Vellore District

SECOND REVISION TEST - 2025

Standard XI

Reg.No. | | | | | | |

MATHEMATICS

Time : 3.00 hrs *Marks : 90*

Part - I $20 \times 1 = 20$

I. Choose the correct answer:

1. The value of x, for which the matrix $A = \begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular, is :

a) 7 b) 6 c) 9 d) 8

2. Which of the following is not true about the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{bmatrix}$?

a) an upper triangular matrix b) a lower triangular matrix
c) a scalar matrix d) a diagonal matrix

3. If $|\vec{a}+\vec{b}| = 60$, $|\vec{a}-\vec{b}| = 60$ and $|\vec{b}| = 46$, then $|\vec{a}|$ is

a) 32 b) 42 c) 12 d) 22

4. If $\vec{a}$ and $\vec{b}$ included an angle 120° and their magnitudes are 2 and $\sqrt{3}$, then $\vec{a}.\vec{b}$ is is equal to

a) $-\sqrt{3}/2$ b) $\sqrt{3}$ c) $-\sqrt{3}$ d) 2

5. The value of $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots\ldots$ is

a) $\frac{e^2-1}{2e}$ b) $\frac{e^2+1}{2e}$ c) $\frac{(e+1)^2}{2e}$ d) $\frac{(e-1)^2}{2e}$

6. $\frac{\cos 6x+6\cos 4x+15\cos 2x+10}{\cos 5x+5\cos n\ 3x+10\cos x} =$

a) 2 cos x b) cos 2x c) cos x d) cos 3x

7. $\frac{1}{\cos 80^o} - \frac{\sqrt{3}}{\sin 80^o} =$

a) 4 b) $\sqrt{2}$ c) $\sqrt{3}$ d) 2

8. If $2nC_3 : nC_3 = 11 : 1$, then n is:

a) 7 b) 5 c) 6 d) 11

9. The function $f : [0, 2\pi] \to [-1, 1]$ defined by $f(x) = \sin x$ is

a) one-to-one b) onto c) bijection d) cannot be defined

10. If A = {1,2,3), B = {1,4,6,9} and R is a relation from A to B defined by 'x' greater than 'y'. The range of R is:

a) {1,4,6,9} b) {4,6,9} c) {1} d) {2}

11. The value of $1-\frac{1}{2}\left(\frac{2}{3}\right)+\frac{1}{3}\left(\frac{2}{3}\right)^2-\frac{1}{4}\left(\frac{2}{3}\right)^3+\ldots\ldots$

a) $\log\left(\frac{5}{3}\right)$ b) $\frac{3}{2}\log\left(\frac{5}{3}\right)$ c) $\frac{5}{3}\log\left(\frac{5}{3}\right)$ d) $\frac{2}{3}\log\left(\frac{5}{3}\right)$

12. If the point (8, –5) lies on the locus $\frac{x^2}{16}-\frac{y^2}{25}=k$, then the value of k is:

a) 0 b) 1 c) 2 d) 3

13. Equation of the straight line perpendicular to the line $x-y+5=0$, through the point of intersection on the y axes and the given line:

a) $x-y-5=0$ b) $x+y-5=0$ c) $x+y+5=0$ d) $x+y+10=0$

14. The expansion of $(1-x)^{-2}$ is

a) $1-x+x^2-\ldots\ldots$ b) $1+x+x^2-\ldots\ldots$

c) $1-2x+3x^2-\ldots\ldots$ d) $1+2x+3x^2\ldots\ldots$

15. For the function $f(x)=\begin{cases}x+2, & x>0\\ x-2, & x<0\end{cases}$

a) $\lim\limits_{x\to 2^-} f(x)=-1$ b) $\lim\limits_{x\to 0} f(x)$ does not exist

c) $\lim\limits_{x\to 0^-} f(x)=-1$ d) $\lim\limits_{x\to 0^+} f(x)=1$

16. If $f(x)=x^2-3x$, then the points at which $f(x)=f'(x)$ are

a) both irrational b) one rational and another irrational

c) both positive integers d) both negative integers.

17. It is given that the events A and B are such that $P(A)=\frac{1}{4}$, $P(A/B)=\frac{1}{2}$ and $P(B/A)=\frac{2}{3}$, then P(B) is

a) $\frac{2}{3}$ b) $\frac{1}{2}$ c) $\frac{1}{6}$ d) $\frac{1}{3}$

18. If $x=at^2$, $y=2at$, then $\frac{dy}{dx}=$

a) $-t$ b) $\frac{1}{t}$ c) $-\frac{1}{t}$ d) t

19. $\int\left(\frac{x-1}{x+1}\right)dx=$

a) $x+2\log(x+1)+c$ b) $\frac{1}{2}\left(\frac{x-1}{x+1}\right)^2+c$

c) $x-2\log(x+1)+c$ d) $\frac{(x-1)^2}{2}\log(x+1)+c$

20. $\int 2^{3x+5}\,dx=$

a) $\frac{2^{3x+5}}{3\log 2}+c$ b) $\frac{3\left(2^{3x+5}\right)}{\log 2}+c$ c) $\frac{2^{3x+5}}{3\log(3x+5)}+c$ d) $\frac{2^{3x+5}}{2\log 3}+c$

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory) **7 x 2 = 14**

21. If A = {1,2,3,4} and B = {3,4,5,6} then find n[(A∪B) x (A∩B) x (AΔB)]
22. Find the complete set of values of 'a' for which the quadratic equation $x^2 - ax + a + 2 = 0$ has equal roots.
23. Find the principal solution of $\cos\theta = -\frac{1}{2}$
24. Find the coefficient of x^5 in the expansion of $\left(x + \frac{1}{x^3}\right)^{17}$
25. Find the equation of the straight line, if the perpendicular from the origin makes an angle of 120° with x-axis and the length of the perpendicular from the origin is 6 units.
26. Define diagonal and scalar matrices.
27. Find a unit vector along the direction of the vector $5\hat{i} - 3\hat{j} + 4\hat{k}$
28. Consider the function $f(x) = \sqrt{x}$, $x \geq 0$. Does $\lim_{x \to 0} f(x)$ exist?
29. Evaluate $\int \frac{1}{\sin^2 x \cos^2 x} dx$
30. Differentiate x^x with respect to x.

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory) **7 x 3 = 21**

31. Find the range of $f(x) = \frac{1}{1 - 3\cos x}$
32. If $a \sin^2\theta + b \cos^2\theta = c$, then show that $\tan^2\theta = \frac{c-b}{a-c}$
33. If $a_1, a_2, a_3, \ldots\ldots a_n$ is a geometric progression, then prove that every term $a_k (k > 1)$ is the geometric mean of its immediate predecessor a_{k-1} and immediate successor a_{k+1}
34. Find the nearest point on the line $x - 2y = 5$ from the origin.
35. If $(n+2)C_8 : (n-2)C_4 = 57:16$, find n
36. Find the value of the product $\begin{vmatrix} \log_3 64 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \times \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix}$
37. Show that $\vec{a} \times (\vec{b} + \vec{c}) + \vec{b} \times (\vec{c} + \vec{a}) + \vec{c} \times (\vec{a} + \vec{b}) = \vec{0}$
38. Does the limit of the function $\frac{\sin x}{|x|}$ exist when $x \to 0$. State reasons for your answer.
39. If $y = \tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ then find y'
40. Evaluate $\int (x+3)\sqrt{x+2}\, dx$

Part - IV

IV. Answer all the questions. $7 \times 5 = 35$

41. a) Find the unit vectors perpendicular to each of the vectors $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$, where $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}+3\hat{k}$

(OR)

b) Write any five different forms of an equation of a straight line.

42. a) For the given base curve y = sin x, draw $y=\frac{1}{2}\sin 2x$

(OR)

b) Solve the equation $\sqrt{6-4x-x^2}=x+4$

43. a) State and Prove any one of the Napier's formula.

(OR)

b) Prove that for any natural number n, $a^n - b^n$ is divisible by a – b, where a > b.

44. a) Prove that $\sqrt[3]{x^3+7}-\sqrt[3]{x^3+4}$ is approximately equal to $1/x^2$ when x is large.

(OR)

b) Evaluate : $\int \frac{2x+4}{x^2+4x+6}dx$

45. a) By the principle of mathematical induction prove that for $n \geq 1$

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

(OR)

b) Show that $\begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ca-b^2 & a^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix} = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2$

46. a) Show that the equation $9x^2-24xy+16y^2-12x+16y-12=0$ represents a pair of parallel lines. Find the distance between them.

(OR)

b) If $y=\frac{\sin^{-1}x}{\sqrt{1-x^2}}$ then show that $(1-x^2)y_2-3xy_1-y=0$

47. a) Differentiate with respect to x : $\frac{5x-2}{2+2x+x^2}$

(OR)

b) If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, prove that $\overrightarrow{AB}+\overrightarrow{AD}+\overrightarrow{CB}+\overrightarrow{CD}=4\overrightarrow{EF}$

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