Sig. of Supdt. P-339

KT-XI-1701

Mathematics (Part – I)

Fresh/Reappear

Roll No. P-339

Code = K

Fic. No. .....

Fic. No. .....

Time allowed: 3 Hrs **Mathematics (Part – I)** **Marks: 100**

Fresh / Reappear

Note: There are three sections of the paper, A, B & C. Attempt Section – A on the same paper and return it to the Superintendent within the given time. No marks will be awarded for cutting, erasing or over writing. Mobile phone etc. are not allowed in the examination hall.

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

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

i. If |A| = product of diagonal elements then such a matrix is .....matrix. [C]

A. Symmetric B. Skew symmetric ●. Diagonal D. Singular

ii. $(-i)^{-98}$ = _____ [D]

A. i B. $-i$ C. 1 D – 1

iii. If $A = \begin{bmatrix} 1 & -2 & 5 \\ 3 & 0 & -1 \\ 5 & 2 & 0 \end{bmatrix}$ then M_{13} = _____ [C]

A. 10 B. – 10 C. 6 D. –6

iv. If u = xi + yj is a vector with magnitude |u| ≠ 0 then $\frac{v}{|v|}$ is ----------vector [D]

A. Position B. Null C. Norm D. Unit

v. Diagonals of a parallelogram ..... each other. [B]

A. Parallel B. Bisect C. Perpendicular D. C and D

vi. A sequence is a function whose domain is the set of ..... [A]

A. Positive integers B. Real numbers C. All integers D. Rational numbers

vii. $i.K \times j$ = _____ [C]

A. i B. j C. 1 D. – 1

viii. When the difference between successive terms of a sequence is always the same number the sequence is called .....sequence. [A]

A. Arithmetic B. Geometric C. Harmonic D. Neither type

ix. Geometric mean between 9 and 16 is ..... [D]

A. 3 B. 4 C. 6 D. 12

x. $\sum_{j=1}^{n} j$ = ... [B]

A. $n^2(n+1)$ B. $\frac{n(n+1)}{2}$ C. $\frac{n(n+1)^2}{2}$ D. $\frac{n^2(n+1)^2}{2}$

xi. $\frac{5!}{2!3!}$ = ... [C]

A. 5 B. 6 C. 10 D. 8

xii. ${}^7P_0$ = ... [C]

A. 7 B. 6 C. 1 D. 5

xiii. The set of all possible outcomes of a random experiment is called ..... [B]

A. Event B. Sample space C. Compound events D. Mutually exclusive

xiv. General tem of binomial expansion $(a+b)^n$ is $T_r + 1$ = ... [D]

A. $\binom{n}{r-1}a^{n-r}b^r$ B. $\binom{n}{r}a^n b^{n-r}$ C. $\binom{n+1}{r+1}a^{n-r}b^r$ D. $\binom{n}{r}a^{n-r}b^r$

xv. Domain of $f(x) = \frac{1}{x}$ is ..... [A]

A. R – {0} B. R C. $-\infty < x < \infty$ D. A and C

xvi. A function $f(x) = \frac{P(x)}{Q(x)}$ where both)P(x) and Q(x) are polynomial function and Q(x) ≠0 is called [D]

.....function

A. Even B. Odd C. Identity D. Rational

xvii. $\text{Cos}\left(\frac{\pi}{2} + (\alpha - \beta)\right)$ = ... [A]

A. – sin (α - β) B. sin(α-β) C. cos(α-β) D. – cos(α-β)

xviii. Cos(270° + θ) = ... [A]

A. sinθ B. - sinθ C. cosθ D. – cosθ

xix. Area of a triangle when the measure of one side and measure of two angles is given is Δ =..... [D]

A. $\frac{1}{2}a^2\frac{\sin\beta\sin\gamma}{\sin\alpha}$ B. $\frac{1}{2}b^2\frac{\sin\alpha\sin\gamma}{\sin\beta}$ C. $\frac{1}{2}c^2\frac{\sin\alpha\sin\beta}{\sin\gamma}$ D. All the three

xx. Circum radius in terms of measurements of sides of a triangle then R = ... [D]

A. $\frac{4abc}{\Delta}$ B. $\frac{4\Delta}{abc}$ C. $\frac{abc}{\Delta}$ D. $\frac{abc}{4\Delta}$

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Time: 2:40 Hours R-340 KT-XI-1701

Mathematics (Part – I)

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Section "B" Marks: 50

Q.2 Attempt any TEN parts. Part-i and Part-ii are compulsory. All carry equal marks.

i. If $Z_1 = 1 + 2i$ and $Z_2 = 2 + 3i$ evaluate $|Z_1 + Z_2|$.

ii. If $A = \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$, $B = \begin{bmatrix} 0 & i^2 \\ -i^2 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ then verify that $CA = -AC = -B$

iii. If $p = 2i + 3j$ and $q = i - j$ then find numbers of x and y such that $xp + yq = -4i - 11j$.

iv. Find a vector of magnitude 10 and perpendicular to $\vec{a} = 2i - 3j + 4k$, $\vec{b} = 4i - 2j - 4k$.

v. Find the seventh terms of a geometric sequence that has 2 and $-\sqrt{2}$ for its second and third terms respectively.

vi. How many terms of the series $1 + \sqrt{3} + 3 + \ldots\ldots$ be added to get the sum $40 + 13\sqrt{3}$.

vii. Solve for n, ${}^{n+1}C_4 = 6.{}^{n-1}C_2$

viii. Find the first four terms in the expansion of $(4 - 8x)^{-3/2}$

ix. If $f(x) = x^2 - 4$. Find the x and y intercepts of the graph of f(x).

x. If $\cos\theta = \frac{-3}{7}$ and terminal ray of θ is in 3rd quadrant, then find $\sin\frac{\theta}{2}$.

xi. Solve right triangle ABC which $\gamma = 90°$ and $c = 632$, $b = 240$.

xii. Find the period of $5\cos 3x$.

xiii. Show that $2\text{Tan}^{-1}A = \tan^{-1}\frac{2A}{1 - A^2}$

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Section "C" Marks: 30

Note: Answer any THREE questions, Each question carries equal marks.

Q.3 a. if $Z_1 = -a - 3bi$, $Z_2 = 2 - 3bi$ then verify that $\overline{\left(\frac{Z_1}{Z_2}\right)} = \frac{\overline{Z_1}}{\overline{Z_2}}$

b. If A is a square matrix of order 3, then show that $A + A^t$ is symmetric.

Q.4 a. Which term of the arithmetic sequence is 4, 1, -2 ..... is -77?

b. Show that 5 is a factor of $3^{2n-1} + 2^{2n-1}$ where n is any positive integer.

Q.5 a. Minimize $f(x, y) = 3x + 4y$ subject to the constraints

$2x + 3y \geq 6$

$x + y \leq 8$

$x \leq 0$

$y \geq 0$

b. Find the angle of largest measure

a = 74 b = 52 and c = 47

Q.6 a. Show that $\frac{abc}{4S}(\sin\alpha + \sin\beta + \sin\gamma) = \Delta$ = area of triangle ABC.

b. Sum the series up to n terms

$1^3 + 3^3 + 5^3 + \ldots\ldots\ldots\ldots$