

Extra

6/10



R.A.N. PUBLIC SCHOOL RUDRAPUR
HALF YEARLY EXAMS 2025-26

MM:80

CLASS XI MATHEMATICS

SET: 2

Time : 3hrs

➤ 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 mark each.

4. Section C has 6 Short Answer (SA)-type questions of 3 mark each.

5. Section D has 3 source based/case based 4 mark each with sub parts

6. Section E has 4 Long Answer (LA)-type questions of 5 mark each.

SECTION - A

1) If $\tan x = -\frac{1}{\sqrt{5}}$ and x lies in 4th quadrant, then $\cos x$ is

- a) $\frac{\sqrt{5}}{\sqrt{6}}$ b) $\frac{2}{\sqrt{6}}$ c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{6}}$

2) the value of $\cos 1^\circ \cdot \cos 2^\circ \dots \dots \dots \cos 179^\circ$ is

- (a) $\frac{1}{\sqrt{2}}$ (b) 0 (c) 1 (d) -1

3) the number of relations from a finite set A having m elements to set B having n elements is

- (a) 2^{mn} (b) $2^{m+n} - 1$ (c) $2mn$ (d) m^n

4) If $3x + 17 \leq 2(1 - x)$, then

- (a) $x \in (-3, \infty)$ (b) $x \in [10, \infty)$ (c) $x \in (-\infty, -3)$ (d) $x \in (3, 10)$

5) i^{-999} is

- (a) i (b) 1 (c) $2i$ (d) $-i$

6) the total number of 4-digit numbers if digit can be repeated are

- (a) 4536 (b) 9000 (c) 1632 (d) 4000

7) The value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 85^\circ + \sin^2 90^\circ$ is

- a) 7 b) 8 c) 9.5 d) 10

8) if $z = \frac{-2}{1+i\sqrt{3}}$ then the value of $\arg(z)$ is

- (a) π (b) $\pi/3$ (c) $2\pi/3$ (d) $\pi/4$

9) $\frac{x+1}{x+2} \geq 1$ then x is equal to

- (a) $x \in (-3, \infty)$ (b) $x \in (-\infty, -1)$ (c) $x \in (-\infty, -2)$
 (d) $x \in (-\infty, -3)$

10) the number of ways in which one can post 5 letters in 7 letter boxes .

- (a) 7^5 (b) 5^7 (c) 625 (d) none of these

11) The value of $i^{200} + i^{401}$ is

a) $1-i$

b) $i+1$

c) -1

d) $-i$

12) The coefficient of x^3y^4 in $(2x+3y^2)^5$ is

(a) 360

(b) 720

(c) 240

(d) 108

13) The number of words from the letters of the word 'BHARAT' in which B and H will never come together, is

(a) 360

(b) 240

(c) 120

(d) none of these

14) In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspaper. find the number of people who read atleast one of the newspaper.

a) 52

b) 46

c) 36

d) 42

15) The argument of $-1+i$ will be

(a) $-3\pi/4$

(b) $\pi/4$

(c) $5\pi/4$

(d) None of these

16) If the third term of an A.P. is 7 and its 7th term is 2 more than three times of its third term, then the sum of its first 20 terms is

(a) 228

(b) 74

(c) 740

(d) 1090

17) $\sin^6 A - \cos^6 A + 3\sin^2 A \cos^2 A =$

(a) 0

(b) 1

(c) 2

(d) 3

18) in an A.P the pth term is q and (p+q)th term is 0, then the qth term is

a) -p

b) q

c) p+q

d) p-q

ASSERTION-REASONBASED QUESTIONS

In the following questions 3 and 4, 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.

19) Assertion : in the expansion of $(1+x)^n$, the coefficient of x^2 and x^6 are equal

Reason : in $(1+x)^n$ the coefficient of x^r and x^{n-r} are equal

20) Assertion (A): If $\sin x = \frac{-1}{3}$, then $\cos x = \frac{2\sqrt{2}}{3}$.

Reason (R): If the value of $\cos x$ is positive and $\sin x$ is negative, then $x \in (\frac{3\pi}{2}, 2\pi)$.

SECTION : B

21) Find the value of $\cot 15^\circ$.

22) prove : ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

23) the sum of three numbers of a G.P is 21 and sum of their square is 189 .find the numbers .

$$24) \tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$$

$$25) \text{ solve : } \frac{|x+3|+x}{x+2} > 1$$

SECTION -C

26) Using binomial theorem ,prove that $6^n - 5n$ always leaves remainder 1 when divided by 25.

27) Evaluate $2x^4 + 5x^3 + 7x^2 - x + 41$ when $x = -2 - i\sqrt{3}$

28) pth ,qth ,rth and sth term of an A.P are in G.P ,then show that $p - q, q - r, r - s$ are also in G.P.

OR

If a ,b ,c are in AP. b ,c ,d are in GP ,and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in AP .Prove that a ,c ,e are in GP.

29) Find the domain of the following real function :

$$f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$$

$$30) \sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} = \frac{3}{2}$$

31) find the rank of the word 'GOOGLE'

SECTION-D

(This section comprises of 3 case-study/passage-based questions of 4 marks each. First two case study questions have three sub-parts (i), (ii), (iii) of marks 1, 1, 2 respectively. The third case study question has two sub-parts of 2 marks each.)

32) CASE-STUDY 1 : permutations can be used to find number of words by using different letters . Based on the above information answer the following

i) How many arrangements can be made with the letters of the word MATHEMATICS

ii) if all vowels are together , how many words can be made by using all the letters of word MATHEMATICS .

33) A school awarded 58 medals for honesty , 20 for punctuality and 25 for obedience , of these medals went to a total of 78 students and only 5 students got medals in all the three sports. Based on the above information answer the following questions

i) how many received medal in only one of the sports.

ii) how many men received medals in exactly two of the three sports

34) in the Binomial expansion of $(a + b)^n$ the coefficient of the fourth and thirteenth terms are equal to each other . Based on the above information answer the following questions

i) find n

ii) find nC_5

SECTION : E

35) how many words can be formed by taking 4 letters at a time out of the letters of the word 'INEFFECTIVE' .

36) solve for x : $2x^2 - (3 + 7i)x - (3 - 9i) = 0$

37) if a, b are roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$ where a, b, c and d form a G.P . Prove that $(q + p) : (q - p) = 17 : 15$

38) if $\frac{\sin^4 x}{a} + \frac{\cos^4 x}{b} = \frac{1}{a+b}$

Prove that $\frac{\sin^8 x}{a^3} + \frac{\cos^8 x}{b^3} = \frac{1}{(a+b)^3}$

Or

Prove : $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3} \right) + \cos^2 (x - \pi/3) = 3/2$