Class XI Session 2023-24

Home work For 28-31 January 2024

Time Allowed: 3 hours **Maximum 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 MCQ's and 02 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 (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-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. $2(1 - 2 \sin^2 7x) \sin 3x$ is equal to **[1]**

   a) cos 17x - cos 11x
   b) cos 17x + cos 11x
   c) sin 17x + sin 11x
   d) sin 17x - sin 11x

2. The range of the function f(x) = $\frac{x^2-x}{x^2+2x}$ is **[1]**

   a) R - { - 1 / 2 ,1 }
   b) R - {1}
   c) R
   d) None of these

3. If S is the sample space and $P(A) = \frac{1}{3}.P(B)$ and $S = A \cup B$, where A and B are two mutually exclusive events, then P (A) = **[1]**

   a) $\frac{3}{8}$
   b) $\frac{1}{2}$
   c) $\frac{3}{4}$
   d) $\frac{1}{4}$

4. If $y = \frac{\sin(x+9)}{\cos x}$ then $\frac{dy}{dx}$ at x = 0 is equal to **[1]**

   a) cos 9
   b) 1
   c) 0
   d) sin 9

5. The medians AD and BE of a triangle with vertices A (0 , b) , B (0, 0) and C (a , 0)are perpendicular to each other if **[1]**

   a) $a = \sqrt{-2}b$
   b) $a = \pm\sqrt{2}b$
   c) none of these
   d) $b = \pm\sqrt{2}a$

6. For any two sets A and B, A ∩ (A ∪ B)' is equal to **[1]**

a) A ∩ B

b) ϕ

c) B

d) A

7. If z is a non-zero complex number, then $\left|\frac{|\bar{z}|^2}{z\bar{z}}\right|$ is equal to **[1]**

a) $\left|\frac{\bar{z}}{z}\right|$

b) $|z|$

c) $|\bar{z}|$

d) None of these

8. If R is a relation from a finite set A having m elements to a finite set B having n elements, then the number of relations from A to B is **[1]**

a) 2mn

b) m^n

c) 2^{mn}

d) 2^{mn} -1

9. If -3x + 17 < -3, then **[1]**

a) $x \in (-\infty, 10]$

b) $x \in [10, \infty)$

c) none of these

d) $x \in (10, \infty)$

10. The value of cos 35° + cos 85° + cos 155° is **[1]**

a) $\frac{1}{\sqrt{3}}$

b) $\cos 275^o$

c) $\frac{1}{\sqrt{2}}$

d) 0

11. If A = {1, 3, 5, 7, 9, 11, 13, 15, 17} ,B = {2, 4, ... , 18} and N the set of natural numbers is the universal set, then A′ ∪ (A ∪ B) ∩ B′) is **[1]**

a) N

b) A

c) ϕ

d) B

12. The sum of an infinite series is 8 and its second term is 2. Its common ratio is **[1]**

a) $\frac{2}{3}$

b) $\frac{1}{4}$

c) $\frac{3}{4}$

d) $\frac{1}{2}$

13. $\sum_{r=0}^{n} 4^r .^n C_r$ is equal to **[1]**

a) 6^n

b) 5^{-n}

c) 4^n

d) 5^n

14. Solve the system of inequalities: $\frac{x+7}{x-8} > 2, \frac{2x+1}{7x-1} > 5$ **[1]**

a) none of these

b) (3, 6)

c) no solution

d) (2, 5)

15. If A ⊂ B, then **[1]**

a) $A^c \subset B^c$

b) $B^c \not\subset A^c$

c) $A^c = B^c$

d) $B^c \subset A^c$

16. If $\tan\ \alpha = \frac{1}{7}$, $\tan\ \beta = \frac{1}{3}$, then cos 2$\alpha$ is equal to **[1]**

a) sin 4β

b) sin 3β

c) cos 2β

d) sin 2β

17. If z = x + yi and w = $\frac{1-iz}{z-i}$, then |w| = 1 implies that, in the complex plane **[1]**

a) z lies on the imaginary axis

b) z lies on the unit circle

c) z lies on the real axis

d) none of these

18. The number of arrangements of the word **DELHI** in which E precedes I is **[1]**

a) 30

b) 59

c) 60

d) 120

19. **Assertion (A):** The expansion of $(1 + x)^n = n_{c_0} + n_{c_1}x + n_{c_2}x^2 \ldots + n_{c_n}x^n$. **[1]**

Reason (R): If x = -1, then the above expansion is zero.

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.

20. **Assertion (A):** The difference between maximum and minimum values of variate is called Range. **[1]**

Reason (R): Coeff. of Range = $\frac{L-S}{L+S}$

Where, L is the largest value

S is the smallest value

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.

Section B

21. Let A = {2, 3,4, 5, 6, 7, 8, 9}. Let R be the relation on A defined by {(x, y): X, y ∈ A, X is a multiple of y and x ≠ y}. **[2]**

i. find the relation.

ii. find the domain of R.

iii. Find the range of R.

iv. Find the inverse relation.

OR

Find the simplified form of

$f(x) = |x - 2| + |2 - x|$, if $-3 \leq x \leq 3$.

22. If f (x) = $\begin{cases} 5x - 4, & 0 < x \leqslant 1 \\ 4x^3 - 3x, & 1 < x < 2 \end{cases}$, show that $\lim_{x \to 1}$ f (x) exists. **[2]**

23. Find the equation of the ellipse, with major axis along the x-axis and passing through the points (4, 3) and (–1, 4). **[2]**

OR

Find the eccentricity, coordinates of foci, length of the latus-rectum of the ellipse: $5x^2 + 4y^2 = 1$.

24. Is B = {x : x ∈ N, 2x + 3 = 4} null set? **[2]**

25. Find the slope and the equation of the line passing through the points (5, 3) and (-5, -3). **[2]**

Section C

26. If f (x) = x^2, find $\frac{f(1.1)-f(1)}{(1.1-1)}$ **[3]**

27. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more **[3]**

than 11.

28. Using distance formula prove that the points are collinear: A (4, -3, -1), B (5, -7, 6) and C (3, 1, -8). **[3]**

OR

Find the length of the medians of the triangle with vertices A(0, 0, 6), B (0, 4, 0) and C (6, 0, 0).

29. If the coefficients of a^{r-1}, a^r and a^{r+1} in the expansion of $(1 + a)^n$ are in arithmetic progression, prove that $n^2 - n(4r + 1) + 4r^2 - 2 = 0$. **[3]**

OR

Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$.

30. Express $(1 - 2i)^{-3}$ in the form of (a + ib). **[3]**

OR

Find the multiplicative inverse of the complex number $= \sqrt{5} + 3i$

31. In a group of 500 persons, 300 take tea, 150 take coffee, 250 take cold drink, 90 take tea and coffee, 110 take tea and cold drink, 80 take coffee and cold drink and 50 take all the three drinks. **[3]**

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.

Section D

32. A die is thrown. Describe the following events: **[5]**

i. A: a number less than 7.

ii. B: a number greater than 7.

iii. C: a multiple of 3.

iv. D: a number less than 4.

v. E: an even number greater than 4.

vi. F: a number not less than 3.

Also, find A ∪ B, A ∩ B, B ∪ C, E ∩ F, D ∩ E, A - C, D - E, F' and E ∩ F'.

33. Solve: $\lim_{x \to 1} \frac{x^4 - 3x^3 + 2}{x^3 - 5x^2 + 3x + 1}$ **[5]**

OR

Find the derivative of x sinx from first principle.

34. Find the sum of the following series up to n terms: **[5]**

i. 5 + 55 + 555 + ……

ii. 6 + .66 + .666 + …..

35. If A + B + C = π, then prove that $\frac{\cos A}{\sin B \cdot \sin C} + \frac{\cos B}{\sin C \cdot \sin A} + \frac{\cos C}{\sin A \cdot \sin B} = 2$. **[5]**

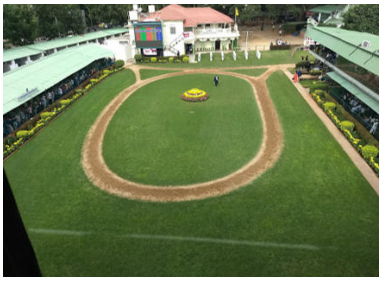
OR

Prove that: cos 40° cos 80° cos 160° = $-\frac{1}{8}$.

Section E

36. **Read the text carefully and answer the questions:** **[4]**

Arun is running in a racecourse note that the sum of the distances from the two flag posts from him is always 10 m and the distance between the flag posts is 8 m.



(i) Path traced by Arun represents which type of curve. Find the length of major axis?

(ii) Find the equation of the curve traced by Arun?

(iii) Find the eccentricity of path traced by Arun?

OR

Find the length of latus rectum for the path traced by Arun.

37. **Read the text carefully and answer the questions:** **[4]**

An analysis of monthly wages paid to workers in two firms A and B, belonging to the same industry, gives the following results:

Particulars	**Firm A**	**Firm B**
No. of wage earners	586	648
Mean of monthly wages	₹ 5253	₹ 5253
Variance of the distribution of wages	100	121

(i) Which firm A or B shows greater variability in individual wages?

(ii) Find the standard deviation of the distribution of wages for frim B.

(iii) Find the coefficient of variation of the distribution of wages for firm A.

OR

Find the amount paid by firm A.

38. **Read the text carefully and answer the questions:** **[4]**

The purpose of the student council is to give students an opportunity to develop leadership by organizing and carrying out school activities and service projects. Create an environment where every student can voice out their concern or need. Raju, Ravi Joseph, Sangeeta, Priya, Meena and Aman are members of student's council. There is a photo session in a school these 7 students are to be seated in a row for photo session.

(i) Find the total number of arrangements so that Raju and Ravi are at extreme positions?

(ii) Find the number of arrangements so that Joseph is sitting in the middle.