

BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, KOHAT

Mathematics (Part – I) · Fresh / New Course

KT-XI-1501	MATHEMATICS (Part – I) Total Marks: 100	Time Allowed: 3 Hrs.
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NOTE: Section-A is compulsory. All parts of this section to be answered on the question paper itself. It should be completed in the given time and handed over to the Centre Superintendent. Deleting / Overwriting is not allowed. Do not use lead pencil.

SECTION - A

Time Allowed: 20 Mins.

Marks: 20

Q. 1 Insert the correct option (a, b, c, d) in the empty box opposite to each part. Each part carries one mark.

i)	Which property does not hold by the set of complex numbers? (a) Commutative (b) Associative (c) Closure (d) Order
ii)	Degree 'n' of the polynomial $P_n(x)$ is integer. (a) Positive (b) Negative (c) Non-negative (d) Non-positive
iii)	A square matrix $A = [A_{ij}]$ of order n is said to be if $A^t = A$. (a) Symmetric (b) Skew symmetric (c) Triangular (d) None of these
iv)	A square matrix A is said to be singular if (a) $ A = 0$ (b) $ A \neq 0$ (c) $ A < 0$ (d) $ A > 0$
v)	Direction of zero vector is (a) Arbitrary (b) x-axis (c) y-axis (d) z-axis
vi)	Sum of the squares of direction cosines of a vector is (a) Zero (b) 1 (c) -1 (d) 2
vii)	The medians of a triangle intersect each other in the ratio of (a) 1 : 2 (b) 2 : 3 (c) 2 : 1 (d) 3 : 2
viii)	Domain of a sequence is (a) N (b) IR (c) Z (d) W
ix)	If $ r < 1$ then sum of infinite geometric series is (a) $\frac{a(1 - r^n)}{1 - r}$ (b) $\frac{a(r^n - 1)}{r - 1}$ (c) $\frac{a}{r - 1}$ (d) $\frac{a}{1 - r}$
x)	$\frac{6!}{2.3!} = \dots\dots\dots$ (a) 1 (b) ${}^6C_2$ (c) 60 (d) ${}^6C_3$
xi)	If A & B are independent events then $P(A \cap B) = \dots\dots\dots$ (a) $\frac{P(A)}{P(B)}$ (b) $P\left(\frac{A}{B}\right)$ (c) $P(A \cup B)$ (d) $P(A) \cdot P(B)$
xii)	Number of terms in expansion of $(a + b)^8$ is (a) 8 (b) 9 (c) 7 (d) Infinite
xiii)	The binomial series convergent only if in $(1 + x)^n$ (a) $ x = 1$ (b) $ x > 1$ (c) $ x < 1$ (d) X is arbitrary
xiv)	$\cos\left(\alpha + \frac{\pi}{2}\right) = \dots\dots\dots$ (a) $-\sin\alpha$ (b) $\sin\alpha$ (c) $-\cos\alpha$ (d) $\cos\alpha$
xv)	$\sin(\pi + \theta) = \dots\dots\dots$ (a) $\sin\theta$ (b) $-\sin\theta$ (c) $\cos\theta$ (d) $-\cos\theta$
xvi)	For equilateral triangle r : R : $r_1 = \dots\dots\dots$ (a) 3 : 2 : 1 (b) 1 : 2 : 3 (c) 2 : 1 : 3 (d) 3 : 1 : 2
xvii)	For triangle ABC inscribed (incentre) r = ... (a) $\frac{abc}{4\Delta}$ (b) $\frac{\Delta}{S}$ (c) $\frac{\Delta}{S - a}$ (d) $\frac{\Delta}{S - b}$
xviii)	Which one is even function? (a) $\sin x$ (b) $\operatorname{cosec} x$ (c) $\sec x$ (d) $\tan x$
xix)	Period of $\sin x$ is (a) $\frac{\pi}{2}$ (b) π (c) 2π (d) 4π
xx)	If $\sin\theta$ is negative and $\cos\theta$ is positive then θ lies in quadrant (a) I (b) II (c) III (d) IV

Time Allowed: 2:40 Hrs. Total Marks: 80

SECTION - B

Marks: 50

Q. 2 Write short answers of any TEN of the following parts. Each part carries equal marks.

- (i) Find the multiplicative inverse of $Z = -2 - 3i$
- (ii) Factorize $P(Z) = 3Z^2 + 7$
- (iii) If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ show that $(A^{-1})^{-1} = A$
- (iv) For $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ show that $(AB)^t = B^t A^t$
- (v) If $\vec{r} = \hat{i} - 9\hat{j}$, $\vec{a} = \hat{i} + 2\hat{j}$ & $\vec{b} = 5\hat{i} - \hat{j}$ determine x and y such that $\vec{r} = x\vec{a} + y\vec{b}$.
- (vi) Which term of the Arithmetic sequence 4, 1, -2, ... is 77.
- (vii) Find 'n' such that ${}^nC_2 = 36$
- (viii) Expand upto four terms the series $(1 - x)^{-1/2}$.
- (ix) Show that the function $f(x) = 2x + 5$ is neither even nor odd function.
- (x) Graph the inequality $x - 2y \geq 4$.
- (xi) Prove that $\sin\theta = 2\sin\frac{\theta}{2}\cos\frac{\theta}{2}$.
- (xii) Show that $\sin 5\theta + 2\sin 3\theta + \sin\theta = 4\sin 3\theta \cos^2\theta$.
- (xiii) Solve the ΔABC if $a = 209$, $b = 120$, $c = 241$

SECTION - C

Marks: 30

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

- Q. 3 a) Determine whether $1 + 2i$ is a solution of $z^2 - 2z + 5 = 0$.
- b) Find 'λ' such that the system has non-trivial solution
- $$\begin{aligned} x + 5y + 3z &= 0 \\ 5x + y - \lambda z &= 0 \\ x + 2y + \lambda z &= 0 \end{aligned}$$
- Q. 4 a) If $y = \frac{x}{3} + \frac{x^2}{3^2} + \frac{x^3}{3^3} + \dots$ where $0 < x < 3$ then show that $x = \frac{3y}{1+y}$
- b) Show that the sum of the first 'n' positive odd integers is n^2 .
- Q. 5 a) Prove by the mathematical induction that for all $n \in \mathbb{N}$ $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$.
- b) Find the term independent for x in $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$.
- Q. 6 a) Show that $\frac{\sin(\alpha + \beta)}{\cos\alpha \cos\beta} = \tan\alpha + \tan\beta$
- b) prove that $\frac{\sin 9\alpha + \sin\alpha}{\cos 9\alpha + \cos\alpha} = \tan 5\alpha$.

Notes

- Typeset from the board paper. Board wording, spelling and notation are reproduced as printed, including slips; nothing has been corrected.
- Board check:** this upload was named as a 2018 Peshawar Board paper, but the sheet is headed "KT-XI-1501 — Mathematics (Part - I) (Fresh / New Course)". KT is the Kohat Board prefix (Peshawar sheets print PR, Bannu BN), and the layout — lettered options with an answer box, "Centre Superintendent" note, 100 marks / 3 hours — is not Peshawar's. Filed under Kohat. The sheet prints no year; 2018 is taken from the upload's filename. Please confirm both.
- The source sheet carries a candidate's handwritten answers in the answer boxes; they are omitted and no answer key is included.
- Section A xx): the options fall at the bottom edge of the scan — (b) II and (c) III are legible, (a) and (d) are cut off/under the watermark and are set as I and IV.
- Kept as printed: "does not hold by the set", "The binomial series convergent only if in $(1+x)^n$ ", "term independent for x", "IR" for the reals.