Paper Code Number: 2197	2024 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No: ____________

MATHEMATICS PAPER-I GROUP-I

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TIME ALLOWED: 30 Minutes	OBJECTIVE	MAXIMUM MARKS: 20

Q.No.1 Your have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	Inverse of square matrix exists if it is:	Singular	Non-singular	Null	Symmetric
2	If A is skew symmetric, then A^2 will be ________.	Symmetric	Skew symmetric	Hermitian	Skew Hermitian
3	Product of roots of $x^2-5x+6=0$ is:	-6	6	5	-5
4	Roots of equation $cx^2+ax+b=0$ are complex if:	$b^2-4ac<0$	$c^2-4ab<0$	$a^2-4bc<0$	$a^2-4ac<0$
5	$\frac{1}{x^3+1}=\frac{1}{x+1}+\frac{----}{x^2-x+1}$ (Numenator of x^2-x+1)	$Bx+c$	B	C	$B+C$
6	Next term of 1, 3, 12, 60, ______ is:	120	180	240	360
7	General term of $-2, 1, 4, 7,$ ______ is:	$3n-2$	$3n-4$	$3n-3$	$3n-5$
8	A die is rolled, probability that dots on top are greater than 4:	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$
9	Sum of odd coefficients in expansion of $(1+x)^4$ is:	8	16	18	6
10	-1035^o is coterminal with ______	60^o	30^o	45^o	35^o
11	$\cos(\alpha+\beta)-\cos(\alpha-\beta)=$	$-2\cos\alpha\cos\beta$	$2\cos\alpha\cos\beta$	$2\sin\alpha\sin\beta$	$-2\sin\alpha\sin\beta$
12	Period of $\sec x$ is:	π	2π	3π	$\frac{\pi}{2}$
13	$\sqrt{\frac{s(s-a)}{bc}}=$ ____	$\cos\frac{\alpha}{2}$	$\sin\frac{\alpha}{2}$	$\tan\frac{\alpha}{2}$	$\cot\frac{\alpha}{2}$
14	$\tan[\tan^{-1}(-1)]=$ ______	1	-1	$\frac{\pi}{4}$	$-\frac{\pi}{4}$
15	$\sin x\cos x=\frac{\sqrt{3}}{4}$, then $x=$ ______	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$
16	$3x+y^2i=1-2i^2$, then value of x is:	$\frac{1}{3}$	1	3	Zero
17	If $z=\sqrt{3}+i$, then $\lvert z\rvert=$ ______	4	$\sqrt{3}-i$	$-\sqrt{3}+i$	2
18	Inverse of $p\to q$ is ____.	$\sim p\to\sim q$	$\sim q\to\sim p$	$\sim q\to p$	$q\to\sim p$
19	Set A contains 4 elements, then number of elements in its power set $P(A)$:	8	12	16	4
20	$\{1,-1\}$ is group with respect to:	Addition	Subtraction	Square root	Multiplication

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MATHEMATICS PAPER-I GROUP-I

TIME ALLOWED: 2.30 Hours	SUBJECTIVE	MAXIMUM MARKS: 80

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. $8\times 2=16$

(i) Simplify $(2, 6) \div (3, 7)$

(ii) Separate into real and imaginary parts $\dfrac{i}{1+i}$

(iii) $\forall z\in C$, prove that $|-z|=|z|=|\bar{z}|=|-\bar{z}|$

(iv) Find the multiplicative inverse of $-3-5i$.

(v) Express $\{x \mid x\in N \wedge x\le 10\}$ in descriptive and tabular form.

(vi) Show $B-A$ by Venn diagram when $A\subseteq B$

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

(viii) If $A=\begin{bmatrix} 1 & -1 \\ a & b \end{bmatrix}$, $A^2=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find the values of a and b.

(ix) Without expansion show that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}=0$

(x) Find roots of the equation $5x^2-13x+6=0$ by using quadratic formula.

(xi) Find four 4th roots of unity.

(xii) Solve the equation $4^x=\dfrac{1}{2}$

3. Attempt any eight parts. $8\times 2=16$

(i) Define Rational fraction.

(ii) Write in to partial fractions $\dfrac{8x^2}{(x^2+1)^2(1-x^2)}$ without finding constants.

(iii) Write the first four terms of the sequence $a_n=(-1)^n(2n-3)$

(iv) How many terms are there in A.P in which $a_1=11$, $a_n=68$, $d=3$?

(v) Sum the series $1+4-7+10+13-16+19+22-25+\_\_\_\_$ to $3n$ terms.

(vi) Find the sum of the infinite series $\dfrac{1}{2}+\dfrac{1}{4}+\dfrac{1}{8}+\_\_\_\_$

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

(viii) If ${}^nC_8={}^nC_{12}$, find n.

(ix) Determine the probability of getting 2 heads in two successive tosses of a balanced coin.

(x) Prove $2+6+18+\_\_\_\_+2\times 3^{n-1}=3^n-1$ for $n=1, 2$

(xi) Calculate $(21)^5$ by means of Binomial theorem.

(xii) Expand $(1+x)^{\frac{-1}{3}}$ up to 4 terms.

4. Attempt any nine parts. $9\times 2=18$

(i) In a right angle triangle ABC, prove that $\sin^2\theta+\cos^2\theta=1$

(ii) Prove that $\cot^2\theta-\cos^2\theta=\cot^2\theta\cos^2\theta$

(iii) Prove that $\sin 3\alpha=3\sin\alpha-4\sin^3\alpha$

(iv) Express the product as sum or difference $\sin 12^\circ\ \sin 46^\circ$

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

(vi) Define period of a trigonometric function.

(vii) Find the period of $\operatorname{cosec}\dfrac{x}{4}$

(viii) Draw the graph of $y=\tan x$ for $-\pi\le x\le\pi$.

(ix) Find area of triangle ABC, if $a=4.33$, $b=9.25$, $\gamma=56^\circ 44'$

(x) Find R, if sides of triangle ABC are $a=13$, $b=14$, $c=15$

(xi) Show that $\dfrac{1}{2rR}=\dfrac{1}{ab}+\dfrac{1}{bc}+\dfrac{1}{ca}$

(xii) Without using calculator, show that $\cos^{-1}\dfrac{4}{5}=\cot^{-1}\dfrac{4}{3}$

(xiii) Find the solution of $\sin x\cos x=\dfrac{\sqrt{3}}{4}$

SECTION-II

NOTE: Attempt any three questions. $3\times 10=30$

5.(a) Use synthetic division to find the values of p and q if $x+1$ and $x-2$ are the factors of the polynomial x^3+px^2+qx+6

(b) Use matrices to solve the system of equations $x_1-2x_2+x_3=-4$, $2x_1-3x_2+2x_3=-6$, $2x_1+2x_2+x_3=5$

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

(b) Show that the sum of n A.Ms. between a and b is equal to n times their A.M.

7.(a) Find values of n and r when ${}^nC_r=35$, ${}^nP_r=210$

(b) Using Mathematical induction to show that $1+2+2^2+\_\_\_\_+2^n=2^{n+1}-1$ for all non-negative integers n.

8.(a) Prove without using calculator $\sin 19^\circ\cos 11^\circ+\sin 71^\circ\sin 11^\circ=\dfrac{1}{2}$

(b) Solve the triangle ABC in which $a=36.21$, $c=30.14$ and $\beta=78^\circ 10'$.

9.(a) Prove that $\dfrac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}=\tan\theta+\sec\theta$

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

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Paper Code Number: 2198	2024 (1st-A) INTERMEDIATE PART-I (11^{th} Class)	Roll No: ________
MATHEMATICS PAPER-I GROUP-II		
TIME ALLOWED: 30 Minutes	OBJECTIVE	MAXIMUM 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 that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	Sum of binomial coefficients is:	2^n ●	n	$2n$	n^2
2	Trigonometric ratio of -330^o is same as:	60^o	30^o ●	45^o	90^o
3	$\frac{3\pi}{2}+\theta$ lies in quadrant:	1^{st}	2^{nd}	3^{rd}	4^{th} ●
4	Range of $y=\sin x$ is:	$(-1,1)$	$[-1,1)$	$[-1,1]$ ●	$(-1,1]$
5	In right triangle, no angle is greater than:	45^o	80^o	60^o	90^o ●
6	Domain of $y=\sin^{-1}(x)$ is:	$-1\le x\le 1$ ●	$-1\ge x\ge 1$	$-1<x<1$	$0\le x\le 1$
7	If $cox\,x=\frac{1}{\sqrt{2}}$, then reference angle is:	$\frac{\pi}{6}$	$\frac{\pi}{4}$ ●	$\frac{\pi}{3}$	$\frac{\pi}{2}$
8	Every non-recurring, non terminating decimals represents:	Rational number	Natural number	Irrational number ●	Whole number
9	The multiplicative inverse of complex number $(0,1)$ is:	$(0,-1)$ ●	$(0,1)$	$(-1,0)$	$(0,0)$
10	How many inverse elements correspond to each element of group?	At least two	Two	At least one	Only one ●
11	Set containing elements A or B is denoted by:	$A\cap B$	$A\cup B$ ●	$A\subseteq B$	$B\supseteq A$
12	$p\to q$ is called converse of:	$\sim p\to q$	$p\to q$	$q\to p$ ●	$\sim q\to p$
13	The inverse of square matrix exists if A is:	Singular	Non-singular ●	Symmetric	Rectangular
14	If A is a square matrix of order 2×2 then $\lvert KA\rvert$ equals:	$K\lvert A\rvert$	$\frac{1}{K}\lvert A\rvert$	$K^2\lvert A\rvert$ ●	$2K\lvert A\rvert$
15	If $4^x=\frac{1}{2}$ then x is equal to:	$-\frac{1}{2}$ ●	-2	$\frac{1}{2}$	$\frac{1}{4}$
16	The roots of the equation $x^2-5x+6=0$ are:	$2,-3$	$-2,-3$	$2,3$ ●	$-2,3$
17	The fraction $\frac{x-3}{x+1}$ is:	Improper ●	Proper	Identity	Equivalent
18	G.M between $\frac{1}{a}$ and $\frac{1}{b}$ is:	$-\frac{1}{ab}$	$\pm\sqrt{\frac{1}{ab}}$ ●	ab	$-\sqrt{ab}$
19	$\sum_{k=1}^{n}1$ is equal to:	1	n^3	n ●	n^2
20	$\frac{3!}{0!}$ is equal to:	3	6 ●	∞	12

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TIME ALLOWED: 2.30 Hours	SUBJECTIVE	MAXIMUM MARKS: 80

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i)	Simplify $(2, 6) \div (3, 7)$	(ii)	Find multiplicative inverse of $a + ib$
(iii)	Show that for all $z \in C$, $z\bar{z} = \lvert z \rvert^2$	(iv)	Simplify $\frac{3}{\sqrt{6}-\sqrt{-12}}$
(v)	For $A=\{1, 2, 3, 4\}$, state the domain and range of relation $\{(x, y) \mid x + y = 5\}$		
(vi)	Define Semi group.	(vii)	If $A=\begin{bmatrix}-2 & 3\\ -4 & 5\end{bmatrix}$, find A^{-1}
(viii)	If $A=\begin{bmatrix}2 & 3\\ 1 & 5\end{bmatrix}$, then show that $4A - 3A = A$	(ix)	If $A=\begin{bmatrix}1 & 2 & -3\\ 0 & -2 & 0\\ -2 & -2 & 1\end{bmatrix}$, then find A_{12}, A_{22}
(x)	Discuss the nature of roots of $2x^2 + 5x + 1 = 0$	(xi)	Evaluate $(1 + \omega - \omega^2)^8$
(xii)	Solve by completing the square $x^2 + 6x - 567 = 0$		

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3. Attempt any eight parts. $8 \times 2 = 16$

(i)	Define Identity. Give one example.		
(ii)	Write $\frac{2x-3}{x(2x+3)(x-1)}$ in partial fraction form without finding constants.		
(iii)	If $a_{n-3} = 2n - 5$, then find nth term of sequence.	(iv)	Find b if 5, 8 are two A.Ms. between a and b.
(v)	If $y = 1 + \frac{x}{2} + \frac{x^2}{4} + \_\_\_\_$, then find the interval in which the series is convergent.		
(vi)	If $\frac{1}{k}, \frac{1}{2k+1}, \frac{1}{4k-1}$ are in H.P, then find k.		
(vii)	In how many ways can 4 keys be arranged on a circular key ring?		
(viii)	Find the number of diagonals of 12 sided figure.		
(ix)	If $P(A)=\frac{1}{2}$; $P(B) = \frac{1}{2}$; $P(A \cap B) = \frac{1}{3}$, then find $P(A \cup B)$		
(x)	Prove that $4^n > 3^n + 2^{n-1}$ for $n = 2$ and $n = 3$	(xi)	Expand $\left(3a - \frac{x}{3a}\right)^4$ by binomial theorem.
(xii)	If x is so small that its square and higher powers be neglected, then show that $\sqrt{\frac{1-x}{1+x}} = 1 - x$		

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4. Attempt any nine parts. $9 \times 2 = 18$

(i)	Prove that $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4} = 2$	(ii)	Show that $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$
(iii)	Prove that $\sin(180^\circ + \alpha) . \sin(90^\circ - \alpha) = -\sin\alpha . \cos\alpha$	(iv)	Find the value of $\cos 105^\circ$
(v)	Show that $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$	(vi)	Write domain and range of $y = \sin x$
(vii)	Find the period of $\tan 4x$	(viii)	Draw the graph of $y = \sin x$ from 0 to π
(ix)	In ΔABC if $\beta=60^\circ$; $\gamma = 15^\circ$; $b = \sqrt{6}$, then find a and γ		
(x)	Find area of ΔABC in which $\alpha = 45^\circ 17'$; $\gamma = 36^\circ 41'$; $b = 25.4$	(xi)	Define inscribed circle
(xii)	Find the value of $\sec\left[\sin^{-1}\left(-\frac{1}{2}\right)\right]$	(xiii)	Define trigonometric equation. Give one example.

SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a)	Find the inverse of $A=\begin{bmatrix}2 & 1 & 0\\ 1 & 1 & 0\\ 2 & -3 & 5\end{bmatrix}$ and show that $A^{-1}A = I_3$
(b)	Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots, if $c^2 = a^2m^2 + b^2$; $a \neq 0$, $b \neq 0$
6.(a)	Resolve $\frac{x^2+1}{x^3+1}$ into partial fractions.
(b)	The sum of three numbers in an A.P is 24 and their product is 440. Find the numbers.
7.(a)	A number is chosen out of first fifty natural numbers. What is probability that chosen number is multiple of 3 or of 5.
(b)	Show that $\left[\frac{n}{2(n+N)}\right]^{\frac{1}{2}} = \frac{8n}{9n-N} - \frac{n+N}{4n}$ where n and N are nearly equal.
8.(a)	Prove without using calculator that $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \frac{1}{2}$
(b)	Find the area of the triangle ABC, when $\alpha = 35^\circ 17'$, $\gamma = 45^\circ 13'$ and $b = 42.1$
9.(a)	Prove the identity and state the domain of θ $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$
(b)	Prove that $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$

Paper Code Number: 2191	2023 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No: ______________

MATHEMATICS PAPER-I GROUP-I Multan Board-2023

TIME ALLOWED: 30 Minutes	OBJECTIVE	MAXIMUM 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 that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.**

S.#	QUESTIONS	A	B	C	D
1	The set $\{1, -1\}$ possess closure property under:	Multiplication	Addition	Subtraction	Division
2	If $'p'$ is logic statement then $p \wedge \sim p$ is:	Tautology	Absurdity	Contingency	Conditional
3	Determinant of any unit matrix has value:	Greater than 1	Less than 1	1	Zero
4	If order of a matrix A is $m \times n$ and order of matrix B is $n \times p$ then order of matrix $(AB)'$ is:	$m \times n$	$n \times m$	$m \times p$	$p \times m$
5	Reciprocal equation remain unchanged when $'X'$ is replaced by:	$-X$	$-\frac{1}{X}$	$\frac{1}{X^2}$	$\frac{1}{X}$
6	If ω is a cube root of unity then $1+\omega^{28}+\omega^{29}$ is equal to:	Zero	1	ω	ω^2
7	$\frac{x^2+1}{Q(x)}$ will be proper fraction if degree of $Q(x)$ is equal to:	0	1	2	3
8	$(n+1)th$ term of an A.P. is:	$a_1+(n-1)d$	$a_1-(n-1)d$	a_1+nd	a_1-nd
9	If A, G, H have their usual meaning [illegible] a and b are positive distinct real numbers and $G>0$ then:	A [illegible] H	[illegible] G < H	H > G > A	G > H > A
10	In how many ways, 5 [illegible] can be seated at a round tabl[illegible]	23	[illegible]4	25	26
11	With usual notation [illegible] is [illegible] to:	${}^nC_{[illegible]}$	${}^{[illegible]+1}C_r$	${}^nC_r$	${}^{n-1}C_r$
12	Number of terms in expansion of [illegible] $(1+x)^{2n+1}$, $'n'$ is positive integ[illegible]	$2n+2$	$2n+1$	$2n$	$3n+1$
13	In equality $n! > 2^n -$ [illegible] valid [illegible]:	$n<4$	$n \geq 4$	$n=3$	$n<3$
14	$\frac{\pi}{2}$ is an angle:	Acute	Obtuse	Quadrental	Non-quadrental
15	$\tan(\alpha - 90^\circ)$ is equal to:	$\cot\alpha$	$-\cot\alpha$	$\tan\alpha$	$-\tan\alpha$
16	Period of $3\sin 3x$ is:	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	π
17	If α, β, γ are angles of an oblique triangle then it must be true that:	$\alpha = 90^\circ$	$\beta = 90^\circ$	$\gamma = 90^\circ$	No angle is 90°
18	If ABC is right triangle then law of cosines reduces to:	Pythagoras theorem	Law of Sines	Area of triangle	Law of tangents
19	$y=\cos x$ is one to one function in interval:	$\left[0, \frac{2\pi}{3}\right]$	$[0, 2\pi]$	$[0, \infty]$	$[0, \pi]$
20	If $\cos 2x = 0$ then solution in first quadrant is:	30°	45°	60°	15°

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INTERMEDIATE PART-I (11th Class)	2023 (1st-A)	Roll No:
MATHEMATICS PAPER-I GROUP-I		
TIME ALLOWED: 2.30 Hours	SUBJECTIVE	MAXIMUM MARKS: 80

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i) Simplify as a simple complex number $(5,-4)\,(-3,-2)$

(ii) Express the complex number $1 + i\sqrt{3}$ in polar form.

(iii) Write the descriptive and tabular form of $\{x \mid x \in N \wedge x + 4 = 0\}$

(iv) For the sets $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 6, 8, 10\}$ verify the commutative property of intersection.

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

(vi) If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$

(vii) Without expansion show that $\begin{vmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{vmatrix} = 0$

(viii) Find the value of λ if matrix $A = \begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is singular.

(ix) Solve $x^2 - 2x - 899 = 0$ by completing square.

(x) Reduce $x^4 - 6x^2 + 10 - \frac{6}{x^2} + \frac{1}{x^4} = 0$ to quadratic form.

(xi) Discuss the nature of the roots of the equation $9x^2 - 12x + 4 = 0$

(xii) Prove that the sum of cube roots of unity is zero.

3. Attempt any eight parts. $8 \times 2 = 16$

(i) Resolve $\frac{7x+25}{(x+3)(x+4)}$ into partial fractions.

(ii) Find the number of terms in A.P if $a_1 = 3$, $d = 7$ and $a_n = 59$

(iii) Define a geometric progression (G.P).

(iv) If the numbers $\frac{1}{k}, \frac{1}{2k+1}$ and $\frac{1}{4k-1}$ are in harmonic sequence, find k.

(v) Find the sum of the infinite G.P, $2, \sqrt{2}, 1, \ldots\ldots$

(vi) How many terms of the series $-7+(-4)+(-1)+\ldots\ldots$ amount to 114?

(vii) How many 3 – digit numbers can be formed by using each one of the digits 2, 3, 5, 7, 9 only once?

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

(ix) If sample space = {1, 2, 3, ... 9}, event $A = \{2, 4, 6, 8\}$ and event $B = \{1, 3, 5\}$. Find $P(A \cup B)$

(x) Use mathematical induction to prove that the formula is true for $n = 1$ and $n = 2$ $1+4+7+\ldots\ldots(3n-2) = \frac{n(3n-1)}{2}$

(xi) Calculate $(2.02)^4$ be means of binomial theorem.

(xii) If x is so small that its square and higher powers can be neglected, then show that $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3}{2}x$

4. Attempt any nine parts. $9 \times 2 = 18$

(i) What is the length of the arc intercepted on a circle of radius 14 cms by the arms of a central angle of 45^o?

(ii) Find the values of all the trigonometric functions of 420°.

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

(iv) Prove that $\cos 330^o \sin 600^o + \cos 120^o \sin 150^o = -1$

(v) Prove that $\frac{\cos 11^o + \sin 11^o}{\cos 11^o - \sin 11^o} = \tan 56^o$

(vi) Find the value of $\cos 15^o$ without calculator.

(vii) Write the domain and range of cosecant function.

(viii) Find α if $a = 7,\ b = 7,\ c = 9$.

(ix) With usual notations prove that $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

(x) Show that $r_3 = s\tan\frac{\gamma}{2}$

(xi) Prove that $\sin^{-1}x = \frac{\pi}{2} - \cos^{-1}x$

(xii) Find the solution set of $\sin x \cos x = \frac{\sqrt{3}}{4}$ in $[0, 2\pi]$

(xiii) Solve the following trigonometric equation $\cot^2\theta = \frac{1}{3}$ in $[0, 2\pi]$

SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a) Use matrices to solve the system of linear equations $x - 2y + z = -1,\ 3x + y - 2z = 4,\ y - z = 1$

(b) Solve the equations simultaneously $x + y = a + b;\ \frac{a}{x} + \frac{b}{y} = 2$

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6.(a) Resolve into partial fractions $\frac{4x^3}{(x^2-1)(x+1)^2}$

(b) A die is thrown. Find the probability that the dots on the top are prime numbers or odd numbers.

7.(a) Find 'n' so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be harmonic mean between a and b.

(b) If 'x' is so small that its square and higher powers can be neglected, then show that $\frac{(9+7x)^{\frac{1}{2}} - (16+3x)^{\frac{1}{4}}}{4+5x} \approx \frac{1}{4} - \frac{17}{384}x$

8.(a) Find the values of other five trigonometric functions of θ, if $\cos\theta = \frac{12}{13}$ and the terminal side of the angle is not in the first quadrant.

(b) Show that $\frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

9.(a) Prove that $(r_1 + r_2)\tan\frac{\gamma}{2} = c$

(b) Prove that identity $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$

13-2023(1st-A)-17000 (MULTAN)

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Paper Code Number: 2198	2023 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No:
MATHEMATICS PAPER-I	GROUP-II	
TIME ALLOWED: 30 Minutes	OBJECTIVE	MAXIMUM MARKS: 20

Multan Board-2023

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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 that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	If A is a matrix of order 3×1 then order of $AA' =$ ______	1×1	1×3	3×1	3×3
2	If $b^2-4ac<0$ for a quadratic equation $ax^2+bx+c=0$ then nature of the roots is ______.	Real and unequal	Real and repeated	Complex or imaginary	Real and rational
3	Under what condition one root of $x^2+px+q=0$ is additive inverse of other.	$p=0$	$q=0$	$p=1$	$q=1$
4	Partial fractions of $\frac{1}{(x-1)^2(x+1)}$ are of the type :	$\frac{Ax+B}{(x-1)^2}+\frac{c}{x+1}$	$\frac{A}{x-1}+\frac{B}{x+1}$	$\frac{Ax}{(x-1)^2}+\frac{B}{x-1}$	$\frac{A}{x-1}+\frac{B}{(x-1)^2}+\frac{C}{x+1}$
5	Fifth term of geometric progression(G.P) 3, 6, 12, ... is:	24	48	18	30
6	Sum of n term of the series $\sum_{k=1}^{n}k^2$ is:	$\frac{n(n+1)}{2}$	$\left[\frac{n(n+1)}{2}\right]^2$	$\frac{n(n+1)(2n+1)}{6}$	$\left[\frac{n(2n+1)}{2}\right]^2$
7	If ${}^nC_{10}=\frac{12\times 11}{2!}$ then $n=$ ___	12	8	11	13
8	If A and B are two independent events then $P(A\cap B)=$ ___	$P(A)+P(B)$	$P(A)P(B)$	$P(A)-P(B)$	$P(A)+P(B)-P(A\cup B)$
9	The sum of coefficients in the binomial expansion equals to ___.	2^{n-1}	2^{n+1}	2^{2n-1}	2^n
10	Third term in the expansion of $(1+2x)^{-1}$ is:	$2x$	$-2x$	$4x^2$	$-8x^3$
11	The radius r of the circle in which the arm of a central angle of measure 1 radian cut off an arc of length 35cm is ______.	35 cm	36 cm	30 cm	32 cm
12	$3\sin\alpha-4\sin^3\alpha=$ ______	$\cos 3\alpha$	$\sin 3\alpha$	$\cos 2\alpha$	$\sin 2\alpha$
13	The range of the function $y=\sec x$ is:	$-1\le y\le 1$	$-\infty<y<+\infty$	$y\le 1$	$y\ge 1$ or $y\le -1$
14	If measures of the sides of the triangle ABC are $a=13$, $b=14$, $c=15$ then $r=$ ___	8.125	10.5	4	14
15	With usual notations the circum-radius $R=$ ______	$\frac{abc}{4\Delta}$	$\frac{4\Delta}{abc}$	$\frac{\Delta}{s}$	$\frac{s}{\Delta}$
16	$\sin^{-1}A+\sin^{-1}B=$ _____	$\sin^{-1}\left(A\sqrt{1+B^2}+B\sqrt{1+A^2}\right)$	$\sin^{-1}\left(A\sqrt{1-B^2}+B\sqrt{1-A^2}\right)$	$\sin^{-1}\left(A\sqrt{1+B^2}-B\sqrt{1+A^2}\right)$	$\sin^{-1}\left(A\sqrt{1-B^2}-B\sqrt{1-A^2}\right)$
17	Solutions of the equation $\sin x=-\sqrt{3}/2$ which lie in $[0,2\pi]$ are:	$\pi/6,\ 5\pi/6$	$2\pi/3,\ 4\pi/3$	$4\pi/3,\ 5\pi/3$	$\pi/3,\ 4\pi/3$
18	If $x+iy=r\cos\theta+ir\sin\theta$ be the polar form of complex number then angle $\theta=$ ______	$\tan^{-1}\frac{y}{x}$	$\tan\frac{y}{x}$	$\tan\frac{x}{y}$	$\tan^{-1}\frac{x}{y}$
19	A compound statement of the form if p then q is called:	Conjunction	Disjunction	Conditional	biconditional
20	In a square matrix A all elements below the principal diagonal are zero is called:	Lower triangular matrix	Upper triangular matrix	Symmetric matrix	Singular matrix

Multan Board-2023

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INTERMEDIATE PART-I (11th Class)	2023 (1st-A)	Roll No:
MATHEMATICS PAPER-I GROUP-II		
TIME ALLOWED: 2.30 Hours	SUBJECTIVE	MAXIMUM MARKS: 80

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i) State trichotomy property and transitive property of inequalities of real numbers.

(ii) Separate $\frac{i}{1+i}$ into real and imaginary parts.

(iii) Define Overlapping sets.

(iv) Construct truth table for statement $(p \wedge \sim p) \rightarrow q$

(v) Define semi-group.

(vi) If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$

(vii) Write two properties of determinants.

(viii) Define Skew Hermitian Matrix.

(ix) Solve the equation $x^{\frac{1}{2}} - x^{\frac{1}{4}} - 6 = 0$

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

(xi) Use factor theorem to determine if $x - 2$ is a factor of $x^3 + x^2 - 7x + 1$

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

3. Attempt any eight parts. $8 \times 2 = 16$

(i) Define Proper Rational Fraction.

(ii) Which term of the A.P $5, 2, -1, \ldots\ldots$ is -85?

(iii) If $5, 8$ are two A.Ms between a and b, find a and b.

(iv) Sum the series $3 + 5 - 7 + 9 + 11 - 13 + 15 + 17 - 19 + \ldots\ldots\ldots$ to $3n$ terms.

(v) If A, G and H are arithmetic, geometric and harmonic means between a and b respectively, show that $G^2 = AH$

(vi) Find the sum of n terms of the series whose nth term is $n^2 + 4n + 1$.

(vii) Prove from the first principle that ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$

(viii) How many permutations of the letters of the word PANAMA can be made, if P is to be the first letter in each arrangement?

(ix) If ${}^nC_8 = {}^nC_{12}$, find n.

(x) Use mathematical induction to prove $2 + 4 + 6 + \ldots\ldots\ldots + 2n = n(n+1)$ for $n = 1, 2$

(xi) Expand by using binomial theorem $(a + 2b)^5$

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

4. Attempt any nine parts. $9 \times 2 = 18$

(i) Find x, if $\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \cos 45^\circ \tan 60^\circ$

(ii) Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2 A$

(iii) Prove that $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$

(iv) If α, β, γ are the angles of a triangle ABC, then prove that $\tan(\alpha + \beta) + \tan\gamma = 0$

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

(vi) Prove the identity $\frac{1 - \cos\alpha}{\sin\alpha} = \tan\frac{\alpha}{2}$

(vii) Find the period of $\cot 8x$

(viii) Find the area of triangle ABC, given three sides, $a = 18$, $b = 24$, $c = 30$

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

(x) A plane flying directly above a post of 6000m away from anti-aircraft gun observes the gun at an angle of depression of 27°. Find the height of the plane.

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

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

(xiii) Find the values of θ, $2\sin\theta + \cos^2\theta - 1 = 0$

SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a) Find the multiplicative inverse of $A = \begin{bmatrix} 1 & 2 & -1 \\ 0 & -1 & 3 \\ 1 & 0 & 2 \end{bmatrix}$

(b) Find the values of a and b if -2 and 2 are the roots of polynomial $x^3 - 4x^2 + ax + b$

6.(a) Resolve into partial fractions $\frac{x^2 + 1}{x^3 + 1}$

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(b) There are twenty chits marked $1, 2, 3, \ldots\ldots\ldots, 20$ in a bag. Find the probability of picking a chit, the number written on which is a multiple of 4 or a multiple of 7.

7.(a) Find n A.M's between a and b.

(b) Use mathematical induction to prove that $1 + 2 + 4 + \ldots\ldots + 2^{n-1} = 2^n - 1$

8.(a) Prove the identity $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

(b) If $\alpha + \beta + \gamma = 180^\circ$ prove that $\cot\beta\cot\alpha + \cot\beta\cot\gamma + \cot\alpha\cot\gamma = 1$

9.(a) Prove that $r_1 + r_2 + r_3 - r = 4R$

(b) Prove that $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$

Paper Code Number: 2197

2021 (A) Roll No: ______________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I Multan Board-2021 TIME ALLOWED: 30 Minutes

GROUP-I **OBJECTIVE** 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 bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

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Q.No.1

(1) The product of roots of the equation $3x^2 + 5x = 0$

(A) $\frac{-5}{3}$ (B) $\frac{5}{3}$ (C) 5 (D) 0

(2) An equation which is true for all values of unknown is called:

(A) Identity (B) Algebric equation (C) Algebric relation (D) Conditional equation

(3) The A.M between $1 - x + x^2$ and $1 + x + x^2$ is: (A) $x + 1$ (B) $x^2 + 1$ (C) $\frac{x+1}{2}$ (D) $\frac{x^2+1}{2}$

(4) G.M between 2 and 8 is/are: (A) 5 (B) 8 (C) ± 4 (D) 16

(5) The sum of an infinite geometric series with $|r| < 1$, where first term is a and r is common ratio:

(A) $\frac{a}{1+r}$ (B) $\frac{a}{1-r^2}$ (C) $\frac{a}{1-r}$ (D) $\frac{a}{1+r^2}$

(6) If ${}^nP_2 = 30$, then $n =$ (A) 6 (B) 4 (C) 5 (D) 8

(7) General term in the expansion of $(a + x)^n$ is:

(A) $\binom{n}{r} a^{n-r} x^r$ (B) $\binom{n}{r} a^r x^n$ (C) $\binom{n}{r} a^n x^{n-r}$ (D) $\binom{n}{r} a^n x^n$

(8) $\frac{5\pi}{4}$ radian = (A) 360^o (B) 225^o (C) 335^o (D) 270^o

(9) $(\cos 2\theta)^2 + (\sin 2\theta)^2 =$ (A) 0 (B) 2 (C) 4 (D) 1

(10) $\sin(180^0 + \alpha) =$ (A) $-\cos\alpha$ (B) $\sin\alpha$ (C) $\cos\alpha$ (D) $-\sin\alpha$

(11) Period of $\tan\frac{x}{3}$ is: (A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) 3π

(12) In any triangle ABC, with usual notation, $r_1 =$

(A) $\frac{\Delta}{s-a}$ (B) $\frac{\Delta}{s-b}$ (C) $\frac{\Delta}{s-c}$ (D) $\frac{\Delta}{s}$

(13) Circum radius $R =$

(A) $\frac{\Delta}{abc}$ (B) $\frac{\Delta}{s}$ (C) $\frac{abc}{4\Delta}$ (D) $\frac{\Delta}{s-a}$

(14) $\cos\left(\sin^{-1}\frac{1}{\sqrt{2}}\right) =$ (A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2}$ (C) $\frac{\pi}{4}$ (D) $-\frac{\pi}{4}$

(15) If $\sin x = \frac{\sqrt{3}}{2}$ and $x \in [0, 2\pi]$ then $x =$

(A) $\frac{5\pi}{3}, \frac{4\pi}{3}$ (B) $\frac{\pi}{4}, \frac{3\pi}{4}$ (C) $\frac{\pi}{3}, \frac{2\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$

(16) If A and B are non empty disjoint sets then:

(A) $A \cap B = A$ (B) $A \cap B = B$ (C) $A \cap B = \phi$ (D) $A \cap B \neq \phi$

(17) If $z = -2 + 3i$, then $\bar{z} =$

(A) $-2 - 3i$ (B) $2 - 3i$ (C) $-2 + 3i$ (D) $2 + 3i$

(18) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then Adj $A =$

(A) $\begin{bmatrix} -a & -b \\ c & d \end{bmatrix}$ (B) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (C) $\begin{bmatrix} a & -b \\ -c & d \end{bmatrix}$ (D) $\begin{bmatrix} -a & -b \\ c & -d \end{bmatrix}$

(19) If $|A| = 5$ then $|A^t| =$ (A) $\frac{1}{5}$ (B) 0 (C) -5 (D) 5

(20) Sum of all the four fourth roots of unity is: (A) 0 (B) 1 (C) -1 (D) 4

Multan Board-2021

2021 (A) Roll No: ________________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I TIME ALLOWED: 2.30 Hours

GROUP-I **SUBJECTIVE** MAXIMUM MARKS: 80

NOTE: Write same question number and its part number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. **$8 \times 2 = 16$**

(i) Find the modulus of the complex number $1 - i\sqrt{3}$

(ii) Simplify $(2, 6) \div (3, 7)$

(iii) Name the property used in the following equation $a(b-c) = ab - ac$

(iv) Write two proper subsets of the set $\{a, b, c\}$

(v) Construct the truth table of the following statement $(p \wedge \sim p) \rightarrow q$

(vi) Find the solution of the linear equation $xa = b$, where a and b belong to group G.

(vii) Find x and y if $\begin{bmatrix} 2 & 0 & x \\ 1 & y & 3 \end{bmatrix} + 2\begin{bmatrix} 1 & x & y \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 6 & 1 \end{bmatrix}$

(viii) Without expansion verify $\begin{vmatrix} 1 & a^2 & \frac{a}{bc} \\ 1 & b^2 & \frac{b}{ca} \\ 1 & c^2 & \frac{c}{ab} \end{vmatrix} = 0$

(ix) Solve the equation by using the quadratic formula $16x^2 + 8x + 1 = 0$

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

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

(xii) If α, β are roots of the equation $x^2 - px - p - c = 0$ then prove that $(1+\alpha)(1+\beta) = 1 - c$

3. Attempt any eight parts. **$8 \times 2 = 16$**

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

(ii) Resolve $\frac{4x^2}{(x^2+1)^2 (x-1)}$ into partial fractions without finding constants.

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

(iv) Find A.M. between $x - 3$ and $x + 5$

(v) If 5 is harmonic mean between 2 and b, Find b.

(vi) Find the 12th term of the harmonic sequence $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, -----$

(vii) Find the value of n if ${}^{n}p_4 : {}^{n-1}p_3 = 9:1$

(viii) How many necklaces can be made by 6 beads of different colours?

(ix) How many diagonals can be made by 8 sided figure?

(x) Verify the statement $2 + 6 + 18 + ---- + 2 \times 3^{n-1} = 3^n - 1$ for $n = 1, 2$

(xi) Expand $(4 - 3x)^{1/2}$ upto 3 terms.

(xii) If x be so small that its square and higher powers be neglected, prove that $\frac{1-x}{\sqrt{1+x}} \approx 1 - \frac{3}{2}x$

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4. **Attempt any nine parts.** $9 \times 2 = 18$

(i) Find r, when $\ell = 5cm$, $\theta = \frac{1}{2}$ radian.

(ii) Write any two fundamental identities of trigonometry.

(iii) Evaluate $\dfrac{1 - \tan^2 \pi/3}{1 + \tan^2 \pi/3}$

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

(v) Prove that $\tan(45^o + A)\tan(45^o - A) = 1$

(vi) Prove that $\dfrac{\sin 8x + \sin 2x}{\cos 8x + \cos 2x} = \tan 5x$

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

(viii) A kite is flying at a height of $67.2m$ is attached to a fully stretched string inclined at an angle of 55^o to the horizontal. Find the length of string.

(ix) Find the area of triangle ABC, when $b = 37,\ c = 45,\ \alpha = 30^o 50'$

(x) Prove that $r r_1 r_2 r_3 = \Delta^2$

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

(xii) Solve the equation $\sin x = \dfrac{1}{2}$, where $x \in [0, 2\pi]$

(xiii) Find solution of the equation $\sec x = -2$ which lies in the interval $[0, 2\pi]$

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SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a) If $A = \begin{bmatrix} -1 & 2 \\ 1 & 4 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -2 & 1 \end{bmatrix}$ then verify $(AB)^t = B^t A^t$

(b) If 'ω' is a root of $x^2 + x + 1 = 0$ show that its other root is ω^2 and prove that $\omega^3 = 1$

6.(a) Resolve $\dfrac{x^2 + 1}{x^3 + 1}$ into partial fractions.

(b) Find four Arithmetic Means (A.Ms) between $\sqrt{2}$ and $\dfrac{12}{\sqrt{2}}$

7.(a) Find the values of n and r, when ${}^nC_r = 35$ and ${}^nP_r = 210$

(b) Find the coefficient of x^5 in the expansion of $\left(x^2 - \dfrac{3}{2x}\right)^{10}$

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

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

9.(a) The sides of a triangle are $x^2 + x + 1,\ 2x + 1$ and $x^2 - 1$. Prove that the greatest angle of the triangle is 120^o.

(b) Prove that $\tan^{-1}\dfrac{1}{11} + \tan^{-1}\dfrac{5}{6} = \tan^{-1}\dfrac{1}{3} + \tan^{-1}\dfrac{1}{2}$

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Paper Code Number: 2194	2021 (A)	Roll No: ______

INTERMEDIATE PART-I (11^{th} CLASS)

MATHEMATICS PAPER-I Multan Board-2021 TIME ALLOWED: 30 Minutes

GROUP-II **OBJECTIVE** 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 bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The A.M between $\sqrt{2}, 3\sqrt{2}$ is: (A) $\sqrt{6}$ (B) $-2\sqrt{2}$ (C) $2\sqrt{2}$ (D) $-\sqrt{6}$

(2) Common ratio of G.P $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ is:
(A) $\pm\sqrt{\frac{a}{c}}$ (B) $\pm\sqrt{\frac{c}{a}}$ (C) $\pm\sqrt{\frac{b}{c}}$ (D) $\pm\sqrt{\frac{c}{b}}$

(3) H.M between 3 and 7 is: (A) 5 (B) $\sqrt{21}$ (C) $\frac{21}{5}$ (D) $\frac{5}{21}$

(4) If A and B are two independent events, then $P(A \cap B) =$
(A) $P(A) + P(B)$ (B) $P(A) - P(B)$ (C) $P(A \cup B)$ (D) $P(A) \cdot P(B)$

(5) The number of terms in the expansion of $(a+x)^n$ are:
(A) n (B) $n+1$ (C) $n-1$ (D) $2n$

(6) The value of $\tan\theta$ for $\theta = 30^o$ is: (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{\sqrt{3}}{2}$

(7) $\frac{5\pi}{6}$ radian = (A) 150^o (B) 130^o (C) 120^o (D) 60^o

(8) If $\sin\alpha = \frac{4}{5}$, $0 < \alpha < \frac{\pi}{2}$, then $\cos\alpha =$ (A) $\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{4}{5}$ (D) $\frac{3}{5}$

(9) π is the period of: (A) $\sec\theta$ (B) $\operatorname{cosec}\theta$ (C) $\cot\theta$ (D) $\sin 3\theta$

(10) In any triangle ABC, with usual notation $\sqrt{\frac{s(s-c)}{ab}} =$
(A) $\cos\frac{\gamma}{2}$ (B) $\cos\frac{\alpha}{2}$ (C) $\cos\frac{\beta}{2}$ (D) $\sin\frac{\alpha}{2}$

(11) Radius of e-circle opposite to vertex 'A' of ΔABC is:
(A) $\frac{\Delta}{s-a}$ (B) $\frac{\Delta}{s-c}$ (C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{s-b}$

(12) $2\tan^{-1}(A) =$
(A) $\tan^{-1}\left(\frac{A}{1-A^2}\right)$ (B) $\tan^{-1}\left(\frac{A}{1+A^2}\right)$ (C) $\tan^{-1}\left(\frac{2A}{1-A^2}\right)$ (D) $\tan^{-1}\left(\frac{2A}{1+A^2}\right)$

(13) Reference angle of $\sin x = \frac{1}{2}$ is: (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

(14) Every non terminating, non recurring decimal represents:
(A) Rational number (B) Irrational number (C) Natural number (D) Whole number

(15) If A and B are any subsets of U, then $A - B =$
(A) $A \cup B^C$ (B) $(A \cup B)^C$ (C) $(A \cap B)^C$ (D) $A \cap B^C$

(16) A square matrix $A = [a_{ij}]$ is called upper triangular matrix if:
(A) $a_{ij} = 0$ for $i < j$ (B) $a_{ij} = 0$ for $i > j$ (C) $a_{ij} \neq 0$ for $i > j$ (D) $a_{ij} = k$ for $i < j$

(17) The trivial solution of system of homogeneous linear equation in three variables is:
(A) $(0, 0, 1)$ (B) $(0, 1, 0)$ (C) $(0, 0, 0)$ (D) $(0, -1, 0)$

(18) If α, β are the roots of $x^2 - px - p - c = 0$, then $\alpha\beta =$
(A) $-p-c$ (B) $p+c$ (C) $p-c$ (D) $-p+c$

(19) Sum of all the four fourth roots of unity is: (A) 1 (B) 0 (C) -1 (D) 2

(20) Partial fraction of $\frac{x^2+1}{(x+1)(x-1)}$ will be of the form:
(A) $\frac{A}{x-1} + \frac{B}{x+1}$ (B) $\frac{A}{x+1} + \frac{Bx+C}{x-1}$ (C) $\frac{Ax+B}{x^2-1}$ (D) $1 + \frac{A}{x+1} + \frac{B}{x-1}$

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Multan Board-2021

2021 (A) Roll No: ________________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I TIME ALLOWED: 2.30 Hours

GROUP-II **SUBJECTIVE** MAXIMUM MARKS: 80

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NOTE: Write same question number and its part number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Prove the following rule of addition $\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c}$

(ii) Find the multiplicative inverse of $(-4, 7)$

(iii) If Z_1 and Z_2 are the complex numbers then prove that $|Z_1 \cdot Z_2| = |Z_1| \cdot |Z_2|$

(iv) Write the set $\{x \mid x \in N \wedge x \leq 10\}$ into (i) Descriptive form (ii) Tabular form

(v) Determine that $p \rightarrow (p \vee q)$ is a tautology or not.

(vi) Find the domain and range of the relation $\{(x, y) \mid x + y > 5\}$ if $A = \{1, 2, 3, 4\}$

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

(ix) Without expansion, show that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$

(x) Find four fourth roots of unity.

(xi) Find the number, if sum of a positive number and its reciprocal is $\frac{26}{5}$

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

3. Attempt any eight parts. **8 × 2 = 16**

(i) Resolve into partial fractions $\frac{1}{(x-1)(2x-1)(3x-1)}$

(ii) Resolve into partial fractions, without finding the constants $\frac{x^2+15}{(x^2+2x+5)(x-1)}$

(iii) If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in A.P, show that $b = \frac{2ac}{a+c}$

(iv) How many terms of the series $-7 + (-5) + (-3) + ---$, amount to 65?

(v) Find geometric means between 2 and 16.

(vi) If $y = \frac{x}{2} + \frac{1}{4}x^2 + \frac{1}{8}x^3 + ---$ and if $0 < x < 2$, prove that $x = \frac{2y}{1+y}$

(vii) Prove that ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$

(viii) How many arrangements of the letters of word, taken all together, can be made "PAKISTAN"?

(ix) What is the probability that a slip of numbers divisible by 4 are picked from the slips bearing numbers 1, 2, 3, ---, 10?

(x) Show that the inequality $4^n > 3^n + 4$ is true for integral values of $n = 2, 3$

(xi) Expand upto three terms $(4-3x)^{1/2}$

(xii) If x is so small that its square and higher powers can be neglected, then show that $\frac{1-x}{\sqrt{1+x}} \approx 1 - \frac{3}{2}x$

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Multan Board-2021

4. Attempt any nine parts. $9 \times 2 = 18$

(i) If $\sin\theta = -\frac{1}{\sqrt{2}}$ & (θ) is in 3rd quadrant. Find the value of $\cot\theta$

(ii) Verify that $2\sin 45^o + \frac{1}{2}\operatorname{cosec}45^o = \frac{3}{\sqrt{2}}$

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(iii) Verify that $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

(iv) Express $\sin 319^o$ as a trigonometric function of an angle of positive degree measure of less than 45^o.

(v) Prove that $\tan(45^o + A) . Tan(45^o - A) = 1$

(vi) Prove that $1 + \tan\alpha . \tan 2\alpha = \sec 2\alpha$

(vii) Find the period of $3\cos\frac{x}{5}$

(viii) Solve for C in a triangle ΔABC if $\gamma = 90^o$, $\alpha = 62^o40'$ and $b = 796$

(ix) In an equilateral triangle find the value of R.

(x) Prove that $(r_1 + r_2)\tan\frac{\gamma}{2} = c$

(xi) Find the value of $\operatorname{cosec}(\tan^{-1}(-1))$

(xii) Solve $\sin x + \cos x = 0$ for $x \in [0, 2\pi]$

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

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SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a) Solve the system of linear equations by Cramer's rule.
$2x_1 - x_2 + x_3 = 8, \quad x_1 + 2x_2 + 2x_3 = 6, \quad x_1 - 2x_2 - x_3 = 1$

(b) If the roots of $px^2 + qx + q = 0$ are α and β, then prove that $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$

6.(a) Resolve $\frac{3x + 7}{(x^2 + 4)(x + 3)}$ into partial fractions.

(b) Sum of three numbers in A.P. is 24 and their product is 440. Find the numbers.

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7.(a) If $y = \frac{1}{3} + \frac{1\cdot3}{2!}\left(\frac{1}{3}\right)^2 + \frac{1\cdot3\cdot5}{3!}\left(\frac{1}{3}\right)^3 + \text{------}$ then prove that $y^2 + 2y - 2 = 0$

(b) Find the values of n and r when ${}^nC_r = 35$ and ${}^nP_r = 210$

8.(a) Find the values of the trigonometric function $\frac{-17\pi}{3}$

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

9.(a) Solve the triangle ABC if $a = 53$; $\beta = 88^o36'$; $\gamma = 31^o54'$

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

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Multan Board-2019

Paper Code Number: 2191

2019 (A) Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I

TIME ALLOWED: 30 Minutes

OBJECTIVE

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 bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) If $i = \sqrt{-1}$, then $i^{14} =$

(A) 1 (B) -1 (C) i (D) $-i$

(2) The symbol used to denote a biconditional between two propositions is:

(A) $\longrightarrow$ (B) $\wedge$ (C) $\longleftrightarrow$ (D) $\vee$

(3) For a non singular matrix A, if $AX = B$, then $X =$

(A) $A^{-1}B$ (B) BA^{-1} (C) $(AB)^{-1}$ (D) $(BA)^{-1}$

(4) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & 0 & 1 \\ 4 & 5 & 2 \end{bmatrix}$, then $M_{13} =$ (A) 13 (B) 0 (C) 10 (D) 7

(5) The number of roots of polynomial $8x^6 - 19x^3 - 27 = 0$ are: (A) 2 (B) 4 (C) 6 (D) 8

(6) If s = sum of roots and p = product of roots, then quadratic equation can be written as:

(A) $x^2 + sx + p = 0$ (B) $x^2 - sx - p = 0$ (C) $x^2 - sx + p = 0$ (D) $sx^2 - sx + p = 0$

(7) $\dfrac{2x^2}{(x-3)(x+2)^2}$ is a fraction: (A) Proper (B) Improper (C) Identity (D) Irrational

(8) If $a_n = (-1)^{n+1}$, then $a_{26} =$ (A) 1 (B) -1 (C) i (D) $-i$

(9) Geometric Mean between $4i$ and $-16i$ is: (A) 8 (B) -8 (C) ± 8 (D) ± 64

(10) The factorial form of $n(n-1)(n-2)\cdots(n-r+1)$ is:

(A) $\dfrac{n!}{(n-r)!}$ (B) $(n-1)!$ (C) $n!$ (D) $\dfrac{n!}{(n-r+1)!}$

(11) When A and B are two disjoint events, then $P(A \cup B) =$

(A) $P(A) - P(B)$ (B) $P(A) + P(B) - P(A \cap B)$ (C) $P(A) - P(A \cap B)$ (D) $P(A) + P(B)$

(12) The statement $4^n > 3^n + 4$ is true if: (A) $n < 2$ (B) $n \neq 2$ (C) $n \geq 2$ (D) $n \leq 2$

(13) In the expansion of $(3 - 2x)^8$, 5th term will be its:

(A) Last term (B) 2nd last term (C) 3rd last term (D) Middle term

(14) The measure of angle between hands of a watch at 3 0'clock is: (A) 30° (B) 60° (C) 90° (D) 120°

(15) The angle $\dfrac{3\pi}{2} - \theta$ lies in quadrant: (A) I (B) II (C) III (D) IV

(16) Range of the function $y = \cos x$ is:

(A) $-\infty < x < \infty$ (B) $-\infty < y < \infty$ (C) $-1 \leq y \leq 1$ (D) $-1 \leq x \leq 1$

(17) In a ΔABC with usual notation $\sqrt{\dfrac{s(s-a)}{bc}} =$ (A) $\sin\dfrac{\alpha}{2}$ (B) $\cos\dfrac{\alpha}{2}$ (C) $\cos\dfrac{\beta}{2}$ (D) $\sin\dfrac{\beta}{2}$

(18) Area of ΔABC in terms of measure of its all sides is:

(A) $\dfrac{1}{2}bc\sin\alpha$ (B) $\dfrac{c^2 \sin\alpha \sin\beta}{2\sin\gamma}$ (C) $\dfrac{1}{2}ca\sin\beta$ (D) $\sqrt{s(s-a)(s-b)(s-c)}$

(19) $Tan\left(Tan^{-1}(-1)\right) =$ (A) -1 (B) 1 (C) 2 (D) -2

(20) Solution set of $\sin x = \dfrac{1}{2}$ is:

(A) $\left\{\dfrac{4\pi}{3}, \dfrac{5\pi}{3}\right\}$ (B) $\left\{\dfrac{\pi}{6}, \dfrac{5\pi}{6}\right\}$ (C) $\left\{\dfrac{\pi}{3}, \dfrac{4\pi}{3}\right\}$ (D) $\{0, \pi\}$

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Multan Board-2019

2019 (A) Roll No:________________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

NOTE: - Write same question number and its part number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i) Express $\left(2+\sqrt{-3}\right)\left(3+\sqrt{-3}\right)$ in the form of $a+bi$ and simplify.

(ii) Find the multiplicative inverse of $(-4, 7)$

(iii) Factorize $9a^2 + 16b^2$

(iv) Define union of two sets and give an example.

(v) If A and B are any two sets then prove $(A \cup B)' = A' \cap B'$

(vi) Define tautology and absurdity.

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

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

(ix) If $A = \begin{bmatrix} 0 & 2-3i \\ -2-3i & 0 \end{bmatrix}$ then show that A is skew-hermitian.

(x) Solve the equation $x^{1/2} - x^{1/4} - 6 = 0$

(xi) Using factor theorem show that $(x-1)$ is a factor of $x^2 + 4x - 5$

(xii) The sum of a positive number and its reciprocal is $\frac{26}{5}$. Find the number.

3. Attempt any eight parts. $8 \times 2 = 16$

(i) Define "Proper Rational Fraction".

(ii) Resolve $\frac{x^2+1}{(x+1)(x-1)}$ into Partial Fractions.

(iii) For the identity $\frac{2x+1}{(x-1)(x+2)(x+3)} = \frac{A}{x-1} + \frac{B}{x+2} + \frac{C}{x+3}$ Calculate the value of B.

(iv) Find the next two terms of the sequence: 1, 3, 7, 15, 31, ----

(v) If the nth term of the A.P is $3n-1$, find its first three terms.

(vi) Find the 11^{th} term of the geometric sequence: $1+i,\ 2,\ \frac{4}{1+i},\ ---$

(vii) Insert two G. Ms. between 1 and 8.

(viii) Find the 12^{th} term of the harmonic sequence: $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, ----$

(ix) Find the value of n when ${}^nP_4 : {}^{n-1}P_3 = 9:1$

(x) Prove the formula for $n=1$ and $n=2$: $1+4+7+---+(3n-2) = \frac{n(3n-1)}{2}$

(xi) Calculate $(0.97)^3$ by using binomial theorem.

(xii) Expand upto 4 terms: $(2-3x)^{-2}$ taking the values of x such that expansion is valid.

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4. Attempt any nine parts. $9 \times 2 = 18$

(i) Find θ, if $\ell = 1.5cm$, $r = 2.5cm$

(ii) Prove $2\sin 45^\circ + \frac{1}{2}\operatorname{cosec} 45^\circ = \frac{3}{\sqrt{2}}$

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

(iv) Prove $\frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

(v) Prove $\frac{\tan\frac{\theta}{2} + \cot\frac{\theta}{2}}{\cot\frac{\theta}{2} - \tan\frac{\theta}{2}} = \sec\theta$

(vi) Prove $\sin\left(\frac{\pi}{4} - \theta\right)\sin\left(\frac{\pi}{4} + \theta\right) = \frac{1}{2}\cos 2\theta$

(vii) Find the period of $\cos 2x$.

(viii) Find the area of a ΔABC, if $b = 37$, $c = 45$, $\alpha = 30^\circ 50'$

(ix) Prove $R = \frac{abc}{4\Delta}$

(x) Prove $r r_1 r_2 r_3 = \Delta^2$

(xi) Prove $\cos(Sin^{-1}x) = \sqrt{1 - x^2}$

(xii) Find the solution of $\sec x = -2$ which lie in $[0, \ 2\pi]$

(xiii) Find the values of θ satisfying the equation $2\sin\theta + \cos^2\theta - 1 = 0$

SECTION-II

NOTE: - Attempt any three questions. $3 \times 10 = 30$

5.(a) Show that the set $\{1, w, w^2\}$ when $w^3 = 1$ is an abelian group w.r.t. ordinary multiplication. 5

(b) Find n so that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be A.M between a and b. 5

6.(a) Find the inverse of the matrix $A = \begin{bmatrix} 2 & 5 & -1 \\ 3 & 4 & 2 \\ 1 & 2 & -2 \end{bmatrix}$ by using column operation. 5

(b) A die is thrown twice. What is the probability that the sum of dots shown is 3 or 11. 5

7.(a) Find the condition that $\frac{a}{x-a} + \frac{b}{x-b} = 5$ may have roots equal in magnitude but opposite in signs. 5

(b) Use binomial theorem to prove that $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \text{----} = \sqrt{2}$ 5

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

(b) Find the value of $\sin 18^\circ$ without using table or calculator. Hint: $5\theta = 2\theta + 3\theta = 90^\circ$ 5

9.(a) Prove that $\frac{1}{2rR} = \frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}$ 5

(b) Prove that $Tan^{-1}\frac{1}{11} + Tan^{-1}\frac{5}{6} = Tan^{-1}\frac{1}{3} + Tan^{-1}\frac{1}{2}$ 5

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r Code ber: 2192 | 2019 (A) | Roll No: Multan Board-2019

INTERMEDIATE PART-I (11th CLASS)

THEMATICS PAPER-I GROUP-II | TIME ALLOWED: 30 Minutes

OBJECTIVE | MAXIMUM MARKS: 20

e: You have four choices for each objective type question as A, B, C and D. The choice which you k is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. ing or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as n in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

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If $a > 0$ then: (A) $2a < 0$ (B) $\frac{1}{a} < 0$ (C) $-a > 0$ (D) $-a < 0$

The number of subsets of a set having 4 elements is: (A) 4 (B) 16 (C) 8 (D) 10

If all the entries of a column of a square matrix A are zero then:
(A) $|A| > 0$ (B) $|A| < 0$ (C) $|A| = 0$ (D) None of these

If A and B are two non-singular matrices then $(AB)^{-1}$ is equal to:
(A) $A^{-1}B^{-1}$ (B) $B^{-1}A^{-1}$ (C) BA (D) AB

If $x^2 - 3 = 0$ then sum of roots is: (A) Zero (B) 3 (C) -3 (D) 1

If one root of $x^2 + 1 = 0$ is i then other root is: (A) -1 (B) $-i$ (C) 1 (D) ± 1

A fraction $\frac{N(x)}{D(x)}$ is called Proper Rational Faction if:
(A) Degree of $N(x) <$ Degree of $D(x)$ (B) Degree of $N(x) >$ Degree of $D(x)$
(C) Degree of $N(x) \le$ Degree of $D(x)$ (D) Degree of $D(x) \le$ Degree of $N(x)$

) For an infinite Geometric series for which $|r| < 1$, $S_n =$ ____ where $n \to \infty$
(A) $\frac{a_1(1+r)}{1-r}$ (B) $\frac{a_1}{1+r}$ (C) $\frac{a_1}{2r}$ (D) $\frac{a_1}{1-r}$

) With usual notations, $\sum_{k=1}^{n} k^3$ equal to:
(A) $\frac{n(n+1)}{4}$ (B) $\frac{n(n+1)}{2}$ (C) $\left(\frac{n(n+1)}{2}\right)^2$ (D) $n(n+1)$

10) How many ways 5 keys can be arranged on a circular key ring? (A) 12 (B) 5 (C) 4 (D) 3

11) ^nP_r equals: (A) ^nC_r (B) $r! \times {}^nC_r$ (C) $\frac{1}{r!} \times {}^nC_r$ (D) $r \times {}^nC_r$

12) In the expansion of $(1+x)^n$, the sum of binomial coefficients is:
(A) n (B) $n+1$ (C) 2^n (D) 2^{n-1}

(13) $n! > n^2$ is true for integral value of n: (A) $n = 3$ (B) $n = 4$ (C) $n = 2$ (D) $n = 1$

(14) The vertex of an angle in standard form is at: (A) $(1, 0)$ (B) $(0, 1)$ (C) $(1, 1)$ (D) $(0, 0)$

(15) $\sin(\alpha + \beta) + \sin(\alpha - \beta)$ equals:
(A) $2\sin\alpha\cos\beta$ (B) $2\cos\alpha\sin\beta$ (C) $\sin\alpha\cos\beta$ (D) $\sin\alpha$

(16) Domain of $\cos x$ function is: (A) W (B) N (C) $\mathbb{R}$ (D) Z

(17) Circle which passes through vertices of a triangle is called:
(A) Circum circle (B) Incircle (C) e-circle (D) Point circle

(18) With usual notations, $\frac{c^2 \sin\beta \sin\alpha}{2\sin\gamma}$ is equal to: (A) Δ (B) Δ^2 (C) $\frac{\Delta}{2}$ (D) $\frac{\Delta^2}{2}$

(19) $Tan^{-1}\frac{1}{2} + Tan^{-1}\frac{1}{3}$ equals: (A) $Tan^{-1}3$ (B) $Tan^{-1}2$ (C) $Tan^{-1}1$ (D) $Tan^{-1}(-1)$

(20) Solution of equation $\tan x = \frac{1}{\sqrt{3}}$ is in:
(A) I and II quadrant (B) I and III quadrant (C) II and IV quadrant (D) I quadrant

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Multan Board-2019

2019 (A) Roll No: ______________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-II TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

NOTE: - Write same question number and its part number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. **$8 \times 2 = 16$**

(i) Find the multiplicative inverse of $(-4, 7)$

(ii) Simplify $(i)^{-3}$

(iii) Simplify $\left(-\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)^3$

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

(v) Show that $p \rightarrow (q \vee p)$ is tautology or not.

(vi) For $A = \{1, 2, 3, 4\}$ find the relation $\{(x, y) | x + y < 5\}$ in A.

(vii) State any two properties of determinants.

(viii) Show that for a non-singular matrix A, $(A^{-1})^{-1} = A$

(ix) Without expansion prove that $\begin{vmatrix} 1 & 2 & 3x \\ 2 & 3 & 6x \\ 3 & 5 & 9x \end{vmatrix} = 0$

(x) Reduce $2x^4 - 3x^3 - x^2 - 3x + 2 = 0$, into quadratic form.

(xi) Solve the equation $x^3 + x^2 + x + 1 = 0$

(xii) Define exponential equation.

3. Attempt any eight parts. **$8 \times 2 = 16$**

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

(ii) Define improper rational fraction.

(iii) For the identity $\frac{1}{(x+1)^2(x^2-1)} = \frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{(x+1)^2} + \frac{D}{(x+1)^3}$

Calculate the values of A and D.

(iv) Write first four terms of the sequence $a_n = 3n - 5$

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

(vi) How many terms of the series $-7 + (-5) + (-3) + ----$ amount to 65?

(vii) Insert two G.Ms. between "2" and "16".

(viii) Write two relations between A, G, H, in which A = Arithmetic Mean, G = Geometric Mean, H = Harmonic Mean.

(ix) How many arrangements of the letters of the word "ATTACKED", taken all together, can be made?

(x) Prove the given formula for $n = 1, 2$ $\quad 1 + \frac{1}{2} + \frac{1}{4} + ---- + \frac{1}{2^{n-1}} = 2\left[1 - \frac{1}{2^n}\right]$

(xi) Calculate $(9.98)^4$ by means of binomial theorem.

(xii) If x is so small that its square and higher powers can be neglected, then show that $\frac{1-x}{\sqrt{1+x}} = 1 - \frac{3}{2}x$

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Multan Board-2019

Attempt any nine parts. $9 \times 2 = 18$

(i) Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2 A$ where $A \neq \frac{n\pi}{2}, n \in Z$

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(ii) Write two fundamental identities.

(iii) Show that $\cot^4\theta + \cot^2\theta = \operatorname{cosec}^4\theta - \operatorname{cosec}^2\theta$

(iv) Prove that $\tan(45^o + A)\tan(45^o - A) = 1$

(v) Express $\sin 5x + \sin 7x$ as a product.

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

(vii) Write down domain and range of $y = \tan x$

(viii) Find the area of the triangle ABC, given three sides $a = 18,\ b = 24,\ c = 30$

(ix) Show that $r = (s - a)\tan\frac{\alpha}{2}$

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

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

(xii) Solve the equation $\sin 2x = \cos x$

(xiii) Define trigonometric equation. Give one example.

SECTION-II

NOTE: - Attempt any three questions. $3 \times 10 = 30$

5.(a) Show that the set $\{1, -1, i, -i\}$ is an abelian group under multiplication where $i^2 = -1$ 5

(b) If $y = \frac{2}{3}x + \frac{4}{9}x^2 + \frac{8}{27}x^3 + \cdots$ and if $0 < x < \frac{3}{2}$, then show that $x = \frac{3y}{2(1+y)}$ 5

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

(b) Find the probability that the sum of dots appearing in two successive throws of two dice is every time 7. 5

7.(a) Use synthetic division to find the values of p and q if $x + 1$ and $x - 2$ are the factors of the polynomial $x^3 - px^2 + qx + 6$ 5

(b) If x is so small that its cube and higher powers can be neglected, then show that $\sqrt{1 - x - 2x^2} \approx 1 - \frac{1}{2}x - \frac{9}{8}x^2$ 5

8.(a) Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$ 5

(b) If α, β, γ are the angles of ΔABC then prove that
$\tan\frac{\alpha}{2}\tan\frac{\beta}{2} + \tan\frac{\beta}{2}\tan\frac{\gamma}{2} + \tan\frac{\gamma}{2}\tan\frac{\alpha}{2} = 1$ 5

9.(a) Prove that $r_1 + r_2 + r_3 - r = 4R$ 5

(b) Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$ 5

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Paper Code Number: 2195

2018 (A)

Roll No: ____________

INTERMEDIATE PART-I (11^{th} CLASS)

MATHEMATICS PAPER-I GROUP-I

TIME ALLOWED: 30 Minutes

OBJECTIVE

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 bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

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Q.No.1

(1) If ${}^nC_8 = {}^nC_{12}$, where C stands for combination then value of n is equals to:-
(A) 4 (B) 20 (C) 8 (D) 12

(2) The inequality $n^2 > n+3$ is true for:- (A) $n \ge 2$ (B) $n \ge 3$ (C) $n \ge 0$ (D) $n \ge 1$

(3) The coefficient of the last term in the expansion of $(x-y)^5$ is:- (A) -1 (B) 1 (C) 5 (D) -5

(4) $Sin^2(5\theta)+Cos^2(5\theta)=$ ______ (A) 5 (B) 2 (C) 1 (D) 10

(5) For double angle identities $Sin2\alpha =$ ________
(A) $1-2Sin^2\alpha$ (B) $2\sin\alpha Cos\alpha$ (C) $2Cos^2\alpha-1$ (D) $Cos^2\alpha - Sin^2\alpha$

(6) The smallest positive number p for which $f(x+p)=f(x)$ is called:-
(A) Index (B) Domain (C) Coefficients (D) Period

(7) For any triangle ΔABC, with usual notations r_2 is equals to:-
(A) $\frac{\Delta}{s}$ (B) $\frac{\Delta}{s-a}$ (C) $\frac{\Delta}{s-b}$ (D) $\frac{\Delta}{s-c}$

(8) If ΔABC is right angle triangle such that $m\angle\alpha = 90°$, then with usual notations, the true statement is:-
(A) $a^2=b^2+c^2$ (B) $b^2=a^2+c^2$ (C) $c^2=a^2+b^2$ (D) $a^2=b^2=c^2$

(9) The domain of $y=Sin^{-1}x$ is:-
(A) $-1<x<1$ (B) $-1\le x\le 1$ (C) $-\pi/2 \le x \le \pi/2$ (D) $-\pi/2 < x < \pi/2$

(10) If $Sinx=\frac{1}{2}$ then $x=$ ________
(A) $-\pi/6,\ 5\pi/6$ (B) $-\pi/6,\ -5\pi/6$ (C) $\pi/3,\ 2\pi/3$ (D) $\pi/6,\ 5\pi/6$

(11) If n is prime then $\sqrt{n}$ is:-
(A) Rational number (B) Whole number (C) Natural number (D) Irrational number

(12) If $a,b\in G$, where G is a group then $(ab)^{-1}=$ _____
(A) $a^{-1}b^{-1}$ (B) $b^{-1}a^{-1}$ (C) $\frac{1}{ab}$ (D) $\frac{-1}{ab}$

(13) If $A=\begin{bmatrix}3&1\\4&2\end{bmatrix}$ then co-factor of "4" is:- (A) +1 (B) -1 (C) -4 (D) 3

(14) If $A=[a_{ij}]_{3\times 3}$, then $|KA|=$ _______
(A) $|A|$ (B) $K|A|$ (C) $K^2|A|$ (D) $K^3|A|$

(15) If x^3+4x^2-2x+5 is divided by $x-1$ then the remainder is:- (A) 10 (B) -10 (C) 8 (D) -8

(16) Nature of the roots of the equation $2x^2+5x-1=0$:-
(A) Irrational and unequal (B) Rational and equal (C) Imaginary (D) Rational and unequal

(17) The type of rational fraction $\frac{3x^2-1}{x-2}$ is:- (A) Proper (B) Improper (C) Polynomial (D) Identity

(18) In geometric sequence nth term is:-
(A) $a_1+(n-1)d$ (B) $\frac{n}{2}[2a_1+(n-1)d]$ (C) $\frac{a_1}{1-r}$ (D) a_1r^{n-1}

(19) For any series $\sum_{k=1}^{n} K =$ _____
(A) $\frac{n(n+1)(2n+1)}{6}$ (B) $\frac{n(n-1)}{2}$ (C) $\frac{n(n+1)}{2}$ (D) $\frac{n^2(n+1)^2}{4}$

(20) For two events A and B if $P(A)=P(B)=\frac{1}{3}$ then probability $P(A\cap B)=$ ______
(A) $\frac{1}{9}$ (B) $\frac{1}{3}$ (C) $\frac{1}{6}$ (D) 1

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Multan Board-2018

2018 (A) Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

NOTE: - Write same question number and its part number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. **$8 \times 2 = 16$**

(i) Write Closure Law and Commutative Law of Multiplication of Real Numbers.

(ii) Show that $z^2 + (\bar{z})^2$ is a real number, $\forall\ z \in c$.

(iii) Show that $z.\bar{z} = |z|^2,\ z \in c$.

(iv) Define a semi – group.

(v) Write number of elements of sets $\{a, b\}$ and $\{\{a, b\}\}$.

(vi) If $A = \{1, 2, 3, 4\}$, then write a relation in A for $\{(x, y) / x + y = 5\}$

(vii) Define Symmetric and Skew Symmetric Matrix.

(viii) If the matrix $\begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is symmetric, then find value of λ.

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

(x) Solve $x^{1/2} - x^{1/4} - 6 = 0$

(xi) Show that the polynomial $(x - 1)$ is a factor of polynomial $x^2 + 4x - 5$ by using factor theorem.

(xii) Discuss nature of roots of equation $x^2 + 2x + 3 = 0$.

3. Attempt any eight parts. **$8 \times 2 = 16$**

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

(ii) Write the first four terms of the sequence, if $a_n = (-1)^n n^2$.

(iii) How many terms of the series $-7 + (-5) + (-3) + \text{-------}$ amount to 65?

(iv) Find the geometric mean between $-2i$ and $8i$.

(v) Find the sum of the infinite geometric series $4 + 2\sqrt{2} + 2 + \sqrt{2} + 1 + \text{-------}$

(vi) Write two important relations between arithmetic, geometric and harmonic means.

(vii) Write the following in factorial form $(n+2)(n+1)(n)$

(viii) Find the value of n, when ${}^nC_{12} = {}^nC_6$.

(ix) A die is rolled. Find the probability that top shows 3 or 4 dots.

(x) Use mathematical induction to verify for $n = 1, 2$

$$1 + \frac{1}{2} + \frac{1}{4} + \_\_\_\_\_ + \frac{1}{2^{n-1}} = 2\left[1 - \frac{1}{2^n}\right].$$

(xi) Calculate $(9.98)^4$ by means of binomial theorem.

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Multan Board-2018

4. **Attempt any nine parts.** $9 \times 2 = 18$

(i) Convert the angle $54^\circ 45'$ into radians.

(ii) Find r, when $\ell = 56cm$ $\theta = 45^\circ$ in a circle.

(iii) Prove that $\frac{1}{1+Sin\theta} + \frac{1}{1-Sin\theta} = 2Sec^2\theta$

(iv) If $Cos\alpha = \frac{3}{5}$, find the value of $Cot\alpha$, where $0 < \alpha < \frac{\pi}{2}$

(v) If α, β, γ are angles of a triangle ΔABC, then prove that $Sin(\alpha + \beta) = Sin\gamma$

(vi) Prove that $Sin3\alpha = 3Sin\alpha - 4Sin^3\alpha$

(vii) Find the period of $\tan\frac{x}{3}$

(viii) State the Law of Cosines.

(ix) Find the area of ΔABC with $a = 200$, $b = 120$ included angle $\gamma = 150^\circ$

(x) Find R if $a = 13$, $b = 14$, $c = 15$ are the sides of triangle ΔABC.

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

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

(xiii) Solve $Sin x + Cos x = 0$

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SECTION-II

NOTE: - Attempt any three questions. $3 \times 10 =$

5.(a) Prove that all non-singular matrices of order 2×2 over real field form a non-abelian group under multiplication. 5

(b) Find the value of λ for which the following system does not possess a unique solution. Also solve the system for the value of λ. 5

$$x_1 + 4x_2 + \lambda x_3 = 2$$
$$2x_1 + x_2 - 2x_3 = 11$$
$$3x_1 + 2x_2 - 2x_3 = 16$$

6.(a) Show that the roots of the equation $x^2 - 2\left(m + \frac{1}{m}\right)x + 3 = 0$, $m \neq 0$,are real. 5

(b) Resolve $\frac{x^4}{1-x^4}$ into partial fraction. 5

7.(a) Sum the series:- $\frac{1}{1+\sqrt{x}} + \frac{1}{1-x} + \frac{1}{1-\sqrt{x}} + \text{-----}$ to n terms. 5

(b) Determine the middle terms in the expansion of $\left(\frac{3}{2}x - \frac{1}{3x}\right)^{11}$ 5

8.(a) Prove the following identity:- $\sin^6\theta - \cos^6\theta = \left(\sin^2\theta - \cos^2\theta\right)\left(1 - \sin^2\theta\cos^2\theta\right)$ 5

(b) Prove that:- $\frac{\sin\theta + \sin3\theta + \sin5\theta + \sin7\theta}{\cos\theta + \cos3\theta + \cos5\theta + \cos7\theta} = \tan4\theta$ 5

9.(a) Prove that $(r_1 + r_2)Tan\frac{\gamma}{2} = c$ (with usual notations) 5

(b) Prove that $Cos^{-1}\frac{63}{65} + 2Tan^{-1}\frac{1}{5} = Sin^{-1}\frac{3}{5}$ 5

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Multan Board-2018

Paper Code Number: 2198

2018 (A) Roll No: ______

INTERMEDIATE PART-I (11^{th} CLASS)

MATHEMATICS PAPER-I GROUP-II

TIME ALLOWED: 30 Minutes

OBJECTIVE

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 bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) A reciprocal equation, remains unchanged when variable x is replaced by:-
(A) $\frac{-1}{x}$ (B) $\frac{1}{x^2}$ (C) $-x$ (D) $\frac{1}{x}$

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(2) $f(x)=3x^4+4x^3+x-5$ is divided by $x+1$ then remainder is:- (A) -6 (B) 7 (C) 6 (D) -7

(3) Types of rational fractions are:- (A) Two (B) Three (C) Four (D) Infinite

(4) Harmonic Mean between a and b is:- (A) $\frac{ab}{a+b}$ (B) $\frac{a+b}{ab}$ (C) $\frac{2ab}{a+b}$ (D) $\frac{a-b}{ab}$

(5) If $a=-1$ and $b=5$ then $A\times H$ is equal to:- (where A = A.M and H = H.M)
(A) -5 (B) $\frac{-5}{2}$ (C) 5 (D) $\frac{2}{5}$

(6) ${}^nC_{r-1}+{}^nC_{r-2}$ is equal to:- (where C is combination)
(A) ${}^nC_{r-1}$ (B) ${}^{n+1}C_{r-1}$ (C) ${}^{n+1}C_{r-2}$ (D) ${}^nC_{r-2}$

(7) The value of n when ${}^{11}P_n=11\times10\times9$ is:- (where P is permutation)
(A) 0 (B) 1 (C) 2 (D) 3

(8) In the expansion of $(3+x)^4$ middle term will be:- (A) 81 (B) $54x^2$ (C) $26x^2$ (D) x^4

(9) The inequality $4^n>3^n+4$ is valid if n is:-
(A) $n=2$ (B) $n=1$ (C) $n=-1$ (D) $n=-2$

(10) The angle $\frac{\pi}{12}$ in degree measure is:- (A) 30° (B) 20° (C) 45° (D) 15°

(11) $\tan(\pi-\alpha)$ equals:-
(A) $\tan\alpha$ (B) $-\tan\alpha$ (C) $\cot\alpha$ (D) $-\cot\alpha$

(12) Period of $\cot 8x$ is:-
(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) π

(13) In any triangle ΔABC, with usual notation, $\sqrt{\frac{s(s-c)}{ab}}$ is equal to:-
(A) $\sin\frac{\gamma}{2}$ (B) $\cos\frac{\gamma}{2}$ (C) $\sin\frac{\alpha}{2}$ (D) $\cos\frac{\alpha}{2}$

(14) In a right angle triangle no angle is greater than:-
(A) 90° (B) 30° (C) 45° (D) 60°

(15) The value of $\sin^{-1}\left(\cos\frac{\pi}{6}\right)$ is equal to:-
(A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{2}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{3}$

(16) If $\sin x=\frac{1}{2}$ then x is equal to:-
(A) $\frac{\pi}{6},\frac{5\pi}{6}$ (B) $\frac{-\pi}{6},\frac{-5\pi}{6}$ (C) $\frac{-\pi}{6}$ (D) $\frac{-5\pi}{6}$

(17) Multiplicative inverse of complex number $(\sqrt{2},-\sqrt{5})$ is:-
(A) $\left(\frac{\sqrt{2}}{\sqrt{7}},\frac{\sqrt{5}}{\sqrt{7}}\right)$ (B) $\left(\frac{-\sqrt{2}}{\sqrt{7}},\frac{-\sqrt{5}}{\sqrt{7}}\right)$ (C) $\left(\frac{\sqrt{2}}{7},\frac{\sqrt{5}}{\sqrt{7}}\right)$ (D) $\left(\frac{\sqrt{2}}{7},\frac{\sqrt{5}}{7}\right)$

(18) If A, B are two sets then $A\cap(A\cup B)$ equals:- (A) A (B) $A\cup B$ (C) B (D) ϕ

(19) A square matrix A is called skew symmetric if $A'=$ ____
(A) A (B) $\overline{A}$ (C) $-A'$ (D) $-A$

(20) If $\begin{vmatrix}2&\lambda\\3&7\end{vmatrix}=2$, then $\lambda=$ ______ (A) 1 (B) 2 (C) 3 (D) 4

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Multan Board-2018

2018 (A) Roll No: ______________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-II TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

NOTE: - Write same question number and its part number on answer book, as given in the question paper.

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SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i) Prove that $\frac{7}{12} - \frac{5}{18} = \frac{-21-10}{36}$ by justifying each step. (writing each property)

(ii) Simplify the following $(5, -4) \div (-3, -8)$

(iii) Prove that $\bar{z} = z$ if and only if z is real.

(iv) Write two proper subsets of the set of real numbers R.

(v) Construct truth table for the following $(p \wedge \sim p) \rightarrow q$.

(vi) For a set $A = \{1, 2, 3, 4\}$, find the relation $R = \{(x, y) / x + y < 5\}$ in A. Also state the domain of R.

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

(viii) If $A = [a_{ij}]_{3\times 4}$, then show that $I_3 A = A$

(ix) Without expansion show that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$

(x) Solve the following equation by factorization $x(x+7) = (2x-1)(x+4)$

(xi) Show that $x^3 - y^3 = (x-y)(x-\omega y)(x-\omega^2 y)$, where ω is a cube root of unity.

(xii) Use remainder theorem to find the remainder, when $x^2 + 3x + 7$ is divided by $x + 1$.

3. Attempt any eight parts. $8 \times 2 = 16$

(i) Define a Partial Fraction.

(ii) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in arithmetic progression, show that $b = \frac{2ac}{a+c}$

(iii) Find the arithmetic mean between $3\sqrt{5}$ and $5\sqrt{5}$.

(iv) If the series $y = \frac{x}{2} + \frac{x^2}{4} + \frac{x^3}{8} + \text{-----} \infty$ and $0 < x < 2$. Then prove that $x = \frac{2y}{1+y}$

(v) If 5 is Harmonic mean between "2" and "b". Find "b".

(vi) Prove that $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$

(vii) How many 5 digits multiples of "5" can be formed from the digits 2, 3, 5, 7, 9 when no digit is to be repeated?

(viii) Find n if ${}^nC_5 = {}^nC_4$ (C is used for combination)

(ix) What is the probability that a slip of numbers divisible by 4 is picked from slips bearing numbers 1, 2, 3, _____, 10?

(x) Use Binomial Theorem, find $(21)^5$.

(xi) Expand up to four terms $(8-2x)^{-1}$

(xii) If x be so small that its square and higher powers can be neglected. Then prove $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3x}{2}$

4. Attempt any nine parts. $9 \times 2 = 18$

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(i) Find "ℓ"(arc length) when $r = 18mm$ and $\theta = 65^\circ 20'$.

(ii) If $\sec\theta < 0$ and $\sin\theta < 0$, in which quadrant terminal arm of 'θ' lies.

(iii) Show that $Sin^2 \pi/6 + Sin^2 \pi/3 + \tan^2 \pi/4 = 2$

(iv) Prove that $Sin(180^\circ + \theta)\ Sin(90^\circ - \theta) = -Sin\theta Cos\theta$

(v) Find the value of $Sin 15^\circ$

(vi) Prove that $\tan 2\theta = \dfrac{2\tan\theta}{1 - \tan^2\theta}$

(vii) Find the period of $Cos\, x/6$

(viii) In a right ΔABC, if $b = 30.8$, $c = 37.2$ and $\gamma = 90^\circ$. Find α and β

(ix) Find the area of ΔABC in which $b = 21.6$, $c = 30.2$ and $\alpha = 52^\circ 40'$.

(x) Define "Inscribed Circle".

(xi) Show that $Cos\left(Sin^{-1}x\right) = \sqrt{1 - x^2}$

(xii) Solve the equation $Sin\, x = \dfrac{1}{2}$ where $x \in [0, 2\pi]$

(xiii) Solve the equation $4Cos^2 x - 3 = 0$, where $x \in [0, 2\pi]$

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SECTION-II

NOTE: - Attempt any three questions. $3 \times 10 = 30$

5.(a) Show that the set $\{1, \omega, \omega^2\}$, (where $\omega^3 = 1$), is an abelian group w.r.t. ordinary multiplication. 5

(b) Without expansion verify that $\begin{vmatrix} -a & 0 & c \\ 0 & a & -b \\ b & -c & 0 \end{vmatrix} = 0$ 5

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6.(a) Resolve $\dfrac{x^2 + 1}{x^3 + 1}$ into Partial Fraction. 5

(b) Solve the equation $\sqrt{3x^2 - 7x - 30} - \sqrt{2x^2 - 7x - 5} = x - 5$ 5

7.(a) Find the value of n so that $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be the Arithmetic Mean between a and b. $1 + 3 + 1$

(b) Use mathematical induction to prove that the following formula holds for every positive integer "n"

$$\frac{1}{2\times5} + \frac{1}{5\times8} + \frac{1}{8\times11} + \text{------} + \frac{1}{(3n-1)(3n+2)} = \frac{n}{2(3n+2)}$$ $1 + 1 + 3$

8.(a) Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\ \cos^2\theta$ 5

(b) Prove that $\sin\dfrac{\pi}{9}\sin\dfrac{2\pi}{9}\sin\dfrac{\pi}{3}\sin\dfrac{4\pi}{9} = \dfrac{3}{16}$ 5

9.(a) The sides of a triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$.
Prove that the greatest angle of the triangle is 120° 5

(b) Prove that $Cos^{-1}\dfrac{63}{65} + 2\tan^{-1}\dfrac{1}{5} = Sin^{-1}\dfrac{3}{5}$ 5

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