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

CLASS: XI M.M 80

SUBJECT: MATHS (OPTIONAL) TIME ALLOWED: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.

Q.1. Write the following interval ¿6,12¿¿ in set-builder form.

Or

Write $\{x: x \in R, -12 < x \leftarrow 10\}$ as interval.

Q.2. Find the multiplicative inverse of the complex number z = 4 – 3i.

Q.3. For what values of x, the numbers $\frac{-2}{7}, x, \frac{-7}{2}$ are in G.P.

Or

Find the 20th term of the G.P $\frac{5}{2}, \frac{5}{4}, \frac{5}{8}$−−−−−−−¿

Q.4. Find the value of x for which the points (x, – 1), (2,1) and (4, 5) are collinear.

Q.5. Evaluate: $\lim_{x \to 0} \left\{ \frac{e^{4x}-1}{x} \right\}$

Or

Evaluate: $\lim_{x \to 0} \left\{ \frac{\tan 3x}{\sin 4x} \right\}$

Q.6. If $x_1, x_2, x_3, x_4, -------, x_n$, be n observations. Write the formula to evaluate mean deviation about mean.

Q.7. Solve: $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$

Or

Solve: $\sqrt{2}x^2 + x + \sqrt{2} = 0$

Q.8. Find the sum of the infinite series,

$8 + 4\sqrt{2} + 4 + 2\sqrt{2} + ------\infty$

Q.9. Find the equation of the line, which makes intercepts –3 and 2 on the x- and y-axes respectively.

Q.10. Evaluate: $\lim_{x \to 5} \left\{ \frac{x^2 - 25}{x - 5} \right\}$

Q.11. Express the given complex number $z = \left(\frac{1}{3} + 3i \right)^3$ in the form of $a + ib$.

Or

If 4x + i (3x – y) = 3 + i (– 6), where x and y are real numbers, then find the values of x and y.

Q.12. Insert two numbers between 3 and 81 so that the resulting sequence is G.P.

Q.13. Find the equation of the line, Passing through the points (–1, 1) and (2, – 4).

Q.14. Evaluate: $\lim_{x \to 0} \left\{ \frac{2^x - 1}{x} \right\}$

Q.15. If $x_1, x_2, x_3, x_4, -------, x_n$, be n observations. Write the formula to evaluate mean deviation about median.

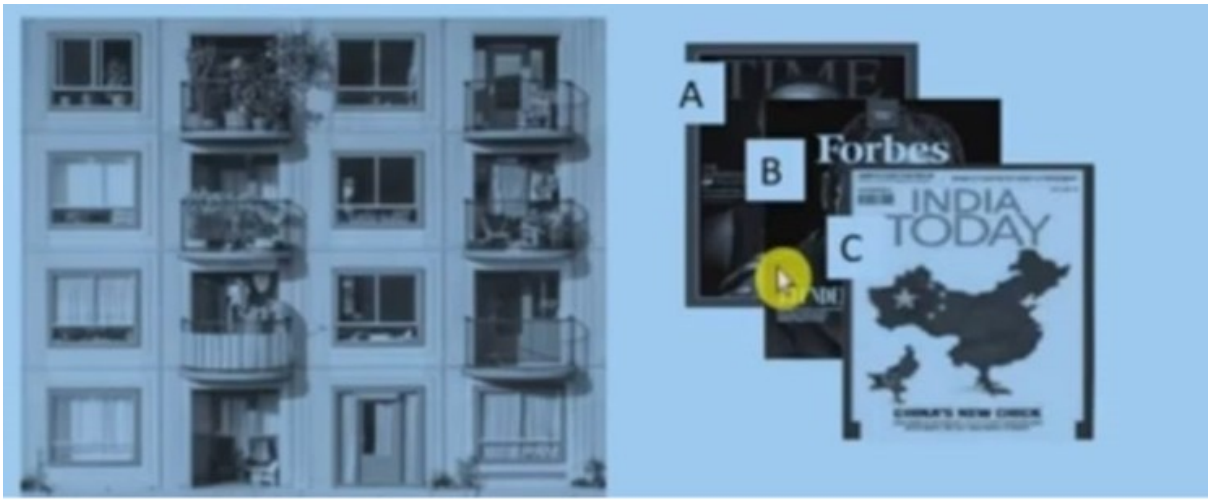
Q.16. If A.M and G.M of roots of a quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.

(Section-II)

Both the Case- study based questions are compulsory. Attempt any 4 sub parts of each question. Each sub part carries 1 mark.

Q.17. **Case Study Based-1**

In a survey of 50 persons of an apartment, it was found that 15 persons read Magazine A, 16 persons read Magazine B, 16 persons read Magazine C, 8 read both A and B, 10 read both B and C, 7 read both C and A, 5 read all the three Magazines.



(i) How many persons read only Magazine A?

(a) 2 (b) 3 (c) 4 (d) 5

(ii) How many persons read only Magazine C?

(a) 2 (b) 3 (c) 4 (d) 5

(iii) How many persons read only Magazine A and B but not C.

(a) 2 (b) 3 (c) 4 (d) 5

(iv) How many persons read at-least one of the Magazine A, B and C

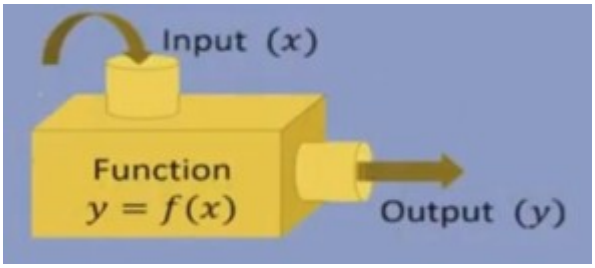
(a) 20 (b) 25 (c) 26 (d) 27

(v) How many persons read none of the magazine

(a) 20 (b) 23 (c) 24 (d) 25

Q.18. **Case Study Based-2**

We can easily visualize a function as a machine, which produces a new element $y=f(x)$ if an element x was put in it.



Answer the following questions:

(i) What will be the output of $\sqrt{-1}$, if the function in the machine is $f(x)=x^2$.

(a) 1 (b) 0 (c) -1 (d) i

(ii) What will be the output of 3.5 if the function in the machine is $f(x)=[x]$

(a) 0 (b) 1 (c) 2 (d) 3

(iii) What will be the input if output for the function $f(x)=\sqrt{x}$ in the machine is 2.5.

(a) 4.1 (b) 4.25 (c) 6.25 (d) 6.5

(iv) If ordered pairs in a relation are $(1,2),(1,3),(2,3),(3,4)$, can we say that these belongs to any such machine?

(a) Yes (b) No (c) May be (d) Data is incomplete

(v) If $x \in R$, and function in the machine is $f(x)=|x|$, then what would be range of the function?

(a) R (b) $R^{+¿¿}$ (c) $R^{-¿¿}$ (d) $R^{+¿ \cup [0]¿}$

Part B

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

(Section-III)

Q.19. Find the angle between the lines $\sqrt{3}x+y=1$ and $x+\sqrt{3}y=1$.

Q.20. Find real values of θ for which $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real.

Q.21. If $\frac{(a+bx)}{(a-bx)}=\frac{(b+cx)}{(b-cx)}=\frac{(c+dx)}{(c-dx)}$, $x \neq 0$ then show that a, b, c and d are in G.P.

Or

If $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the A.M between a and b, then find the value of n.

Q.22. Find the equation of a line parallel to the line $3x-4y+2=0$ and passing through the point $(-2,3)$.

Q.23. Evaluate: $\lim_{x \to 0} \left\{ \frac{\tan x - \sin x}{\sin^3 x} \right\}$.

Or

Evaluate: $\lim_{x \to \pi} \left\{ \frac{\sin 3x - 3\sin x}{(\pi - x)^3} \right\}$

Q.24. Find mean deviation about mean for the data: $7, 8, 4, 13, 9, 5, 16, 18$.

Q.25. If $A = \{a, b, c\}$. Find power set $P(A)$.

Q.26. Find the value of $0.4\dot{2}\dot{3}$ in the form of a simple fraction by using G.P.

Or

Prove that: $9^{1/3} \times 9^{1/9} \times 9^{1/27} \times ----- \infty = 3$

Q.27. Equation of a line is 3x – 4y + 10 = 0. Find its (i) slope, (ii) x - and y-intercepts.

Q.28. If $A = \{1, 2, 3\}$. Write down all the subsets of set A.

(Section-IV)

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

Q.29. Find the domain and range of the function $f(x) = \frac{x^2}{1 + x^2}$.

Q.30. If $A = \{1, 2, 5\}, B = \{1, 2, 3, 4\}, C = \{5, 6, 2\}$. Verify that

$A \times (B \cap C) = (A \times B) \cap (A \times C)$

Q.31. If $A = \{1, 2, 4, 5\}, B = \{2, 3, 5, 6\}, C = \{4, 5, 6, 7\}$. Verify that

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

Or

If A, B and C be the sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$. Prove that B = C.

Q.32. Find the sum to n terms of the sequence:

8, 88, 888, 8888 ----------

Or

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

Q.33. Evaluate: $\lim_{x \to 4} \frac{(3 - \sqrt{5 + x})}{(1 - \sqrt{5 - x})}$.

Q.34. Find equation of the line passing through the point (2, 2) and cutting off intercepts on the axes whose sum is 9.

Or

Find the equation of the line passing through (–3, 5) and perpendicular to the line through the points (2, 5) and (–3, 6).

Q.35. Find the mean deviation about the median for the following data.

C.I	0 - 10	10- 20	20-30	30-40	40-50	50-60
Frequency	6	8	11	18	5	2

(Section-V)

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

Q.36. If $\alpha \wedge \beta$ are different complex numbers with $|\beta|=1$, then find the value of $\left|\frac{\beta-\alpha}{1-\acute{\alpha}\,\beta}\right|$.

Or

If $(x+iy)^3=u+iv$ then prove that $\frac{u}{x}+\frac{v}{y}=4(x^2-y^2)$

Q.37. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day, 4 more workers dropped out on third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed.

Or

If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form a G.P. Prove that $(q + p) : (q - p) = 17:15$.

Q.38. Using short cut method, find the mean, variance and standard deviation for the data:

C.I	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Frequency	3	7	12	15	8	3	2

Or

Using short cut method, find the mean, variance and standard deviation for the data:

C.I	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6