PAPER NO. 04

FAISALABAD 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. If $\cos x = \frac{1}{\sqrt{2}}$, then reference angle is:

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

2. $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} =$:

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

3. With usual notation $\frac{abc}{4\Delta} =$:

(A) r (B) r_2

(C) R (D) 2r

4. A tree of 8 meters high has shadow 8m in length, then angle of elevation of sun at the mom... is:

(A) 15° (B) 30°

(C) 45° (D) 60°

5. The period of $\cos\left(\frac{x}{2}\right)$ is:

(A) 4π (B) 2π

(C) $\frac{\pi}{2}$ (D) π

6. $2\sin^2\frac{\theta}{2} =$:

(A) $1 + \cos\theta$ (B) $1 - \sin\theta$

(C) $1 + \sin\theta$ (D) $1 - \cos\theta$

7. One radian is equal to:

(A) 45° (B) 50°

(C) 60° (D) 57.296°

8. The number of terms in the expansion of $(2a + b)^{12}$ is:

(A) 13 (B) 14 (C) 15 (D) 12

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9. The inequality $n! > 2n - 1$ is valid if n is:

(A) $n = 3$ (B) $n \leq 3$

(C) $n < 4$ (D) $n \geq 4$

10. ${}^{n}C_{r} + {}^{n}C_{r-1} =$: (usual notation)

(A) ${}^{n}C_{r}$ (B) ${}^{n-1}C_{r}$

(C) ${}^{n+1}C_{r+1}$ (D) ${}^{n-1}C_{r-1}$

11. Factorial form of $6 \cdot 5 \cdot 4$ is:

(A) $\frac{6!}{3!}$ (B) $\frac{6!}{2!}$

(C) $6!$ (D) $3!$

12. Geometric mean between 2i and 8i is:

(A) ± 4 (B) 4

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

13. An infinite geometric series is convergent if:

(A) $|r| \leq 1$ (B) $|r| < 1$

(C) $|r| < 2$ (D) $|r| > 1$

14. The conditional equation $5x = 4$ is true if $x =$:

(A) 4 (B) 5

(C) $\frac{5}{4}$ (D) $\frac{4}{5}$

15. Cube roots of unity are:

(A) $-1, -2, 1$ (B) $1, -1, \omega$,

(C) $1, \omega, \omega^2$ (D) $-1, -\omega, \omega^2$

16. The product of the roots of the equation $ax^2 + bx + c = 0$ is:

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

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

17. The value of $\begin{vmatrix} 1 & 12 & 25 \\ 0 & 3 & 15 \\ 0 & 0 & 8 \end{vmatrix}$ is:

(A) 0 (B) 1

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

PART- I

Q2. Attempt any eight parts: (16)

(i) Simplify by justifying each step mentioning each property: $\dfrac{\frac{a}{b}+\frac{c}{d}}{\frac{a}{b}-\frac{c}{d}}$

(ii) Factorize: $9a^2 + 16b^2$.

(iii) Show that $\forall Z \in C, Z^2 + \bar{Z}^2$ is a real number.

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

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

(vi) Write the inverse of relation $\{(x,y) \mid y = 2x + 3, x \in R\}$. Is it inverse a function or not?

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

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

(ix) Without expansion show that $\begin{vmatrix} bc & ca & ab \\ \frac{1}{a} & \frac{1}{b} & \frac{1}{c} \\ a & b & c \end{vmatrix} = 0$

(x) Sove the equation by completing the square: $x^2 + 4x - 1085 = 0$

(xi) Prove the $\left(\dfrac{1+\sqrt{-3}}{2}\right)^9 + \left(\dfrac{1-\sqrt{-3}}{2}\right)^9 = -2$

(xii) When $x^4 + 2x^3 + kx^2 + 3$ is divided by 'x – 2', the remainder is 1. Find the value of K.

Q3. Attempt any eight parts: (16)

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

(ii) Find the next two terms of 1, 3, 7, 15, 31, ...

(iii) If $S_n = n(2n - 1)$, then find the series.

(iv) Find the geometric mean (G.M.) between –2i and 8i

(v) Find the vulgar fractino equivalent to recurring decimal 0.7°

(vi) If the numbers $\dfrac{1}{K}, \dfrac{1}{2K+1}$ and $\dfrac{1}{4K-1}$ are in harmonic sequence, find K.

$(n+1)n(n-1)$

(vii) Express in factorial form $\frac{}{3.2.1}$

(viii) Find the value of n, when ${}^{n}C_{10} = \frac{12 \times 11}{2!}$. (C is used for combination)

(ix) If the sample space = {1,2,3 ..... 9} Events A = {2,4,6,8} and B = {1,3,5}, find P(A|B) = ?

(x) Calculate by means of binomial theorem $(0.97)^3$.

(xi) Define a mathemtatical induction.

(xii) Expand upto 4 terms $(1 + 2x)^{-1}$.

Q4. Attempt any nine parts: **(18)**

(i) What is the circular measure of angle between the hands of watch at 4'O clock?

(ii) Find x if $\tan^2 45^\circ - \cos^2 60^\circ = x \cdot \sin 45^\circ \cdot \cos 45^\circ \cdot \tan 60^\circ$.

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

(iv) If ΔABC, $\alpha + \beta + \gamma = 180^\circ$, then prove that $\cos(\alpha + \beta) + \cos\gamma = 0$.

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

(vi) Show that $\frac{\sin 2\theta}{1 + \cos 2\theta} = \tan\theta$.

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

(viii) In a right ΔABC, if $\gamma = 90^\circ$; $c = 10$; $b = 5$ then find 'a' and 'α'.

(ix) The area of ΔABC is 2437. If $a = 79$; $c = 97$, then find 'β'.

(x) If $a = 13$; $b = 14$; $c = 15$, then find R.

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

(xii) Define trigonometric equation. Give an example.

(xiii) Solve $\sin x \cdot \cos x = \frac{\sqrt{3}}{4}$ in $[0, 2\pi]$

PART - II

Note: Attempt any THREE questions.

Q5. (a) Convert $(A \cap B) \cap C = A \cap (A \cap C)$ into logical form and prove by constructing truth table when A,B,C are three non-empty sets. 5

(b) If $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 2 & -1 \\ -1 & 3 & 2 \end{bmatrix}$, show that $A + A^1$ is symmetric. 5

Q6. (a) Resolve $\frac{x-1}{(x-2)(x+1)^2}$ into partial fraction. 5

(b) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2$, $a \neq 0$, $b \neq 0$. 5

Q7. (a) The sum of three numbers in A.P. is 24 and their product is 440. Find the numbers. 5

(b) Find the term independent of x in $\left(x-\frac{2}{x}\right)^{10}$ 5

Q8. (a) Show that $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$ 5

(b) Prove that $\cos20^\circ\ \cos40^\circ\ \cos60^\circ\ \cos80^\circ = \frac{1}{16}$ (without using calculator). 5

Q9. (a) Prove that in triangle ABC, $abc(\sin\alpha + \sin\beta + \sin\gamma) = 4\Delta S$ 5

(b) Prove that $\sin^{-1}\frac{1}{\sqrt{5}} + \cot^{-1}3 = \frac{\pi}{4}$. 5