# Studentpad

**JEE - Main Full Portion 2020-21**

| Time : 120 Min | Maths : Full Portion Paper | Marks : 150 |
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01) The first four terms in the expansion of $(1-x)^{3/2}$ are

1) $1-\frac{3}{2}x+\frac{3}{8}x^2+\frac{x^3}{16}$

2) $1-\frac{3}{2}x+\frac{3}{8}x^2-\frac{1}{16}x^3$

3) $1-\frac{3}{2}x-\frac{3}{8}x^2-\frac{x^3}{16}$

4) None of these

02) The four distinct points $(0,0),(2,0),(0,-2)$ and $(k,-2)$ are con-cyclic, if k =

1) -2
2) 0
3) 1
4) 2

03) Consider the following statements
(1) Mode can be computed from histogram
(2) Median is not independent of change of scale
(3) Variance is independent of change of origin and scale
Which of these is/are correct
1) Only (1)
2) Only (1) and (2)
3) Only (2)
4) (1), (2) and (3)

04) If the parabola $y=(a-b)x^2+(b-c)x+(c-a)$ touches the x -axis then mark the correct for the line $ax+by+c=0$.

1) Always passes through a fixed point
2) Always has negative slope
3) It is always perpendicular to x- axis
4) Represents the family of parallel lines

05) $\int\frac{1}{\sqrt{1+\sin x}}dx=$

1) $\frac{1}{2\sqrt{2}}\log\tan\left(\frac{\pi}{8}+\frac{x}{4}\right)+c$

2) $\sqrt{2}\log\tan\left(\frac{\pi}{8}+\frac{x}{4}\right)+c$

3) $\frac{1}{\sqrt{2}}\log\tan\left(\frac{\pi}{8}+\frac{x}{4}\right)+c$

4) $2\sqrt{2}\log\tan\left(\frac{\pi}{8}+\frac{x}{4}\right)+c$

06) A box contains 15 tickets numbered 1, 2, ..... 15. Seven tickets are drawn at random one after the other with replacement. The probability that the greatest number on a drawn ticket is 9, is

1) $\left(\frac{9}{10}\right)^6$

2) $\left(\frac{8}{15}\right)^7$

3) $\left(\frac{3}{5}\right)^7$

4) None of these

07) Distance between the pair of lines represented by the equation $x^2-6xy+9y^2+3x-9y-4=0$ is

1) $\frac{1}{2}$

2) $\sqrt{\frac{5}{2}}$

3) $\frac{1}{\sqrt{10}}$

4) $\frac{15}{\sqrt{10}}$

08) $\tan\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]=$

1) $\frac{2}{3+\sqrt{5}}$

2) $\frac{3+\sqrt{5}}{2}$

3) $\frac{3-\sqrt{5}}{2}$

4) Both (1) and (3)

09) ${}^nC_r+{}^{n-1}C_r+.....+{}^rC_r=$

1) $2^n$

2) ${}^{n+1}C_r$

3) ${}^{n+2}C_r$

4) ${}^{n+1}C_{r+1}$

10) The graph of a quadratic polynomial (parabola) opens downward, with y - intercept 10 and x - intercepts -1 and 5. If the point P (8, k) lies on the graph of the parabola, then find the value of k.

1) -8
2) -54
3) -27
4) -60

11) P,Q,R and S are four coplanar points on the sides AB, BC, CD and DA of a skew quadrilateral.

The product $\frac{AP}{PB}\cdot\frac{BQ}{QC}\cdot\frac{CR}{RD}\cdot\frac{DS}{SA}=?$

1) -2
2) 2
3) -1
4) 1

12) $\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix} = ?$

1) $(x+y)(y+z)(z+x)(xy+yz+zx)$
2) $(x-y)(y-z)(z-x)(xy+yz+zx)$
3) $(x-y)(y-z)(z-x)(x+y+z)$
4) None of the above

13) If OA and OB are equal perpendicular chord of the circles $x^2+y^2-2x+4y=0$, then what is the equation of OA and OB are (where, O is origin)

1) $3x+y=0$ and $3y-x=0$
2) $3x+y=0$ and $3x-y=0$
3) $x+3y=0$ and $y-3x=0$
4) $x+y=0$ or $x-y=0$

14) What is the maximum value of $\cos^2\left(\frac{\pi}{3}-x\right)-\cos^2\left(\frac{\pi}{3}+x\right)$?

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

15) If the sum of the coefficients in the expansion of $(x+y)^n$ is 1024, then the value of the greatest coefficient in the expansion is

1) 120
2) 210
3) 252
4) 356

16) If $a^{1/x}=b^{1/y}=c^{1/z}$ and a, b, c are in G.P., then x, y, z will be in

1) H.P.
2) G.P.
3) A.P.
4) None of these

17) The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=x^2$ is

1) $xy=4x^4+c$
2) $\frac{1}{4}xy=x^4+c$
3) $xy=x^4+c$
4) $4xy=x^4+c$

18) $\int_1^{\sqrt{3}}\frac{1}{1+x^2}dx$ is equal to

1) $\pi/3$
2) $\pi/4$
3) $\pi/6$
4) $\pi/12$

19) If $f:R\to R$, then the range of the function $f(x)=\frac{x^2}{x^2+1}$ is

1) $R\times R$
2) R
3) $R^+$
4) $R^-$

20) The function $f(x)=2x^3-3x^2-12x+4$ has

1) one maximum and one minimum.
2) two minima.
3) two maxima.
4) no maxima and minima.

21) If $\cos\alpha+\cos\beta+\cos\gamma=\sin\alpha+\sin\beta+\sin\gamma=0$, then $\cos3\alpha+\cos3\beta+\cos3\gamma$ equals to

1) $3\sin(\alpha+\beta+\gamma)$
2) $3\cos(\alpha+\beta+\gamma)$
3) $\cos(\alpha+\beta+\gamma)$
4) 0

22) An AND gate is the Boolean function defined by

1) $f(x_1,x_2)=x_2, x_1, x_2\in\{0,1\}$
2) $f(x_1,x_2)=x_1, x_1, x_2\in\{0,1\}$
3) $f(x_1,x_2)=x_1+x_2, x_1, x_2\in\{0,1\}$
4) $f(x_1,x_2)=x_1:x_2, x_1, x_2\in\{0,1\}$

23) $\lim_{x\to1}\frac{\sqrt{1-\cos2(x-1)}}{x-1}$

1) exists and it equals $-\sqrt{2}$.
2) exists and it equals $\sqrt{2}$.
3) does not exist because $x-1\to0$.
4) does not exist because left hand limit is not equal to right hand limit.

24) If $5\cos2\theta+2\cos^2\frac{\theta}{2}+1=0, -\pi<\theta<\pi$, then $\theta=$

1) $\frac{\pi}{3}$
2) $\cos^{-1}\frac{3}{5}$
3) $\frac{\pi}{3}, \cos^{-1}\frac{3}{5}$

4) $\frac{\pi}{3}, \pi - \cos^{-1}\frac{3}{5}$

25) If a+b+c=0 and $|a|=3, |b|=5$ and $|c|=7$, then what is the angle between a and b?

1) $\frac{5\pi}{3}$

2) $\frac{2\pi}{3}$

3) $\frac{\pi}{3}$

4) $\frac{\pi}{6}$

26) If $\begin{vmatrix} y+z & x-z & x-y \\ y-z & z+x & y-x \\ z-y & z-x & x+y \end{vmatrix} = k\,xyz$, then the value of k is

1) 8
2) 6
3) 4
4) 2

27) Equation of diameter of parabola $y^2 = x$ corresponding to the chord $x - y + 1 = 0$ is

1) $y = 1$
2) $2y = 1$
3) $2y = 3$
4) $2y = 5$

28) The distance of the point $B(i + 2j + 3k)$ from the line which is passing through $A(4i + 2j + 2k)$ and which is parallel to the vector $\vec{C} = 2i + 3j + 6k$ is

1) $\sqrt{10}$
2) 10
3) 100
4) None of these

29) If a vertex of an equilateral triangle is the origin and the side opposite to it has the equation $x + y = 1$ then what is the orthocentre of the triangle?

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

2) $\left(\frac{\sqrt{2}}{3}, \frac{\sqrt{2}}{3}\right)$

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

4) None of these

30) Conjugate of $1 + i$ is

1) 1 + i
2) 1 - i
3) 1
4) i