



## JEE Main Online Exam 2019

### Questions & Solutions

9th April 2019 | Shift - II

(Memory Based)

#### MATHEMATICS

**Q.1** Area bounded by inequality  $\frac{y^2}{2} \leq x \leq y + 4$  is

- (1) 18                                      (2) 30                                      (3)  $\frac{53}{3}$                                       (4) 50

**Ans.** [1]

**Q.2**  $\int_0^1 x \cot^{-1}(1-x^2+x^4) dx$

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

**Ans.** [2]

**Q.3**  $\cos x \frac{dy}{dx} - (\sin x)y = 6x$  and  $y\left(\frac{\pi}{3}\right) = 0$ , then  $y\left(\frac{\pi}{6}\right)$  is

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

**Ans.** [2]

**Q.4**  $y = [x] - \left[\frac{x}{4}\right]$

- (1)  $\lim_{x \rightarrow 4^+}$  exist but  $\lim_{x \rightarrow 4^-}$  does not exist  
(2)  $\lim_{x \rightarrow 4^+}$  does not exist but  $\lim_{x \rightarrow 4^-}$  exist  
(3)  $\lim_{x \rightarrow 4^+}$  and  $\lim_{x \rightarrow 4^-}$  both exist but both do not have some value  
(4) continuous at  $x = 4$

**Ans.** [4]



**Q.5** A rectangle is inscribed in a circle having diameter  $3y = x + 7$  and two adjacent vertices of rectangle are  $(-8, 5)$  and  $(6, 5)$  then area of rectangle is

- (1) 84 (2) 72 (3) 98 (4) 56

**Ans.** [1]

**Q.6** The area of smaller circle touching the parabola  $y^2 = 4x$  at  $(1, 2)$  and x-axis is

- (1)  $8\pi(3 - 2\sqrt{2})$  (2)  $4\pi(3 - \sqrt{2})$  (3)  $4\pi(3 - 2\sqrt{2})$  (4)  $4\pi(3 - \sqrt{3})$

**Ans.** [1]

**Q.7** Tangent for parabola  $y^2 = x$  at point  $(\alpha, \beta)$  becomes tangent for ellipse  $x^2 + 2y^2 = 1$ , then  $\alpha$  is ( $\beta > 0$ )

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

**Ans.** [1]

**Q.8** If the sum of roots of equation  $(m^2 + 1)x^2 - 3x + (m^2 + 1)^2 = 0$  is minimum, then  $(\alpha^3 - \beta^3)$  is

- (1)  $8\sqrt{5}$  (2)  $4\sqrt{5}$  (3)  $8\sqrt{3}$  (4)  $4\sqrt{3}$

**Ans.** [1]

**Q.9** If the statement  $(p \rightarrow q \vee r)$  is false then truth values of p, q, r is

- (1) T, F, F (2) F, T, T (3) F, T, F (4) T, T, T

**Ans.** [1]

**Q.10** Value of  $\sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ$  is

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

**Ans.** [2]

**Q.11** Unit vector  $\bar{a}$  making an angle  $\frac{\pi}{3}$  with  $\hat{i}$  and  $\frac{\pi}{4}$  with  $\hat{j}$  and  $\theta$  with  $\hat{k}$  (where  $\theta \in (0, \pi)$ ), then  $\theta$  is

- (1)  $\frac{2\pi}{3}$  (2)  $\frac{\pi}{4}$  (3)  $\frac{5\pi}{6}$  (4)  $\frac{\pi}{6}$

**Ans.** [1]

**Q.12** If there are 10 numbers 10, 22, 26, 29, 34, x, 42, 67, 70, y arranged in increasing order and their mean is 42 and median is 35, then  $\frac{y}{x}$  is

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

**Ans.** [2]

**Q.13** First three terms of an A.P having sum 33 and product 1155. Then 11<sup>th</sup> term is

- (1) -35 (2) -30 (3) -25 (4) -20

**Ans.** [3]



**Q.14**  $1 + 2.3 + 3.5 + 4.7 + \dots$  then find the sum of 11 terms  
 (1) 942 (2) 944 (3) 946 (4) 948

**Ans.** [3]

**Q.15** Two towers of height 5m and 10m are separated by distance  $d$  and line joining top of tower making angle  $15^\circ$  with the ground, then the distance between the both the tower is

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

**Ans.** [2]

**Q.16** If equation of common tangent of circle  $x^2 + y^2 = 4$  and  $x^2 + y^2 + 6x + 8y - 24 = 0$  exist then which point lie on this tangent

(1)  $(6, -4)$  (2)  $(8, 4)$  (3)  $(-4, 6)$  (4)  $(6, -2)$

**Ans.** [4]

**Q.17** The binomial coefficients of any three consecutive terms of the expansion  $(1 + x)^n$  are in the ratio  $2 : 15 : 70$  then the mean of these coefficients is

(1) 232 (2) 230 (3) 234 (4) 236

**Ans.** [1]

**Q.18** A plane passes through the line of intersection of two planes  $2x + 3y + z + 6 = 0$  and  $x + y + z - 5 = 0$  and perpendicular to  $xy$  plane, then the distance of point  $(0, 0, 256)$  from that plane is

(1)  $\frac{12}{\sqrt{5}}$  (2)  $\frac{11}{\sqrt{5}}$  (3)  $\frac{9}{\sqrt{5}}$  (4)  $\frac{8}{\sqrt{5}}$

**Ans.** [2]

**Q.19** A triangle ABC whose side BC lies on line  $\frac{x-2}{3} = \frac{y-1}{0} = \frac{z}{4}$  and distance between B and C is 5 unit and

$A(1, -1, 2)$  then area of triangles is

(1)  $\sqrt{46}$  (2)  $\sqrt{48}$  (3)  $\sqrt{50}$  (4)  $\sqrt{52}$

**Ans.** [3]

**Q.20** If  $f(2) = 6$  then  $\lim_{x \rightarrow 2} \frac{\int_2^x 2t dt}{(x-2)^6}$  is equal to

(1)  $6 f'(2)$  (2)  $12 f'(2)$  (3)  $16 f'(2)$  (4)  $18 f'(2)$

**Ans.** [2]

**Q.21** Domain of function  $f(x) = \frac{1}{4-x^2} + \log_{10}(x^3 - x)$  is

(1)  $(-1, 0) \cup (1, \infty)$  (2)  $(-1, 0) \cup (1, 2) \cup (2, \infty)$   
 (3)  $(-1, 2)$  (4)  $(-1, \infty)$

**Ans.** [2]



**Q.22**  $f(x) = \begin{cases} a|x - \pi| + 1; & x \geq 5 \\ b|\pi - x| + 3; & x < 5 \end{cases}$  if  $f(x)$  is continuous at  $x = 5$  then  $a - b =$

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

**Ans.** [1]

**Q.23** If line  $x + (a - 1)y = 1$  and  $2x + a^2y = 1$  perpendicular to each other, then distance of the point of intersection from origin is

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

**Ans.** [2]

**Q.24** Water is flow at rate of  $5\text{m}^3/\text{min}$  into a conical vassal whose semi vertical angle is  $\tan^{-1}\left(\frac{1}{2}\right)$ . Then there rate of change in height of water level. When height of water level is 10 m is

- (1)  $\frac{1}{2\pi}$  m/min                      (2)  $\frac{1}{4\pi}$  m/min                      (3)  $\frac{1}{5\pi}$  m/min                      (4)  $\frac{1}{6\pi}$  m/min

**Ans.** [3]