Sig. of Supdt.	MRD-XI-16(A) 211 **MATHEMATICS** (Part – I) (Fresh / New Course)	Roll No. .....

Fic. # .....

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Fic. # .....

Time Allowed : 3 Hrs. **MATHEMATICS** Total Marks: 100

(Part – I)

(Fresh / New Course)

NOTE : There are THREE sections in this paper i.e. Section A, B and C.

Time : 20 Mins. **Section "A"** Marks: 20

NOTE : Use this sheet for this section. No mark will be awarded for cutting, erasing or over writing.

Q. 1 Write the correct option i.e. A, B, C and D in the empty box provided opposite to each part.

i) In order pair iota i = ...
(a) (1,0) (b) (-1,0) (c) (0,1) (d) (0,-1) — c (i)

ii) Let Z be a complex number, then $z \cdot \bar{z}$ = ...
(a) $|z|^2$ (b) $|z|$ (c) $\sqrt{z}$ (d) $(z)^2$ — a (ii)

iii) A matrix in which the number of rows and number of column's are not equal, the matrix is called ..... matrix.
(a) Diagonal (b) Rectangular (c) Scalar (d) Square — b (iii)

iv) In a square matrix A, $(A^{-1})^{-1}$ = ...
(a) $(A^{-1})^2$ (b) $(A^2)^{-1}$ (c) A (d) None of these — c (iv)

v) A vector whose magnitude is one is called .....vector.
(a) Null (b) Unit (c) Zero (d) Equal — b (v)

vi) If $\bar{v} = 3i - 2j$ be a vector, then its magnitude is $|\bar{v}|$ = ...
(a) $\sqrt{13}$ (b) $\sqrt{5}$ (c) 1 (d) $\sqrt{-6}$ — a (vi)

vii) i x j = ...
(a) (j x i) (b) (I x k) (c) K (d) (k x j) — c (vii)

viii) The fourth term of a sequence $(-1)^{n-1}2^{n+1}$ is .....
(a) 32 (b) -32 (c) -16 (d) 16 — b (viii)

ix) The nth term of a geometric sequence is a_n = ...
(a) a+(n-1)d (b) 2a+(n-1)d (c) ar^{n-1} (d) ar^{n+1} — c (ix)

x) If A, G and H be the A. Mean, G. Mean and H. Mean respectively, then A x H = ...
(a) G^2 (b) $\sqrt{G}$ (c) G (d) $(G)^{\frac{3}{2}}$ — a (x)

xi) The factorial of zero is always equals to .....
(a) Zero (b) One (c) Two (d) Three — b (xi)

xii) How many different wards can be formed from letter "BOOKKE"?
(a) 180 (b) 120 (c) 90 (d) 360 — a (xii)

xiii) If A and B are mutually exclusive events, then $(A \cap B)$ = ... set.
(a) Even numbers (b) Odd numbers (c) Empty (d) None of these — c (xiii)

xiv) If E be an event, then the range of P(E) is ;
(a) $0 \le P(E) \le 1$ (b) $-1 \le P(E) \le 1$ (c) $1 \le P(E) \le 0$ (d) $1 \le P(E) \le 2$ — a (xiv)

xv) If A and $\bar{A}$ are the complementary events, then $P(\bar{A})$ = ...
(a) 1+P(A) (b) $\frac{1}{P(A)}$ (c) P(A)-1 (d) 1-P(A) — d (xv)

xvi) The nth term of 1.3 + 2.4 + 3.5 + ... Is T_n = ...
(a) n(n+1) (b) n(n+2) (c) n(n+3) (d) n(n-3) — b (xvi)

xvii) Number of terms in the expansions of $(a+b)^{n+1}$ is .....
(a) n (b) n + 1 (c) n – 1 (d) n + 2 — d (xvii)

xviii) When f(-x) = -f(x), then the function f(x) is called ..... function.
(a) Odd (b) Even (c) Rational (d) Linear — a (xviii)

xix) $\cos(2\pi - \beta)$ = ...
(a) $-\cos\beta$ (b) $\cos\beta$ (c) $\sin\beta$ (d) $-\sin\beta$ — b (xix)

xx) $\cos\left(\frac{\theta}{2}\right)$ = ...
(a) $\sqrt{\frac{1-\cos\theta}{2}}$ (b) $\sqrt{\frac{1-\sin\theta}{2}}$ (c) $\sqrt{\frac{1+\cos\theta}{2}}$ (d) $\sqrt{\frac{1+\sin\theta}{2}}$ — c (xx)

MRD-XI-16(A) 212

MATHEMATICS

(Part – I)

(Fresh / New Course)

Section – B & C

Total Marks : 80

Time Allowed : 2:40 Hrs.

Section – B

Marks : 50

Q. 2 Answer any Ten parts. Each part carries equal marks.

(i) Let $Z_1 = a + bi$ and $Z_2 = c + di$, then show that show that $\overline{Z_1 + Z_2} = \overline{Z_1} + \overline{Z_2}$.

(ii) Factorize the polynomial $P(z) = z^3 - 2z^2 + z - 2$

(iii) If $A = \begin{bmatrix} 3 & 2 \\ 4 & -1 \\ 6 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 5 \\ -1 & 4 \\ 0 & 3 \end{bmatrix}$, show that $(A+B)^t = A^t + B^t$.

(iv) If A and B are the non-singular matrices, then show that $(AB)^{-1} = B^{-1}A^{-1}$.

(v) Find the direction cosines of the vector from P(4, 8, -3) to Q(-1, 6, 2).

(vi) Show that $k \cdot j \times i = -1$.

(vii) Insert two geometric means between 64 and 125.

(viii) Find the A. Mean, G. Mean and H. Mean for the numbers -6 and –216 and verify that $A \times H = G^2$.

(ix) Find the sum of the series $2 + 5 + 10 + 17 + \ldots\ldots\ldots\ldots$ to n terms.

(x) Find n such that ${}^{n}p_5 = 9({}^{n-1}p_4)$.

(xi) Show by mathematical induction that $5 + 10 + 15 + \ldots\ldots\ldots + 5n = \frac{5n(n+1)}{2}$.

(xii) If $f(x) = x^3 - 2$, then find $f^{-1}(3)$.

(xiii) Show that $\tan\left(\frac{\pi}{2} + \theta\right) = -\cot\theta$

Section – C

Marks : 30

NOTE : Attempt any THREE questions. Each question carries equal marks.

Q. 3 (a) For what value of n will $\left(\frac{a^{n+1} + b^{n+1}}{a^n + b^n}\right)$ be the harmonic mean between "a" and "b".

(b) Show that $\begin{vmatrix} 1 & \alpha & \alpha^2 \\ 1 & \beta & \beta^2 \\ 1 & \gamma & \gamma^2 \end{vmatrix} = (\alpha - \beta)(\beta - \gamma)(\gamma - \alpha)$

Q. 4 (a) Show that $\left(\sin\frac{\alpha}{2} + \cos\frac{\alpha}{2}\right)^2 = 1 + \sin\alpha$

(b) Show that $\frac{1 + \cos 2\theta}{\sin 2\theta} = \cot\theta$

Q. 5 (a) Solve the triangle ABC by using the law of tangent, when b = 12.5, c = 23 and $\alpha = 38°20'$.

(b) Find the angle of the largest measure when a = 7, b = 9 and c = 7.

Q. 6 (a) Find the domain of the function $y = \text{cosec } 2x$.

(b) Draw the graph of the function $y = \cos 2x$ when $0 \le x \le 2\pi$.