CAREER POINT

JEE Main Online Exam 2019

[Memory Based Paper]

Questions & Answer

11th January 2019 | Shift - I

MATHEMATICS

Q.1 The area between the curve $x^2 = 4y$ and line $x + 2 = 4y$ is

(1) 9/8 (2) 9/4 (3) 9/2 (4) 5/4

Ans. **[1]**

Q.2 $\int \frac{\sqrt{1-x^2}}{x^4} dx = A(x) (\sqrt{1-x^2})^m + c$ then $(A(x))^m$ is

(1) $-\frac{1}{27x^9}$ (2) $\frac{1}{27x^9}$ (3) $\frac{1}{9x^6}$ (4) $-\frac{1}{9x^6}$

Ans. **[1]**

Q.3 If ${}^{20}C_r \cdot {}^{20}C_0 + {}^{20}C_{r-1} \cdot {}^{20}C_1 + ... + {}^{20}C_0 \cdot {}^{20}C_r$ then value of r for which expressions have maximum value

(1) 10 (2) 15 (3) 20 (4) None

Ans. **[3]**

Q.4 If $a_1, a_2, ... , a_{10}$ are in G.P. & $\frac{a_3}{a_1} = 25$ then $\frac{a_9}{a_5}$ is

(1) 5^2 (2) 5^4 (3) 5^3 (4) 5^5

Ans. **[2]**

Q.5 If $xy = 2$ and $x^2 = 4y$. Then the common tangent is

(1) $2x + y + 4 = 0$ (2) $x + 2y - 4 = 0$

(3) $2x + y - 4 = 0$ (4) $x - 2y + 4 = 0$

Ans. **[1]**

Q.6 $x^2 + y^2 + 6x - 8y - 103 = 0$; A square inscribed in circle and sides of square are parallel to coordinate axes, then minimum distance of any vertex from origin is

(1) $\sqrt{37}$ (2) $\sqrt{41}$ (3) 5 (4) 4

Ans. **[3]**

Q.7 There are two circles of same radius they intersect at (0, 1) & (0, –1). Tangent at one point on circle passes through centre of other circle. Then distance between their centres is-

(1) 1 (2) 2 (3) 3 (4) 4

Ans. **[2]**

Q.8 If $\left(-2-\frac{i}{3}\right)^3 = \left(\frac{x+iy}{27}\right)$ then $y - x$ is

(1) 85 (2) 6 (3) 91 (4) –6

Ans. **[3]**

Q.9 Straight line $x + 2y = 1$ cuts coordinates axes at points A and B. A circle passes through points A, B and origin. Then sum of length of perpendicular drawn from A and B on tangent at origin of given circle is

(1) $\frac{\sqrt{5}}{4}$ (2) $\frac{\sqrt{5}}{3}$ (3) $\frac{\sqrt{5}}{2}$ (4) None of these

Ans. **[3]**

Q.10 If $(p \wedge q \leftrightarrow r)$ is true and q is false, then mark tautology

(1) $p \wedge r$ (2) $(p \wedge r) \rightarrow (p \vee r)$ (3) $(q \vee r) \rightarrow (p \wedge r)$ (4) $p \vee r$

Ans. **[2]**

Q.11 If $x \log_e(\log_e x) - x^2 + y^2 = 4$ then $\frac{dy}{dx}$ at $x = e$ is

(1) $\frac{1-2e}{2\sqrt{4+e^2}}$ (2) $\frac{2e-1}{\sqrt{e^2+4}}$ (3) $\frac{e-1}{2\sqrt{e^2+4}}$ (4) $\frac{2e-1}{2\sqrt{e^2+4}}$

Ans. **[4]**

Q.12 If $f : R \rightarrow R$, $f(x) = \frac{x}{x^2+1}$ then range of f(x) is

(1) $R - \left[-\frac{1}{2}, \frac{1}{2}\right]$ (2) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (3) $[-1, 1] - \{0\}$ (4) $\left[-\frac{1}{2}, \frac{1}{2}\right] - \{0\}$

Ans. **[2]**

Q.13 If $A = \begin{bmatrix} 0 & 2q & r \\ p & q & -r \\ p & -q & r \end{bmatrix}$ and $AA^T = I_3$ then $|p|$ is

(1) $\frac{1}{\sqrt{2}}$ (2) $\frac{1}{\sqrt{3}}$ (3) $\frac{1}{2}$ (4) None

Ans. **[1]**

Q.14 If $f_k(x) = \left[\frac{\sin^k x + \cos^k x}{k}\right]$ then value of $f_4(x) - f_6(x)$ is

(1) 1 (2) $\frac{1}{2}$ (3) $-\frac{1}{12}$ (4) $\frac{1}{12}$

Ans. **[4]**

Q.15 If one root of quadratic equation $81x^2 + \lambda x + 256 = 0$ is cube of other then λ is

(1) –300 (2) –100 (3) 200 (4) 350

Ans. **[1]**

Q.16 $\int_{-2}^{2} \frac{\sin^2 x}{\frac{1}{2} + \left[\frac{x}{\pi}\right]} dx$ is equal to where [·] is G.I.F.

(1) 0 (2) sin 4 (3) 4 – sin 4 (4) 2

Ans. **[1]**

Q.17 A = {1, 2, 3, ..., 11}, two numbers are selected and sum is even. Then the conditional probability that both numbers are even is

(1) $\frac{1}{5}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{4}{5}$

Ans. **[2]**

Q.18 Tangent drawn on ellipse $2x^2 + y^2 = 1$ at any point (not in vertex) cut axis of coordinate at point A & B. Then locus of midpoint of AB is

(1) $\frac{1}{4x^2} + \frac{1}{2y^2} = 1$ (2) $\frac{1}{2x^2} + \frac{1}{4y^2} = 1$ (3) $\frac{1}{2x^2} - \frac{1}{4y^2} = 1$ (4) None

Ans. **[1]**

Q.19 $x^2 - c^2 = y$

x = sum of two sides

y = product of two sides

c = third side

Then circumradius is

(1) $\frac{c}{\sqrt{3}}$ (2) $\frac{c}{3}$ (3) $\frac{y}{3}$ (4) $\frac{\sqrt{y}}{3}$

Ans. **[1]**

Q.20 y(x) is the solution of $\frac{dy}{dx} + \left(\frac{2x+1}{x}\right)y = e^{-2x}$ given that $y(1) = \frac{1}{2}e^{-2}$ then y(x) is

(1) decreasing in $x \in (0, 1)$ (2) decreasing in $\left(\frac{1}{2}, 1\right)$

(3) $y(\ln 2) = \frac{1}{4}\ln 2$ (4) $y\left(\frac{\ln 2}{2}\right) = \frac{1}{8}\ln 2$

Ans. **[2]**

Q.21 $f(x) = \begin{cases} -1 & -2 \le x < 0 \\ x^2 - 1 & 0 \le x \le 2 \end{cases}$, $g(x) = |f(x)| + f(|x|)$ then g(x) is

(1) not differentiable at one point (2) not differentiable at two points

(3) not differentiable at three points (4) discontinuous in [–2, 2]

Ans. **[1]**

Q.22 Out of 30 observations, 10 observations is $\left(\frac{1}{2} - d\right)$, 10 observations is 1/2 and remaining 10 observations is $\left(\frac{1}{2} + d\right)$. If variance of 30 observations is $\frac{4}{3}$. Then |d| is

(1) 1 (2) $\sqrt{3}$ (3) 2 (4) $\sqrt{2}$

Ans. **[4]**

Q.23 If $\left(\frac{x^3}{3} + \frac{3}{x}\right)^8$ the middle term is 5670. Then sum of all possible values of x is

(1) 1 (2) 4 (3) 0 (4) 9

Ans. **[3]**

Q.24 Sum of infinite terms of a G.P. is 3 and sum of their cubes is $\frac{27}{19}$ then r is

(1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) $-\frac{1}{3}$ (4) $\frac{1}{4}$

Ans. **[2]**

Q.25 If $\vec{a} = \hat{i} + \hat{j} + 4\hat{k}$

$\vec{b} = 2\hat{i} + \lambda\hat{j} + 4\hat{k}$

and $\vec{c} = \hat{i} + \hat{j} + (\lambda^2 - 1)\hat{k}$ are coplanar then $\vec{a} \times \vec{c}$ is

(1) $-\hat{i} + \hat{j}$ (2) $\hat{i} - \hat{j}$ (3) $\hat{i} + \hat{j}$ (4) None

Ans. **[1]**

Q.26 $\lim_{x\to 0}\frac{\tan(\pi\sin^2 x)+(|x|-\sin(x[x]))^2}{x^2}$ where [·] G.I.F.

(1) $\pi+1$ (2) π (3) -1 (4) Does not exist

Ans. **[4]**

Q.27 The direction ratio of normal of a plane passing through two points (0, –1, 0) & (0, 0, 1) and makes an angle $\pi/4$ with the plane y –z = 5 are-

(1) $(2,-\sqrt{2},\sqrt{2}))$ (2) $(\sqrt{2},2,1)$ (3) $(\sqrt{2},1,1)$ (4) $(\sqrt{2},-1,1)$

Ans. **[2]**

Q.28 The system of linear equations x+ 2y + 4z = a, 3x – y + 5z = b, 2x – 3y + z = c have more than two solutions then which of the following is true ?

(1) b – a = c (2) c – a = b (3) a = b + c (4) a + b + c = 0

Ans. **[1]**

Q.29 If x satisfies the condition $f(x)=\{x:x^2+30\le 11x\}$ then maximum value of function $f(x)=3x^3-18x^2+27x-40$ is equal to -

(1) 122 (2) –122 (3) 333 (4) 222

Ans. **[1]**