Internal Assessment-2021
Exam date - 4/3/21
Subject - Mathematics(MTM)
Sem - I / Paper - GE1
Full Marks - 10
Time - 30 min

Answer all the questions carefully (Write the correct options only in your answer scripts completely):

1) The order of the differential equation

$$x^3 \frac{d^2y}{dx^2} + \cos x \cdot \frac{dy}{dx} + \sin x \cdot y = 0 \text{ is}$$

ⓐ 1, ⓑ 2, ⓒ 3, ⓓ 0.

2) The differential equation $y\,dx - 2x\,dy = 0$ represents a family of,

ⓐ straight lines, ⓑ parabolas, ⓒ circles, ⓓ Catenaries.

3) If the bisectors of the angle between the lines of $x^2 - 2pxy - y^2 = 0$ are $x^2 - 2qxy - y^2 = 0$, then

ⓐ $pq = 1$, ⓑ $pq = 2$, ⓒ $p = -q$, ⓓ $pq = -1$.

4) The angle between the lines represented by $x^2 + 2xy \sec\theta + y^2 = 0$ is

ⓐ θ, ⓑ 2θ, ⓒ 4θ, ⓓ $\theta/2$.

5) The polar equation $\frac{l}{r} = 1 - e\cos\theta$ represents a parabola when

ⓐ $e = 1$, ⓑ $e < 1$, ⓒ $e > 1$, ⓓ $e = 0$.

6) The locus of the point z such that $\arg\left(\frac{z-1}{z+1}\right) = \pi/4$ is a/an

ⓐ Circle, ⓑ ellipse, ⓒ pair of straight lines, ⓓ parabola.

7) For any complex number z, $z \cdot \bar{z} = 0$ if and only if

ⓐ $Re(z) = 0$, ⓑ $Im(z) = 0$, ⓒ $z + \bar{z} = 0$, ⓓ $z = 0$.

8) which of the following is correct?

(a) $2+i > 2-i$,

(b) $7-2i < 2+7i$

(c) $-2-i < 1+i$,

(d) none of these.

9) If $(1+x)^n = a_0 + a_1 x + a_2 x^2 + \cdots\cdots$, then the value of $a_1 - a_3 + a_5 - \cdots\cdots$ is equal to

(a) $2^{n/2} \cos\left(\frac{n\pi}{4}\right)$,

(b) $2^{n/2} \sin\left(\frac{n\pi}{4}\right)$,

(c) $-2^{n/2} \cos\left(\frac{n\pi}{4}\right)$,

(d) $-2^{n/2} \sin\left(\frac{n\pi}{4}\right)$.

10) If α and β are the roots of the equation $x^2 + 1 = 0$, then $\alpha^{2021} + \beta^{2021}$ is equal to,

(a) 0,

(b) -2,

(c) -1,

(d) 2.