CAREER POINT

JEE Main Online Exam 2019

Questions & Solutions

9th April 2019 | Shift - I

(Memory Based)

MATHEMATICS

Q.1 $\int_0^{\pi/2} \frac{\sin^3 x}{\sin x + \cos x} dx$

(1) $\left(\frac{\pi-1}{2}\right)$ (2) $\left(\frac{\pi-1}{4}\right)$ (3) $\left(\frac{\pi-1}{8}\right)$ (4) $\left(\frac{\pi-1}{16}\right)$

Ans. **[2]**

Q.2 $\int \sec^{2/3} x \operatorname{cosec}^{4/3} x \, dx$

(1) 3 $(\tan x)^{-1/3}$ + C (2) – 3 $(\tan x)^{-1/3}$ + C

(3) 2 $(\tan x)^{-1/3}$ + C (4) –3 $(\cot x)^{-1/3}$ + C

Ans. **[2]**

Q.3 Let $f(x) = \begin{cases} \frac{\sqrt{2}\cos x - 1}{\cot x - 1} & ; \quad x \neq \frac{\pi}{4} \\ k & ; \quad x = \frac{\pi}{4} \end{cases}$, if f(x) is continuous then k is

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

Ans. **[1]**

Q.4 The area bounded by the inequality ; $x^2 \leq y \leq x + 2$ is

(1) $\frac{7}{2}$ (2) $\frac{9}{2}$ (3) $\frac{11}{2}$ (4) $\frac{5}{2}$

Ans. **[2]**

Q.5 A committee of 11 members is to be formed from 8 males and 5 females. Let m denotes the number of ways of selecting committee having atleast 6 males and n denotes the number of ways of selecting atleast 3 females then

(1) m = n – 8 (2) m = n = 68 (3) m = n = 78 (4) m = n = 65

Ans. **[3]**

Q.6 4 shooters hit the target. Their probability of hitting the target independently is $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{8}$. Probability of hitting the target by atleast one of them is -

(1) $\frac{25}{32}$ (2) $\frac{24}{32}$ (3) $\frac{23}{32}$ (4) $\frac{21}{32}$

Ans. **[1]**

Q.7 If $\left\{S=\frac{\alpha+i}{\alpha-i},\ \alpha\in R\right\}$, than locus of S is

(1) straight line with slope 'i' (2) straight line with slope '–i'

(3) Circle with radius $\sqrt{2}$ (4) Circle with radius 1

Ans. **[4]**

Q.8 $2\cos^2\theta + 3\sin\theta = 0$, $\theta\in[-2\pi, 2\pi]$ then the sum of all solutions is

(1) 2π (2) 4π (3) -2π (4) π

Ans. **[1]**

Q.9 $(2-\sqrt{3})$ is one root of equation $x^2 + px + q = 0$, then

(1) $p^2 - 4q + 16 = 0$ (2) $p^2 + 4q + 12 = 0$

(3) $p^2 - 4q - 12 = 0$ (4) $p^2 - 4q - 16 = 0$

Ans. **[3]**

Q.10 $\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}\begin{bmatrix}1 & 2\\ 0 & 1\end{bmatrix}\begin{bmatrix}1 & 3\\ 0 & 1\end{bmatrix}$--------$\begin{bmatrix}1 & n-1\\ 0 & 1\end{bmatrix}=\begin{bmatrix}1 & 78\\ 0 & 1\end{bmatrix}$ then inverse of $\begin{bmatrix}1 & n\\ 0 & 1\end{bmatrix}$ is

(1) $\begin{bmatrix}1 & 12\\ 0 & 1\end{bmatrix}$ (2) $\begin{bmatrix}1 & -12\\ 0 & 1\end{bmatrix}$ (3) $\begin{bmatrix}1 & 13\\ 0 & 1\end{bmatrix}$ (4) $\begin{bmatrix}1 & -13\\ 0 & 1\end{bmatrix}$

Ans. **[4]**

Q.11 Standard deviation of four observations –1, 0, 1, k is $\sqrt{5}$ then k is

(1) $2\sqrt{5}$ (2) $2\sqrt{3}$ (3) $2\sqrt{6}$ (4) $2\sqrt{7}$

Ans. **[3]**

Q.12 If the roots of equation $x^2 + x + 1 = 0$ are α and β then $\begin{vmatrix}y+\alpha & 1 & \beta\\ 1 & y+\beta & \alpha\\ \beta & \alpha & y+1\end{vmatrix}$ is

(1) y^3 (2) $y(y^2-1)$ (3) y^3-1 (4) $(y^3 + 1)$

Ans. **[1]**

Q.13 Parabola $y^2 = 16x$ and one end point of its focal chord is (1, 4) then find length of focal chord

(1) 26 (2) 25 (3) 27 (4) 28

Ans. **[2]**

Q.14 Let f(x) be a non zero polynomial of degree 4. Points of extremum of f(x) are –1, 1, 0. If f(k) = f(0) then number of values of k satisfying this equation are

(1) 2 rational, 2 irrational (2) 2 rational, 1 irrational

(3) 1 rational, 2 irrational (4) 2 rational, 2 rational

Ans. **[1]**

Q.15 If f(x) = 15 – |10 – x| then f(f(x)) is non differentiable at

(1) 5, 10, 15, 20 (2) 10 (3) 10, 20 (4) 5, 10, 15

Ans. **[4]**

Q.16 A tangent is drawn to circle $x^2 + y^2 = 1$, and intersects the coordinate axes at P and Q. The locus of middle point of PQ is

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

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

Ans. **[1]**

Q.17 If $\sum_{k=1}^{10} f(a+k) = 16\,(2^{10} - 1)$ and $f(x + y) = f(x).\, f(y)$ for all $x, y \in N$ and $f(1) = 2$ then a is

(1) 2 (2) 3 (3) 16 (4) 8

Ans. **[2]**

Q.18 Let y(x) satisfies the differential equation $x\frac{dy}{dx} + 2y = x^2$ and y(1) = 1 then y(x) is

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

Ans. **[1]**

Q.19 If line $y = mx + 7\sqrt{3}$ is a normal to the hyperbola $\frac{x^2}{24} - \frac{y^2}{18} = 1$ then m is

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

Ans. **[2]**

Q.20 If 4^{th} term in the expansion of $\left(\frac{2}{x} + x^{\log_8 x}\right)^6$ is 20×8^7, then x is equal to

(1) 8^4 (2) 8^2 (3) 8^3 (4) 8

Ans. **[3]**

Q.21 $\cos^2 10° + \cos^2 50° - \cos 10° \cos 50°$ is equal to

(1) $\frac{3}{4}$ (2) $\frac{3}{2}$ (3) $\frac{3}{2}(\cos 20^\circ + 1)$ (4) $\frac{3}{4}(\cos 20^\circ + 1)$

Ans. **[1]**

Q.22 Let the function f(x) defined on $f : R - \{-1, 1\} \to A$ and $f(x) = \frac{x^2}{1-x^2}$ 2f f(x) is subjective then A is

(1) R – [–1, 1) (2) R – [–1, 0) (3) R – [–1, 2) (4) R – [0, 1)

Ans. **[2]**

Q.23 The negation of $p \vee (\sim p \wedge q)$ is

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

Ans. **[1]**

Q.24 Let a_1, a_2 -------- a_{50} are non constant terms of an A.P. and sum of n terms is given by $S_n = 50n + n(n-7)\frac{A}{2}$ then ordered pair (d_1, a_{50}) is (where d is the common difference)

(1) (A, 45A) (2) (A, 50 + 46A) (3) (2A, 6A) (4) (2A, 50A + 49A)

Ans. **[2]**

Q.25 If a line passing through P(2,3) intersects the line x + y = 7 at a distance of four units from P then slope of line is

(1) $\frac{\sqrt{7}-1}{\sqrt{7}+1}$ (2) $\frac{1-\sqrt{5}}{1+\sqrt{5}}$ (3) $\frac{1-\sqrt{7}}{1+\sqrt{7}}$ (4) $\frac{\sqrt{5}-1}{\sqrt{5}+1}$

Ans. **[3]**

Q.26 Let $\vec{\alpha} = 3\hat{i} + \hat{j}$, $\vec{\beta} = 2\hat{i} - \hat{j} + 3\hat{k}$ and $\vec{\beta} = \vec{\beta}_1 - \vec{\beta}_2$ such that $\vec{\beta}_1$ is parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ is perpendicular to $\vec{\alpha}$. Find $\vec{\beta}_1 \times \vec{\beta}_2$

(1) $\frac{1}{2}(-3\hat{i} + 9\hat{j} + 10\hat{k})$ (2) $-\frac{3}{2}(\hat{i} + 2\hat{j} + 10\hat{k})$

(3) $-\frac{1}{2}(3\hat{i} + 9\hat{j} + 10\hat{k})$ (4) $\frac{1}{2}(-3\hat{i} - 9\hat{j} - 10\hat{k})$

Ans. **[1]**

Q.27 A curve $f(x) = x^3 + ax - b$ passing through (1, –5) and tangent to f(x) at point P is perpendicular to line x – y + 5 = 0 then which of the following point lie on the curve

(1) (–2, 2) (2) (2, –1) (3) (2, –2) (4) (–1, 2)

Ans. **[1]**

Q.28 A plane passes through the points (0, –1, 0) & (0, 0, 1) and makes an angle of $\frac{\pi}{4}$ with the plane y – z = 0 then the point which satisfies the desired plane is

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

Ans. **[2]**

Q.29 Consider a line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-2}{4}$ and a plane x + 2y + 3z = 15 then find the distance of origin from point of intersection of line and plane

(1) $\frac{5}{2}$ (2) 4 (3) $\frac{1}{2}$ (4) $\frac{9}{2}$

Ans. **[4]**