a.

Manaslu Public Secondary School

Re- Examination-2078

Subject: Basic Mathematics

Grade XI

Time: 3 Hrs. F.M. 75

Group 'A' 11×1=11

Choose the correct answer.

1. The domain of the function $\sqrt{x-2}$ is
   a. $x > 2$ b. $x < 2$ c. $x \geq 2$ d. $x \leq 2$
2. If the inverse of the function $f(x) = -x$ is g(x), thus
   a. $g(x) = x$ b. $g(x) = -x$ c. $g(x) = \frac{1}{x}$ d. $g(x) = -\frac{1}{x}$
3. If $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then A^2 is equal to
   a. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ b. $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ c. $\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$ d. $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
4. The function $f(x) = 2x^3 - 15x^2 + 36x + 4$ is maximum at,
   a. $x = 3$ b. $x = 0$ c. $x = 4$ d. $x = 2$
5. If ω is a complex cube root of unity, then,
   a. $\omega^4 = \omega$ b. $\omega^5 = 1$ c. $\omega^2 = \omega^4$ d. $\omega = \omega^6$
6. The interval satisfying $3 \leq x \leq 5$ is
   a. *[2, 3]* b. *(2, 3)* c. *[3, 5]* d. *(3, 5)*
7. The distance between the lines $4x + 3y = 11$ *and* $8x + 6y = 15$ *is*
   a. $\frac{7}{2}$ b. 4 c. $\frac{7}{10}$ d. $\frac{11}{5}$
8. The conditional $(p \wedge q) \Rightarrow q$ is
   a. a tautology b. a contradiction
   c. neither tautology nor contradiction d. none of these

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

a. $\frac{2}{3}$ b. $\frac{3}{2}$ c. $\frac{-4}{5}$ d. $\frac{-7}{4}$

10. If $y = \log(\sin x)$, then $\frac{dy}{dx}$ equal to

a. $-\operatorname{cosec}^2 x$ b. $-\sec^2 x$ c. $\tan x$ d. $\cot x$

11. The function $f(x) = x^2 - 2x$, is increasing in the interval

a. (-2, -1) b. (-1, 0) c. (0, 1) d. (1, 2)

Group 'B' 8×5=40

12.a. Let p and q be any two statements, prove that: (2)

$(p \wedge q) \equiv (q \wedge p)$

b. Let A, B and C be the subsets of a universal set. Then prove that: $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. (3)

13.a. If two angles of a triangle are 75^0 and 60^0. Find the ratio of the sides.

b. Rewrite the given inequalities using absolute value sign. (3)

$-5 < x < 7$

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

b. If $A = \begin{pmatrix} 2 & 4 & 3 \\ 2 & 3 & 4 \\ 5 & 2 & 6 \end{pmatrix}$, find A^T. Show that the sum of the given matrix and its transpose is a symmetric matrix. (3)

15.a. Find the inverse of the matrix $\begin{pmatrix} 3 & 2 \\ -1 & 6 \end{pmatrix}$. (2)

b. Prove that: $\begin{vmatrix} 1+a_1 & a_2 & a_3 \\ a_1 & 1+a_2 & a_3 \\ a_1 & a_2 & 1+a_3 \end{vmatrix} = 1 + a_1 + a_2 + a_3$

16.a. Prove that: $(1+i)^4 \left(1+\frac{1}{i}\right)^4 = 16$. (2)

b. Find the square roots of $3 - 4i$. (3)

17.a. Find the value of: $\lim_{x \to 1} \frac{x^2+3x-4}{x-1}$ (2)

b. A function f(x) is defined as:

$$f(x) = \begin{cases} 2x+3 & for\ x < 1 \\ 5 & for\ x = 1 \\ 6x-1 & for\ x > 1 \end{cases}$$

Is the function continuous at x=1? (3)

18.a. Find $\frac{dy}{dx}$ of $\sin(4x-5)$ (2)

b. Find from the first principles the derivatives of $\sqrt{x}$ (3)

19.a. Evaluate: $\int \frac{x+3}{x+3}$ (2)

b. Find the area of the curve y=(x-1) (x-2) bounded by x-axis. (3)

Group 'D' 3×8=24

20. a. Define function with examples. (2)

b. If $f(x) = 2x + 1$ *and* $g(x) = 3x - 1$, *find* $gof(x)$. (2)

c. Let a function $f: A \to B$ be defined by $f(x) = \frac{x^2}{6}$ with $A = \{-2, -1, 0, 1, 2\}$ and $B = \left(0, \frac{1}{6}, \frac{2}{3}\right)$, find the range of f. is the function of one to one and onto both? (4)

21.a. Find the length of perpendicular drawn from (0, 0) to the line $3x + y + 1 = 0$ (2)

b. If P is the length of the perpendicular dropped from the origin on the line $\frac{x}{a} + \frac{y}{b} = 1$, *prove that*: $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$ (2)

c. Find the equation of the bisectors of the angles between the lines $3x + 5y = 11$ and $3x + 5y = -23$ (4)

22. a. Examine whether the function $f(x) = 15x^2 - 14x + 1$ is increasing or decreasing at $x = \frac{2}{5}$ (2)

b. Find the local maxima and minima of the function: (2)

$$f(x) = 3x^2 - 6x + 3$$

c. Show that the three points A, B, C with position vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} - 4\vec{k}$ and $-7\vec{j} + 10\vec{k}$ respectively are collinear. (4)

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