



## JEE Main Online Exam 2019

### [Memory Based Paper]

### Questions & Answer

11<sup>th</sup> 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  ${}^{20}C_r \cdot {}^{20}C_0 + {}^{20}C_{r-1} \cdot {}^{20}C_1 + \dots + {}^{20}C_0 \cdot {}^{20}C_r$  then value of  $r$  for which expressions have maximum value

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

**Ans.** [3]

**Q.4** If  $a_1, a_2, \dots, a_{10}$  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  $xy = 4$  and  $x^2 = 4y$ . Then the common tangent is

- (1)  $y = (-16)^{1/3}x - (-16)^{2/3}$  (2)  $y = (16)^{1/3}x - (16)^{2/3}$   
(3)  $y = (-16)^{2/3}x - (-16)^{1/3}$  (4) None of these

**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  $f: \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = \frac{x}{x^2+1}$  then range of  $f(x)$  is  
 (1)  $\mathbb{R} - \left[-\frac{1}{2}, \frac{1}{2}\right]$  (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  $f(x) = \left[ \frac{\sin^k x + \cos^k x}{k} \right]$  then value of  $f(4) - f(6)$  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  $\lambda$  is

- (1) -300                                      (2) -100                                      (3) 200                                      (4) 350

**Ans.** [1]

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

- (1) 0                                      (2)  $\sin 4$                                       (3)  $4 - \sin 4$                                       (4) 2

**Ans.** [1]

**Q.17**  $A = \{1, 2, 3, \dots, 11\}$ , two numbers are selected and sum are 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**  $f(x) = \begin{cases} -1 & -2 \leq x < 0 \\ x^2 - 1 & 0 \leq x \leq 2 \end{cases}$ ,  $g(x) = |f(x)| + f(|x|)$  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  $d$  and remaining 10 observations is  $\left(\frac{1}{2} + d\right)$ . If variance of 30 observations is  $\frac{4}{3}$ . Then  $|d|$  is

- (1)  $\frac{1 + \sqrt{87}}{2\sqrt{3}}$  (2)  $\frac{1 + \sqrt{95}}{2\sqrt{2}}$  (3)  $\frac{1 + \sqrt{93}}{2\sqrt{3}}$  (4)  $\frac{1 + \sqrt{93}}{8}$

**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]