**FIRST REVISION TEST - 2024**   | Exam No. | | | | | |

**Time : 3-00 Hours**   **XI - MATHS**   61 30

## PART - I

**Note: 1) Answer all the questions.**   (20x1=20)

**2) Choose the most suitable answer.**

1.  If n(A)=2 and n(B ∪ C)=3 then n[(AxB) ∪ (AxC)] is
    1) $2^3$                   2) $3^2$
    3) 6                       4) 5

2.  If n∈ z, then $7^{2n}+3^{3n-3} \cdot 3^{n-1}$ is always divisible by
    1) 45                      2) 25
    3) 55                      4) 35

3.  If a is the arithmetic mean and g is the geometric mean of two numbers, then
    1) a≤ g                    2) a≥ g
    3) a=g                     4) a>g

4.  Straight line joining the points (2, 3) and (–1, 4) passes through the points (α, β) if,
    1) $\alpha+2\beta=7$        2) $3\alpha+\beta=9$
    3) $\alpha+3\beta=11$       4) $3\alpha+\beta=11$

5.  $A = \begin{bmatrix} a & x \\ y & a \end{bmatrix}$ and xy=1, then det(AA$^T$) is
    1) $(a-1)^2$               2) $(a^2+1)^2$
    3) $a^2-1$                 4) $(a^2-1)^2$

6.  $\cos1°+\cos2°+\cos3°+......+\cos179°=$
    1) 0                       2) 1
    3) –1                      4) 89

7.  Find the value of $10C_3$
    1) 50                      2) 120
    3) 105                     4) 103

8.  If $\vec{BA} = 3\vec{i} + 2\vec{j} + \vec{k}$ and the position vector of B is, $\vec{i} + 3\vec{j} - \vec{k}$ then the position vector of A is
    1) $4\vec{i} + 2\vec{j} + \vec{k}$      2) $4\vec{i} + 5\vec{j}$
    3) $4\vec{i}$                           4) $-4\vec{i}$

9.  $\int \frac{\sec x}{\sqrt{\cos 2x}} dx =$
    1) $\tan^{-1}(\sin x) +c$    2) $2\sin^{-1}(\tan x) +c$
    3) $\tan^{-1}(\cos x) +c$    4) $\sin^{-1}(\tan x) +c$

10. $\lim_{n \to \infty}\left(\frac{1}{n^2} + \frac{2}{n^2} + \frac{3}{n^2} + ..... + \frac{n}{n^2}\right)$ is
    1) $\frac{1}{2}$            2) 0
    3) 1                       4) ∞

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11. Let $f: R \rightarrow R$ be defined by $f(x) = 1 - |x|$ then the range of f is
    1) R
    2) $(1, \infty)$
    3) $(-1, \infty)$
    4) $(-\infty, 1)$

12. The value of $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} \cdots$ is
    1) $\frac{e^2 + 1}{2e}$
    2) $\frac{(e+1)^2}{2e}$
    3) $\frac{(e-1)^2}{2e}$
    4) $\frac{e^2 - 1}{2e}$

13. The image of the point (2, 3) in the line $y = -x$ is
    1) $(-3, -2)$
    2) $(-3, 2)$
    3) $(-2, -3)$
    4) $(3, 2)$

14. If $y = \tan x$, then $y'$
    1) $\sin^2 x$
    2) $\cos^2 x$
    3) $\sec^2 x$
    4) $\sin x \tan x$

15. If a and b are the roots of the equation $x^2 - px + q = 0$ then the value of $\frac{1}{a} + \frac{1}{b}$ is
    1) pq
    2) p/q
    3) p
    4) q

16. If ABCD is a parallelogram, then $\overline{AB} + \overline{AD} + \overline{CB} + \overline{CD}$ is
    1) $2(\overline{AB} + \overline{AD})$
    2) $4\overline{AC}$
    3) $4\overline{BD}$
    4) $\overline{O}$

17. $\int f(x) dx = g(x) + c$, then $\int f(x) g'(x) dx$ is
    1) $\int (f(x))^2 dx$
    2) $\int f(x) g(x) dx$
    3) $\int f'(x) g(x) dx$
    4) $\int (g(x))^2 dx$

18. If A and B is any event, $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$, then $P(\overline{A} \cap B)$ is
    1) 0.96
    2) 0.24
    3) 0.56
    4) 0.66

19. $y = f(x^2 + 2)$ and $f'(3) = 5$, then $\frac{dy}{dx}$ at $x = 1$ is
    1) 5
    2) 25
    3) 15
    4) 10

20. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ are
    1) 4
    2) 2
    3) 1
    4) 3

## PART - II

**Note : 1) Answer any seven questions.**                    **(7x2=14)**

**2) Question number 30 is compulsory.**

21.  Find the number of subsets of A if $A=\{x:x=4n+1, 2\leq n\leq 5, n\in N\}$

22.  1) The odds that the event A occurs 5 to 7 then find P(A).

2) Suppose P(B)= 2/5, Express the odds that the event B occurs.

23.  Solve: 23x<100 when i) x is natural numbers        ii) x is an integer

24.  Evaluate: $\lim\limits_{x\to 1} \dfrac{x^3-1}{x-1}$

25.  If A+B=45°. Show that (1+tanA)(1+tanB)=2

26.  If the letters of the word IITJEE are permuted in all posible ways and the strings thus formed are arranged in the lexicographic order. Find the rank of the word 'IITJEE'.

27.  Write the first 6 terms of the sequences whose nth term $a_n$ is given below.

$$a_n= \begin{cases} n+1 & \text{if } n \text{ is odd} \\ n & \text{if } n \text{ is even} \end{cases}$$

28.  Find the separtae equation of the pari of straight lines $3x^2+2xy-y^2=0$

29.  Determine the values of a if $A= \begin{bmatrix} 7 & 3 \\ -2 & a \end{bmatrix}$ is singular matrix.

30.  Evaluate: $\lim\limits_{n\to\infty} \left[6^n + 5^n\right]^{1/n}$

## PART - III

**Note : 1) Answer any seven questions.**                    **(7x3=21)**

**2) Question number 40 is compulsory.**

31.  The probability of an event A occuring is 0.5 and B occuring is 0.3. If A and B are mutually exclusive events, then find the probability of ,

a) P(A∪B)        b) P(A∩$\bar{B}$)        c) P($\bar{A}$∩B)

32.  Evaluate: $\int \dfrac{\sin x}{\cos^2 x} dx$

33.  Find the range of the function $\dfrac{1}{2\cos x -1}$.

34.  If $y=e^x \sin x$, then $\dfrac{dy}{dx}$ .

35.  Write the equation of the lines through the point (1, −1) parallel to x+3y−4=0.

36.  For any vector $\vec{r}$ prove that $\vec{r} = (\vec{r}.\vec{i})\,\vec{i} + (\vec{r}.\vec{j})\vec{j} + (\vec{r}.\vec{k})\vec{k}$

37.  Prove that $\dfrac{\sin 4x + \sin 2x}{\cos 4x + \cos 2x} = \tan 3x$.

38.  Solve: $2x^2 +x-15 \leq 0$

39.  If $nP_r= 720$ and, $nC_r= 120$ then the value of n and r.

40.  Find the matrix A which satisfies the matrix relation $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$.

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## PART - IV

**Note :** *Answer all the questions.*                     **(7x5=35)**

41. a) If , $\dfrac{\log x}{y - z} = \dfrac{\log y}{z - x} = \dfrac{\log z}{x - y}$ then prove that $xyz=1$.

    **(OR)**

    b) Prove that $A+B+C=\pi$ , $\cos^2 A+\cos^2 B+\cos^2 C=1-2\cos A\cos B\cos C$.

42. a) From the curve $y=|x|$, draw

    1) $y=|x-1|+1$        2) $y=|x+1|-1$        3) $y=|x+2|+3$

    **(OR)**

    b) If $A_i$, $B_i$, $C_i$ are the cofactors of $a_i$, $b_i$, $c_i$ respectively, $i=1, 2, 3$ in

    $$|A| = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \text{ show that } \begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix} = |A|^2$$

43. a) Prove that $\sqrt{\dfrac{1 - x}{1 + x}}$ is approximately equal to $1 - x + \dfrac{x^2}{2}$ when x is very

    small.            **(OR)**

    b) If $P_1$ and $P_2$ one of the lengths of the perpendiculars from the origin to the straight line $x \sec \theta + y \cosec \theta = 2a$ and, $x \cos \theta - y \sin \theta = a \cos 2\theta$ then prove that $P_1^2 + P_2^2 = a^2$

44. a) Resolve into partial fraction $\dfrac{7 + x}{(1 + x)(1 + x^2)}$

    **(OR)**

    b) Prove that: $\begin{vmatrix} b + c & a & a^2 \\ c + a & b & b^2 \\ a + b & c & c^2 \end{vmatrix} = (a + b + c)(a - b)(b - c)(c - a)$

45. a) Prove that by mathematical induction,

    $$1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = \dfrac{n(2n-1)(2n+1)}{3}$$

    **(OR)**

    b) Evaluate: $\displaystyle\int \dfrac{3x + 5}{x^2 + 4x + 7}dx$

46. a) Find the cosine and sine angle between the vectors $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$

    and $\vec{b} = 4\hat{i} - 2\hat{j} + 2\hat{k}$.

    **(OR)**

    b) If $y=e^{\tan^{-1}x}$ show that $(1+x^2)y'' + (2x - 1)y' = 0$.

47. a) The chances of x, y, z becoming managers of a certain company are 4:2:3 the probabilities that bonus scheme will be introduced by x, y and z hences managers are 0.3, 0.5 and 0.4 respectively. If the bonus scheme will be introduced, what is the probability that z was appointed as the manger?

    **(OR)**

    b) Rewrite $\sqrt{3}x + y + 4 = 0$ into normal form.      (11-Maths-4)