THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

ANNUAL EXAMINATION-2023-24

Date:19-02-2024 **Time: 3 hours**

Class 11 **MATHEMATICS** **Max.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 MCQs and 2 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 type questions of 3 marks each.
5. Section D has 4 Long Answer 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	
1.	If A ={1,3,5 },how many elements P(A) has (a) 8 (b) 9 (c) 4 (d) 3	1
2.	A=set of letters of the word DELHI B=set of letters of the word DOLL. Find A-B (a) {E,I } (b) {E,H,I } (c) {D,L } (d) {E,H,I,D,L }	1
3.	If P= {1,3 } , Q={2,3,5},find the number of relations from P to Q (a) 64 (b) 62 (c) 9 (d) 8	1
4.	If R={(x ,y) : x, y ϵ Z, x2+y2=64 },then, write R in roster form (a) R={(0 ,8) (0 ,-8), (8,0), (-8,0)} (b) R={(0 ,8) (0 ,-8)} (c) R= {((8,0), (-8,0)} (d) R={8,0}	1
5.	A={1,2} , B={2,3,4 } , C={4,5 }. Find A×(B ∩C) (a) {(1,2) ,(1 ,3), (1,4), (1,5),(2,2),(2,3),(2,4),(2,5)} (b) {(1,2) ,(1 ,3), (1,4), (1,5)} (c) {(2,2),(2,3),(2,4),(2,5)} (d) { (1,4),(2,4)}	1

6.	Find the value of $2\sin 750^0 \sin 150^0$ (a) 2 (b) 1 (c) 1/2 (d)2/3	1
7.	Find the radian measure of $-37^0 30'$ (a) $5\pi/24$ radian (b) $-5\pi/24$ radian (c) $\pi/24$ radian (d) $-\pi/24$ radian	1
8.	Find the value of sin (-1125) (a) -1/2 (b) 1/2 (c) $-1/\sqrt{2}$ (d) $1/\sqrt{2}$	1
9.	Let x,y ϵR, then x+iy is a non real complex number if (a) x=0 (b) y=0 (c) $x \neq 0$ (d) $y \neq 0$	1
10.	If $x+iy = \sqrt{\frac{1+i}{1-i}}$, then find $x^2 + y^2$ (a) 2 (b) 1 (c) i (d) -i	1
11.	If $-3x + 17 < -13$ then (a) $x \in (10, \infty)$ (b) $x \in [10, \infty)$ (c) $x \in (-\infty, 10]$ (d) $x \in [-10,10]$	1
12.	If x,y and b are real numbers and $x<y$,$b<0$,then (a) $\frac{x}{b} < \frac{y}{b}$ (b) $\frac{x}{b} \leq \frac{y}{b}$ (c) $\frac{x}{b} \geq \frac{y}{b}$ (d) $\frac{x}{b} > \frac{y}{b}$	1
13.	$nC_{12} = nC_8$, then n is equal to (a) 20 (b) 12 (c) 6 (d) 30	1
14.	The total number of terms in the expansion of $(x+a)^{100} + (x-a)^{100}$ after simplification is (a) 50 (b) 202 (c) 51 (d) 200	1
15.	If in a G.P, $a_3 + a_5 = 90$ and r=2, find first term of the G.P (a) 9/ 2 (b) 1/3 (c) 2/9 (d) 1/2	1
16.	Evaluate $\lim_{x\to 1} \frac{\sqrt{1+x}-\sqrt{1-x}}{1+x}$ (a) 1/2 (b)1 (c) 0 (d)$1/\sqrt{2}$	1
17.	The mean deviation of data 3, 10, 10, 4, 7, 10, 5 from the mean is (a) 2 (b) 3 (c) 2.57 (d) 3.75	1
18.	The standard deviation of data 6, 5, 9, 13, 12, 8 and 10 is (a) $\sqrt{\frac{52}{7}}$ (b) 52/7 (c) $\sqrt{6}$ (d) 6	1

	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.	
19.	Assertion (A) : When a coin is tossed .Let A=event of getting head and B= event of getting tail. A and B are mutually exclusive and exhaustive Reason (R) : $A \cap B = \{\}$ and $A \cup B = S$	1
20.	Assertion (A) :The set of all points on the circumference of a circle is finite Reason (R) : Circle is a collection of infinite points in a plane whose distance from the centre is constant	1
	SECTION – B	
21.	Find the degree measure of the angle subtended at the centre of a circle of radius 100cm by an arc of length 22cm (use $\pi = 22/7$) OR Find the value of cot $(-15\pi/4)$.	2
22.	Find the centre and radius of the circle $x^2+y^2-8x+10y-12=0$ OR Find the equation of the circle with centre (1,1) and radius $\sqrt{2}$	2
23.	Find the equation of set of points P such that $PA^2+PB^2=2K^2$, where A and B are the points (3,4,5) and (-1,3,-7)?	2
24.	f(x)=$\begin{Bmatrix} 2x+3, & x \leq 0 \\ 3(x+1), & x > 0 \end{Bmatrix}$ find $\lim_{x \to 1} f(x)$	2
25.	Evaluate $\lim_{x \to 2} \frac{3x^2-x-10}{x^2-4}$	2
	SECTION C	
26.	Find the domain and range of the function f(x)= $\sqrt{9-x^2}$	3

27.	Express the following expression in the form of a+ib $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-i\sqrt{2})}$ OR Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$	3
28.	Solve $\frac{x}{4} < \frac{(5x-2)}{3} - \frac{7x-3}{5}$ OR Find all pairs of consecutive odd natural numbers ,both of which are larger than 10,such that their sum is less than 40	3
29.	Find $(x+y)^4 + (x-y)^4$ .Hence evaluate $(\sqrt{3}+\sqrt{2})^4 + (\sqrt{3}-\sqrt{2})^4$	3
30.	Find the foci, the vertices ,the length of major axis, the length of minor axis, the eccentricity and the length of the latus rectum of the ellipse $36x^2 + 4y^2 = 144$	3
31.	Find the derivative of y = xsinx using first principle **OR** $b) y = \frac{\sin x + \cos x}{\sin x - \cos x}$ find $\frac{dy}{dx}$	3
	SECTION D	
32.	Prove that $\cos 2x \cos(\frac{x}{2}) - \cos 3x \cos(\frac{9x}{2}) = \sin 5x \sin(\frac{5x}{2})$ OR Prove that $\cos^2 x + \cos^2(x+\frac{\pi}{3}) + \cos^2(x-\frac{\pi}{3}) = \frac{3}{2}$	5
33.	Consider the points A (-2,-3) and B(1,6) a) Find the equation of the line passing through A and B b) Find slope of above line c) Find the equation of the line passing through (2,1) and perpendicular to AB d) Find the foot of the above perpendicular to AB OR Consider equation of the straight line 3x+4y-12=0 a) Reduce the equation in to intercept form b) Find the slope of the above line	5

<table>
<tr><td></td><td>c) Find the distance of the above line from the origin

d) Find the distance of the above line from the line 6x+8y-18=0</td><td></td></tr>
<tr><td>34.</td><td>Find the sum of the following
7+77+777+7777+…….</td><td>5</td></tr>
<tr><td>35.</td><td>The diameter of the circles (in mm) drawn in a design are given below
<table>
<tr><td>Diameters</td><td>33-36</td><td>37-40</td><td>41-44</td><td>45-48</td><td>49-52</td></tr>
<tr><td>No: of circles</td><td>15</td><td>17</td><td>21</td><td>22</td><td>25</td></tr>
</table>
Calculate the mean, variance and standard deviation of the circles</td><td>5</td></tr>
<tr><td></td><td>SECTION E</td><td></td></tr>
<tr><td>36.</td><td>Case-Study 1
In a class,18 students took physics, 23 students took chemistry and 24 students took mathematics. Of these 13 took both chemistry and mathematics, 12 took both physics and chemistry and 11 took both physics and mathematics. If 6 students offered all the three subjects, find:
a) Total no. of students in the class.
b) How many took chemistry but not mathematics.
c) How many took exactly one of he three subjects.
d) How many took only Mathematics.</td><td>4</td></tr>
<tr><td>37.</td><td>Case-Study 2
How many words can be formed out of the letters of the word HEXAGON? In how many of them will all the vowels
a) come together?
b) never come together?</td><td>4</td></tr>
<tr><td>38.</td><td>Case-Study 3
One of the 4 persons John, Rita, Aslam or Gurpreet will be promoted next month. Consequently the sample space consists of four elementary outcomes S= {John promoted, Rita promoted, Aslam promoted, Gurpreet promoted}. You are told that the chances of john’s promotion is same that of Gurpreet, Rita’s chances of promotion are twice as likely as John. Aslam’s chances are four times that of john
I. What is the probability that John got promoted?
II. What is the probability that Rita got promoted?
III. Find the probability that either John promoted or Gurpreet promoted?</td><td>4</td></tr>
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