Mathematics	Inter Part I (2018) Gujranwala Board	Paper – I
Time: 30 Min.	Objective	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 circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1.1 If $a = 1$ then sum of even coefficients in expression of $(a+x)^n$ is equal to

(A) 2^{n-1} (B) 2^n

(C) 2^{n+1} (D) 2^{2n}

2 The arithmetic mean (A.M) between $\frac{1}{a}$ and $\frac{1}{b}$ is equal to

(A) $\frac{a+b}{2}$ (B) $\frac{a+b}{2ab}$

(C) $\frac{1}{a+b}$ (D) $\frac{2ab}{a+b}$

3 Solution of equation $\cos x + 1 = 0$ is

(A) $\{\pi + n\pi\}$ (B) $\{\pi + 2n\pi\}$

(C) $\{\pi\}$ (D) $\left\{\frac{\pi}{2} + n\pi\right\}$

4 The radius of inscribed circle r =

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

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

5 The range of sin x =

(A) [-1, 1] (B) [0, 1]

(C) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (D) [-1, 0]

6 The angle formed by a line above horizontal line is called
(A) right angle (B) oblique angle
(C) angle of depression (D) angle of elevation

7 If A is non-singular matrix then A^{-1} =

(A) $\frac{Adj(A)}{|A|}$ (B) $|A|\,Adj(A)$

(C) A^t (D) $\frac{|A|}{Adj(A)}$

8 The number $\sqrt{-1}$ is called
(A) real number (B) natural number
(C) complex number (D) rational number

9 The fraction $\frac{x+1}{x^2+2}$ is
(A) proper fraction (B) improper fraction
(C) identity (D) mixed

10 Show that $n! > n^2$ is true for integral values of
(A) n = 3 (B) n < 4
(C) $n \geq 4$ (D) $n \leq 4$

11 The value of $2\,Sin^2 \frac{\theta}{2}$ =
(A) 1 + cos θ (B) 1 – cos θ
(C) 1 + sin θ (D) 1 – sin θ

12 The roots of equation $ax^2 + bx + c = 0$ are rational if $b^2 - 4ac$ is
(A) positive (B) perfect square
(C) negative (D) 0

13 The converse of $P \rightarrow q$ is
(A) $\sim q \rightarrow p$ (B) $q \rightarrow p$
(C) $p \rightarrow \sim q$ (D) $\sim p \rightarrow \sim q$

14 The value of $\sin(\tan^{-1}(0)) =$

(A) 0 (B) 1

(C) –1 (D) ∞

15 In a triangle with usual notation $\cos\frac{\beta}{2} =$

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

(C) $\sqrt{\frac{s(s-c)}{ab}}$ (D) $\sqrt{\frac{s(s-b)}{ac}}$

16 If α, β are roots of equation $x^2 - x + 1 = 0$ then $\alpha + \beta =$

(A) –1 (B) 0

(C) 1 (D) 2

17 For two +ve real numbers, with usual notation

(A) $A > G$ (B) $A = G$

(C) $A \geq G$ (D) $A < G$

18 A die is rolled, the probability that dots on tops are greater than 4 is

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

(C) $\frac{1}{4}$ (D) $\frac{1}{6}$

19 The value of permutation ${}^{20}P_3$ is

(A) 4050 (B) 5040

(C) 6840 (D) 4068

20 The matrix $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ is called

(A) identity (B) null

(C) scalar (D) diagonal

Time: 2:30 Hours (Subjective Part) Marks: 80

SECTION-I

2. Attempt any Eight Parts. 16

(i) Define rational numbers.

(ii) Simplify: $(8,-5)-(-7,4)$

(iii) $\forall z \in \mathbb{C}$, show that $z\bar{z} = |z|^2$.

(iv) Write the set $\{x \mid x \in Q \wedge x^2 = 2\}$ in tabular form.

(v) Show that $(p \wedge q) \rightarrow p$ is a tautology.

(vi) Let G be a group and a, b ∈ G Solve ax = b and xa = 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) Find inverse of $\begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$

(ix) If A and B are non singular matrices then show that $(AB)^{-1} = B^{-1}A^{-1}$

(x) Discuss nature of roots of equation $x^2 - 5x + 6 = 0$.

(xi) Show that $x-2$ is factor of $x^4 - 13x^2 + 36$.

(xii) Solve $5x^2 + 2ax - a^2 = 0$ by quadratic formula.

3. Attempt any Eight Parts. **16**

(i) Define identity.

(ii) How many terms of $-7+(-4)+(-1)+\ldots\ldots$ amount to 114.

(iii) Find vulgar fraction equivalent to 1.53.

(iv) If $\frac{1}{k}, \frac{1}{2k+1}, \frac{1}{4k-1}$ are in H.P., find k.

(v) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in G.P., find $r = \pm\sqrt{\frac{a}{c}}$.

(vi) Define sample space.

(vii) Find , if ${}^{n}C_{12} = {}^{n}C_{6}$.

(viii) How many words can be formed from OBJECT using all letters?

(ix) Prove that ${}^{n}C_{r} = {}^{n}C$

(ix) Prove that $C_r = C_{n-r}$

(x) Expand $(8-2x)^{\frac{1}{3}}$ upto two terms.

(xi) Show that $n! > n^2$ is true for $n = 4,5$.

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

4. **Attempt any Nine Parts.** 18

(i) Prove that $\cos^4\theta - \sin^4\theta = \cos^2\theta - \sin^2\theta$

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

(iii) Define radian.

(iv) Find the distance between the points P $(\cos x, \cos y)$ and Q $(\sin x, \sin y)$

(v) Without using tables / calculator, find the values of sin105° and cos105°.

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

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

(viii) Solve the right triangle ABC in which $\gamma = 90°, \beta = 796, \alpha = 62°40'$

(ix) Find the smallest angle of triangle ABC when a = 37.34, b = 3.24, c = 35.06

(x) With usual notations, prove that $R = \frac{abc}{4\Delta}$.

(xi) Without using tables / calculator, show that $\tan^{-1}\frac{5}{12} = \sin^{-1}\frac{5}{13}$

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

(xiii) Solve $2\sin^2\theta - \sin\theta = 0$ where $\theta \in [0, 2\pi]$

SECTION-II: Attempt any THREE questions. Each questions carries 10 marks.

5. (a) Use Cramer's rule to solve the systems:
$$\begin{aligned} 3x_1 + x_2 - x_3 &= -4 \\ x_1 + x_2 - 2x_3 &= -4 \\ -x_1 + 2x_2 - x_3 &= 1 \end{aligned}$$

(b) Find the condition that one root of $ax^2 + bx + c = 0$, $a \neq 0$ is square of the other.

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

(b) If the 5th term of an A.P. is 16 and the 20th term is 46, what is its 12th term?

7. (a) Show that ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^{n}C_r$

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

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

(b) Prove that $\frac{\operatorname{cosec}\theta + 2\operatorname{cosec}2\theta}{\sec\theta} = \cot\frac{\theta}{2}$

9. (a) Solve the triangle ABC, in which a = 36.21, c = 30.14, $\beta = 78°10'$ by using first law of tangents and then law of sines.

(b) Prove that $\tan^{-1}A + \tan^{-1}B = \tan^{-1}\left(\frac{A+B}{1-AB}\right)$