Newton's Academy

Mathematics Part - I

Time: 2 Hours **Max. Marks: 40**

Notes:

i. *All* questions are compulsory.
ii. Use of calculator is not allowed.
iii. The numbers to the right of the questions indicate full marks.
iv. In case of MCQ's Q. No. 1(A) only the first attempt will be evaluated and will be given credit.
v. For every MCQ, the correct alternative (A), (B), (C) or (D) of answers with subquestion number is to be written as an answer.

Q.1. A. For every subquestion 4 alternative answers are given. Choose the correct answer and write the alphabet of it: **[4]**

i. In the format of GSTIN there are _____ alpha-numerals.
(A) 15 (B) 10
(C) 16 (D) 9

ii. From the following equations, which one is the quadratic equation?
(A) $\frac{5}{x} - 3 = x^2$ (B) $x(x + 5) = 4$
(C) $n - 1 = 2n$ (D) $\frac{1}{x^2}(x + 2) = x$

iii. For simultaneous equations in variables x and y, if $D_x = 49$, $D_y = -63$, $D = 7$, then what is the value of x?
(A) 7 (B) –7
(C) $\frac{1}{7}$ (D) $\frac{-1}{7}$

iv. If $n(A) = 2$, $P(A) = \frac{1}{5}$, then $n(S) = ?$
(A) $\frac{2}{5}$ (B) $\frac{5}{2}$
(C) 10 (D) $\frac{1}{3}$

Q.1. B. Solve the following subquestions: **[4]**

i. Find second and third term of an A.P. whose first term is – 2 and common difference is – 2.

ii. 'Pawan Medicals' supplies medicines. On some medicines the rate of GST is 12%, then what is the rate of CGST and SGST?

iii. Find the values of a and b from the quadratic equation $2x^2 - 5x + 7 = 0$.

iv. If $15x + 17y = 21$ and $17x + 15y = 11$, then find the value of $x + y$.

Q.2. A. Complete and write any *two* activities from the following: **[4]**

i. Complete the following table to draw the graph of $2x - 6y = 3$:

x	–5	☐
y	☐	0
(x, y)	☐	☐

ii. First term and common difference of an A.P. are 6 and 3 respectively. Find S_{27}.

Solution:

First term = a = 6, common difference = $d = 3$, $S_{27} = ?$

$S_n = \frac{n}{2}[\square + (n-1)d]$ – formula

$S_{27} = \frac{27}{2}[12 + (27-1)\square]$

$= \frac{27}{2} \times \square$

$= 27 \times 45$

$\therefore \quad S_{27} = \square$

iii. A card is drawn from a well shuffled pack of 52 playing cards. Find the probability of the event, the card drawn is a red card.

Solution:

Suppose 'S' is sample space.

$\therefore \quad n(S) = 52$

Event A: Card drawn is a red card.

$\therefore$ Total red cards = $\square$ hearts + 13 diamonds

$\therefore \quad n(A) = \square$

$\therefore \quad p(A) = \frac{\square}{n(S)}$ – formula

$\therefore \quad p(A) = \frac{26}{52}$

$\therefore \quad p(A) = \square$

Q.2. B. Solve any *four* subquestions from the following: **[8]**

i. Find the value of the determinant:

$$\begin{bmatrix} \frac{7}{3} & \frac{5}{3} \\ \frac{3}{2} & \frac{1}{2} \end{bmatrix}$$

ii. Solve the quadratic equation by factorisation method:

$x^2 - 15x + 54 = 0$

iii. Decide whether the following sequence is an A.P. if so, find the 20^{th} term of the progression:

$-12, -5, 2, 9, 16, 23, 30, \ldots\ldots\ldots\ldots$

iv. A two digit number is formed with digits 2, 3, 5, 7, 9 without repetition. What is the probability that the number formed is an odd number?

v. If L = 10, $f_1 = 70$, $f_0 = 58$, $f_2 = 42$, $h = 2$, then find the mode by using formula.

Q.3. A. **Complete and write any *one* activity from the following:** **[3]**

i.

Age group (in years)	**No. of Persons**	**Measure of central angle**
20 – 25	80	$\frac{\square}{200} \times 360 = \square$
25 – 30	60	$\frac{60}{200} \times 360 = \square$
30 – 35	35	$\frac{35}{200} \times \square = 63^\circ$
35 – 40	25	$\frac{25}{200} \times 360 = \square$
Total	200	$\square$

ii. Shri Shantilal has purchased 150 shares of FV ₹ 100, for MV of ₹ 120, Company has paid dividend at 7%, then to find the rate of return on his investment, complete the following activity:

Solution: FV = ₹ 100; Number of shares = 150

Market value = ₹ 120

1. Sum investment = MV × No. of Shares

$= \square \times \square$

∴ Sum investment = ₹ 18,000

2. Dividend per share = FV × Rate of dividend

$= \square \times \frac{\square}{100}$

= ₹ 7

∴ Total dividend received = 150 × 7

$= \square$

3. $\text{Rate of return} = \frac{\text{Dividend income}}{\text{Sum invested}} \times 100$

$= \frac{1050}{18000} \times 100$

$= \square$

Q.3. B. **Attempt any *two* subquestions from the following:** **[6]**

i. A balloon vendor has 2 red, 3 blue and 4 green balloons. He wants to choose one of them at random to give it to Pranali. What is the probability of the event that Pranali gets:

1. a red balloon.
2. a blue balloon.

ii. The denominator of a fraction is 4 more than twice its numerator. Denominator becomes 12 times the numerator, if both the numerator and the denominator are reduced by 6, find the fraction.

iii. A milk centre sold milk to 50 customers. The table below gives the number of customers and the milk they purchased. Find the mean of the milk sold by direct method:

Milk Sold (litre)	No. of Customers
1–2	17
2–3	13
3–4	10
4–5	7
5–6	3

iv. In an A.P. sum of three consecutive terms is 27 and their products is 504. Find the terms. (Assume that three consecutive terms in an A.P. are a – d, a, a + d.)

Q.4. Attempt any *two* subquestions from the following: **[8]**

i. Represent the following data by histogram:

Price of Sugar (per kg in ₹)	Number of Weeks
18–20	4
20–22	8
22–24	22
24–26	12
26–28	6
28–30	8

ii. One person borrows ₹ 4,000 and agrees to repay with a total interest of ₹ 500 in 10 instalments. Each instalment being less than the preceding instalment by ₹ 10. What should be the first and the last instalments?

iii. The sum of the areas of two squares is 400 sq.m. If the difference between their perimeters is 16 m, find the sides of two squares.

Q.5. Attempt any *one* subquestion from the following: **[3]**

i. Convert the following equations into simultaneous equations and solve:

$$\sqrt{\frac{x}{y}} = 4, \frac{1}{x} + \frac{1}{y} = \frac{1}{xy}$$

ii. A dealer sells a toy for ₹ 24 and gains as much percent as the cost price of the toy. Find the cost price of the toy.