1124	Warning:- Please	write vou	r Roll No. in	the space	nrovided and s	ion Roll	No		
	r Part – I)		2020-22 to				ent		
Math	ematics (Objective)		(Group-II)	- 1	0-2-24	•	er (I)		
Time Allowed:- 30 minutes PAPER CODE 2198 Maximum Marks:- 20 Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed. Q. 1 1) The transpose of a rectangular matrix is a									
	(A) Square matrix	(B)]	Diagonal mat	rix (C)	Rectangular ma	atrix (D) S	Scalar matrix		
2)	$1-\omega+\omega^2=$						•		
	(A) -1	(B) ()	(C)	$-\omega$	(D) -	-2ω		
3)	The quadratic equation with roots $3-\sqrt{3}$, $3+\sqrt{3}$ is								
	(A) $x^2 + 4x + 1 = 0$	(B).	$x^2 - 4x + 1 = 0$	(C)	$x^2 - 6x + 6 = 0$	· (D)	$x^2 - 6x - 6 = 0$		
4)	The reflexive property of equality of real numbers is that $\forall \alpha \in \mathbb{R}$								
	(A) $a = a$	(B)	$a \neq a$	(C)	a < a	(D)	a > a		
5)	$ Z ^2 =$				*0				
	(A) Z^2	(B)	$Z\overline{Z}$	(C)	\bar{Z}^2	(D)	Z		
6)	$\{x \mid x \in \mathbb{N}, x \le 10\}$ is the								
	(A) Discriptive met	thod (B)	Tabular meth	od (C)	Set builder met	hod (D) 1	Non-discriptive method		
7)	p: 4 < 7, $q: 6 > 1$	1, the d	isjunction p	$\vee q$ is					
	(A) False	(B)	True	(C)	Not valid	(D) t	ınknown		
8)	The identity element of a set X with respect to intersection in P(X) is								
	(A) 0	(B)	*		Does not exist	(D) X	(
9)	If $A = \begin{bmatrix} x & 1 \\ 1 & 1 \end{bmatrix}$ and (A) $\frac{8}{7}$	$\frac{1}{ A } = 7 , t$	hen $x =$						
	(A) $\frac{8}{7}$	(B)	78	(C)	$\frac{9}{7}$	(D) 7			
P.T.O 1127 1124 11000 (4)									

	(2)	- (1n	2.1					
10) $r_1 r_2 r_3 =$		5417-2-						
(A) Rr^2	(B) rR^2	$(C)_{.}RS^{2}$	(D) YS					
11) $2\cos^{-1} A =$								
(A) $\sin^{-1}\{2A^2-1\}$	(B) $\sin^{-1}\{A^2-2\}$	(C) $\cos^{-1}\{2A^2-1\}$	(D) $\cos^{-1}\{A^2-2\}$					
12) $\cos x = -\frac{1}{\sqrt{2}}$ and $x \in [0]$	$[0,\pi]$ then $x=$							
(A) $\frac{3\pi}{4}$	(B) $\frac{5\pi}{4}$	(C) $\frac{\pi}{4}$	(D) $\frac{-\pi}{4}$					
13) $(x-4)^2 = x^2 - 8x + 16$ is								
(A) A linear equation	(B) Cubic equation	(C) An equation	(D) An identity					
14) A number A is said to be the arithmatic mean between two numbers a and b if a, A, b is								
(A) G.P	(B) A.P	(C) H.P	(D) Not a sequence					
15) If $a = 3$, $r = 2$ then nth	n term of the G.P is							
(A) 3.2^{n-1}	(B) 2.3^{n-1}	(C) 3.2 ⁿ	(D) 3.2^{n+1}					
16) $n(n-1)(n-2)(n-3)$	(n-r+1)=	3						
(A) $n!r!$	(B) $\frac{n!}{r!}$	$(C) \frac{n!}{(n-\kappa)!}$	(D) n!					
17)The sum of the odd cod	efficients in the expansion	$(1+x)^3$ is						
(A) 4	(B) 8	(C) 12	(D) 16					
18) 120° = radia								
$(A) \ \frac{3\pi}{2}$	(B) $\frac{2\pi}{3}$	(C) $\frac{\pi}{2}$	(D) 180π					
$19) \ 2\sin^2\left(\frac{\alpha}{2}\right) =$			*					
(A) $1 + \sin \alpha$	(B) $1-\sin\alpha$	(C) $1+\cos\alpha$	(D). $1-\cos\alpha$					
20) The range of $\sin x$ is								
(A) [-1, 1]	(B)]-1, 1[(C) IR	(D)]-1, 1]					
	1127 1124	 11000 (4)						

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Mathematics (Subjective)

(Session 2020-22 to 2023-25)

Paper (I)

Time Allowed: 2.30 hours

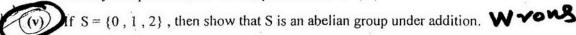
(Inter Part - I) (Group-II)

Maximum Marks: 80

Section --Answer briefly any Eight parts from the followings:-

$$8 \times 2 = 16$$

- Prove the rule of addition $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$ (i)
- Separate real and imaginary parts $\frac{2-7i}{4+5i}$ (iii) Find the multiplicative inverse of -3-5i(ii)
- For any complex number $z \in C$, prove that $z \cdot \overline{z} = |z|^2$



(vi) Construct the truth table of the statement $(p \land \neg p) \rightarrow q$

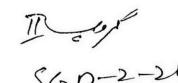
(vii) If
$$B = \begin{bmatrix} 5 & -2 & 5 \\ 3 & -1 & 4 \\ -2 & 1 & -2 \end{bmatrix}$$
, then find B_{21} and B_{23} .

- If A is symmetric or skew-symmetric, show that A^2 is symmetric Find the matrix X if $X\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$ (ix)
- Show that the product of all the three cube roots of unity is unity. (x)
- If α , β are the roots of $x^2 px p c = 0$, prove that $(1 + \alpha)(1 + \beta) = 1 c$ (xi)
- Solve the equation $x^4 6x^2 + 8 = 0$ (xii)
 - Answer briefly any Eight parts from the followings:-3.
- (i) Define a Rational Fraction with example.
- Resolve into partial Fraction without determining the constants $\frac{3x^2 4x 5}{(x 2)(x^2 + 7x + 10)}$ (ii)
- If $\frac{1}{a}$, $\frac{1}{b}$ and $\frac{1}{c}$ are in A.P, show that $b = \frac{2ac}{a+c}$ (iv) If $S_n = n(2n+1)$, then find the series (iii)
- 4.M between two numbers is 5 and their positive G.M is 4. Find the numbers. (v)
- 15 is Harmonic Mean between 2 and b. Find b (vii) Find the value of n, when ${}^{n}P_{4}: {}^{n-1}P_{3}=9:1$ (vi)
- (viii) A die is rolled, what is the probability that the top shows dot 3 or 4.
- Find the number of the diagonals of a 6 sided figure. (x) State the principle of Mathematical induction. (ix)
- (xii) Find the general term of $\left(\frac{a}{2} \frac{2}{a}\right)^a$ Prove the formula 2+4+6+...2n = n(n+1)(xi)

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4. Answer briefly any Nine parts from the followings:-

$$9 \times 2 = 18$$

- (i) State fundamental identities.
- (ii) Verify that $\sin^2 \frac{\pi}{6} : \sin^2 \frac{\pi}{4} : \sin^2 \frac{\pi}{3} : \sin^2 \frac{\pi}{2} = 1 : 2 : 3 : 4$
- (iii) Prove that $\cos 330^{\circ} \sin 600^{\circ} + \cos 120^{\circ} \sin 150^{\circ} = -1$ &
- (iv) Show that $\cot(\alpha + \beta) = \frac{\cot \alpha \cot \beta 1}{\cot \alpha + \cot \beta}$
- (v) Prove that $\sin(\alpha + \beta) \sin(\alpha \beta) = 2\cos\alpha\sin\beta$
- (vi) Write down the Domain and Range of secant function. (vii) Find the period of $\tan 4x$
- (viii) Draw the graph of $y = \sin x$ from 0 to π
- (ix) Define the angles of elevation and depression. (x) What do you mean by oblique triangle.
- (xi) By using law of cosine, find α when a = 7, b = 3, c = 5
- (xii) Prove that $\sin^{-1} x = \frac{\pi}{2} \cos^{-1} x$
- (xiii) Solve the trigonometric equation $\cot^2 \theta = \frac{1}{3}$

Section -----II

Note: Attempt any three questions.

$$(10\times3=30)$$

- (a) Use Crammer's Rule to solve the systems of Linear equations $x_1 + x_2 2x_3 = -4$ $-x_1 + 2x_2 x_3 = 1$
 - (b) Find the values of a and b if -2 and 2 are the roots of the polynomial $x^3 4x^2 + ax + b$
- 6. (a) Resolve into partial fractions $\frac{x^2 + 2x + 2}{(x^2 + 3)(x + 1)(x 1)}$
 - (b) How many terms of the series -9 -6 -3 + 0 + amount to 66?
- 7. (a) Find values of n and r when ${}^{n-1}C_{r-1}:{}^{n}C_{r}:{}^{n+1}C_{r+1}=3:6:11$
 - (b) If $2y = \frac{1}{2^2} + \frac{1.3}{2!} \cdot \frac{1}{2!} + \frac{1.3.5}{3!} \cdot \frac{1}{2^6} + \dots$ then prove that $4y^2 + 4y 1 = 0$
- 8. (a) Prove that $\sin 10^{\circ} \cdot \sin 30^{\circ} \cdot \sin 50^{\circ} \cdot \sin 70^{\circ} = \frac{1}{16}$
 - (b) Using Law of tangents, solve the $\triangle ABC$ in which a = 36.21; c = 30.14; $\beta = 78^{\circ}10'$
- 9 (a) If $\csc\theta = \frac{m^2 + 1}{2m}$; m > 0; $0 < \theta < \frac{\pi}{2}$, then find the values of remaining trigonometric functions.
 - **(b)** Prove that $2 \tan^{-1} \left(\frac{1}{3} \right) + \tan^{-1} \left(\frac{1}{7} \right) = \frac{\pi}{4}$

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