Manasalu Public High School
Nayabazar-16, Kathmandu

Second Terminal Examination-2078

Subject: Basic Mathematics

Grade XI | Time: 3 Hrs. | F.M. 75

Group 'A' 11×1=11

Choose the correct answer.

1. If $A = \begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$, then AA^T *is equal to*

   a. $3I$ b. $4I$ c. $5I$

2. $\lim_{x\to\infty} \frac{2x^3-4x+7}{3x^3+5x^2-4}$ is equal to

   a. $\frac{2}{3}$ b. $\frac{3}{2}$ c. $-\frac{4}{5}$

3. The cofactor of 3 of $\begin{pmatrix} 1 & 2 & -1 \\ 2 & 0 & 1 \\ 1 & 3 & -1 \end{pmatrix}$ *is*

   a. -4 b. 3 c. -3

4. $\lim_{x\to 9} \frac{x^{\frac{3}{2}}-27}{x-9}$ is equal to

   a. $\frac{3}{2}$ b. $\frac{9}{2}$ c. $-\frac{2}{3}$

5. The value of $\begin{vmatrix} 3 & 4 & 5 \\ 15 & 21 & 26 \\ 21 & 29 & 34 \end{vmatrix}$ is

   a. 6 b. -6 c. 5

6. If $(x, y) = (1, 2) + (2, 3)$. Then the value of x is

   a. 1 b. 1 c. 3

7. The value of $3\sqrt{-4} + 5\sqrt{-9} - 4\sqrt{-25}$ is
   a. 1 b. i c. -1
8. The absolute value of $1 - 2i$ is
   a. 2 b. -3 c. $\sqrt{5}$
9. The value of $1 + \omega + \omega^2$ is equal to
   a. -1 b. 0 c. 1
10. $\lim_{x \to a} \frac{x^n - a^n}{x - a}$ is equal to
   a. xa^{n-1} b. an^{a-1} c. na^{n-1}

11. If w be a complex cube roots of unity, then the value of $(1 + \omega + \omega^2)^3 - (1 - \omega + \omega^2)^3$ is
   a. 1 b. 16 c. 0

Group 'B' 10×2=20

12.a. If $A = \begin{pmatrix} 4 & -5 \\ 3 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 3 \\ -1 & -2 \end{pmatrix}$ find $(AB)^T$

   b. If $A = \begin{pmatrix} 4 & x+2 \\ 2x-1 & 0 \end{pmatrix}$ and $A = A^T$, find the value of x.

13.a. Evaluate: $\begin{vmatrix} -1 & 0 & 3 \\ 2 & 1 & 4 \\ -2 & -3 & -1 \end{vmatrix}$

   b. Find the inverse of $\begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$

14.a. Simplify: $\sqrt{-9} + \sqrt{-25} - \sqrt{-36}$

   b. Find the real numbers x and y if $x + iy = (2 - 3i)(3 - 2i)$

15.a. If $x - iy = \sqrt{\frac{1-i}{1+i}}$, prove that $x^2 + y^2 = 1$

   b. Find the absolute value of $(3 + 4i)(3 - 4i)$

16.a. Evaluate: $\lim_{x \to 1} \frac{x^2 + 3x - 4}{x - 1}$

b. Find $\frac{dy}{dy}$ of $\sqrt{\frac{1-\sin x}{1+\sin x}}$

Group 'C' 6×4=24

17.a. Show that $\sim P \wedge (P \vee Q)$ is tautology

b. Evaluate: $\lim_{x \to 1} \frac{x-\sqrt{2-x^2}}{2x-\sqrt{2+2x^2}}$

18.a. If $A = \begin{pmatrix} 3 & 4 \\ 4 & -3 \end{pmatrix}$, prove that: $AA^T = A^T A = 25I$. Where I is a unit matrix of order 2.

b. Show that: $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a)$

19.a. Find the derivative of $\sqrt{x}$ by using first principal.

Group 'D' 4×5=20

20. What is symmetric matrix? If $A = \begin{pmatrix} 2 & 0 & -6 \\ 5 & 1 & 2 \\ 7 & -3 & 0 \end{pmatrix}$, find A^T

Show that sum of the given matrix and its transpose is the symmetric matrix.

21. Define union, intersection and power set and prove that $(A \cup B) \cap C = (A \cup C) \cap (B \cup C)$

22. If $A = \begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ -0 & -2 & 1 \end{pmatrix}$, Find A^{-1} *and verify that* $AA^{-1} = I$

23. Show that:

a) Rewrite using absolute value sign $-4 \leq x \leq -1$

b) $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8) = 9$

The End