

BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, PESHAWAR

Higher Secondary School Certificate (H.S.S.C.) Examination — Inter Part-I

Inter Part-I	MATHEMATICS Paper – XI (01) (23) · PR XI (02) 23	Fresh / Reappear 2023
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Instructions (printed in Urdu on the sheet): 1. Each question has four circles; fill in only the circle of the correct answer. 2. Use a blue or black pen to fill the circles. 3. Filling more than one circle will be treated as a wrong answer.

SECTION - A

Time Allowed: 20 Minutes

Marks: 20

1	In rolling a die, the probability of less than one, is..... ☐ 0 ☐ 1 ☐ $\frac{1}{2}$ ☐ $\frac{1}{6}$
2	Amplitude of $\cos 2\theta$ is equal to: ☐ 2 ☐ $\frac{1}{3}$ ☐ $-\frac{1}{3}$ ☐ 1
3	Frequency of $\sin 6\theta$ is equal to: ☐ $\frac{3}{\pi}$ ☐ $\frac{\pi}{3}$ ☐ $\frac{\pi}{4}$ ☐ $\frac{2\pi}{3}$
4	$\tan\theta$ is positive in.....quadrant. ☐ 1 st and 2 nd ☐ 1 st and 3 rd ☐ 1 st and 4 th ☐ 2 nd and 3 rd
5	$\binom{n-1}{1} + \binom{n-1}{2} + \binom{n-1}{3} + \dots + \binom{n-1}{n-1} =$ where $n > 1$ ☐ $2^n - 1$ ☐ 2^{n-2} ☐ $2^{n-1} - 1$ ☐ 2^{n-1}
6	The linear inequalities involved in the problem are called..... ☐ Problem constraints ☐ Feasible solution ☐ Decision variable ☐ Optimal solution
7	Exact value of: $\sin 42^\circ \cos 12^\circ - \cos 42^\circ \sin 12^\circ =$ ☐ $-\frac{1}{2}$ ☐ $\frac{3}{2}$ ☐ $\frac{1}{2}$ ☐ $\frac{2}{3}$
8	$\tan(2\pi - \theta) =$ ☐ $\tan\theta$ ☐ $\cot\theta$ ☐ $-\cot\theta$ ☐ $-\tan\theta$
9	$\sin \frac{\theta}{2} = \sqrt{\frac{1 - \cos\theta}{2}}$ where $\frac{\theta}{2}$ lies in: ☐ 1 st quadrant ☐ 2 nd quadrant ☐ 3 rd quadrant ☐ Both A and B
10	$\sqrt{\frac{S(S-b)}{a \cdot c}} =$ ☐ $\sin \frac{\alpha}{2}$ ☐ $\cos \frac{\alpha}{2}$ ☐ $\cos \frac{\beta}{2}$ ☐ $\sin \frac{\beta}{2}$
11	$\sqrt{-2} \times \sqrt{-3} =$ ☐ $\sqrt{6}$ ☐ $-\sqrt{6}$ ☐ $\sqrt{-6}$ ☐ $-\sqrt{-6}$
12	If $Z = x + iy$ then which of the given is always true? ☐ $Z \cdot \bar{Z} = Z ^2$ ☐ $ \bar{Z} = - Z $ ☐ $\bar{Z} = -Z$ ☐ None of these
13	If A and B are two matrices then $(A + B)^t =$ ☐ $A + B$ ☐ $A^t \cdot B^t$ ☐ AB ☐ $A^t + B^t$
14	If $A = \begin{bmatrix} \alpha & 1 \\ 1 & \alpha \end{bmatrix}$ and $ A = 24$ then value of α is: ☐ 5 ☐ ± 5 ☐ 4 ☐ ± 4
15	If $\hat{u}$ is a unit vector then $ \hat{u} =$ ☐ -1 ☐ 1 ☐ ± 1 ☐ 2
16	If the nth term of an A.P is $4n + 1$, then common difference is..... ☐ 3 ☐ 5 ☐ 4 ☐ 6
17	Harmonic mean between two numbers a and b is..... ☐ $\frac{2ab}{a+b}$ ☐ $\frac{a+b}{2ab}$ ☐ $\frac{a \cdot b}{a+b}$ ☐ $\frac{a+b}{a \cdot b}$
18	The nth term of the series $1.2 + 2.3 + 3.4 + \dots$ is: ☐ $n^2 + n$ ☐ $n^2 - n$ ☐ n^2 ☐ None of these
19	The transpose of a row matrix is: ☐ Row matrix ☐ Column matrix ☐ Square matrix ☐ Unit matrix
20	10 th term of the sequence, 2, 5, 8, ... is: ☐ 27 ☐ 31 ☐ 29 ☐ 33

Note: Time allowed for Section - B and Section - C is 2 Hours and 40 minutes.**SECTION - B**

Marks: 50

Q-II Answer any TEN parts. Each part carries FIVE marks.

1. Find the multiplicative inverse of $(7, -9)$.
2. Factorize: $P(z) = z^2 + 4$
3. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 6 & 5 & 4 \\ 4 & 3 & -2 \end{bmatrix}$ then show that $A + A^t$ is symmetric matrix.
4. Find the rank of the matrix if $A = \begin{bmatrix} 3 & 1 & -4 \\ 0 & 2 & 1 \\ 1 & -1 & -2 \end{bmatrix}$
5. For what value of C. the following vectors are coplanar? $a = \hat{i} + \hat{j} + 2\hat{k}$, $b = 2\hat{i} + 3\hat{j} + \hat{k}$ and $c = c\hat{i} + 2\hat{j} + 6\hat{k}$
6. Insert two harmonic means between 12 and 48.
7. Show that $\hat{i} + 7\hat{j} + 3\hat{k}$ is perpendicular to both $\hat{i} - \hat{j} + 2\hat{k}$ and $2\hat{i} + \hat{j} - 3\hat{k}$
8. Find the sum of all the integers lying between 100 and 600 that end in 5.
9. Find the sum of the series: $\sum_{k=2}^5 \frac{1}{k^2 - k}$
10. Solve for n, if ${}^nP_5 = 9({}^{n-1}P_4)$
11. Find the inverse of the function $g(x) = 4 + \sqrt{2x}$
12. Graph the inequality $2x - 3y > 6$
13. Find the domain, range and period of $\sec \frac{\pi}{4}x$.

SECTION - C

Marks: 30

Note: Attempt any THREE questions. Each question carries equal marks.

- Q-III (a) If $y = \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \dots$ then show that $y^2 + 2y - 7 = 0$
- (b) Prove that $\frac{\sin(\alpha + \beta)}{\cos\alpha \cos\beta} = \tan\alpha + \tan\beta$
- Q-IV (a) Find the area of inscribed circle of the triangle with measures of the sides 55m, 25m and 70m.
- (b) Prove that $\frac{\sin\alpha + \cos\alpha}{\cos\alpha - \sin\alpha} + \frac{\sin\alpha - \cos\alpha}{\cos\alpha + \sin\alpha} = 2 \tan 2\alpha$
- Q-V (a) Find the total number of diagonals of a regular hexagon.
- (b) Given that $f(x) = x^3 - ax^2 + bx + 1$ if $f(2) = -3$ and $f(-1) = 0$, then find the value of a and b.
- Q-VI (a) Find maximum and minimum values of the function, $y = \frac{1}{19 - 10\sin(3\theta - 45)}$
- (b) Find the area of the triangle whose vertices are A(2, 2, 0), B(-1, 0, 2) and C(0, 4, 3)

Notes

1. Typeset from the board paper. Board wording, spelling and notation are reproduced as printed, including slips; nothing has been corrected.
2. The source answer sheet arrived with the bubbles already shaded in. Options are given unmarked; no answer key is included.
3. The Section A instructions are printed in Urdu on the board sheet; an English rendering is given here.
4. The objective sheet is headed "Mathematics Paper - XI (01) (23)" and the subjective "PR XI (02) 23 — Mathematics (New), Inter Part-I (Fresh/Reappear)". The two series numbers differ as printed; both sheets are the 2023 Inter Part-I paper.
5. Section B Q.9: the upper limit of the sum is small and faint on the scan; read as 5.