

D.A.V Senior Secondary School (Lahore)

Sector-8C, Chandigarh

First Terminal Test

2024-25

Mathematics

Class-XI

Time Allowed: 3 hour.

Maximum Marks: 80

General Instructions:-

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. **Section A** has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark Each.
3. **Section B** has 5 Very Short Answer (VSA) - type questions of 2 marks each.
4. **Section C** has 6 Short Answer (SA) - type questions of 3 marks each.
5. **Section D** has 4 Long Answer (LA) - type questions of 5 marks each.
6. **Section E** has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

Section -A.

(Multiple choice questions)

Each question carry 1 mark

- Q1.(i) Number of proper subsets of a set containing 4 elements is
(a) 4^2 (b) 4^2-1 (c) 2^4 (d) 2^4-1
- (ii) The angle subtended by an arc of length 20 cm at the centre of circle when radius is 14cm is
(a) $\frac{5}{7}$ radians (b) $\frac{10}{7}$ radians (c) $\frac{5}{14}$ radians (d) $\frac{7}{10}$ radians
- (iii) If $\sin x = 3/5$, then $\cos x$ is
(a) $4/5$ but not $-4/5$ (b) $4/5$ or $-4/5$ (c) $-4/5$ but not $4/5$ (d) none of these
- (iv) The conjugate of $3+4i$ is
(a) $3-4i$ (b) $-3+4i$ (c) $\frac{3+4i}{25}$ (d) $\frac{3-4i}{25}$
- (v) Write the following as interval:- $\{x: x \in \mathbb{R}, -12 < x < -10\}$
(a) $(-12, -10]$ (b) $[-12, -10]$ (c) $[-12, -10)$ (d) $(-12, -10)$
- (vi) Find the value of i^{-35}
(a) i (b) $-i$ (c) 1 (d) -1
- (vii) A Function f is defined by $f(x) = 2x-5$. Write down the values of $f(-3)$
(a) 16 (b) 26 (c) -11 (d) 53
- (viii) Let $A = \{x, y, z\}$ and $B = \{1, 2\}$. Find the number of relations from A to B.
(a) 16 (b) 20 (c) 64 (d) 32

- (ix) What is the value of $7! - 5!$
 (a) 5040 (b) 120 (c) 4920 (d) 416
- (x) State whether the following statement is true/false
 $\{20\} \in \{1, 2, 3\}$ (True/False)
- (xi) If $x \leq 8$, then
 (a) $-x \leq -8$ (b) $-x \geq -8$ (c) $-x < -8$ (d) $-x > -8$
- (xii) Multiplicative Inverse of $1-i$ is -
 (a) $1+i$ (b) $\frac{1-i}{2}$ (c) $2-i$ (d) $\frac{1+i}{2}$
- (xiii) Find the value of 5P_3 .
 (a) 50 (b) 20 (c) 60 (d) 12
- (xiv) If x is a negative integer, then the solution set of $-12x > 30$ is
 (a) $\{-2, -1\}$ (b) $\{\dots, -5, -4, -3\}$ (c) $\{\dots, -5, -4, -3, -2\}$ (d) $\{-2, -1, 0, 1, 2, \dots\}$
- (xv) Evaluate: $3\sqrt{-16}\sqrt{-25}$
 (a) -50 (b) 60 (c) 50 (d) -60
- (xvi) Find the number of terms in $(2x - \frac{3}{x^3})^9$
 (a) 10 (b) 9 (c) 8 (d) 11
- (xvii) Solve $11-5x > 3-2x, x \in W$
 (a) $\{1, 2\}$ (b) $\{1, 2, 3\}$ (c) $\{0, 1, 2\}$ (d) $\{0, 1, 2, 3\}$
- (xviii) State whether $A=B$ or not
 $A = \{x : x \in N \text{ and is a prime factor of } 36\}$ $B = \{1, 2, 3, 4, 6, 9, 12\}$

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.
- (xix) **Assertion (A):** If $A \subset B$ then $A \cap B = A$
Reason (R): If A and B are two sets, then $A \subset B$ means every element of A is Also a element of B. ✓
- (xx) **Assertion (A):** If $\sin x = 3/5$ and $\cos x = -4/5$, then x lies in third quadrant.
Reason (R): In the third quadrant, $\sin x < 0$, $\cos x < 0$ (0)

Section -B

(Each question carry 2 mark)

(DO ANY FIVE)

Q 2. Prove that $\cos\left(\frac{3\pi}{2} + x\right) \cos(2\pi + x) \left[\cot\left(\frac{3\pi}{2} - x\right) + \cot(2\pi + x) \right] = 1$

✓ Q 3. Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$.

Q 4. How many 3 letter code words are possible using the first 10 letters of english Alphabet if (i) no letter can be repeated? (ii) letters can be repeated?

Q 5. If $U = \{x: x \in \mathbb{N} \text{ and } x \leq 10\}$

$A = \{x: x \text{ is a prime}\}$

$B = \{x: x \text{ is a factor of } 24\}$

Verify the following result : $A-B = A \cap B'$

✓ Q 6. Solve the inequality for real x:-

$$\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$$

✓ Q 7. If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, find x

Section - C

(Each Questions carry 3 marks)

(DO ANY SIX)

✓ Q 8. Using Binomial theorem, Evaluate $(98)^5$ ✓

✓ Q 9. Determine n, if ${}^{2n}C_3 : {}^nC_3 = 12:1$

Q10. A Solution is to be kept between 68°F and 77°F . What is the range in temperature in degree celcius (C) if the celcius / fahrenteit (F) conversion formula is given by $F = \frac{9}{5}C + 32$?

Q 11. Prove that :

✓ $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4 \sin^2 \frac{x-y}{2}$

✓ Q12. Express $(\frac{1}{3} + 3i)^3$ in the form a+ib and find the multiplicative inverse.

Q13. Let $A = \{x: x \in \mathbb{N} \text{ and } x \text{ is a multiple of } 2\}$

$B = \{x: x \in \mathbb{N} \text{ and } x \text{ is multiple of } 5\}$

$C = \{x: x \in \mathbb{N} \text{ and } x \text{ is multiple of } 10\}$

Write the set $A \cap (B \cup C)$.

Q14. (a) If the arcs of the same lengths in two circles subtend angles 65° and 110° at

✓ The centre, Find the ratio of their radii.

(b) Find the value of $\sin 75^\circ$.

Section-D

(Each Questions carry 5 marks)

(DO ANY FOUR)

✓ Q15. If $a + ib = \frac{(x+i)^2}{2x^2+1}$, then Prove that $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$

Q16. Find all pairs of consecutive odd natural number s, both of which are larger than 10
Such that their sum is less than 40.

✓ Q17. Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.

Q18. Let $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,4\}$, $B = \{2,4,6,8\}$ and
✓ $C = \{3,4,5,6\}$

Find (i) A' (ii) B' (iii) $(A \cup B)'$
(iv) $(A \cap B)'$ (v) $(A')'$ (vi) $(B - C)'$

✓ Q19. The function 't' which maps temperature in degree Celcius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$

Find (i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$ (iv) The value of C, when $t(C) = 212$

Section – E

(3 Case- Study Based Questions of 4 marks each)

✓ Q20. $\tan x = \frac{5}{12}$ and x lies in third quadrant.

Based on the above information, answer the following questions:

- (i) Find the value of $\sin 2x$.
- (ii) Find the value of $\cos 2x$.
- (iii) Find the value of $\sin \frac{x}{2}$.

OR

- (iii) Find the value of $\cos \frac{x}{2}$.

✓ Q21. Marks obtained by Radhika in Quarterly and half-yearly exams of mathematics are 60 and 70 respectively.

Based on the above information, answer the following question:

- (i) Find the minimum marks, she should get in the annual exam to have an average Of atleast 70 marks.
- (ii) Find the maximum marks, she should get in the annual exam to have an Average of atmost 75 marks.
- (iii) Find the range of marks in annual exam, so that the average mark is atleast 60 and atmost 70.

✓ Q22. Find the number of arrangements of the letters of the word INDEPENDENCE .

In how many of these arrangements ,

- (i) Do the words start with P

- (ii) Do all the vowels always occur together
- (iii) Do the vowels never occur together