

Periodic Test- 4
Class-XI
Mathematics

Time allowed: 3 Hours

Max. Marks: 80

General Instructions:

(i) *All questions are compulsory.*

(ii) The question paper consists of 40 questions divided into four sections A, B, C & D.

(iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 6 questions of 4 marks each. Section D comprises 4 questions of 6 marks each.

(iv) There is no overall choice. However internal choices have been provided in two questions of 2 marks each, two questions of 4 marks each and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.

(v) *Use of calculators is not permitted. Draw the figures and graphs wherever needed.*

Section A (20 questions of 1 mark each)

Q.No.	Question	Marks
1	Write in set builder form {3,9,27,81,243}.	1
2	Value of $[-3.4]$ ($[]$ denotes the Greatest Integer Function) is _____.	1
3	Write domain of $f(x) = \sqrt{x-1}$	1
4	A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second ?	1
5	Write principal value for $\operatorname{cosec} x = -2$.	1
6	Find the multiplicative inverse of $2-3i$.	1
7	$i^{20} + i^{21} + i^{22} + i^{23} = \underline{\hspace{2cm}}$.	1
8	Solve $30x < 200$ when x is a natural number.	1
9	Find the number of 4 letter words, with or without meaning, which can be formed out of the letters of the word ROSE, where the repetition of the letters is not allowed.	1
10	How many chords can be drawn through 21 points on a circle?	1
11	Using binomial theorem find the 6 th term in the expansion of $(1-x)^{10}$	1
12	Write first 6 terms of sequence defined by $a_1 = 3, a_n = 3a_{n-1} + 2$ for all $n > 1, n$ being a natural number.	1
13	If the 4th, 10th and 16th terms of a G.P. are x, y and z , respectively, then x, y, z are in (a) A.P. (b) G.P. (c) H.P. (d) none of these	1
14	Line through the points $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$. Find the value of x .	1
15	Find the centre and the radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$	1
16	Find the equation of the parabola with focus $(2,0)$ and directrix $x = -2$.	1
17	Coordinate planes divide the space into _____ octants.	1

18	Evaluate: $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 5x}$	1
19	Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.	1
20	Events E and F are such that $P(\text{not } E \text{ or not } F) = 0.25$, State whether E and F are mutually exclusive or mutually inclusive.	1

SECTION-B (6 questions of 2 marks each)

21	Find range for $f(x) = \sqrt{16 - x^2}$.	2
22	Express in radians : $-47^\circ 30'$. OR Express in degrees : $\frac{11}{16}$ radians	2
23	Solve for real X : $3(2-X) \geq 2(1-X)$ OR Solve for real X : $\frac{3(X-2)}{5} \leq \frac{5(2-X)}{3}$	2
24	Solve $\sqrt{5x^2 + x} + \sqrt{5} = 0$	2
25	Write the contrapositive and converse of the following statement: If a number is divisible by 9, then it is divisible by 3.	2
26	Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that both Anil and Ashima will not qualify the examination.	2

SECTION-C (6 questions of 4 marks each)

27	If $R = \{(a,b) : (a-b) \text{ is divisible by } 2; a, b \in Z\}$. Then determine whether $(a,a) \in R$ or not, also show that – a) $(a,b) \in R \Rightarrow (b,a) \in R$ b) $(a,b) \in R, (b,c) \in R \Rightarrow (a,c) \in R$. OR Let $f = \{(1,1), (2,3), (0,-1), (-1, -3)\}$ be a function from Z to Z defined by $f(x) = ax + b$, for some integers a, b . Determine a, b .	4
28	Prove by Principle of Mathematical Induction : $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$ where n is a natural number.	4
29	Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together (ii) all vowels do not occur together. OR A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?	4
30	Prove that the product of n GMs between two numbers is equal to the nth power of the single GM between them.	4
31	Using first principal find the first derivative of $\sqrt{\sin x}$.	4
32	For any two sets A and B prove that if $P(A) = P(B)$ then $A = B$	4

SECTION-D (4 questions of 6 marks each)

33	Prove that $\cot 8x \cot 5x - \cot 13x \cot 5x - \cot 13x \cot 8x = 1$	6
34	Using binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by 25.	6
35	In the triangle ABC with vertices A (2, 3), B (4, -1) and C (1, 2), find the equation and length of altitude from the vertex A. OR Find the equation of the circle passing through the points (4,1) and (6,5) and whose centre is on the line $4x + y = 16$.	6
36	If each of the observation x_1, x_2, \dots, x_n is increased by ' k ', where k is a negative or positive number, show that the variance remains unchanged. OR The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and standard deviation?	6