

O. P. JINDAL SCHOOL, SAVITRI NAGAR**Annual Examination - (2022 – 2023)****Class: XI****MM: 80****Subject: Mathematics****Time: 3 Hrs.*****(Fifteen Minutes Extra will be given for reading the Question Paper.)*****General Instructions:**

- i. This question paper has 5 sections A-E.*
- ii. Section A has 20 MCQs carrying 1 mark each.*
- iii. Section B has 5 questions carrying 2 mark each.*
- iv. Section C has 6 questions carrying 3 mark each.*
- v. Section D has 4 questions carrying 5 mark each.*
- vi. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.*
- vii. All the questions are compulsory. However an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks, 2 Qs of 2 marks has been provided. An internal choice has been provided in 2 marks questions of section E .*
- viii. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.*

SECTION A

1. The number of proper subset of a set containing n elements is
a) $2n - 1$ b) 2^n c) $2^n - 1$ d) $2^n + 1$
2. If $f : A \rightarrow R$ and $A = \{-2, -1, 0\}$ and $f(x) = 2x - 3$, then range of f is
a) $\{7, -5, -3\}$ b) $\{-7, 5, -3\}$ c) $\{-7, -5, 3\}$ d) $\{-7, -5, -3\}$
3. $\sin 33^\circ \cos 12^\circ + \cos 33^\circ \sin 12^\circ = ?$
a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{2}$ c) $\frac{\sqrt{3}}{2}$ d) 1
4. If $z = (3 + \sqrt{2}i)$ then $z\bar{z} = ?$
a) 5 b) 7 c) 11 d) $\sqrt{11}$
5. If $-3x + 17 < -13$, then
a) $x \in (10, \infty)$ b) $x \in [10, \infty)$ c) $x \in (-\infty, 10]$ d) $x \in [-10, 10]$
6. The number of different four digit numbers that can be formed with the digits 2, 3, 4, 7 using each digit only once is
a) 120 b) 96 c) 24 d) 100
7. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
a) 330 b) 1050 c) 100 d) 200
8. The number of terms in the expansion of $\{(2x + 3y)^9 + (2x - 3y)^9\}$ is
a) 10 b) 8 c) 4 d) 5
9. The two geometric mean between the numbers 1 and 64 are
a) 1 and 64 b) 4 and 16 c) 2 and 16 d) 8 and 16

10. Slope of a line which cuts off intercept of equal lengths on the axes is

- a) -1 b) 0 c) $\sqrt{3}$ d) 2

11. The foci of an ellipse are $(0, \pm 6)$ and the length of its minor axis is 16. The equation of the ellipse is

- a) $\frac{x^2}{16} + \frac{y^2}{36} = 1$ b) $\frac{x^2}{36} + \frac{y^2}{64} = 1$ c) $\frac{x^2}{100} + \frac{y^2}{64} = 1$ d) $\frac{x^2}{64} + \frac{y^2}{100} = 1$

12. The distance between the points $P(1, -3, 4)$ and $Q(-4, 1, 2)$ is

- a) $\sqrt{5}$ b) $2\sqrt{5}$ c) $3\sqrt{5}$ d) $\sqrt{48}$

13. The ratio in which the line joining $(2, 4, 5)$ and $(3, 5, -4)$ is divided by YZ-plane, is

- a) 2 : 3 b) 3 : 2 c) -2 : 3 d) 4 : -3

14. If $f(x) = x \sin x$, then $f'(\frac{\pi}{2})$ is equal to

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

15. $\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$ is equal to:

- a) 1 b) 3 c) -1 d) $\frac{1}{3}$

16. The variance of certain set of data is 3. If each observation is increased by 2 then new variance will be

- a) 2 b) 5 c) 6 d) 3

17. The probability of getting at most two tail or at least two heads in a toss of three coins is

- a) $\frac{3}{4}$ b) $\frac{5}{8}$ c) $\frac{7}{8}$ d) $\frac{3}{8}$

18. From a well shuffled pack of 52 cards, a card is drawn at random. Find the probability that it is a king or a queen.

- a) $\frac{2}{13}$ b) $\frac{3}{26}$ c) $\frac{4}{13}$ d) 1

DIRECTIONS: In the question number 19 and 20, a statement of **Assertion(A)** is followed by a statement of **Reason(R)**. Choose the correct option

(A) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

(B) Both assertion(A) and reason(R) are true and reason(R) is not the correct explanation of assertion(A)

(C) Assertion(A) is true but reason(R) is false

(D) Assertion(A) is false but reason(R) is true.

19. **Assertion(A):** The distance between the lines $4x + 3y = 11$ and $8x + 6y = 15$ is $\frac{7}{10}$

Reason(R): The distance between the lines $ax + by = c_1$ and $ax + by = c_2$ is $\left| \frac{c_1 - c_2}{\sqrt{a^2 + b^2}} \right|$.

20. **Assertion(A):** If the equation of circle is $(x - 3)^2 + (y + 1)^2 = 9$, then its radius is 3.

Reason(R): Equation of circle with radius r is given by $(x - a)^2 + (y - b)^2 = r^2$.

SECTION B

21. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ $A = \{1, 2, 3, 4\}$ $B = \{2, 4, 6, 8\}$ $C = \{3, 4, 5, 6\}$
Find a) A' b) $A \cap C$ c) $B - C$ d) $A' \cap B$

22. Prove that $\sin 2X(\tan X + \cot X) = 2$

OR

Find the value of $\sin 22.5^\circ$.

23. Express $(7 - 5i)x(3 + i)$ in the form of $a + bi$, and hence find the value of A and B.

24. Find the equation of circle with centre (2, 2) and passes through the point (4, 5).

OR

Find the equation of the parabola with focus (6, 0) and directrix $x = -6$.

25. The distance between the points (a, 2, 1) and (1, -1, 1) is 5, then find the value(s) of a.

SECTION C

26. In how many ways the letter of the word PERMUTATION be arranged So that there are exactly four letters between P and S.

27. Find the middle term in the expansion of $(\frac{x}{3} + 9y)^{10}$.

OR

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

28. Prove that $\sin 2x + 2\sin 4x + \sin 6x = 4\cos^2 x \sin 4x$.

OR

Prove that : $\sin 3x + \sin 2x - \sin x = 4\sin x \cos \frac{x}{2} \cos \frac{3x}{2}$.

29. Find the image of the point (3, 8) with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.

30. Using section formula show that the points A(2, -3, 4), B(-1, 2, 1) and C(0, $\frac{1}{3}$, 2) are collinear.

31. Differentiate $\left(\frac{2x^3 + 9}{x^2 - 6}\right)$ with respect to x.

OR

Differentiate $x^2 e^{\sin x}$ with respect to x.

SECTION D

32. For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. later on it was discovered that the scores 43 was misread as 34. Find the correct mean and standard deviation.

OR

Find the mean and variance of the following frequency distribution

Class	0-10	10-20	20-30	30-40	40-50
Frequency	7	9	19	10	5

33. a) Find the derivative of $\cos\left(x - \frac{\pi}{8}\right)$ from first principle.

b) Evaluate $\lim_{x \rightarrow 0} \frac{\tan 3x}{\tan 2x}$, $a, b \neq 0$.

34. Find the sum of the series : $(1 \times 2 \times 3) + (2 \times 3 \times 4) + \dots$ to n term

OR

The sum of first three terms of a G.P is 16 and the sum of next three terms is 128.. Determine the first term the common ratio and the sum of n terms of the G.P .

35. A rod of length 15 cm moves with its end always touching the coordinate axes. Find the equation of the locus of point P on the rod, which is at a distance of 3 cm from the end in contact with the x- axis.

SECTION E

36. Rohit is playing with scramble word cubes. He needs to form a word using all the letters of the word 'ORGANIC' without repetition of the letters.

- (i) How many words begin and end with consonants? 1
- (ii) In how many words vowels and consonants alternate between each other? 1
- (iii) In how many words vowels are together? 1
- (iv) How many words begin with O? 1

37. Four cards are drawn at random from a pack of 52 playing cards. Find the probability of getting

- (i) All four queens. 1
- (ii) All four cards of same colour. 1
- (iii) Two red and two black cards. 1
- (iv) All face cards. 1

38. Coordinate of two points A and B are (3, 4) and (-1, 2) respectively. Find:

- (i) Slope of line AB. 1
- (ii) Slope of Perpendicular bisector of AB. 1
- (iii) Mid point of AB. 1
- (iv) Equation of line AB. 1
