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## Sample Question Paper

### Class – 11<sup>th</sup>

### Subject - Mathematics

Time Allowed : 3 hours

Maximum Marks : 80

#### General Instructions :

1. All questions are compulsory.
2. The question paper consists of 36 questions divided into 4 Sections A, B, C and D.
3. 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 and Section D comprises of 4 questions of 6 marks each.
4. There is no overall choice. However internal choice has been provided in 6 questions of 1 mark, 2 questions of 2 marks, 2 questions of 4 marks and 2 questions of 6 marks. You have to attempt only one of the alternatives in all such questions.
5. Write the serial number of questions before attempting.
6. Use of a calculator is not permitted.

#### Section - A

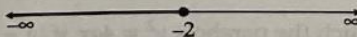
Question numbers 1 to 10 carries 1 mark each. For each of these questions, four alternative choices have been provided of which only one is correct. Select the correct choice :

1. Consider the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. If 1 is added to each number the variance of the numbers, so obtained is (A)   
(A) 6.5 (B) 2.87  
(C) 3.87 (D) 8.25
2. If without repetition of the digits four-digit numbers are formed with the numbers 0, 2, 3 and 5 then the probability of such a number divisible by 5 is (A)   
(A)  $\frac{1}{5}$  (B)  $\frac{4}{5}$   
(C)  $\frac{1}{30}$  (D)  $\frac{5}{9}$
3. The standard deviation of some temperature data in °C is 5. If the data were converted into °F, then the variance would be  
(A) 81 (B) 57  
(C) 36 (D) 25
4.  $x$  and  $b$  are real numbers. If  $b > 0$  and  $|x| > b$ , then  
(A)  $x \in (-b, \infty)$  (B)  $x \in (-\infty, b)$   
(C)  $x \in (-b, b)$  (D)  $x \in (-\infty, -b) \cup (b, \infty)$

OR

What will be the required interval for given number line?

- (A)  $x \in (-\infty, -2)$  (B)  $x \in (-\infty, -2]$   
(C)  $x \in (-2, \infty)$  (D)  $x \in [-2, \infty)$





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5. If the distance between the points  $(a, 0, 1)$  and  $(0, 1, 2)$  is  $\sqrt{27}$ , then the value of  $a$  is AI
- (A) 5 (B)  $\pm 5$   
 (C)  $-5$  (D) None of these

OR

The point  $(-2, -3, -4)$  lies in the

- (A) first octant (B) seventh octant  
 (C) second octant (D) eighth octant
6. If  $f(x) = x^{100} + x^{99} + \dots + x + 1$ , then  $f'(1)$  is equal to : AI
- (A) 5050 (B) 5049  
 (C) 5051 (D) 50051

7. The distance between the foci of a hyperbola is 16 and its eccentricity is  $\sqrt{2}$ . Its equation is AI
- (A)  $x^2 - y^2 = 32$  (B)  $\frac{x^2}{4} - \frac{y^2}{9} = 1$   
 (C)  $2x - 3y^2 = 7$  (D) None of these

8. If in an A.P.  $S_n = qn^2$  and  $S_m = qm^2$ , where  $S_r$  denotes the sum of  $r$  terms of the A.P. then  $S_q$  equals AI
- (A)  $\frac{q^3}{2}$  (B)  $mnq$   
 (C)  $q^3$  (D)  $(m+n)q^2$

9. The distance of the point of intersection of the lines  $2x - 3y + 5 = 0$  and  $3x + 4y = 0$  from the line  $5x - 2y = 0$  is AI
- (A)  $\frac{130}{17\sqrt{29}}$  (B)  $\frac{130}{7\sqrt{29}}$   
 (C)  $\frac{130}{7}$  (D) None of these

10. The real value of  $\theta$  for which the expression  $\frac{17i \cos \theta}{1 - 2i \cos \theta}$  is a real number is : AI
- (A)  $n\pi + \frac{\pi}{4}$  (B)  $n\pi + (-1)^n \frac{\pi}{4}$   
 (C)  $2n\pi \pm \frac{\pi}{2}$  (D) none of these

OR

If  $\left(\frac{1+i}{1-i}\right)^x = 1$ , then

- (A)  $x = 2n + 1$  (B)  $x = 4n$   
 (C)  $x = 2n$  (D)  $x = 4n + 1$ , where  $n \in \mathbb{N}$

Question numbers 11 to 15 carry 1 mark each. Write whether the statement is true/false.

11. If  $|x| \leq 4$ , then  $x \in [-4, 4]$  AI
12. The equation of the line joining the point  $(3, 5)$  to the point of intersection of the lines  $4x + y - 1 = 0$  and  $7x - 3y - 35 = 0$  is equidistant from the points  $(0, 0)$  and  $(8, 34)$ . AI
13. The probabilities that a typist will make 0, 1, 2, 4 and 5 or more mistake in typing are respectively, 0.12, 0.25, 0.36, 0.14, 0.08 and 0.11. AI
14. One value of  $\theta$  which satisfies the equation  $\sin^4 \theta - 2\sin^2 \theta - 1$  lies between 0 and  $2\pi$ . AI
15. The line  $lx + my + n = 0$  will touch the parabola  $y^2 = 4ax$ , if  $ln = am^2$  AI



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Question numbers 16 to 20 carry 1 mark each.

16. Find the coefficient of  $x$  in the expansion of  $(1 - 3x + 7x^2)(1 - x)^{16}$ .

OR

Expand  $\left(\sqrt{\frac{x}{a}} - \sqrt{\frac{a}{x}}\right)^6$  using binomial theorem.

17. Find the centre and radius of the circle whose equation is  $3x^2 + 3y^2 + 6x - 4y - 1 = 0$

OR

Find the eccentricity of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$ .

18. If  $P = \{1, 3\}$ ,  $Q = \{2, 3, 5\}$ , find the number of relations from  $P$  to  $Q$ .

19. How many different words can be formed by using all the letters of word 'SCHOOL' ?

AI

OR

Ten buses are plying between two places  $A$  and  $B$ . In how many ways a person can travel from  $A$  to  $B$  and come back ?

20. Show that the  $\Delta ABC$  with vertices  $A(0, 4, 1)$ ,  $B(2, 3, -1)$  and  $C(4, 5, 0)$  is right-angled.

AI

## Section - B

Question numbers 21 to 26 carry 2 marks each.

21. Evaluate  $\lim_{x \rightarrow 0} \frac{x^4 - \sqrt{x}}{\sqrt{x} - 1}$

22. Find the maximum and minimum value of  $7 \cos x + 24 \sin x$ .

OR

Find the value of  $p$  so that the three lines  $3x + y - 2 = 0$ ,  $px + 2y - 3 = 0$  and  $2x - y - 3 = 0$  may intersect at one point.

23. If  $E_1, E_2, E_3$  are three mutually exclusive event and less space between words of an experiment such that—

$$2P(E_1) = 3P(E_2) = P(E_3), \text{ then find } P(E_1).$$

AI

24. Find sets  $A, B$  and  $C$  such that  $A \cap B, B \cap C$  and  $A \cap C$  are non-empty sets and  $A \cap B \cap C = \phi$ .

AI

OR

Using properties of sets, show that

$$A \cup (A \cap B) = A$$

25. Find the equation of the lines which cut-off intercepts on the axes whose sum and products are 1 and  $-6$  respectively.

26. Evaluate  $\lim_{x \rightarrow -3} \frac{x^3 + 27}{x^5 + 243}$

AI

## Section - C

Question numbers 27 to 32 carry 4 marks each.

27. If  $\alpha$  and  $\beta$  are the solution of the equation,  $a \tan \theta + b \sec \theta = c$ , then show that  $\tan(\alpha + \beta) = \frac{2ac}{a^2 - c^2}$

AI

OR

$$\text{Prove that: } \cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{8\pi}{5} = -\frac{1}{16}$$

AI

28. If in the expansion of  $(1 + x)^n$ , the coefficients of three consecutive terms are 28, 56 and 70. Then find  $n$  and the position of terms of these coefficients.

AI



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29. Find the real value of  $x$  and  $y$  if  $\frac{(1+i)x-2i}{3+i} + \frac{(2-3i)y+i}{3-i} = i$  [AI]

30. Find the value of ' $k$ ' if  $\lim_{x \rightarrow 1} \frac{x^4-1}{x-1} = \lim_{x \rightarrow k} \frac{x^3-k^3}{x^2-k^2}$ .

OR

Find the mean and variance for the first 10 multiples of 3.

31. Find the co-ordinates of focus, the axis of the parabola, the equation of directrix, co-ordinate of vertex of the parabola  $x^2 - 6x - 4y - 11 = 0$

32. The mean and variance of eight observations are 9 and 9.25, respectively. If six of the observations are 6, 7, 10, 12, 12 and 13, find the remaining two observations. [AI]

## Section - D

Question numbers 33 to 36 carry 6 marks each.

33. In a survey of 60 people it was found that 25 people read newspaper H, 26 read newspaper T, 26 read the newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all the three newspapers find: [AI]

- (i) The number of people who read at least one newspaper.
- (ii) The number of people who read exactly one newspaper.

34. Find the distance of the line  $4x + 7y + 5 = 0$  from the point  $(1, 2)$  along the line  $2x - y = 0$ .

OR

Evaluate  $\lim_{x \rightarrow \pi/4} \frac{\tan^3 x - \tan x}{\cos\left(x + \frac{\pi}{4}\right)}$

35. Solve the following system of inequalities graphically

$$4x + 3y \leq 60, y \geq 2x, x, y \geq 0, x \geq 3.$$

36. The sum of three numbers in G.P is 56. If we subtract the 1, 7, 21 from these numbers in that order, we obtain an Arithmetic progression (A.P). Find the numbers. [AI]

OR

Find the mean and variance for the following frequency distribution.

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequencies	5	8	15	16	6