Roll No. : _____ FBD-11-2-23 230 / 13

Objective

Paper Code **6198**

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.acf**

S.#	Questions	A	B	C	D
1	If n = 1, then value of n(n – 1)! is:	0	2	1	–1
2	$\frac{n^3+2n}{3}$ represents an / a:	Real number	Rational number	Irrational number	Integer
3	In the expansion of $(a+b)^7$, the 2nd term is:	a^7	$7ab^6$	$7a^6b^6$	$7a^6b$
4	$1^\circ =$:	$\frac{180}{\pi}$ radian	$\frac{\pi}{180}$ radian	$\frac{1}{180\pi}$ radian	180π radian
5	$\sin 3x =$:	$4\cos^3 x - 3\cos x$	$3\cos^3 x - 4\cos x$	$3\sin x - 4\sin^3 x$	$4\sin x - 3\sin^3 x$
6	Range of sin x is:	[– 1 , 1]	(– 1 , 1)	[– 1 , 1)	(– 1 , 1]
7	If ABC be any triangle and $\gamma = 90^\circ$, then:	$a^2 - c^2 = b^2$	$a^2 + b^2 + c^2 = 0$	$a^2 + c^2 = b^2$	$a^2 + b^2 = c^2$
8	With usual notation area of triangle ABC is:	$\sqrt{(s-a)(s-b)(s-c)}$	$\frac{b}{a\sin\beta}$	$ab\sin\gamma$	$\frac{ac\sin\beta}{2}$
9	$\tan\left(\tan^{-1}(-1)\right) =$:	$\frac{\pi}{4}$	$\frac{-\pi}{4}$	–1	1
10	If $\sin x = \frac{1}{2}$, then x = :	$\frac{-\pi}{6}, \frac{-5\pi}{6}$	$\frac{-\pi}{6}, \frac{5\pi}{6}$	$\frac{\pi}{6}, \frac{5\pi}{6}$	$\frac{\pi}{3}, \frac{2\pi}{3}$
11	The set, S = { 1 } is closed under:	Multiplication	Addition	Subtraction	Division
12	$p \wedge \sim q$ is a / an:	Absurdity	Tautology	Inverse	Converse
13	If $A = \begin{bmatrix} x & 1 \\ 1 & 1 \end{bmatrix}$ and $\lvert A \rvert = 1$, then x = :	3	1	2	0
14	The matrix [a b c d] is a _____ matrix.	Square	Row	Unit	Null
15	For what value of K will equation $x^2 - Kx + 4 = 0$ have sum of roots equal to product of roots?	3	–2	–4	4
16	Which is a factor of $x^n + a^n$, $n \in O$?	x + a	x – a	x = 0	x – 2a
17	$\frac{p(x)}{x^2+1}$ will be proper fraction if degree of p(x) = :	1	4	2	3
18	No, term of the geometric sequence is:	1	0	2	–1
19	If two numbers are $3\sqrt{5}$ and $5\sqrt{5}$, then arithmetic mean will be:	$8\sqrt{5}$	$4\sqrt{5}$	$2\sqrt{5}$	$6\sqrt{5}$
20	${}^6P_4 =$:	3450	361	360	363

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Intermediate Part First

Roll No. _____

MATHEMATICS (Subjective) Group – II

Time: 02:30 Hours Marks: 80

SECTION – I

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

(i) State trichotomy property of real numbers.

(ii) Express $\frac{i}{1+i}$ in the form of $a + bi$

(iii) Write the descriptive and tabular form of set $A = \{x : x \in E \wedge 4 \leq x \leq 10\}$

(iv) Find the converse and inverse of $q \rightarrow p$

(v) Define group.

(vi) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$

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

(viii) Let $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 2 & -1 \\ -1 & 3 & 2 \end{bmatrix}$, show that $A + A^t$ is symmetric.

(ix) Find three cube roots of unity.

(x) Show that $x + a$ is a factor of $x^n + a^n$ where n is odd integer.

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

(xii) Show that roots of equation $(p+q)x^2 - px - q = 0$ are rational.

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

(i) $\frac{3x^2+1}{x-2}$ is an improper fraction, convert into proper fraction.

(ii) Find a_8 for the sequence $1, 1, -3, 5, -7, 9, \ldots\ldots$

(iii) Sum the series $(-3) + (-1) + 1 + 3 + \ldots\ldots + a_{16}$

(iv) Find the nth term of H.P. $\frac{1}{2}, \frac{1}{5}, \frac{1}{8} \ldots\ldots$

(v) Find the sum of infinite geometric series $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots\ldots$

(vi) Define arithmetic progression.

(vii) Evaluate $\frac{8!}{6!}$

(viii) How many signals can be made with 4-different flags when any number of them are to be used at a time?

(ix) Find the value of n when ${}^nC_5 = {}^nC_4$

(x) Expand $\left(\frac{a}{2} - \frac{2}{a}\right)^6$

(xi) Find the term independent of x in the expansion of $\left(\frac{x}{2} + \frac{2}{x^2}\right)^{12}$

(xii) Using binomial theorem, find the value of $\sqrt{99}$ up to three places of decimals.

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

(i) Find θ, when $\ell = 3.2m$, $r = 2m$

(ii) Prove the identity $\cot^4\theta + \cot^2\theta = \operatorname{cosec}^4\theta - \operatorname{cosec}^2\theta$

(iii) For $\theta = \frac{-71}{6}\pi$, find the values of $\sin\theta$ and $\cos\theta$

(iv) Show that $\cos 330° \sin 600° + \cos 120° \sin 150° = -1$

(v) Prove that $\sin 2\alpha = 2\sin\alpha\cos\alpha$

(vi) Express $2\sin 7\theta \sin 2\theta$ as a sum or difference.

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

(viii) In the triangle ABC if $a = 36.21$, $c = 30.14$, $\beta = 78°10'$ find angle γ

(ix) The area of triangle is 2437. If $a = 79$, $c = 97$ find angle β.

(x) Show that $r_2 = s\tan\frac{\beta}{2}$

(xi) Without using table / calculator show that $\cos^{-1}\frac{4}{5} = \cot^{-1}\frac{4}{3}$

(xii) Find the solutions of $\operatorname{cosec} x = 2$, $x \in [0, 2\pi]$

(xiii) Solve $\sin x + \cos x = 0$

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

5. (a) Solve the system of linear equations by Cramer's rule: 05

$$\begin{aligned} 2x_1 - x_2 + x_3 &= 8 \\ x_1 + 2x_2 + 2x_3 &= 6 \\ x_1 - 2x_2 - x_3 &= 1 \end{aligned}$$

(b) Solve the equation: $x^2 - \frac{x}{2} - 7 = x - 3\sqrt{2x^2 - 3x + 2}$ 05

6. (a) Resolve into partial fractions: $\frac{2x^4}{(x-3)(x+2)^2}$ 05

(b) Find value of n and r when ${}^{n-1}C_{r-1} : {}^{n}C_{r} : {}^{n+1}C_{r+1} = 3:6:11$ 05

7. (a) The sum of three numbers in A.P is 24 and their product is 440. Find the numbers. 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) Prove the identity $\frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta} + \frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{2}{1 - 2\sin^2\theta}$ 05

(b) Prove that $\frac{\sin\theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta} = \tan 4\theta$ 05

9. (a) Prove that $r_3 = s\tan\frac{\gamma}{2}$ 05

(b) Prove that $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65} = \frac{\pi}{2}$ 05