Mathematics	Inter Part I (2018) Lahore Board	Group – II
Time:30 Min.	Objective Type	Marks : 20

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1.1 If 'ω' be the cube root of unity, then ω^2 = :

(A) $\frac{-1-\sqrt{3}i}{2}$ (B) $\frac{1-\sqrt{3}i}{2}$

(C) 1 (D) $\frac{1+\sqrt{3}i}{2}$

2 Simplify form of $\frac{10!}{7!}$ is equal to :

(A) 720 (B) 620

(C) 520 (D) 420

3 Multiplicative inverse of complex number - 3 - 5i is :

(A) $\frac{3}{34}+\frac{5}{34}i$ (B) $\frac{-3}{34}-\frac{5}{34}i$

(C) $\frac{-3}{34}+\frac{5}{34}i$ (D) $\frac{-3}{\sqrt{34}}+\frac{5}{\sqrt{34}}i$

4 Formula for the sum of n terms of A.P. (Arithmetic progression) :

(A) $a_n = a_1 + (n-1)d$ (B) $s_n = \frac{n}{2}(a_1 + a_n)$

(C) $s_n = \frac{a_1(1-r^n)}{1-r}$ (D) $s = \frac{a_1}{1-r}$

5 Tabular form of $\{x \mid x \in E \wedge 4 < x < 6\}$ is :

(A) { } (B) {4}

(C) {6} (D) {4,6}

6 Partial fractions of $\frac{1}{(x^2+1)(x-1)}$ are of the form :

(A) $\frac{A}{x^2+1}+\frac{B}{(x-1)}$ (B) $\frac{A}{x+1}+\frac{B}{(x^2+1)}+\frac{C}{x-1}$

(C) $\frac{A}{x^2+1}+\frac{Bx+C}{x-1}$ (D) $\frac{Ax+B}{x^2+1}+\frac{C}{x-1}$

7 Roots of the equation $x^2 - 7x + 10 = 0$ are :

(A) (2, –5) (B) (–2, 5)

(C) (2, 5) (D) (–2, –5)

8 If matrix $\begin{bmatrix} x & 4 \\ 2 & 8 \end{bmatrix}$ is singular then x = :

(A) 0 (B) –1

(C) 2 (D) 1

9 Geometric mean between 4 and 16 are :

(A) 10 (B) ±8

(C) $\frac{32}{5}$ (D) 64

10 A matrix A is said to be symmetric if :

(A) $A^t = -A$ (B) $A^t = A$

(C) $\left(\overline{A}\right)^t = A$ (D) $\left(\overline{A}\right)^t = -A$

11 Period of 3sin 2x is :

(A) 6π (B) 2π

(C) π (D) $\frac{\pi}{2}$

12 With usual notation ${}^nC_0$ = :

(A) 1 (B) 0

(C) n (D) 2

13 Solution of $\cot\theta = \frac{1}{\sqrt{3}}$ in quadrant - III :

(A) $\frac{5\pi}{4}$ (B) $\frac{7\pi}{6}$

(C) $\frac{4\pi}{3}$ (D) π

14 $2\sin\left(\frac{P+Q}{2}\right)\cos\left(\frac{P-Q}{2}\right) =$ - - - :

(A) sin P + sin Q (B) sin P – sin Q

(C) cos P + cos Q (D) cos P – cos Q

15 $\sin^{-1}A - \sin^{-1}B =$ ----------:

(A) $\sin^{-1}\left(A\sqrt{1-B^2} - B\sqrt{1-A^2}\right)$

(B) $\sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$

(C) $\cos^{-1}\left(A\sqrt{1-B^2} - B\sqrt{1-A^2}\right)$

(D) $\cos^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$

16 The sum of coefficients in the binomial expansion when n = 4 is :

(A) 1 (B) 8

(C) 16 (D) 32

17 Values of trigonometric functions of the quadrantal angle 765° are same as of the angle:

765° are same as of the angle:

(A) 30° (B) 45°

(C) 60° (D) 90°

18 With usual notation the "circum-radius" R = ------

(A) $\frac{\Delta}{s}$ (B) $\frac{abc}{4\Delta}$

(C) $\frac{\Delta}{abc}$ (D) $\frac{s}{\Delta}$

19 Which one is divisible by 2 for all positive integral values of n:

(A) $n^3 - n$ (B) $5^n - 1$

(C) $5^n - 2^n$ (D) $n^2 + n$

20 In law of tangents $\frac{\tan\left(\frac{\beta-\gamma}{2}\right)}{\tan\left(\frac{\beta+\gamma}{2}\right)} =$:

(A) $\frac{a-b}{a+b}$ (B) $\frac{c-a}{c+a}$

(C) $\frac{c-b}{c+b}$ (D) $\frac{b-c}{b+c}$

Mathematics	Inter Part I (2018) Lahore Board	Group – II
Time:2.30 hrs	Essay Type	Marks : 80

SECTION-I

2. Write short answers to any EIGHT (8) questions: 16

i Does the set {1, -1} close w.r.t. :
(a) addition (b) multiplication

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

iii If $z = 1 - i\sqrt{3}$, then find $|z|$

iv Write inverse and contrapositive of $q \rightarrow p$

v If A = {a , b , c}, then write all subsets of A and find P (A)

vi Show that set of natural number is not a group w.r.t. addition.

vii Define diagonal matrix with an example.

viii If $A = \begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$, then find A^{-1}

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

x Find four 4^{th} roots of unity.

xi If α, β are roots of $x^2 - px - p - c = 0$, show that $(1 - \alpha)(1 + \beta) = 1 - c$

xii Find quadratic equation whose roots are 2ω, $2\omega^2$, where ω is cube roots of unity.

3. Write short answers to any EIGHT (8) questions: 16

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

ii Find the indicated term of the sequence 2. 6. 11. 17.----

$a_7 = ?$

iii Sum the series upto n-terms

$$\frac{1}{1-\sqrt{x}} + \frac{1}{1-x} + \frac{1}{1+\sqrt{x}} + \text{------}$$

iv Insert two G.Ms between 1 and 8.

v Find the sum of the infinite geometric series

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \text{------}$$

vi Find the 12^{th} term of the harmonic sequence

$$\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \text{------}$$

vii Evaluate $\frac{15!}{15!(15-15)!}$

viii Find the value of n, when $\frac{12 \times 11}{2!} = {}^{n}C_{10}$

ix There are 5 green and 3 red balls in a box, one ball is taken out, find the probability that the ball drawn is green.

x Find the number of the diagonals of a 6-sided figure.

xi Find the term involving x^4 in the expansion of $(3 - 2x)^7$.

xii Using binomial theorem find the value of $(1.03)^{\frac{1}{3}}$ upto three decimal places.

4. Write short answers to any NINE (9) questions: 18

i Define angle in the standard position with figure.

ii Find x, if $\tan^2 45° - \cos^2 60° = x \sin 45° \cos 45° \tan 60°$

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

iv Find the value of sin 540° without using calculator.

v Prove that $\tan\left(\frac{\pi}{2} - \theta\right) + \tan\left(\frac{3\pi}{2} + \theta\right) = 0$

vi Express $\sin(x + 45°)\sin(x - 45°)$ as sum or difference.

vii Find the period of $\cos \frac{x}{6}$

viii Find the area of triangle ΔABC, in which $b = 37$, $c = 45$ and $\alpha = 30°50'$.

ix Prove that $r\, r_1\, r_2\, r_3 = \Delta^2$ (Using usual notation)

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

xi Find domain and range of $y = \cos^{-1} x$

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

xiii Find solutions of $\cot \theta = \frac{1}{\sqrt{3}}$ which lie in $[0, 2\pi]$

SECTION-II

Note: Attempt any THREE questions.

5.(a) Convert the following theorem to logical form and prove it by constructing truth table : 5

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

(b) Solve the following system by reducing their augmented matrices to the echelon form : 5

$$x + 2y + z = 2$$

$$2x + y + 2z = -1$$

$$2x + 3y - z = 9$$

6.(a) If α, β are the roots of the equation $ax^2 + bx + c = 0$ then find the equation whose roots are $\frac{-1}{\alpha^3}, \frac{1}{\beta^3}$ 5

(b) Resolve $\frac{2x^4}{\quad}$ into partial fraction 5

$(x-3)(x+2)^2$

7.(a) For what value of n, $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the positive geometric mean (G.M.) between a and b. 5

(b) If x is so small that its square and higher powers can be neglected, then show that : 5

$$\frac{(1-x)^{\frac{1}{2}}(9-4x)^{\frac{1}{2}}}{(8+3x)^{\frac{1}{3}}} \approx \frac{3}{2} - \frac{61}{48}x$$

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

(b) Prove without using calculator that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$ 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 $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$ 5

Mathematics	Inter Part I (2018) Lahore Board	Group – I
Time:30 Min.	Objective Type	Marks : 20

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1.1 If α, β, γ are angles of triangle then $\tan(\alpha + \beta) + \tan\gamma =$:

(A) 1 (B) 0

(C) 2 (D) –1

2 If A and B are mutually exclusive events, then $P(A \cup B) =$:

(A) $P(A) \cup P(B)$ (B) $P(A) + P(B)$

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

3 The value of $\cos\left(\tan^{-1} 0\right) =$:

(A) –1 (B) 1

(C) 0 (D) ∞

4 If $\sin\theta < 0$ and $\cot\theta > 0$, then θ lies in quadrant :

(A) 1 (B) 2

(C) 3 (D) 4

5 If $\cos x = -\frac{1}{2}$ then reference angle is :

(A) $\frac{\pi}{6}$ (B) $-\frac{\pi}{3}$

(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

6 $4^n > 3^n + 4$ is true for integral values of n = :

(A) 1 (B) $n \leq 1$

(C) 0 (D) $n \geq 2$

7 The value escribed circle r_1 = :

(A) Δ (B) Δ

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

(C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{a}$

8 Period of $\cos\left(\frac{x}{2}\right)$ = :

(A) 2π (B) $\frac{\pi}{2}$

(C) 3π (D) 4π

9 The 2nd term in expansion of $\left(1-\frac{1}{3}x\right)^{-1}$ is:

(A) $\frac{1}{3}x$ (B) $-\frac{1}{3}x$

(C) $3x$ (D) $2x$

10 Radius of escribed circle opposite to vertex 'c' of the triangle is :

(A) $\frac{\Delta}{s}$ (B) $\frac{\Delta}{s-a}$

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

11 Product of all fourth roots of unity is:

(A) -1 (B) 0

(C) 1 (D) i

12 The set {0 , 1} is closed under :

(A) Addition (B) Multiplication

(C) Division (D) Subtraction

13 The value of $\frac{4!}{0!}$ is :

(A) 24 (B) 4

(C) 0 (D) Infinity

(C) 0 (D) Infinity

14 A square matrix A is skew symmetric if A^t = :

(A) $-A$ (B) A

(C) $\overline{A}$ (D) A^t

15 Geometric mean between –2 and 8 is :

(A) 4 (B) ± 4

(C) 8 (D) $\pm 4i$

16 Sum of roots of quadratic equation $ax^2 + bx + c = 0$ is :

(A) $\frac{a}{b}$ (B) $\frac{b}{a}$

(C) $\frac{c}{a}$ (D) $-\frac{b}{a}$

17 The 10th term of $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, - - - -$ is :

(A) 30 (B) 28

(C) $\frac{1}{29}$ (D) $\frac{1}{32}$

18 If A and B are two sets, then A – B = :

(A) $A \cup B^c$ (B) $(A \cup B)^c$

(C) $A \cap B^c$ (D) $(A \cap B)^c$

19 The fraction $\frac{3x^2 + 5}{x + 1}$ is :

(A) Proper fraction (B) Polynomial

(C) Partial fraction (D) 1mproper fraction

20 If order of a matrix A is $m \times n$, then order of A^t is :

(A) $m \times n$ (B) $m \times m$

(C) $n \times m$ (D) $n \times n$

Mathematics	Inter Part I (2018) Lahore Board	Group – I
Time:2.30 hrs	Essay Type	Marks : 80

SECTION-I

2. Write short answers to any EIGHT (8) questions: 16

i Simplify $(-1)^{-21}$

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

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

iv Is there any set which has no proper subset? If so name that set.

v Write the converse and contrapositive of $\sim q \rightarrow \sim p$

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

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

viii Find the multiplicative inverse of the matrix $\begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$

ix Show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix}$

x Solve the equation $x^4 - 6x^2 + 8 = 0$

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

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

3. Write short answers to any EIGHT (8) questions: 16

3. Write short answers to any EIGHT (8) questions: 16

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

ii If $a_{n-2} = 3n - 11$, find the nth term of the sequence

iii If 5 , 8 are two A.Ms between *a* and b, find *a* and b

iv Which term of the A.P. 5, 2, –1,------ is – 85 ?

v Insert two G.Ms between 1 and 8.

vi If 5 is the harmonic mean between 2 and b, find b

vii Define fundamental principle of counting.

viii Find the number of the diagonals of a 6-sided figure.

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

x State the principle of mathematical induction.

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

xii Find the 6^{th} term in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$

4. **Write short answers to any NINE (9) questions:** 18

i An arc subtends an angle of 70° at the center of a circle and its length is 132 m. Find the radius of the circle.

ii Define coterminal angles.

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

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

v Find the value of sin 105°, without calculator.

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

vii Write the domain of $y = \sin x$

viii A vertical pole is 8m high and the length of its shadow is 6m. What is the angle of elevation of the sun at that moment?

ix Find α and β in the triangle ΔABC in which a = 7, b = 7, c = 9

x Find the area of the triangle ΔABC in which a = 200, b = 120 , $\gamma = 150°$

xi Evaluate without using calculator $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

xii Solve the equation $2\sin x - 1 = 0$

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

SECTION-II

Note: Attempt any THREE questions.

5.(a) Consider the set S = {1, - 1 , i, - i}. Set up its multiplication table and show that the set S is an abelian group under multiplication. 5

(b) If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 1 & -1 & 1 \end{bmatrix}$ then find A^{-1} by using adjoint of the matrix. 5

6.(a) Solve the system of equations : $x+y = a+b$; and $\frac{a}{x}+\frac{b}{y}=2$

(b) Resolve $\frac{9x-7}{(x^2+1)(x+3)}$ into partial fractions. 5

7.(a) Find four numbers in arithmetic sequence (A.P.) whose sum is 32 and the sum of whose squares is 276. 5

(b) Use binomial series to show that . 5

$$1+\frac{1}{4}+\frac{1\times 3}{4\times 8}+\frac{1\times 3\times 5}{4\times 8\times 12}+\text{- - - -}=\sqrt{2}$$

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

2m (2)

values of the all remaining trigonometric ratios. 5

(b) Prove that $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9} = \frac{3}{16}$ without using calculator 5

9.(a) With usual notations, prove that $r_1 = \frac{\Delta}{s}$ 5

(b) Prove that $\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{8}{17} = \sin^{-1}\frac{77}{85}$ 5