FBD-11-18

Roll No. : _____

Objective
Paper Code
6191

Intermediate Part First

MATHEMATICS (Objective)

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	$(7,9)+(3,-5)=$:	$(7,9)$	$(4,10)$	$(3,-5)$	$(10,4)$
2	$\{x \mid x \in E \text{ and } 4<x<6\}$ equals:	4	5	6	ϕ
3	The order of matrix A is 3×2 then order of A^tA is:	3×2	3×3	2×2	2×3
4	The value of $\begin{vmatrix} 1 & 12 & 25 \\ 0 & 3 & 15 \\ 0 & 0 & 8 \end{vmatrix}$ is :	0	1	8	24
5	The product of the roots of the equation $ax^2+bx+c=0$ is:	$\frac{b}{a}$	$-\frac{b}{a}$	$\frac{c}{a}$	$-\frac{c}{a}$
6	Cube roots of unity are:	$-1,-2,1$	$1,-1,\omega$	$1,\omega,\omega^2$	$-1,-\omega,\omega^2$
7	The conditional equation $5x=4$ is true if $x=$:	4	5	$\frac{5}{4}$	$\frac{4}{5}$
8	An infinite geometric series is convergent if:	$\lvert r\rvert \le 1$	$\lvert r\rvert < 1$	$\lvert r\rvert < 2$	$\lvert r\rvert > 1$
9	Geometric mean between 2i and 8i is:	± 4	4	$\pm 4i$	-4
10	Factorial form of $6 \cdot 5 \cdot 4$ is :	$\frac{6!}{3!}$	$\frac{6!}{2!}$	$6!$	$3!$
11	${}^nC_r + {}^nC_{r-1} =$: (usual notation)	${}^nC_r$	${}^{n+1}C_r$	${}^{n+1}C_{r+1}$	${}^{n-1}C_{r-1}$
12	The inequality $n! \ge 2^n - 1$ is valid if n is:	$n=3$	$n \le 3$	$n<4$	$n \ge 4$
13	The number of terms in the expansion of $(2a+b)^{13}$ is:	13	14	15	12
14	One radian is equal to:	45°	50°	60°	57.296°
15	$2\sin^2\frac{\theta}{2} =$:	$1+\cos\theta$	$1-\sin\theta$	$1+\sin\theta$	$1-\cos\theta$
16	The period of $\cos\left(\frac{x}{2}\right)$ is:	4π	2π	$\frac{\pi}{2}$	π
17	A tree of 8 meters high has shadow 8m in length, then angle of elevation of sun at the moment is:	15°	30°	45°	60°
18	With usual notation $\frac{abc}{4\Delta} =$:	r	r_2	R	2r
19	$\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3} =$:	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$
20	If $\cos x = \frac{1}{\sqrt{2}}$, then reference angle is:	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$

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Intermediate Part First

MATHEMATICS (Subjective)

Time: 02:30 Hours Marks: 80

Roll No. _____

SECTION – I

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

(i) Simplify by justifying each step mentioning each property: $\dfrac{\frac{a}{b}+\frac{c}{d}}{\frac{a}{b}-\frac{c}{d}}$

(ii) Factorize: $9a^2 + 16b^2$

(iii) Show that $\forall Z \in C$, $Z^2 + Z^{-2}$ is a real number.

(iv) Write the power set of $\{ a , \{ b , c \} \}$

(v) Show that the statement $\sim (p \rightarrow q) \rightarrow p$ is a tautology.

(vi) Write the inverse of relation $\{ (x , y) | y = 2x + 3 , x \in R \}$. Is it inverse a function or not?

(vii) If $A = \begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}$ and $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, find 'a' and 'b'.

(viii) Find the multiplicative inverse of the matrix $A = \begin{bmatrix} 3 & -1 \\ 2 & 1 \end{bmatrix}$.

(ix) Without expansion show that $\begin{vmatrix} bc & ca & ab \\ \frac{1}{a} & \frac{1}{b} & \frac{1}{c} \\ a & b & c \end{vmatrix} = 0$

(x) Solve the equation by completing the square: $x^2 + 4x - 1085 = 0$

(xi) Prove that $\left(\dfrac{1+\sqrt{-3}}{2}\right)^9 + \left(\dfrac{1-\sqrt{-3}}{2}\right)^9 = -2$

(xii) When $x^4 + 2x^3 + K x^2 + 3$ is divided by 'x – 2', the remainder is 1. Find the value of K.

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

(i) Resolve $\dfrac{x^2+1}{(x+1)(x-1)}$ into partial fractions.

(ii) Find the next two terms of 1 , 3 , 7 , 15 , 31 , ...

(iii) If $S_n = n (2n - 1)$, then find the series.

(iv) Find the geometric mean (G.M.) between – 2i and 8i

(v) Find the vulgar fraction equivalent to recurring decimal 0.7°

(vi) If the numbers $\dfrac{1}{K}$, $\dfrac{1}{2K+1}$ and $\dfrac{1}{4K-1}$ are in harmonic sequence, find K.

(vii) Express in factorial form $\dfrac{(n+1)n(n-1)}{3 \cdot 2 \cdot 1}$

(viii) Find the value of n, when ${}^{n}C_{10} = \dfrac{12 \times 11}{2!}$. (C is used for combination)

(ix) If the sample space = { 1 , 2 , 3 , ... 9 } Events A = { 2 , 4 , 6 , 8 } and B = { 1 , 3 , 5 }, find P (AUB) = ?

(x) Calculate by means of binomial theorem $(0.97)^3$

(xi) Define a mathemtatical induction.

(xii) Expand upto 4 terms $(1 + 2x)^{-1}$

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

(i) What is the circular measure of angle between the hands of watch at 4'O clock?

(ii) Find x if $\tan^2 45^{\circ} - \cos^2 60^{\circ} = x \cdot \sin 45^{\circ} \cdot \cos 45^{\circ} \cdot \tan 60^{\circ}$

(iii) Prove that $\sec^2 \theta - \operatorname{cosec}^2 \theta = \tan^2 \theta - \cot^2 \theta$

(iv) If ΔABC, $\alpha + \beta + \gamma = 180^{\circ}$, then prove that $\cos (\alpha + \beta) + \cos \gamma = 0$

(v) Prove that $\tan\left(\dfrac{\pi}{4} - \theta\right) + \tan\left(\dfrac{3\pi}{4} + \theta\right) = 0$

(Continued P/2)

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(vi) Show that $\frac{\sin 2\theta}{1+\cos 2\theta} = \tan\theta$

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

(viii) In a right ΔABC, if $\gamma = 90°$; $c = 10$; $b = 5$ then find 'a' and 'α'

(ix) The area of ΔABC is 2437. If $a = 79$; $c = 97$, then find 'β'

(x) If $a = 13$; $b = 14$; $c = 15$, then find R

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

(xii) Define trigonometric equation. Give an example.

(xiii) Solve $\sin x \cdot \cos x = \frac{\sqrt{3}}{4}$ in $[0, 2\pi]$

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

5. (a) Convert $(A \cap B) \cap C = A \cap (B \cap C)$ into logical form and prove by constructing truth table when A , B , C are three non-empty sets. 05

(b) If $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 2 & -1 \\ -1 & 3 & 2 \end{bmatrix}$, show that $A + A^t$ is symmetric. 05

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

(b) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2$, $a \neq 0$, $b \neq 0$ 05

7. (a) The sum of three numbers in A.P. is 24 and their product is 440. Find the numbers. 05

(b) Find the term independent of x in $\left(x - \frac{2}{x}\right)^{10}$ 05

8. (a) Show that $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$ 05

(b) Prove that $\cos 20° \cos 40° \cos 60° \cos 80° = \frac{1}{16}$ (without using calculator) 05

9. (a) Prove that in triangle ABC $abc(\sin\alpha + \sin\beta + \sin\gamma) = 4\Delta S$ 05

(b) Prove that $\sin^{-1}\frac{1}{\sqrt{5}} + \cot^{-1} 3 = \frac{\pi}{4}$ 05