# PRE BOARD EXAMINATION 2019

## $XI \sum$ ATHEMATICS

FROM THE DESK OF: FAIZAN AHMED

PAPER A

**Max. Marks: 20** **Time: 20 minutes**

## "Section A" (Multiple Choice Questions)

**Q1. Choose the correct answer for each from the given options.**

i. $(1+\ \omega^2)^{18}\ =$ ______________.

* 1 * -1 * ω * $\omega^2$

ii. The equation whose roots are 3 and 1, is:

* $x^2 - 4x + 3 = 0$ * $x^2\ - 3x + 2 = 0$ * $x^2 - 3x - 2 = 0$ * $12x^2 + 4x - 8 = 0$

iii. For what value of 'q', will both roots of $x^2 + (2p - 4)x + (3q - 12) = 0$ are zero.

* -3 * 4 * 5 * 7

iv. Factors of $a^2 - ab + b^2$ are.

* (a + b)(a - b) * (a-b)(a-b) * (a+b)(a+b) * $(a + \omega b)(a + \omega^2 b)$

v. A matrix having equal number of rows and columns is called ___________ matrix.

* rectangular * square * row * column

vi. $\begin{bmatrix} 2 & -3 \\ \sqrt{32} & 6 \end{bmatrix} + \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ = ___________.

* $\begin{bmatrix} 4 \\ \sqrt{32}+3 \end{bmatrix}$ * $\begin{bmatrix} 2 & -1 \\ \sqrt{32} & 9 \end{bmatrix}$ * $\begin{bmatrix} 0 & -11 \\ \sqrt{62} & 10 \end{bmatrix}$ * not possible

vii. The matrix $\begin{bmatrix} 1 & 1 \\ 3 & 3 \end{bmatrix}$ is a

* singular * non-singular * square * rectangular

viii. The $n^{th}$ term of the sequence 1,2,3,… is.

* 4n+1 * n * 2n * 4n-2

ix. The arithmetic mean between a and b is

* $\frac{a+b}{2}$ * $\sqrt{ab}$ * $\frac{2ab}{a+b}$ * none

x. The $60^{th}$ part of one degree is called one

* second * radian * degree * minute

xi. The length of the arc cut off on a circle of radius 6cm by a central angle of $\frac{2}{3}\pi$ radians is

* 9.156cm * 10.033cm * 12.113cm * 12.566cm

xii. $\tan(-\alpha)$ = _______

* $sin\alpha$ * $tan\alpha$ * $-tan\alpha$ * $cos\alpha$

xiii. $sinU + sinV =$ _______

* $2\sin\frac{U+V}{2}.\cos\frac{U-V}{2}$ * $2\cos\frac{U+V}{2}.\sin\frac{U-V}{2}$ * $2\cos\frac{U+V}{2}.\cos\frac{U-V}{2}$ * $2\sin\frac{U+V}{2}.\sin\frac{U-V}{2}$

xiv. $2Cos46^0.Cos12^0$= ______________

* $\cos34^0.\cos58^0$ * $\cos34^0+\cos58^0$ * $\sin34^0 - \sin58^0$ * $\cos34^0 - \cos58^0$

xv. The period of cosx is ________

* $2\pi$ * $\pi$ * $3\pi$ * $4\pi$

xvi. $\cos\frac{\gamma}{2}$ = ____________.

* $\sqrt{\frac{(s-b)(s-c)}{bc}}$ * $\sqrt{\frac{s(s-c)}{ab}}$ * $\sqrt{\frac{s(s-a)}{bc}}$ * $\sqrt{\frac{(s-a)(s-b)}{abc}}$

xvii. If a, b, c are the sides of a triangle ABC, then area of the triangle is ____________.

* $\sqrt{s(s-a)(s-b)(s-c)}$ * $\sqrt{s(s-a)(s+b)(s+c)}$

* $\sqrt{s(s-a)(s+b)}$ * $\sqrt{s(s-a)(s+b)(s+a)}$

xviii. R has its usual meaning, then R = ______________.

* $\frac{a}{2sin\alpha}$ * $\frac{b}{sin\beta}$ * $\frac{c}{sin\gamma}$ * $\frac{a}{sin\gamma}$

xix. $\sin^{-1}\frac{1}{2}$ = ____________.

* $\infty$ * 1 * $90^0$ * $30^0$

xx. The geometric mean between 9 *and* 4 __________.

* 3 * 5 * 6 * 9

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## $XI \sum$ ATHEMATICS

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PAPER A

**Max. Marks: 50** **Time: 2 hours 40 minutes**

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**SECTION 'B' (SHORT-ANSWER QUESTIONS)** **(30 Marks)**

**NOTE:** Attempt any **TEN part questions** from this Section, selecting **at least THREE part questions** from each question. All questions carry equal marks

**COMPLEX NUMBER, ALGEBRA & MATRICES**

Q-2

(i) simplify: $\frac{1+2i}{3-4i}$

**OR** Solve the complex equation $(x,y)(2,3) = (5,8)$

(ii) Find all cube roots of 64 also show that their sum is zero.

(iii) Solve: $\frac{x+3}{x-3} + \frac{x-3}{x+3} = \frac{34}{15}$

**OR** If $\alpha, \beta$ are the roots of the equation $ax^2 + bx + c = 0; p \neq 0$, find the value of $\alpha^3 + \beta^3$.

(iv) If $\alpha, \beta$ are the roots of the equation $px^2 + qx + r = 0; p \neq 0$,

Prove that: $\sqrt{\frac{q}{p}} + \sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} = 0$

**OR** Perform the Matrix multiplication: $[a \quad b \quad c]\begin{bmatrix} x & f & g \\ f & y & h \\ g & h & z \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix}$

(v) Using the properties of determinants, evaluate the determinant:

$$\begin{vmatrix} a+x & a & a \\ a & a+x & a \\ a & a & a+x \end{vmatrix} = x^2(3a+x) \qquad \text{OR} \qquad \begin{vmatrix} 1 & 1 & 1 \\ \alpha & \beta & \gamma \\ \beta\gamma & \gamma\alpha & \alpha\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)$$

**GROUPS, SEQUENCES & SERIES, COUNTING PROBLEMS**

Q-3

(i) If $A = \{1, -1, i, -i\}$, construct the multiplication for complex numbers multiplication $(\cdot)$ in A, also show that $(\cdot)$ is commutative in A.

(ii) In how many distinct ways can the letters of the word MATHEMATICS be arranged?

**OR** How many natural numbers may be formed by using 4 out of 2,3,5,7,8,9:
(i) If the digits are not repeated? (ii) If the digits may be repeated?

(iii) Prove by Mathematical Induction that:

$$1.3 + 2.4 + 3.5 + \ldots + n(n+2) = \frac{1}{6}n(n+1)(2n+7)$$

(iv) Find the sum of 15 terms of an A.P whose middle term is – 42.

(v) Find the two G.M's between 2 and -16.

**OR** Find the G.P. whose third term is $\frac{9}{4}$ and whose sixth term is $\frac{243}{32}$.

## TRIGONOMETRY

**Q-4**

i) If a point on the rim of a 43 cm, diameter flywheel travels 243 meters in a minute, through how many radians does the flywheel turn in one second?

ii) Show that sinx is periodic function of period $2\pi$

iii) Draw the graph of sinx when $-\pi \leq x \leq \pi$

iv) Prove that $rr_1r_2r_3 = \Delta^2$, where all symbols have usual meanings.

v) Prove that arc Cosθ + arc Sin θ $= \frac{\pi}{2}$

## SECTION 'C' (DETAILED-ANSWER QUESTIONS) (30 Marks)

**Attempt any TWO selecting Q.5 which is compulsory.**

Q-5

(a) Find the sum to 20 terms of an A.P whose $4^{th}$ term is 7 and the $7^{th}$ term is 13.

(b) Derive law of Sines

Q-6

(a) If |x|<1, prove that: $\frac{(1+x)^{\frac{1}{2}} + (1-x)^{\frac{2}{3}}}{1+x+(1-x)^{\frac{1}{2}}} = 1 - \frac{5x}{6}$; nearly

**OR** If y = $\frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \ldots$, prove that: $y^2 + 2y - 7 = 0$

(b) If A = $\begin{bmatrix} 2 & 3 & 0 \\ 1 & -1 & 2 \\ 0 & 1 & 0 \end{bmatrix}$, then find $Adj\ A$

Q-7

(a) Find the remaining trigonometric functions using radian definition if $tan\theta = \frac{1}{3}$ and $sin\theta$ is positive.

(b) Solve:
$x^2 + y^2 = 5$ , $xy = 2$ **OR** $y + z = 5$, $y^2 + 2z^2 = 17$

(c) Prove any TWO of the following:

a. $\frac{sin2\theta}{sin\theta} - \frac{cos2\theta}{cos\theta} = sec\theta$   b. cos 4θ = 8 $\cos^4$ θ - 8 $\cos^2$ θ + 1

c. $cos\,(\alpha+\beta) cos\,(\alpha+\beta) = \cos^2\alpha - \sin^2\beta$