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:	| A | adj (A)	$\frac{1}{\|A\| adj(A)}$	$\frac{adj(A)}{\|A\|}$	$\frac{\|A\|}{adj(A)}$
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 $\lfloor n$ 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-I-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 $\tan^{-1}\frac{120}{119} = 2\cos^{-1}\frac{12}{13}$

Roll No. : _____

Objective
Paper Code
6194

Intermediate Part First

MATHEMATICS (Objective) Group – II

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-2-24

S.#	Questions	A	B	C	D
1	If $\sin x = \frac{1}{2}$, then x = :	$\frac{\pi}{6}, \frac{5\pi}{6}$	$-\frac{\pi}{6}, \frac{5\pi}{6}$	$-\frac{\pi}{6}, -\frac{5\pi}{6}$	$\frac{\pi}{3}, \frac{2\pi}{3}$
2	Domain of $y = \tan^{-1} x$ is:	$\mathbb{R}$	Q	N	Z
3	Angle below the horizontal line is called:	Right angle	Oblique angle	Angle of depression	Angle of elevation
4	Period of $\cos\theta$ is:	2π	$\frac{3\pi}{2}$	π	$\frac{\pi}{2}$
5	$\cos(\theta - 90°) - \cos(\theta + 90°)$ equals to:	$-2\cos\theta$	$2\cos\theta$	$-2\sin\theta$	$2\sin\theta$
6	The angle $\frac{\pi}{12}$ in degree measure is:	30°	20°	45°	15°
7	If $n^2 > n + 3$ then it is true for:	$n = 0$	$n < 1$	$n \geq 2$	$n \geq 3$
8	For an event A, the range of P(A) is:	$0 < P(A) \leq 1$	$0 \leq P(A) < 1$	$0 \leq P(A) \leq 1$	$0 < P(A) < 1$
9	If a = 1, b = 5 then A×H is equal to:	5	–5	$-\frac{5}{2}$	$\frac{2}{5}$
10	Sum of infinite geometric series is valid if:	$r < 1$	$\lvert r \rvert < 1$	$\lvert r \rvert = 1$	$\lvert r \rvert > 1$
11	The fraction $\frac{x+1}{x^2+2}$ is:	Proper fraction	Improper fraction	Identity	Mixed
12	Complex cube roots of –1 are :	ω, ω^2	$1, \omega, \omega^2$	$-1, -\omega, -\omega^2$	$-\omega, -\omega^2$
13	Sum of all the three cube roots of unity is:	1	–1	3	0
14	The additive inverse of matrix A is:	A	– A	A^2	1
15	The trivial solution of homogeneous linear equations is:	(1, 0,0)	(0, 1, 0)	(0, 0, 1)	(0, 0, 0)
16	The domain of f = {(a, 1) , (b, 1) , (c, 1)} is:	{a, b, c}	{ 1 }	{b , c}	{a, b, c, 1}
17	A function which is onto is called:	Injective	Surjective	Objective	Bijective
18	The set {(a , b)} is called:	Infinite set	Set with two elements	Singleton set	Empty set
19	Imaginary part of $\frac{i}{1+i}$ is:	1	$\frac{1}{2}$	$\frac{i}{2}$	$-\frac{i}{2}$
20	$\sqrt{-5}$ belongs to the set of:	Rational numbers	Real numbers	Complex numbers	Integers

1110-XI124-30000

1110-XI124 **Intermediate Part First** Roll No. _____

MATHEMATICS (Subjective) Group – II

Time: 02:30 Hours Marks: 80 FSD-2-24

SECTION – I

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

(i) Let $z \in C$, show that $\overline{\overline{z}} = z$

(ii) Find multiplicative inverse of $1 - 2i$

(iii) Simplify: $(2, 6) . (3, 7)$

(iv) State and prove Golden Rule of fractions.

(v) Find inverse of the given relation $R = \{(x, y) | y^2 = 4ax, x \geq 0\}$

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

(vii) If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$

(viii) If $A = \begin{bmatrix} 2 & 3 & -2 \\ -1 & 1 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -3 & 1 \\ 5 & 4 & -1 \end{bmatrix}$ then solve $3X - 2A = B$ for X.

(ix) Define minor and cofactor of an element of a matrix.

(x) Solve $x^2 + 7x + 12 = 0$ by factorization.

(xi) Discuss the nature of the roots of equation $2x^2 + 5x + 1 = 0$

(xii) Find two consecutive numbers, whose product is 132.

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

(i) Define rational fraction.

(ii) Resolve into partial fractions $\frac{7x + 25}{(x + 4)(x + 3)}$

(iii) Define arithmetic progression.

(iv) Find three A.Ms between $\sqrt{2}$ and $3\sqrt{2}$

(v) Sum the series: $2 + (1 - i) + \left(\frac{1}{i}\right) + \ldots\ldots$ to 8 terms.

(vi) Find 9th term of the H.P $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \ldots\ldots$

(vii) Evaluate: $\frac{8!}{4!2!}$

(viii) Define sample space.

(ix) Find the number of diagonals of a 6-sided figure.

(x) Show that $5^n - 2^n$ is divisible by 3 for $n = 4$

(xi) Find the middle term of $\left(\frac{1}{x} - \frac{x^2}{2}\right)^{12}$

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

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

(i) Define radian.

(ii) Express the angle $75°6'30''$ in radian measure.

(iii) Without using the tables, write the values of $\cos 315°$ and $\sin 540°$

(iv) If α, β and γ are the angles of a triangle ABC, then prove that $\tan(\alpha + \beta) + \tan\gamma = 0$

(v) Prove that $\sin(\alpha + \beta)\sin(\alpha - \beta) = \sin^2\alpha - \sin^2\beta$

(vi) Write the domain and range of $\sin\theta$

(Continued P . . . . . 2)

FSD-2-24

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

(viii) Draw the graph of $y = \sin x$ from 0 to π

(ix) At the top of a cliff 80m high, the angle of depression of a boat is 12°. How far is the boat from the cliff?

(x) State any two Law of Cosines.

(xi) Find the area of triangle ABC, in which $b = 21.6$, $c = 30.2$ and $\alpha = 52°40'$

(xii) Find the value of $\sin\left(\cos^{-1}\frac{\sqrt{3}}{2}\right)$

(xiii) Define trigonometric equation. Give an example.

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

5. (a) Prove that $\begin{vmatrix} a & b+c & a+b \\ b & c+a & b+c \\ c & a+b & a+c \end{vmatrix} = a^3+b^3+c^3-3abc$ 05

(b) Find the values of a and b if –2 and 2 are the roots of polynomial equation $x^3 - 4x^2 + ax + b = 0$ 05

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

(b) Find four numbers in A.P whose sum is 32 and sum of whose squares is 276 05

7. (a) A card is drawn from a deck of 52 playing cards. What is the probability that it is a diamond card or an ace? 05

(b) If x is so small that its square and higher powers can be neglected, then show that:

$$\frac{(1+x)^{\frac{1}{2}}(4-3x)^{\frac{3}{2}}}{(8+5x)^{\frac{1}{3}}} \approx 4\left(1-\frac{5x}{6}\right)$$ 05

8. (a) If α, β, γ are the angles of triangle ABC, prove that $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\beta}{2}\tan\frac{\gamma}{2}+\tan\frac{\gamma}{2}\tan\frac{\alpha}{2}=1$ 05

(b) Prove that in an equilateral triangle $r : R : r_1 = 1 : 2 : 3$ 05

9. (a) If $\operatorname{cosec}\theta = \frac{m^2+1}{2m}$ and $m > 0\left(0 < \theta < \frac{\pi}{2}\right)$, find the values of remaining trigonometric ratios. 05

(b) Prove that $2\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{7}=\frac{\pi}{4}$ 05