Roll No. : ____________

FSD

Objective
Paper Code
6191

Intermediate Part First

MATHEMATICS (Objective) Group – I

Time: 30 Minutes Marks: 20

F-BO-G1-21

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	$(7,9)+(3,-5)=$:	$(7,9)$	$(3,-5)$	$(10,4)$	$(4,10)$
2	Which cannot be used as binary operation?	Addition '+'	Division '÷'	Multiplication '×'	Square root '$\sqrt{\ }$'
3	If adjoint of a matrix $A=\begin{bmatrix}-1 & -2\\ 3 & 4\end{bmatrix}$, then matrix A is:	$\begin{bmatrix}-1 & -2\\ 4 & 3\end{bmatrix}$	$\begin{bmatrix}-4 & 3\\ -2 & 1\end{bmatrix}$	$\begin{bmatrix}4 & 2\\ 3 & -1\end{bmatrix}$	$\begin{bmatrix}4 & 2\\ -3 & -1\end{bmatrix}$
4	Rank of the matrix $\begin{bmatrix}1\\1\\1\\0\end{bmatrix}$ is:	0	1	2	3
5	Which equation has roots 2 and -3 ?	$x^2+x+6=0$	$x^2+x-6=0$	$x^2-x-6=0$	$x^2-x+6=0$
6	If roots of the equation $x^2+px+q=0$ are additive inverse of each other, then which is true?	$p=0$	$q=1$	$p=1$	$p=q$
7	$\frac{x^2+x-1}{Q(x)}$ will be an improper fraction, if:	Degree of $Q(x)=2$	Degree of $Q(x)>2$	Degree of $Q(x)=3$	Degree of $Q(x)\neq 2$
8	Sum of 5 A.Ms between 2 and 8 is:	10	40	25	50
9	If a and b are negative distinct real numbers, then with usual notations, which is correct?	$A>G$	$H<G$	$A<G$	$A>G>H$
10	Which cannot be the term of a G.P. ?	-1	0	1	5
11	A coin is tossed 5 times, then total number of outcomes $n(S)=$:	10	25	20	32
12	2nd term in the expansion of $(1-x)^{-1}$ is:	1	$2x$	x	$-x$
13	$\sec\theta\cdot\operatorname{cosec}\theta\cdot\sin\theta\cdot\cos\theta=$	1	-1	0	Cannot be determined
14	In a right angled triangle, the side opposite to right angle is called:	Base	Hypotenuse	Perpendicular	Altitude
15	If $\sin\alpha=\frac{2}{3}$, $\cos\alpha=\frac{3}{4}$, then value of $\sin 2\alpha=$:	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{15}{144}$	1
16	Period of $2+\cos 3x$ is:	π	$\frac{3\pi}{2}$	2π	$\frac{2\pi}{3}$
17	In any triangle ABC, $a=4$, $b=10$, $\gamma=30°$, then area of triangle $\Delta=$:	5 sq.units	20 sq.units	10 sq.units	40 sq.units
18	If a, b and c are the sides of a triangle ABC, then $\frac{c^2+b^2-a^2}{2bc}=$:	$\cos\alpha$	$\cos\gamma$	$\cos\beta$	$\cos^2\alpha$
19	If $\sin^{-1}a=0$, then value of a is:	$\frac{\pi}{2}$	π	0	$0\ \&\ \pi$
20	The solution of the equation $2\sin x+\sqrt{3}=0$ in 4th quadrant is:	$\frac{\pi}{3}$	$\frac{5\pi}{3}$	$\frac{-\pi}{4}$	$\frac{-\pi}{6}$

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Intermediate Part First Roll No. __________

MATHEMATICS (Subjective) Group – I

Time: 02:30 Hours Marks: 80 FBD-G1-21

SECTION – I

2. Attempt any EIGHT parts: 16

(i) Does the set { 1 , – 1} possess closure property with respect to addition and subtraction?

(ii) Find the difference and product of the complex numbers (8 , 9) and (5 , – 6)

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

(iv) If U = { 1, 2, 3, 4, 5, ... , 20 } and A = {1, 3, 5, ... , 19 } verify $A \cup A' = U$

(v) Write the inverse and contrapositive of the conditional $\sim q \to \sim p$

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

(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) If A and B are square matrices of the same order, then explain why in general $(A+B)(A-B) \neq A^2 - B^2$

(ix) Without expansion verify that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

(x) Use the remainder theorem to find remainder when first polynomial is divided by second polynomial $x^2 + 3x + 7\ ,\ x + 1$

(xi) Find the condition that one root of the equation $x^2 + px + q = 0$ is multiplicative inverse of the other.

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

3. Attempt any EIGHT parts: 16

(i) Resolve $\dfrac{3x-11}{(x^2+1)(x+3)}$ into partial fractions without finding constants.

(ii) Change $\dfrac{6x^3+5x^2-7}{2x^2-x-1}$ into proper rational fraction.

(iii) Find the indicated term of the sequence 1, – 3, 5, – 7, 9, – 11, ... , a_8

(iv) If $a_{n-3} = 2n - 5$ find the nth term of the sequence.

(v) Find the nth term of the geometric sequence if $\dfrac{a_5}{a_3} = \dfrac{4}{9}$ and $a_2 = \dfrac{4}{9}$

(vi) Find A, G, H and verify that A > G > H (G > 0) if a = 2 and b = 8.

(vii) Write n(n – 1)(n – 2) . . . . . (n – r + 1) in factorial form.

(viii) Find the value of n when ${}^nP_2 = 30$

(ix) A die is rolled. What is the probability that the dots on the top are greater than 4.

(x) Using binomial theorem expand $(a + 2b)^5$.

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

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

4. Attempt any NINE parts: 18

(i) Find ℓ, when $\theta = \pi$ radians , r = 6cm

(ii) Verify $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4} = 2$

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

(iv) Without using the table, find the value of sin(–300°)

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

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

(vii) Find the period of $\tan\dfrac{x}{7}$

(viii) Find the greatest angle of triangle ABC if a = 16 , b = 20 , c = 33

(Continued P . . . . . 2)

(ix) Find area of triangle ABC, given sides are $a = 18$, $b = 24$, $c = 30$

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

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

(xii) Find the solution of the equation $\sin x = \frac{-\sqrt{3}}{2}$ which lies in $[0, 2\pi]$

(xiii) Solve $\cot\theta = \frac{1}{\sqrt{3}}$ where $\theta \in [0, 2\pi]$

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

5. (a) Show that $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$ 05

(b) If α, β are the roots of equation $ax^2 + bx + c = 0$ then form the equation whose roots are $\frac{1}{\alpha^3}, \frac{1}{\beta^3}$ 05

6. (a) Resolve into partial fractions: $\frac{9}{(x+2)^2(x-1)}$ 05

(b) If the H.M and A.M between two numbers are 4 and $\frac{9}{2}$ respectively, find the numbers. 05

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

(b) Determine the middle term in the expansion of $\left(\frac{1}{x} - \frac{x^2}{2}\right)^{12}$ 05

8. (a) If $\cot\theta = \frac{5}{2}$ and the terminal arm of the angle is in the I-quadrant, find the values of $\frac{3\sin\theta + 4\cos\theta}{\cos\theta - \sin\theta}$ 05

(b) Prove that $\frac{2\sin\theta\sin 2\theta}{\cos\theta + \cos 3\theta} = \tan 2\theta\tan\theta$ 05

9. (a) Show that $\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} = \frac{a^2+b^2+c^2}{\Delta^2}$ 05

(b) Prove that $2\tan^{-1}\frac{2}{3} = \sin^{-1}\frac{12}{13}$ 05

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