PAPER NO. 12 — BAHAWALPUR BOARD (FIRST GROUP) — ANNUAL 2018

Roll No. ______________________ (To be filled in by the candidate)

Maximum Marks: 20 **(OBJECTIVE TYPE)** Time Allowed : 30 Minutes

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. Cutting or filling two or more circles will result in zero mark in that question.

Q1. 20

1. **What is the Multiplicative Inverse of $1 - 2i$:**
   (A) $\frac{1+2i}{5}$ (B) $\frac{1-2i}{5}$
   (C) $\frac{1+2i}{\sqrt{5}}$ (D) $\frac{1-2i}{\sqrt{5}}$

2. **How many inverse elements correspond to each element of a group:**
   (A) At least one (B) Only One
   (C) Two (D) At least two

3. **If A is a Matrix of Order 4×3, then number of elements in each column of A is:**
   (A) 2 (B) 3
   (C) 4 (D) 5

4. **A square Matrix A is Skew - Symmetric if $(A)^t =$:**
   (A) A (B) -A
   (C) $\overline{A}$ (D) $-A^t$

5. **The Roots of the Equation $x^2 + x + 2 = 0$ are:**
   (A) Real, Equal (B) Real, Unequal
   (C) Equal (D) Imaginary

6. **If $3^x + 2^{2x} = 5^x$, then the value of x is:**
   (A) 0 (B) 1
   (C) 2 (D) 3

7. **Partial Fractions of $\frac{x+4}{(x-1)(x^2+2)}$ will be:**
   (A) $\frac{A}{x-1} + \frac{Bx+C}{x^2+2}$ (B) $\frac{A}{x-1} + \frac{B}{x^2+2}$
   (C) $\frac{Ax}{x-1} + \frac{Bx+C}{x^2+2}$ (D) $\frac{A}{x-1} + \frac{Bx}{x^2+2}$

8. **The Sum $\sum_{k=1}^{n} 1 =$:**

(A) 1 (B) n (C) n^2 (D) n^3

9. **The Geometric Means between $-2i$ and $8i$ are:**

(A) $\pm 4i$ (B) ± 2

(C) $\pm 3i$ (D) $\pm 4i$

10. **If P(E) is the Probability of an Event E, then:**

(A) $0 < P(E) < 1$ (B) $0 > P(E) > 1$

(C) $0 \le P(E) \le 1$ (D) $0 \ge P(E) \ge 1$

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11. **The Non – Occurrence of an Event E is denoted by $\overline{E}$ and $P(\overline{E})$ is given by:**

(A) $P(\overline{E}) = 1$ (B) $1 - P(E)$

(C) $1 - P(\overline{E})$ (D) $P(E) - 1$

12. **If $n \notin Z^+$ and $|x| < 1$, then the Expansion $1 + nx + \frac{n(n-1)}{2!}x^2 + \dots$ is:**

(A) Arithmetic Series (B) Geometric Series

(C) Harmonic Series (D) Binomial Series

13. **The 2nd term in the expansion [illegible] is:**

(A) [illegible] (B) $\frac{2}{3}x$

(C) $-6x$ (D) $\frac{8}{3}$

14. **An Angle in the Standard Position whose terminal arm lies on the x - axis or on the y - axis is called:**

(A) Obtuse Angle (B) Acute Angle

(C) Right Angle (D) Quadrantal Angle

15. **$\cos\left(\theta + \frac{3\pi}{2}\right)$ is equal to:**

(A) $-\sin\theta$ (B) $\sin\theta$

(C) $-\cos\theta$ (D) $\cos\theta$

16. **Period of Sec 10x is:**

(A) [illegible] (B) π

(C) [illegible] (D) 2π

17. **Radius of Escribed Circle opposite to Vertex C of the Triangle is:**

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

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

18. **In any Triangle ABC, with usual notation $\tan\frac{\gamma}{2} =$**

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

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

19. $2\tan^{-1}A =$

(A) $\tan^{-1}\frac{2A}{1-A^2}$ (B) $\tan^{-1}\frac{2A}{1-A^2}$

(C) $\tan^{-1}\frac{1-A}{2A}$ (D) $\tan^{-1}\frac{1+A}{2A}$

20. If $\sin x = \frac{\sqrt{3}}{2}$ and $x \in [0, 2\pi]$ then x is:

(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) $\frac{\pi}{6}, \frac{5\pi}{6}$

Bahawalpur Board 2018 (First Group)

Roll No. ______________________ (To be filled in by the candidate)

Maximum Marks: 80 **(SUBJECTIVE TYPE)** Time Allowed :2.30 Hours

PART-I

Q2. Attempt any eight parts. (16)

(i) Simplify and justify each step $\frac{4+16x}{4}$ by using properties.

(ii) Separate into Real and Imaginary parts $\frac{i}{1+i}$

(iii) Find the Inverse of a relation $\{(x,y) \mid y = 2x + 3,\ x \in R\}$

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

(v) Show that $\forall z \in C$, $z^2 + (\bar{z})^2$ is a Real Number.

(vi) If $A = \begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$, show that $A + (\bar{A})^t$ is Hermitian.

(vii) Find x, if $\begin{vmatrix} 1 & 2 & 1 \\ 2 & x & 2 \\ 3 & 6 & x \end{vmatrix} = 0$.

(viii) Solve $x^3 + x^2 + x + 1 = 0$

(ix) Write two proper subsets of $\{0,1\}$

(x) Construct the truth Table of $P \to (p \vee q)$.

(xi) When $x^4 - 2x^3 + Kx^2 + 3$ is divided by $x - 2$, the remainder is 1, find the value of K.

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

Q3. Attempt any eight parts. (16)

(i) Define Proper Rational Fraction.

(ii) Define Harmonic Progression.

(iii) If $a_{n-1} = 3n - 11$, then find nth term of A.P.

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

(v) Find vulgar Fraction Equivalent to $1.\dot{3}\dot{4}$.

(vi) Write values of : (i) $\sum_{K=1}^{n} K$ (ii) $\sum_{K=1}^{n} K^3$

(vii) Find the value of "n" if ${}^{n}P_4 : {}^{n-1}P_3 = 9 : 1$

(viii) Find the number of Diagonals of 6 - Sided Figure

(ix) By using Mathematical Induction show that $1 + \frac{1}{2} + \frac{1}{4} + \text{------} + \frac{1}{2^{n-1}} = 2\left(1 - \frac{1}{2^n}\right)$ is true for n = 1 and n = 2

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

(xi) Using Binomial Theorem, find the value of $\frac{1}{\sqrt{252}}$ to three place of Decimals.

(xii) Let S = {1, 2, 3, --------- 9}; Event A = {2,4,6,8}; Event B = {1, 3, 5}; Find P (A U B)

Q4 Attempt any nine parts. (18)

(i) Find the Radius of the Circle in which the arms of a Central Angle of Measure 1 radian cut off an Arc of length 35cm.

(ii) Show that $\cos(\alpha + \beta)\cos(\alpha - \beta) = \cos^2\alpha - \sin^2\beta$

(iii) A ladder leaning against a vertical wall makes an angle of 24° with the wall. Its foot is 5 m from the wall. Find its length.

(iv) If α, β, γ are the angles of a Triangle ABC, then prove that $\cos\left(\frac{\alpha+\beta}{2}\right) = \sin\frac{\gamma}{2}$

(v) Evaluate $\dfrac{\tan\frac{\pi}{3} - \tan\frac{\pi}{6}}{1 + \tan\frac{\pi}{3}\tan\frac{\pi}{6}}$

(vi) With Usual Notations show that $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$

(vii) Write any two laws of Tangents

(viii) Define Period of a Trigonometric Function.

(ix) Prove that $\frac{2\tan\theta}{1+\tan^2\theta} = 2\sin\theta\cos\theta$

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

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

(xii) Solve the Equation $\cos x = -\frac{1}{2}$

(xiii) Find the Solution of $\cot\theta = \frac{1}{\sqrt{3}}$ which lies in $[0, 2\pi]$

PART - II

Note: Attempt any THREE questions.

Q5. (a) Let A, B, C are any non - empty sets, then show that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. 5

(b) Define Rank of a Matrix and fnd Rank of given Matrix: 5

$$\begin{bmatrix} 1 & -1 & 2 & -3 \\ 2 & 0 & 7 & -7 \\ 3 & 1 & 12 & -11 \end{bmatrix}$$

Q6. (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) Resolve $\frac{2x^4}{(x-3)(x+2)^2}$ into Partial Fractions. 5

Q7. (a) Find "n" so that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be the Arithmatic Mean (A.M.) between "a" and "b". 5

(b) Prove by Mathematical Induction that for all positive integral values of "n" 5

$$\frac{1}{3} + \frac{1}{3^2} + \text{---------} + \frac{1}{3^n} = \frac{1}{2}\left[1 - \frac{1}{3^n}\right]$$

Q8. (a) Prove that: (i) $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$ 5

(ii) $(\cos^2\theta - \sin^2\theta) = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

(b) Show that (without using calculator) $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$ 5

Q9. (a) Show that $r_3 = 4R \cos\frac{\alpha}{2} \cos\frac{\beta}{2} \sin\frac{\gamma}{2}$ with usual notations of ΔABC 5

(b) Prove that $\tan-1\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$ 5