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Sample Question Paper

Class – 11th

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. If the probabilities for A to fail in an examination is 0.2 and that for B is 0.3. then the probability that either A or B fails is A1
(A) > 0.5 (B) 0.5
(C) ≤ 0.5 (D) 0
2. The standard deviations for first ten natural number is
(A) 5.5 (B) 3.87
(C) 2.97 (D) 2.87
3. If M and N are any two events, the probability that atleast one of them occurs is A1
(A) $P(M) + P(N) - 2P(M \cap N)$ (B) $P(M) + P(N) - P(M \cap N)$
(C) $P(M) + P(N) + P(M \cap N)$ (D) $P(M) + P(N) + 2P(M \cap N)$
4. If x_1, x_2, x_4 and x_5 be the observation with mean m and standard deviation s then, the standard deviation of the observations kx_1, kx_2, kx_3, kx_4 and kx_5 is
(A) $k + 5$ (B) $\frac{s}{k}$
(C) ks (D) s
5. A plane is parallel to YZ-plane, so it is perpendicular to
(A) X-axis (B) Y-axis
(C) Z-axis (D) None of these
6. A line passes through (2, 2) and is perpendicular to the line $3x + y = 3$.
its y-intercept is
(A) $\frac{1}{3}$ (B) $\frac{2}{3}$
(C) 1 (D) $\frac{4}{3}$

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OR

If the line $\frac{x}{a} + \frac{y}{b} = 1$ passes through the points $(2, -3)$ and $(4, -5)$ then (a, b) equals

- (A) $(1, 1)$ (B) $(-1, 1)$
 (C) $(1, -1)$ (D) $(-1, -1)$

7. If the coefficient of variation of two distributions are 50, 60 and their arithmetic means are 30 and 25 respectively, then the difference of their standard deviation is AI

- (A) 0 (B) 1
 (C) 1.5 (D) 2.5

8. If $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at $x = 0$ is equal to : AI

- (A) -2 (B) 0
 (C) 1 (D) Does not exist

OR

$\lim_{x \rightarrow 1} \frac{(\sqrt{x} - 1)(2x - 3)}{2x^2 + x - 3}$ is equal to :

- (A) $\frac{1}{10}$ (B) $\frac{-1}{10}$
 (C) 1 (D) None of these

9. The value of $\cos 12^\circ + \cos 84^\circ + \cos 156^\circ + \cos 132^\circ$ is AI

- (A) $\frac{1}{2}$ (B) 1
 (C) $-\frac{1}{2}$ (D) $\frac{1}{8}$

OR

The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is equal to

- (A) 1 (B) 0
 (C) $\frac{1}{2}$ (D) 2

10. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is

- (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

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

11. The probability that a person visiting a zoo will see the giraffe is 0.72, the probability that he will see the bears is 0.84 and the probability that he will see both is 0.52.

12. A candidate is required to answer 7 questions out of 12 questions which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. He can choose the seven questions in 650 ways. AI

OR

In the permutations of n things, r taken together, the number of permutations in which m particular things occur together is ${}^{n-m}P_{r-m} \times {}^rP_m$.

13. Given that $M = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ and if $B = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, then $B \subset M$.

14. Line joining the points $(3, -4)$ and $(-2, 6)$ is perpendicular to the line joining the points $(-3, 6)$ and $(9, -18)$.

15. If $P = \{1, 2\}$, then $P \times P \times P = \{(1, 1, 1), (2, 2, 2), (1, 2, 2), (2, 1, 1)\}$.

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Question numbers 16 to 20 carry 1 mark each.

16. Show the graph of the solution of $2x - 3 > x - 5$

17. Find the sum of the coefficient in $(x + y)^8$.

18. Find the value of 'p' so that the equation $x^2 + y^2 - 2px + 4y - 12 = 0$ may represent a circle of radius 5 units. **[1]**

OR

Find the equation of the parabola with vertex at (0, 0) and focus at (0, 2).

19. Find the value of $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$.

20. Write the argument of $(1 + \sqrt{3}i)(\cos \theta + i \sin \theta)$.

OR

Find the value of $i^4 + i^5 + i^6 + i^7$.

Section - B

Question numbers 21 to 26 carry 2 marks each.

21. Solve $\frac{2x+3}{4} - 3 < \frac{x-4}{3} - 2, x \in \mathbb{R}$.

OR

Solve $\frac{2x-1}{3} \geq \left(\frac{3x-2}{4}\right) - \left(\frac{2-x}{5}\right)$.

22. If $a = \cos \theta + i \sin \theta$, then find the value of $\frac{1+a}{1-a}$.

23. If a, b, c are in G.P, then show that $a^2 + b^2, ab + bc, b^2 + c^2$ are also in G.P

OR

The 5th, 8th and 11th terms of G.P are p, q and s respectively. Show that $q^2 = ps$.

24. Evaluate: $\lim_{x \rightarrow \pi/6} \frac{\sqrt{3} \sin x - \cos x}{x - \frac{\pi}{6}}$ **[1]**

25. Let $A = \{1, 2, 4, 5\}, B = \{2, 3, 5, 6\}, C = \{4, 5, 6, 7\}$ verify the following identity

$$A \cup (B \cap C) = [(A \cup B) \cap (A \cap C)]$$

26. If A and B be the point (3, 4, 5) and (-1, 3, -7), respectively, find the equation of the set of points P such that $PA^2 + PB^2 = k^2$, where k is constant.

Section - C

Question numbers 27 to 32 carry 4 marks each.

27. Prove that: $\tan \alpha \cdot \tan (60^\circ - \alpha) \tan (60^\circ + \alpha) = \tan 3\alpha$ **[1]**

OR

Prove that: $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = 2 \cos \theta$.

28. If $z = 2 - 3i$ show that $z^2 - 4z + 13 = 0$, hence find the value of $4z^3 - 3z^2 + 169$

OR

Convert complex number $-\sqrt{3} + i$ in polar form. **[1]**

29. An arc is in the form of a semi ellipse, It is 8m wide and 2m high at the centre. Find the height of arc at a point 1.5m from one end.

30. Evaluate $\lim_{x \rightarrow 1} \frac{x^7 - 2x^5 + 1}{x^3 - 3x^2 + 2}$

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31. Find the mean and variance for the following frequency distribution.

| Classes | 0 - 30 | 30 - 60 | 60 - 90 | 90 - 120 | 120 - 150 | 150 - 180 | 180 - 210 |
|-------------|--------|---------|---------|----------|-----------|-----------|-----------|
| Frequencies | 2 | 3 | 5 | 10 | 3 | 5 | 2 |

32. Find the coefficient of x^4 in $(1-x)^2(2+x)^5$ using binomial theorem.

Section - D

Question numbers 33 to 36 carry 6 marks each.

33. In a group of 500 persons, 300 take tea, 150 take coffee, 250 take a cold drink, 90 take tea and coffee, 110 take tea and a cold drink, 80 take coffee and a cold drink and 50 take all the three drinks.

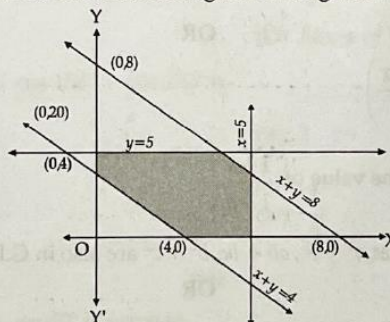
- (i) Find the number of persons who take none of the three drinks.
- (ii) Find the number of persons who take only tea.
- (iii) Find the number of persons who take coffee and cold drink but not tea.

34. A variable line passes through a fixed point P . The algebraic sum of the perpendiculars drawn from the points $(2, 0)$, $(0, 2)$ and $(1, 1)$ on the line is zero. Find the coordinates of the point P .

OR

If the sum of the distance of a moving point in a plane from the axes is 1, then find the locus of the point.

35. Find the linear inequalities for which the shaded region in the given figure is the solution set.



36. The sum of an infinite G.P is 57 and the sum of the cubes of its terms is 9747, find the G.P. [1]

OR

Find the sum of first n terms of the series $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \dots + n$ terms.