

LIONS SCHOOL, MIRZAPUR
HALF YEARLY EXAMINATIONS 2021-22
TERM -1

CLASS: XI
SUBJECT: MATHS

M.M 80
TIME: 3 HOURS

General Instructions:

1. This question paper contains two parts A and B. Each part is compulsory. Part A carries 24 marks and Part B carries 56 marks.
2. Part A has Objective Type Questions and Part B has Descriptive Type Questions.
3. Both part A and B have internal choices.

Part- A:

1. It consists of two sections -I and II.
2. Section I comprises of 16 very short answer type questions of one mark each. Internal choice is provided in 5 questions.
3. Section II has 2 questions on case study. Each case study has 5 case-based MCQs. An examinee is to attempt any 4 out of 5 MCQs.

Part-B:

1. It consists of three sections- III, IV and V.
2. Section III comprises of 10 questions of 2 marks each.
3. Section IV comprises of 7 questions of 3 marks each.
4. Section V comprises of 3 questions of 5 marks each.
5. Internal choice is provided in 3 questions of Section - III, 2 questions of Section - IV and 3 question of Section - V. You have to attempt only one of the alternatives in all such questions.

Part - A

(Section-I)

All questions are compulsory. In case of internal choices attempt anyone.

Q1. Find the number of all proper subsets of a set containing n elements.

OR

Find the number of elements of power set of a set having n elements.

Q2. If A and B are two sets such that $n(A) = 115$, $n(B) = 326$ and $n(A \cap B) = 47$ then find $n(A \cup B)$.

Q3. Find the smallest set A such that $A \cup \{1,2\} = \{1,2,3,5,9\}$.

Q4. Determine whether the set $f = \{(1,5), (2,9), (3,1), (4,5), (2,11)\}$ are function from X to Y .

Q5. Find the set of values of x for which the functions $f(x) = 3x^2 - 1$ and

$$g(x) = 3 + x \text{ are equal.}$$

Q6. Evaluate i^{-999} .

Q7. Find the conjugate of $\frac{1}{2-3i}$.

OR

Find the modulus of $\frac{1}{2-\sqrt{-3}}$.

Q8. Find the real values of x and y such that $(x + iy)(2 - 3i) = (4 + i)$

Q9. Solve the equation $9x^2 + 4 = 0$.

OR

Solve the equation $x^2 + x + 1 = 0$.

Q10. Find the A.M. between 12 and -8.

OR

Find the G.M. between -2 and -8.

Q11. Find 10th term of G.P. 1, 4, 16, 64,

Q12. Find the angle between the X-axis and the line joining the points (3, -1) and (4, -2).

Q13. Reduce equation $x + \sqrt{3}y - 4 = 0$ to normal form and find the value of p and α .

Q14. Evaluate $\lim_{x \rightarrow 0} \frac{\tan 8x}{\sin 2x}$.

OR

Evaluate $\lim_{x \rightarrow -1} \frac{x^3 - 1}{x + 1}$.

Q15. Evaluate $\lim_{x \rightarrow 2} \frac{\sqrt{3-x}-1}{2-x}$.

Q16. Find the perpendicular distance of point (3,4) from the line $3x - 4y + 12 = 0$.

Section II

Both the case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each sub parts question carries one mark.

Q17. 150 workers were engaged to finish a piece of work in a certain number of days. four workers dropped the second day, four more workers dropped the third day and so on. It takes 8 more days to finish the work now.

Based on the above information answer the following.

i) sequence formed by above information is

- A.P.
- G.P.
- H.P.
- none of these.

- ii) First term of the sequence is
 - a). 150
 - b). 15
 - c). 8
 - d). none of these.
- iii) common difference of the sequence is
 - a). 4
 - b). -4
 - c). 8
 - d). none of these.
- iv) Find the number of days in which work was completed
 - a). 15 days
 - b). 8 days
 - c). 25 days
 - d). none of these.
- v) Had the workers not dropped then work would have finished in
 - a). 16 days
 - b). 8 days
 - c). 25 days
 - d). none of these.

Q17. In a survey of hundred persons, it was found that 28 read Magazine A, 30 read Magazine B, 42 read Magazine C, 8 read Magazines A and B, 10 read Magazines A and C, 5 read Magazines B and C 3 read all three Magazines.

Based on the above information answer the following.

- i) How many read Magazine A only?
 - a). 13
 - b). 12
 - c). 20
 - d). none of these.

- ii) How many read Magazine B only?
 - a). 15
 - b). 16
 - c). 20
 - d). none of these.
- iii) How many read Magazine C only?
 - a). 28
 - b). 30
 - c). 100
 - d). none of these.
- iv) How many read none of three magazines?
 - a). 17

- b). 12
 c). 20
 d). none of these.
- v) How many read all the three magazines?
 a). 80
 b). 100
 c). 90
 d). none of these.

Part -B

Section- iii

Q. Nos. 19 to 28 carry 2 marks each.

Q19. Write the relation $R = \{(x, x^3) : x \text{ is a prime number less than } 12\}$ in roaster form.

Q20. Find the domain and range of the function $f(x) = \frac{x-2}{3-x}$.

Q21. $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,4\}$, $B = \{2,4,6,8\}$ find $(A \cup B)'$.

Q22. If $x + iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$.

Q23. Which term of the G.P. $\sqrt{3}, 3, 3\sqrt{3}, \dots$ is 729?

OR

How many terms are there in A.P. $-1, \frac{-5}{6}, \frac{-2}{3}, \frac{-1}{2}, \dots, \frac{10}{3}$.

Q24. Find the equation of right bisector of the line segment joining the points

$(3, 4)$ and $(-1, 2)$.

OR

Find the equation of the straight line which passes through point $(1, -2)$ and cuts of equal intercepts on the axes.

Q25. In a GP 3rd term is 24 and 6th term is 192. Find first term and common ratio.

Q26. Find the multiplicative inverse of $Z = 4 - 3i$.

OR

Solve the quadratic equation $x^2 - 2x + \frac{3}{2} = 0$.

Q27. Find the mean deviation from the mean for the data

4, 6, 7, 10, 12, 13, 8, 20.

Q28. If $f(x) = x^3 - \frac{1}{x^3}$, find the value of $f(x) + f(\frac{1}{x^3})$.

Section - IV

Question nos.29 to 35 carry 3 marks each.

Q29. Let $U = \{a, b, c, d, e, f, g, h\}$, $A = \{b, d, f, g\}$ and $B = \{b, c, e, f, h\}$ verify that

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

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

Q30. Three numbers are in GP whose sum is 70. If the extremes be each multiplied by 4 and the mean by 5, they will be in AP. Find the numbers.

Q31. Find the equation of the straight line passing through the intersection of the lines $5x-6y-1=0$ and $3x+2y+5=0$ and perpendicular to the line $3x-5y+11=0$

Q32. The vertices are triangle ABC are $A(2,5)$, $B(-4,9)$ and $C(-2,-1)$. Find

- i) Median through A ii) altitude through B .

Q33. Compute the mean deviation from the median of following distribution

Classes	0-10	10-20	20-30	30-40	40-50	50-60
frequencies	6	18	14	16	4	2

OR

Compute the mean deviation from the mean of following distribution

Marks	0-10	10-20	20-30	30-40	40-50	50-60
frequencies	5	8	15	16	6	10

Q34. Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 + \cos 2x}{(\pi - 2x)^2}$.

OR

Evaluate $\lim_{x \rightarrow 1} \frac{(2x-3)(\sqrt{x}-1)}{3x^2+3x-6}$.

Q35. Evaluate $\lim_{x \rightarrow 0} \frac{3^{2x}-1}{2^{3x}-1}$.

Section V

Question nos.36 to 38 carry 5 marks each.

Q36. Calculate the mean, variance and standard deviation for the following distribution:

marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of students	3	6	13	15	14	5	4

Q37. Sum the series $3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 + \dots$ to n terms.

OR

Find the sum of the series whose n^{th} term is $n^3 - 3^n$.

Q38. Find the sum of the series $7 + 77 + 777 + \dots$ to n terms.

OR

The sum of two numbers is 6 times their geometric means, show that the numbers are in the ratio $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$.