NAME: **ENGG MATHEMATICS-II**

Each question carries 1(one) mark in PART-A and 6(SIX) marks in PART-B

UNIT –I -CIRCLES

PART -A

1. Write down the equation of the circle whose **centre is (0,-2) and radius 5.**
2. Find the centre and radius of the circle $\mathbf{(x+1)^2+y^2=4.}$
3. What is the equation of the circle described on the line joining the points **(2,3) and (-4,5) as diameter.**
4. Find the **centre** and **radius** of the circle $\mathbf{x^2+y^2+4x-2y+3=0}$.
5. What is the equation of the circle whose **centre is at the origin** and radius is 10 units.
6. Show that the points **(5,-12)** lies outside the circle $\mathbf{x^2+y^2-2x+2y-60=0}$.
7. Find the length of the tangent from **(-3,3)** to the circle $\mathbf{x^2+y^2-2x+y+9=0.}$
8. Find the equation of the tangent at**(4,1)** onthe circle $\mathbf{x^2+y^2-2x+6y-15=0.}$
9. Find the **distance** between the points **(1,2) and (-2,3).**
10. Define: **concyclic**.

PART –B

1. Find the equation of the circle passing through **the points (1,2)** and having **it's centre at(2,3).**
2. Find the equation of the circle two of whose diameters are **x+y=6 and x+2y=4** and whose **radius is 10 units.**
3. (i)Prove that **3x-y-7=0 is a diameter** of the circle $\mathbf{x^2+y^2-4x+2y-10=0.}$ (ii)prove that the point **(7,-5)** lies on the circle $\mathbf{x^2+y^2-6x+4y-12=0}$.find also the other **end ofthe diameter.**
4. Prove that the **points (1,2), (-2,-4), (-1,3) and (2,0) are concyclic.**
5. Find the equation of the circle passing through the **points (1,2) and (4,3)** and has it's **centre onthe line 4x-5y-5=0.**
6. Show that **(8,9)** lies on the circle $\mathbf{x^2+y^2-10x-12y+43=0}$. Find the equation of the tangent at this point.
7. Show that **(4,1)** lies on the circle $\mathbf{x^2+y^2-2x+6y-15=0.}$ Find the equation of the tangent at the point diametrically opposite to **(4,1).**

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UNIT-II-FAMILY OF CIRCLES

PART-A

1. Show that the circles $x^2+y^2-10x+4y-13=0$ and $x^2+y^2-10x+4y-19=0$ are **concentric.**
2. Write the condition for orthogonal ?.
3. Prove that the circles $x^2+y^2-8x+6y-23=0$ and $x^2+y^2-2x-5y+16=0$ **cut orthogonally**.
4. Evaluate: $\lim_{x\to 0} \frac{sin5x}{4x}$.
5. Evaluate: $\lim_{x\to 1} \frac{x^2-3x+2}{x^2-5x+4}$
6. Evaluate: $\lim_{x\to \infty} \frac{3x^2-5x+1}{5x^2+2x-4}$
7. Evaluate: $\lim_{x\to 2} \frac{x^4-2^4}{x-2}$
8. Find $\frac{dy}{dx}$ **if y=**$\frac{2}{x^3}$**+ sinx.**
9. Find $\frac{dy}{dx}$ **if y=**$\frac{a}{x^2}+\frac{b}{x^3}+\frac{c}{x}$
10. Find $\frac{dy}{dx}$ **if y=**$xe^x logx$.
11. Find $\frac{dy}{dx}$ **if y=**$\frac{sinx}{e^x}$.
12. Find $\frac{dy}{dx}$ **if y=**$\frac{x^2 tanx}{e^x}$

PART-B

1. Show that the circles $x^2+y^2-4x-6y+9=0$ and $x^2+y^2+2x+2y-7=0$ **touch each other**. Find the co- ordinates of the point of contact of the two circles. Find also **The equation of common tangent.**

2. Find the equation of the circle which passes through the point (1,-2) and cuts orthogonally with the circles $x^2+y^2-5x-3y+6=0$ and $x^2+y^2+7x-y-3=0$.
3. Evaluate: (i) $\lim_{x\to a} \frac{x^{5/8}-a^{5/8}}{x^{1/3}-a^{1/3}}$ (ii)$\lim_{x\to 0} \frac{1-cosx}{x^2}$
4. Evaluate :(i)$\lim_{x\to 3} \frac{x^5-243}{x^3-8}$ (ii) $\lim_{x\to 0} \frac{sin7x}{sin5x}$
5. (i) Find $\frac{dy}{dx}$ **if y=**$\frac{1}{x^2}+\frac{1}{3x}+\frac{1}{sinx}+\frac{1}{2}$ (ii) Find $\frac{dy}{dx}$ **if y=**$\frac{1+sinx}{1-sinx}$
6. (i) Find $\frac{dy}{dx}$ **if y=**$\frac{x^2 tanx}{x-sinx}$ (ii) Find $\frac{dy}{dx}$ **if y=**$3x^4 e^{-3x} cosecx$

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UNIT-III-DIFFERENTIATION METHODS

PART-A

1. Find $\frac{dy}{dx}$ **,if y=sin(logx)**
2. Find $\frac{dy}{dx}$ **,if y=sin(**e^x**)**
3. Find $\frac{dy}{dx}$ **,if y=cos^{6}x**
4. Find $\frac{dy}{dx}$ **,if y ^{2}= xsiny**
5. Find $\frac{dy}{dx}$ **,if y = a+x**e^y
6. Find $\frac{dy}{dx}$ **,if x^{2}siny=c**
7. Find $\frac{dy}{dx}$ **,if x^3+y^3=3xy**
8. Find $\frac{dy}{dx}$ **,if y=tan^{-1}**$\sqrt{x}$
9. Find $\frac{dy}{dx}$ **,if y=sin^{-1}(x/a)**
10. Find $\frac{dy}{dx}$ **,where x=at^2 ,y=2at**
11. Find $\frac{dy}{dx}$ **,where x=acos∅ ,y=bsin∅**
12. Find $\frac{d^2y}{dx^2}$ **,if y =sin3x**
13. Find $\frac{d^2y}{dx^2}$ **,if y =secx**
14. Find $\frac{d^2y}{dx^2}$ **,if y =3**e^{-3x}
15. Find $\frac{d^2y}{dx^2}$ **,if y =tanx**

PART-B

1. (a)Find $\frac{dy}{dx}$ **,if y=sin(**$e^x logx$**)** (b) Find $\frac{dy}{dx}$ **,if y=sin2x**
2. (a)Find $\frac{dy}{dx}$ **,if y=(3x3+4x+5)^5**(b) Find $\frac{dy}{dx}$ **,if y=log**$\left(\frac{1-sinx}{1+sinx}\right)$
3. Find $\frac{dy}{dx}$ **,if ax^2+2hxy+by^2=0** (b) Find $\frac{dy}{dx}$,if xy= c^2
4. Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ (b)Find $\frac{dy}{dx}$ **,if y=** $\tan^{-1}\left(\frac{x}{a}\right)$
5. Find $\frac{dy}{dx}$,where **x=acos^{3}t, y=asin^{3}t**

   (b)Find $\frac{dy}{dx}$ **,where x=sec∅ ,y=log(sec∅ +** $tan\emptyset$)
6. If **x=a(∅ −** $sin\emptyset$**),** $y = a(1 - cos\emptyset)$, show that $\frac{dy}{dx} = cot\frac{\emptyset}{2}$
7. If y= x^{2}sinx , prove that x^2y_2-4xy_1+(x^2+2)y=0
8. If y= e^{x}sinx , prove that y_2-2y_1+2y=0

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