Roll No. : _____

Objective Paper Code **6191**

Intermediate Part First

MATHEMATICS (Objective) Group – I

Time: 30 Minutes Marks: 20

Q.No.1 **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

FSD-1-24

S.#	Questions	A	B	C	D
1	Multiplicative inverse of $-i$ is:	i	$-i$	1	-1
2	If n is prime, then $\sqrt{n}$ is:	Rational number	Whole number	Natural number	Irrational number
3	A function f : A → B is surjective if:	Range f = A	Range f = B	Range f ≠ A	Range f ≠ B
4	Set of integers is a group with respect to:	+	÷	×	−
5	Which symbol is used for membership of a set?	∧	∨	∈	~
6	Transpose of diagonal matrix is:	Scalar matrix	Row matrix	Null matrix	Diagonal matrix
7	For any non-singular matrix A, A^{-1} is:	$\lvert A \rvert \text{ adj } (A)$	$\frac{1}{\lvert A \rvert \text{ adj } (A)}$	$\frac{\text{adj } (A)}{\lvert A \rvert}$	$\frac{\lvert A \rvert}{\text{adj } (A)}$
8	A quadratic equation $ax^2 + bx + c = 0$ becomes linear equation if:	a = 0	b = 0	c = 0	a = b
9	If ω is complex root of unity then value of $(3+\omega)(3+\omega^2)$ is:	6	7	9	13
10	The improper fraction can be changed into proper fraction by:	Addition	Subtraction	Multiplication	Division
11	The sequence 3, 6, 12 is:	A.P	G.P	H.P	Arithmetic series
12	If a, b are negative and G.M is also negative then:	H < A < G	A < H < G	G < A < H	A < G < H
13	If n is a negative integer then $\lfloor \underline{n}$ is:	1	Not defined	Zero	n
14	The number of term in the expansion of $(a+b)^n$ is:	n^2+1	n+1	n−1	n
15	The 60th part of 1 degree is called one:	Second	Radian	Degree	Minute
16	$\cot(\pi-\alpha) =$:	$\sin\alpha$	$\cot\alpha$	$-\cot\alpha$	$\tan\alpha$
17	The domain of cosx is:	$[-1, 1]$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$	R	Q
18	A circle passing through the three vertices of a triangle is called:	Circumcircle	In-circle	Escribed circle	Both A and B
19	$\sin^{-1}\left(-\frac{1}{2}\right) =$:	$\frac{\pi}{3}$	$-\frac{\pi}{6}$	$\frac{\pi}{4}$	$-\frac{\pi}{3}$
20	If sinx = cosx, then x = :	45°	30°	0°	60°

Intermediate Part First

Roll No. _____

1109-XI124

MATHEMATICS (Subjective) Group – I

Time: 02:30 Hours Marks: 80 FSD-1-24

SECTION – I

2. **Attempt any EIGHT parts:** 16

(i) State Golden rule of fractions and rule for quotient of fractions.

(ii) Find multiplicative inverse of $(\sqrt{2}, -\sqrt{5})$

(iii) Prove that sum as well as product of two conjugate complex numbers is a real.

(iv) Simplify: $(a+bi)^{-2}$

(v) Write power set of $A = \{9, 11\}$

(vi) If a, b are elements of a group G, then show $(ab)^{-1} = b^{-1}a^{-1}$

(vii) If $A = \begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$, show that $A - (\bar{A})^t$ is skew-Hermitian.

(viii) Evaluate: $\begin{vmatrix} 1 & 2 & -3 \\ -1 & 3 & 4 \\ -2 & 5 & 6 \end{vmatrix}$

(ix) If $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$ then find A^{-1}

(x) Find k if $x^3 + kx^2 - 7x + 6$ has remainder -4, when divided by $x + 2$.

(xi) α, β are roots of $5x^2 - x + 2 = 0$, find $\frac{3}{\alpha} + \frac{3}{\beta}$

(xii) Discuss the nature of roots of $x^2 - 5x + 6 = 0$

3. **Attempt any EIGHT parts:** 16

(i) Define rational fraction.

(ii) Resolve into partial fractions $\frac{x^2 + x - 1}{(x+2)^3}$

(iii) Define sequence.

(iv) If the 5th term of an AP is 13 and its 17th term is 49, find its general term.

(v) Find vulgar fraction equivalent to 1.53 recurring decimal.

(vi) Find the 12th term of harmonic sequence $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \ldots$

(vii) Evaluate: $\frac{10!}{7!}$

(viii) Define sample space.

(ix) Find the value of n if ${}^{n}C_{10} = \frac{12 \times 11}{2!}$

(x) Show that $5^n - 1$ is divisible by 4 if $n = 5$.

(xi) Expand $(1-2x)^{\frac{1}{3}}$ up to 4 terms.

(xii) Find the middle term of $\left(\frac{x}{2} + \frac{2}{x^2}\right)^{12}$

4. **Attempt any NINE parts:** 18

(i) If $\cos\theta = -\frac{\sqrt{3}}{2}$ and the terminal arm of the angle is in III quadrant, find the value of $\sin\theta$ and $\tan\theta$

(ii) Verify that $\cos 2\theta = 2\cos^2\theta - 1$ when $\theta = 30°$

(iii) Show that $\cos(\alpha+\beta)\cos(\alpha-\beta) = \cos^2\beta - \sin^2\alpha$

(iv) Prove that $\cot\alpha - \tan\alpha = 2\cot 2\alpha$

(v) Prove that $\frac{\sin 3x - \sin x}{\cos x - \cos 3x} = \cot 2x$

(vi) What is the domain and range of $y = \cos x$?

(Continued P . . . . . 2)

(vii) Find the period of $3\cos\frac{x}{5}$

FSD-I-24

(viii) Draw the graph of $y = \sin x$ for $0 \le x \le 360°$.

(ix) Find the measure of the greatest angle if sides of triangle are 16, 20, 33.

(x) Find the area of the triangle ABC, when $b = 37$, $c = 45$, $\alpha = 30°50'$

(xi) Prove that $r_1 r_2 r_3 = rs^2$

(xii) Prove that $2\tan^{-1} A = \tan^{-1}\frac{2A}{1-A^2}$

(xiii) Find the solution of equation $\sec x = -2$, $x \in [0, 2\pi]$

SECTION – II Attempt any THREE questions. Each question carries 10 marks.

5. (a) If $A = \begin{bmatrix} 1 & -1 \\ a & b \end{bmatrix}$, $A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find the values of a and b. 05

(b) Solve the system of equations $x^2 - 5xy + 6y^2 = 0$; $x^2 + y^2 = 45$ 05

6. (a) Resolve into partial fractions: $\frac{x^4}{1-x^4}$ 05

(b) If $y = 1 + 2x + 4x^2 + 8x^3 + \ldots$ show that $x = \frac{y-1}{2y}$ 05

7. (a) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$ 05

(b) If $2y = \frac{1}{2^2} + \frac{1.3}{2!}\cdot\frac{1}{2^4} + \frac{1.3.5}{3!}\cdot\frac{1}{2^6} + \ldots$, then prove that $4y^2 + 4y - 1 = 0$ 05

8. (a) Find $\sin(\alpha+\beta)$ and $\cos(\alpha+\beta)$, given that $\tan\alpha = -\frac{15}{8}$ and $\sin\beta = -\frac{7}{25}$ and neither the terminal side of the angle of measure α nor that of β is in the IV quadrant. 05

(b) Prove that $r_1 r_2 + r_2 r_3 + r_3 r_1 = s^2$ 05

9. (a) Prove the identity, state the domain of θ, $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$ 05

(b) Prove that $\tan^{-1}\frac{120}{119} = 2\cos^{-1}\frac{12}{13}$