FBD-42-21

Roll No. : _____

Objective
Paper Code
6196

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.**

S.#	Questions	A	B	C	D
1	For any two real numbers a and b, G^2 is equal to:	AH	$\frac{H}{A}$	$\frac{A}{H}$	$\sqrt{AH}$
2	If $\frac{1}{5}$, $\frac{1}{8}$ are two harmonic means between a and b, then value of b is:	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{1}{11}$	$\frac{1}{13}$
3	If $a_n = n + (-1)^n$, then a_{10} = :	10	11	9	–11
4	$\frac{P(x)}{x^2+1}$ is proper fraction, if degree of the polynomial P(x) is:	Equal to 2	Greater than 2	Not equal to 2	Less than 2
5	Degree of a constant polynomial is:	1	0	2	Arbitrary
6	If one root of $x^2 + ax + 2 = 0$ is 2, then value of a is:	3	4	3	– 2
7	If $A = \begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$, then cofactor of 6 is:	1	– 6	– 1	3
8	The matrix [7] is:	Row matrix	Square matrix	Column matrix	All these
9	If $\sim p \rightarrow q$ is a conditional, then its converse is:	$q \rightarrow \sim p$	$\sim q \rightarrow p$	$p \rightarrow \sim q$	$\sim q \rightarrow \sim p$
10	If r is the radius and C is the circumference of a circle, then value of $\frac{C}{r}$ = :	π	$\frac{\pi}{2}$	2π	$\frac{1}{2\pi}$
11	The solution of equation $\tan x = \frac{1}{\sqrt{3}}$ lies in quadrants:	I & II	I & III	II & IV	I & IV
12	If $x = \sin^{-1}\frac{\sqrt{3}}{2}$, then value of x is:	$\frac{-\pi}{2}$	$\frac{-\pi}{3}$	$\frac{\pi}{3}$	$\frac{\pi}{6}$
13	With usual notations, $\frac{abc}{\Delta}$ = :	4R	r	R	rs
14	In any triangle ABC, if two sides and their included angle is given, then area of triangle is:	$\Delta = \frac{1}{2}bc\sin\alpha$	$\frac{1}{2}ab\sin\gamma$	$\Delta = \frac{1}{2}ac\sin\beta$	All these
15	Period of $2\operatorname{cosec}\frac{x}{4}$ is:	$\frac{\pi}{2}$	4π	2π	8π
16	Value of $\sin 7\pi$ is equal to:	1	$\frac{1}{2}$	– 1	0
17	Angle $\frac{5\pi}{9}$ lies in quadrant:	I	III	II	IV
18	If $\ell = 1.5$cm , r = 2.5cm, then value of θ is:	3.75 rad	$\frac{3}{5}$ rad	0.60 rad	$\frac{5}{3}$ rad
19	The 2nd term in the expansion of $(1-2x)^{\frac{1}{3}}$ is:	$-\frac{2}{3}x$	$\frac{2}{3}x$	$\frac{4}{9}x^2$	$\frac{3}{2}x$
20	The number of permutations of the word PANAMA are:	10	60	20	120

Intermediate Part First

MATHEMATICS (Subjective) Group – II

Roll No. _____

Time: 02:30 Hours Marks: 80 FBD-G2-21

SECTION – I

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

(i) Simplify $(-1)^{\frac{-21}{2}}$

(ii) Show that $z\bar{z} = |z|^2$

(iii) Find multiplicative inverse of $-3-5i$

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

(v) Write $\{x \mid x \in 0 \wedge 3 < x < 12\}$ in descriptive and tabular form.

(vi) Show that subtraction is non-commutative on 'N'.

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

(viii) Find inverse of $\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$

(ix) Without expansion show that $\begin{vmatrix} 6 & 7 & 8 \\ 3 & 4 & 5 \\ 2 & 3 & 4 \end{vmatrix} = 0$

(x) Evaluate $(1+\omega-\omega^2)^8$

(xi) When the polynomial x^3+2x^2+kx+4 is divided by $x-2$, the remainder is 14. Find value of k.

(xii) If α, β are the roots of $3x^2-2x+4=0$, then find the value of $\frac{1}{\alpha^2}+\frac{1}{\beta^2}$

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

(i) Write only partial fraction form of $\frac{x^2+1}{x^3+1}$ without finding constants.

(ii) Resolve $\frac{7x+5}{(x+3)(x+4)}$ into partial fraction.

(iii) Find the 13th term of the sequence $x, 1, 2-x, 3-2x, \ldots\ldots$

(iv) Show that reciprocals of the terms of the geometric sequence $a_1, a_1r^2, a_1r^4, \ldots\ldots$ form another geometric sequence.

(v) If $y = 1+\frac{x}{2}+\frac{x^2}{4}+\ldots\ldots$ show that $x = 2\left(\frac{y-1}{y}\right)$

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

(vii) Write $\frac{(n+1)(n)(n-1)}{3\cdot 2\cdot 1}$ in the factorial form.

(viii) Find the value of n when ${}^{n}P_4 : {}^{n-1}P_3 = 9:1$

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

(x) Prove the formula $1+2+4+\ldots\ldots+2^{n-1} = 2^n-1$ for $n = 1, 2$

(xi) Using binomial theorem, expand $(a+2b)^5$

(xii) Expand $(2-3x)^{-2}$ upto 4-terms.

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

(i) Find θ when $\ell = 1.5\text{cm}$; $r = 2.5\text{cm}$

(ii) Verify $\sin 60° \cos 30° - \cos 60° \sin 30° = \sin 30°$

(iii) Prove that $2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

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

(v) Prove that $\cos(\alpha+45°) = \frac{1}{\sqrt{2}}(\cos\alpha - \sin\alpha)$

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(vi) Express $2\sin(3\theta)\cos\theta$ as sum or difference.

(vii) Find the period of $\tan\left(\frac{x}{7}\right)$

(viii) Find the value of $\sin 53°40'$

(ix) Find area of triangle ABC, if $a = 200$; $b = 120$ and $\gamma = 150°$

(x) Find the value of α if $a = 7$; $b = 7$, $c = 9$

(xi) Show that $\tan(\sin^{-1} x) = \frac{x}{\sqrt{1-x^2}}$

(xii) Solve the equation $\sin x = \frac{1}{2}$

(xiii) Find the solutions of $\cot\theta = \frac{1}{\sqrt{3}}$; $\theta \in [0\ ,\ 2\pi]$

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

5. (a) Show that $\begin{vmatrix} x & 1 & 1 & 1 \\ 1 & x & 1 & 1 \\ 1 & 1 & x & 1 \\ 1 & 1 & 1 & x \end{vmatrix} = (x+3)(x-1)^3$ 05

(b) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2$ 05

6. (a) Resolve into partial fraction: $\frac{1}{(x-1)(2x-1)(3x-1)}$ 05

(b) For what value of n, $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the positive geometric mean between a and b. 05

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

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

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

(b) Prove without using calculator $\sin 19°\cos 11° + \sin 71°\sin 11° = \frac{1}{2}$ 05

9. (a) Show that $r_3 = 4R\cos\frac{\alpha}{2}\cdot\cos\frac{\beta}{2}\cdot\sin\frac{\gamma}{2}$ 05

(b) Prove that $\sin^{-1}\frac{5}{13} + \sin^{-1}\frac{7}{25} = \cos^{-1}\frac{253}{325}$ 05