CAREER POINT

JEE Main Online Exam 2019

Questions & Solutions

10th April 2019 | Shift - I

(Memory Based)

MATHEMATICS

Q.1 $\int_0^{2\pi} [\sin x(1+\cos 3x)]dx$ (where [.] G.I.F.)

(1) π (2) $-\pi$ (3) 2π (4) -2π

Ans. **[2]**

Q.2 If $\lim\limits_{x\to 1}\frac{x^4-1}{x-1} = \lim\limits_{x\to k}\left(\frac{x^3-k^3}{x^2-k^2}\right)$ then k is -

(1) $\frac{2}{3}$ (2) $\frac{8}{3}$ (3) $\frac{9}{3}$ (4) $\frac{10}{3}$

Ans. **[2]**

Q.3 If $f(x) = \begin{cases} \frac{\sin(p+1)x+\sin x}{x} & , \quad x<0 \\ q & , \quad x=0 \\ \frac{\sqrt{x^2+x}-\sqrt{x}}{x^{3/2}} & , \quad x>0 \end{cases}$ is continuous at x = 0 then (p, q) will be -

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

Ans. **[3]**

Q.4 If α and β are roots of equation $x^2 - 2x\sin\theta - 3\sin\theta = 0$ then $\left(\frac{\alpha^{12}+\beta^{12}}{\alpha^{-12}+\beta^{-12}}\right)\left(\frac{1}{\alpha-\beta}\right)^{24}$ is -

(1) $\frac{3^{12}}{(4\sin\theta+12)^2}$ (2) $\frac{2^{12}}{(4\sin\theta+12)^2}$ (3) $\frac{3^{12}}{(4\sin\theta-12)^2}$ (4) $\frac{3^{13}}{(4\sin\theta+12)^2}$

Ans. **[1]**

Q.5 The sum of 10 terms of the series $3 + \frac{5(1^3+2^3)}{1^2+2^2} + \frac{7(1^3+2^3+3^3)}{1^2+2^2+3^2} + ...$ is -

(1) 665 (2) 660 (3) 655 (4) 650

Ans. **[2]**

Q.6 Which statement is tautology -

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

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

Ans. **[1]**

Q.7 If $z = \frac{(1+i)^2}{a-i}$, $|z| = \sqrt{\frac{2}{3}}$ $(a > 0)$ then $\bar{z}$ is -

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

Ans. **[3]**

Q.8 If $C_1 : |y - x| \le 2$

$C_2 : |y + x| \le 2$

then region bounded by C_1 and C_2 is

(1) square of area $2\sqrt{2}$ (2) square of area 8

(3) rhombus of area 16 (4) rhombus of side 4

Ans. **[2]**

Q.9 $a_1, a_2 \ldots a_n$ are in A.P. and $a_1 + a_4 + a_7 + a_{10} + a_{13} + a_{16} = 114$ then $a_1 + a_6 + a_{11} + a_{16}$ will be equal to -

(1) 36 (2) 114 (3) 76 (4) 38

Ans. **[3]**

Q.10 If $f(x) = e^x - x$; $g(x) = x^2 - x$ then fog (x) is increasing for x belong to -

(1) $(1, \infty)$ (2) $\left(0, \frac{1}{2}\right) \cup (1, \infty)$ (3) $(2, \infty)$ (4) $(-\infty, 2) \cup (3, \infty)$

Ans. **[2]**

Q.11 If $\frac{dy}{dx} + y\sec^2 x = \sec^2 x \tan x$ and $y(0) = 0$ then $y\left(\frac{-\pi}{4}\right)$ is equal to -

(1) $-1 + e$ (2) $-1 - e$ (3) $2 + e$ (4) $-2 + e$

Ans. **[4]**

Q.12 If the coefficient of x^2 and x^3 in the expansion of $(1 + ax + bx^2)(1 - 3x)^{15}$ is zero then ordered pair of (a, b) is -

(1) (28, 315) (2) (28, 325) (3) (18, 315) (4) (18, 325)

Ans. **[1]**

Q.13 Tangent to the circle of radius r at (1, 1) is y = x and circle passes through (1, –3) then radius of circle is -

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

Ans. **[4]**

Q.14 Number of 6 digit numbers divisible by 11 made by using digits 0, 1, 2, 5, 7, 9 without repetition is equal to

(1) 60 (2) 55 (3) 120 (4) 62

Ans. **[1]**

Q.15 Let $\Delta_1 = \begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & \sin 2\theta & \cos 2\theta \\ -\sin 2\theta & x & 1 \\ \cos 2\theta & 1 & x \end{vmatrix}$, then which of the following is true

(1) $\Delta_1 - \Delta_2 = 2x^2$ (2) $\Delta_1 + \Delta_2 = -x^3$ (3) $\Delta_1 + \Delta_2 = -2x^3$ (4) $\Delta_1 - \Delta_2 = x^3$

Ans. **[3]**

Q.16 Value of $\lim\limits_{n\to\infty} \dfrac{(n+1)^{1/3} + (n+2)^{1/3} + ... + (2n)^{1/3}}{n^{4/3}}$ is equal to

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

Ans. **[3]**

Q.17 From point P(β, 0, β) a perpendicular is drawn on line $\frac{x}{1} = \frac{y-1}{0} = \frac{z+1}{-1}$. If length of perpendicular is $\sqrt{\frac{3}{2}}$ $(\beta \neq 0)$ then β is

(1) –2 (2) –1 (3) 1 (4) 2

Ans. **[2]**

Q.18 If common chord of circles $x^2 + y^2 + 5kx + 2y + k = 0$ and $x^2 + y^2 + kx + \frac{y}{2} + \frac{1}{2} = 0$ is $4x - 5y - k = 0$, then number of values of k is

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

Ans. **[2]**

Q.19 There are two family each having two children. If there are atleast two girls among the children then the probability that all children are girls is

(1) $\frac{1}{10}$ (2) $\frac{1}{11}$ (3) $\frac{1}{12}$ (4) $\frac{1}{9}$

Ans. **[2]**

Q.20 There are three points A, B and C on a horizontal plane, such that AB = AC = 100 m. A vertical tower is placed on the mid point of BC; such that angle of elevation of the top of the tower from A is $\cot^{-1}(3\sqrt{2})$ and that from B is $\text{cosec}^{-1}(2\sqrt{2})$, then the height of the tower is -

(1) $\frac{100}{\sqrt{3}}$ (2) 25 (3) 10 (4) 20

Ans. **[4]**

Q.21 If $\int \frac{dx}{(x^2-2x+10)^2} = A\left[\tan^{-1}\left(\frac{x-1}{3}\right)+\frac{f(x)}{x^2-2x+10}\right]$, then A and f(x) is

(1) $A = \frac{1}{54}$, $f(x) = 3(x-1)$ (2) $A = \frac{1}{81}$, $f(x) = 3(x-1)$

(3) $A = \frac{1}{27}$, $f(x) = 9(x-1)^2$ (4) $A = \frac{1}{54}$, $f(x) = 9(x-1)^2$

Ans. **[1]**

Q.22 If the equation of tangent to ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at $\left(3,-\frac{9}{2}\right)$ is $x-2y=12$, then the length of latus rectum is

(1) $2\sqrt{2}$ (2) 9 (3) $3\sqrt{2}$ (4) $2\sqrt{3}$

Ans. **[2]**

Q.23 The marks of 20 students in an examination are given in the following table

marks	2	3	5	7
no. of students	$(x+1)^2$	$2x-5$	x^2-3x	x

Then the average marks of these students is

(1) 2.6 (2) 2.8 (3) 2.7 (4) 2.9

Ans. **[2]**

Q.24 A hyperbola has centre at origin and passing through $(4, -2\sqrt{3})$ and having directrix $5x = 4\sqrt{5}$, then eccentricity of hyperbola satisfy the equation

(1) $4e^4 + 24e^2 - 35 = 0$ (2) $4e^4 + 24e^2 + 35 = 0$

(3) $4e^4 - 24e^2 + 35 = 0$ (4) $4e^4 - 24e^2 - 35 = 0$

Ans. **[3]**

Q.25 If $f(x) = x^2$, $x \in R$; $S \in [0, 4]$; $g(A) = \{x : x \in R, f(x) \in A\}$ where $A \subset R$. Which one is incorrect

(1) $f\{g(S)\} \neq f(S)$ (2) $f\{g(S)\} = S$ (3) $g\{f(S)\} = g(S)$ (4) $g\{f(S)\} \neq S$

Ans. **[3]**

Q.26 Let the equation $x + y + z = 5$, $x + 2y + 2z = 6$, $x + 3y + \lambda z = \mu$ have infinite solution, then the value of $\lambda + \mu$ is

(1) 7 (2) 10 (3) 11 (4) 12

Ans. **[2]**

Q.27 Given a point P(0, –1, –3) and the image of P in the plane $3x - y + 4z - 2 = 0$ is Q. Point R is (3, –1, –2), then the area of ΔPQR is -

(1) $\frac{\sqrt{91}}{13}$ (2) $\frac{\sqrt{91}}{5}$ (3) $\sqrt{\frac{91}{2}}$ (4) $\frac{\sqrt{91}}{2}$

Ans. **[4]**

Q.28 If $\frac{2^{\sqrt{\sin^2 x - 2\sin x + 5}}}{4^{\sin^2 y}} \leq 1$, then which is correct

(1) $2\sin x = \sin y$ (2) $\sin x = 2\sin y$ (3) $|\sin x| = \sin y$ (4) $\sin x = |\sin y|$

Ans. **[4]**

Q.29 A function f(x) is differentiable at $x = c (c \in R)$. Let $g(x) = |f(x)|$, $f(c) = 0$ then -

(1) g(x) is not differentiable at x = c (2) for g(x) to be diffrentiable at c, $f'(c) = 0$

(3) for g(x) to be non-differentiable at c, $f'(c) = 0$ (4) None

Ans. **[2]**

Q.30 A(3, 0, –1), B(2, 10, 6) and C(1, 2, 1) are the vertices of a triangle, m is the mid point of the line segment joining AC and G is a point on the line segment BM, dividing it in 2 : 1 ratio internally then $\cos(\angle GOA)$ is

(1) $\frac{1}{\sqrt{10}}$ (2) $\frac{2}{\sqrt{5}}$ (3) $\frac{1}{\sqrt{15}}$ (4) $\frac{1}{\sqrt{3}}$

Ans. **[3]**