

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) (21) · PR XI (01) 21	Fresh / Reappear 2021
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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	$\tan(\alpha - \beta) = \dots\dots\dots$ ☐ $\frac{\tan\alpha - \tan\beta}{1 - \tan\alpha \tan\beta}$ ☐ $\frac{\tan\alpha + \tan\beta}{1 + \tan\alpha \tan\beta}$ ☐ $\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta}$ ☐ $\frac{\tan\alpha - \tan\beta}{1 + \tan\alpha \tan\beta}$
2	$\cos(\frac{\pi}{2} - \theta) = \dots\dots\dots$ ☐ $-\sin\theta$ ☐ $-\cos\theta$ ☐ $\cos\theta$ ☐ $\sin\theta$
3	If $b = 14\text{cm}$, $c = 12\text{ cm}$ and $\alpha = 82^\circ$ the area of triangle is equal to..... ☐ $\frac{bc}{2}\cos\alpha$ ☐ $\frac{bc}{2}\sin\alpha$ ☐ $\frac{bc}{2}\sin\beta$ ☐ $\frac{bc}{2}\sin\gamma$
4	$\cos\alpha = \dots\dots\dots$ ☐ $\frac{b^2 + c^2 - a^2}{2bc}$ ☐ $\frac{a^2 + b^2 - c^2}{2bc}$ ☐ $\frac{a^2 + c^2 - b^2}{2bc}$ ☐ $\frac{b^2 + c^2 - a^2}{2ac}$
5	The minimum value of $y = 1 + 2\sin\theta$ is: ☐ -1 ☐ -3 ☐ 1 ☐ 3
6	$\sin^{-1}x + \cos^{-1}x = \dots\dots\dots$ ☐ 2π ☐ π ☐ $\frac{\pi}{2}$ ☐ $\frac{\pi}{3}$
7	The next term in the $2 + 6 + 18 + \dots\dots$ is: ☐ 24 ☐ 36 ☐ 54 ☐ 72
8	If $t_n = 6n + 5$, then $T_{n+1} = \dots\dots\dots$ ☐ $6n$ ☐ $6n + 11$ ☐ $6n + 6$ ☐ $6n - 5$
9	$\frac{(n-2)!}{n!}$ is..... ☐ $\frac{1}{n-1}$ ☐ $\frac{1}{n}$ ☐ $\frac{1}{n+1}$ ☐ $\frac{1}{n(n-1)}$
10	If A and B are mutually exclusive events, then ☐ $P(A \cap B) = P(A) + P(B)$ ☐ $P(A \cup B) = P(A) + P(B)$ ☐ $P(A \cup B) = P(A) - P(B)$ ☐ $P(A \cap B) = P(A) - P(B)$
11	The number of terms in the expansion of $(a + b)^n$ is..... ☐ n ☐ $(n - 1)$ ☐ $(n + 1)$ ☐ $n(n - 1)$
12	The middle term in the expression of $(2x + 5y)^4$ is..... ☐ $600 x^2y^2$ ☐ $120 xy^2$ ☐ $500 xy^3$ ☐ $6 x^2y^2$
13	If $f(x) = x^3 - \frac{1}{x^3}$ then $f(x + \frac{1}{x}) = \dots\dots\dots$ ☐ -1 ☐ 0 ☐ 1 ☐ x^3
14	If $z_1 = 2 + 4i$ and $z_2 = 1 - 3i$, then $z_1 - 3z_2 = \dots\dots\dots$ ☐ $-1 + 5i$ ☐ $-1 + 13i$ ☐ $-1 - 5i$ ☐ $-1 - 13i$
15	If Z is any non-zero complex number, then $z + \bar{z} = \dots\dots\dots$ ☐ $2\text{Im}(z)$ ☐ $2\text{Re}(\bar{z})$ ☐ $2\bar{z}$ ☐ $-2\bar{z}$
16	If $A = \begin{bmatrix} 1 & 3 & 1 \\ -1 & 2 & 0 \\ 2 & 0 & -2 \end{bmatrix}$, then $A_{33} = \dots\dots\dots$ ☐ -1 ☐ -5 ☐ 1 ☐ 5
17	Evaluate $\begin{bmatrix} 0 & 1 & 3 \\ -1 & 2 & 1 \\ 2 & 1 & 1 \end{bmatrix} = \dots\dots\dots$ ☐ -9 ☐ -15 ☐ 9 ☐ 15
18	The projection of the vector $2\bar{i} + 3\bar{j} - 2\bar{k}$ on the vector $\bar{i} + 2\bar{j} + 3\bar{k}$ is..... ☐ $\frac{-2}{\sqrt{14}}$ ☐ $\frac{1}{\sqrt{14}}$ ☐ $\frac{2}{\sqrt{14}}$ ☐ $\frac{3}{\sqrt{14}}$
19	If $A(-4, 6)$ and $B(6, 8)$, then vector $\overline{AB} =$ ☐ $-2i + 2j$ ☐ $2i + 2j$ ☐ $10i + 2j$ ☐ $-10i + 2j$

20	Which of the given is an A.P? ☐ 2, 4, 8, 16, ... ☐ 3, 6, 9, 12, ... ☐ 3, 7, 11, 15, ... ☐ 4, 8, 12, 16, ...
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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.

- Multiply $\sqrt{2} + \sqrt{3}i$ and $2\sqrt{2} - \sqrt{3}i$
- Prove that $\begin{vmatrix} 1+x & y & z \\ x & 1+y & z \\ x & y & 1+z \end{vmatrix} = 1+x+y+z$
- If $a = 3i - 5j$ and $b = -2i - 3j$ then find $|a| - |b|$
- Find the value of 'k' if $2k + 7, 6k - 2, 8k - 4$ are in A.P. Also, find the sequence.
- Find the sum $1.2 + 2.3 + 3.4 + \dots + 99.100$
- Find n, d, a_{21} , when $a_1 = -40, S_{21} = 210$
- Find n when ${}^{2n}C_3 : {}^nC_2 = 36 : 3$
- Find the middle term in the expansion of $\left(3x - \frac{x^2}{2}\right)^9$
- Find the inverse function of $f(x) = 4 + \sqrt{2}$
- Prove that $\frac{\sin 3\theta}{\cos \theta} + \frac{\cos 3\theta}{\sin \theta} = 2\cot 2\theta$
- Solve the triangle when $a = 120, b = 240, \gamma = 32^\circ$
- Prove that $\sin^{-1}\left(\frac{77}{85}\right) - \sin^{-1}\left(\frac{3}{5}\right) = \cos^{-1}\left(\frac{15}{17}\right)$
- If $a = 30, \beta = 50^\circ, \gamma = 100^\circ$, find the area of triangle.

SECTION - C

Marks: 30

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

- Q-III (a) Solve by Cramer's rule, if
 $x - y + 2z = 10$
 $2x + y - 2z = -4$
 $3x + y + z = 7$
- (b) For what value of c the vectors are coplanar? If $u = i + j + 2k, v = 2i + 3j + k, w = ci + 2j + 6k$
- Q-IV (a) The harmonic mean of two number is $4\frac{4}{5}$ and the geometric mean is 6. What are the numbers?
- (b) In how many ways can letters of the word 'Fasting' be arranged?
- Q-V Solve by mathematical induction $1.2 + 2.3 + 3.4 + \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$
- Q-VI (a) Prove that $\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta = 4\cos \theta \sin 6\theta \cos 2\theta$
- (b) Show that $r_1 = s \tan \frac{\alpha}{2}$

Notes

- Typeset from the board paper. Board wording, spelling and notation are reproduced as printed, including slips; nothing has been corrected.
- The source answer sheet arrived with the bubbles already shaded in. Options are given unmarked; no answer key is included.
- The Section A instructions are printed in Urdu on the board sheet; an English rendering is given here.
- Section B Q.9 prints " $f(x) = 4 + \sqrt{2}$ " with no variable under or after the radical (compare 2023 Q.11, $g(x) = 4 + \sqrt{2}x$). Reproduced as printed.
- Section A Q.17 prints the array in square brackets although it asks for a value. The third option is overwritten by a candidate's handwriting on the scan and is read as 9. Section A Q.13 is printed as shown ($f(x + 1/x)$ rather than $f(1/x)$).
- Q-V is printed as a single question with no (a)/(b) parts.