N 684

Seat No. | | | | | | | |

2025 VII 01 1100 -N 684- MATHEMATICS (71) ALGEBRA—PART I (E)

(REVISED COURSE)

Time : 2 Hours **(Pages 11)** **Max. Marks : 40**

***Note* :— (*i*) *All* questions are compulsory.**

(*ii*) Use of a calculator is not allowed.

(*iii*) The numbers to the right of the questions indicate full marks.

(*iv*) In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.

1. (A) Four alternative answers are given for every subquestion. Choose the correct alternative and write its alphabet with subquestion number : 4

(*i*) The value of determinant $\begin{vmatrix} 5 & 3 \\ -7 & -4 \end{vmatrix}$ is .....

(A) –1

(B) –41

(C) 41

(D) 1

P.T.O.

(*ii*) Out of the following equations which one is not a quadratic equation ?

(A) $x^2 + 4x = 11 + x^2$

(B) $x^2 = 4x$

(C) $5x^2 = 90$

(D) $2x - x^2 = x^2 + 5$

(*iii*) For given A.P. $a = 3.5$, $d = 0$, then t_2 = ...

(A) 0

(B) 3.5

(C) 7

(D) 10.5

(*iv*) From the following numbers which number cannot represent a probability ?

(A) 0.6

(B) 2.0

(C) 0.15

(D) 0.75

(B) Solve the following subquestions : **4**

(*i*) For simultaneous equations in variables x and y $D_x = 49$, $D_y = -63$, $D = 7$, then find the value of x.

(*ii*) Write the following quadratic equation in standard form :

$$2y = 10 - y^2$$

(*iii*) Face value of one share is ₹ 100 and premium is ₹ 10. Find the market value of the share.

(*iv*) Find the class mark of the class 6–10.

2. (A) Complete the following activities and rewrite it (any *two*) : **4**

(*i*) Complete the following activity to solve the quadratic equation $x^2 + 8x - 48 = 0$ by completing square method.

Activity :

$\therefore\ x^2 + 8x - 48 = 0$

$\therefore\ x^2 + 8x + 16 - \square - 48 = 0$

$\therefore\ (x + 4)^2 - \square = 0$

$\therefore\ (x + 4)^2 = 64$

$\therefore\ x + 4 = \square$ or $x + 4 = -8$

$\therefore\ x = 4$ or $x = \square$

(*ii*) Courier service agent charged total ₹ 590 to courier a parcel from Nashik to Nagpur. In the tax invoice taxable value is ₹ 500 on which CGST is ₹ 45 and SGST is ₹ 45. Complete the following activity to find the rate of GST charged for this service :

Activity :

Total GST = CGST + SGST

= ☐ + 45

= ₹ ☐

Rate of GST = $\frac{90}{500} \times$ ☐

∴ Rate of GST charged by agent is ☐ %

(*iii*) The monthly expenditure of a family on different items is shown in the following table. Complete the following activity to calculate the related central angles.

Activity :

Different items	**Percentage of expenditure**	**Measure of central angle**
Food	40	$\frac{40}{100} \times 360^\circ = \square^\circ$
Clothing	20	$\frac{20}{100} \times 360^\circ = \square^\circ$
Education	30	$\frac{30}{100} \times 360^\circ = \square^\circ$
Other expenditure	10	$\frac{10}{100} \times 360^\circ = \square^\circ$
Total	100	360°

(B) Solve the following subquestions (any *four*) : **8**

(*i*) Find the values of $(x + y)$ and $(x - y)$ of the following given simultaneous equations :

$$101x + 99y = 501$$

$$99x + 101y = 499$$

(*ii*) Solve the following quadratic equation by factorisation method :

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

(*iii*) Which term of the following A.P. is 560 ?

2, 11, 20, 29, ...

(*iv*) Market value of a share is ₹ 200. If the brokerage rate is 0.3%, then find the purchase value of the share.

(*v*) If $\sum fidi = 10{,}000$, $\sum fi = 100$ and A = 2000, then find mean $(\bar{x})$.

3. (A) Complete the following activities and rewrite it (any *one*) : 3

(*i*) In an A.P. sum of three consecutive terms is 27 and their product is 504. Complete the following activity to find the terms.

Activity :

Let three consecutive terms be $a - d$, a, $a + d$.

$\therefore \quad a - d + a + a + d =$ ☐

$\therefore \quad a =$ ☐

Similarly :

$(a - d) \times a \times (a + d) =$ ☐

$\therefore \quad [(9)^2 - d^2] \times 9 = 504$

$\therefore \quad (81 - d^2) \times 9 = 504$

$\therefore \quad d^2 = 81 -$ ☐

$\therefore \quad d = \pm 5$

Thus by putting $a = 9$ and $d = 5$ we get three consecutive terms = ☐

Or by putting $a = 9$ and $d = -5$ we get three consecutive terms = ☐

(*ii*) A card is drawn from a well shuffled pack of 52 playing cards.

Complete the following activity to find the probability of the following events :

(*a*) A red card

(*b*) A face card.

Activity :

Let 'S' is the sample space

$\therefore$ $n(S) =$ ☐

Event A : Card drawn is a red card.

Total red cards = ☐

$\therefore$ $n(A) =$ ☐

$\therefore$ $P(A) = \frac{n(A)}{n(S)}$ ..... Formula

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

$\therefore$ $P(A) =$ ☐

Event B : Card drawn is a face card.

Total face cards = 12

$\therefore \quad n(B) =$ ☐

$\therefore \quad P(B) = \frac{n(B)}{n(S)}$ ..... Formula

$\therefore \quad P(B) = \frac{12}{52}$

$\therefore \quad P(B) =$ ☐

(B) Solve the following subquestions (any *two*) : 6

(*i*) In the following table the yearly investment made by 210 families is given. From this information draw the histogram.

Investment (Thousand Rupees)	**Number of families**
10–20	30
20–30	50
30–40	60
40–50	55
50–60	15

(*ii*) Shri Shivajirao has purchased 150 shares of F.V. ₹ 100, for M.V. of ₹ 120. Company has paid 7% dividend. Find the rate of return on his investment.

(*iii*) Product of Shraddha's age 2 years ago and 3 years hence is 84. Find her present age.

(*iv*) Solve the following simultaneous equations graphically :

$$x + y = 6,\ x - y = 4$$

4. Solve the following subquestions (any *two*) : **8**

(*i*) In an agriculture field the ratio of salary of skilled and unskilled workers is 5 : 4. Total salary of one day of both of them is ₹ 900. Find daily wages of skilled and unskilled workers.

(*ii*) Two dice are thrown. Find the probability of the following events :

(*a*) Event A : The sum of the numbers on their upper faces is at least 9.

(*b*) Event B : The sum of the numbers on their upper faces is divisible by 5.

(*c*) Event C : The number on the upper face of the first die is greater than the number on the upper face of the second die.

(*iii*) In the following frequency distribution table ages of 300 patients and number of patients in a hospital is given. Find the median age of the patients :

Age (In years)	**Number of patients**
10–20	60
20–30	42
30–40	55
40–50	70
50–60	53
60–70	20

5. Solve the following subquestions (any *one*) : **3**

(*i*) Three conditions are given below. Write the quadratic equation for each of them satisfy that condition :

(*a*) If discriminant $\Delta = 0$

(*b*) If discriminant $\Delta > 0$

(*c*) If discriminant $\Delta < 0$

(*ii*) If first term of an A.P. is '*p*', second term is '*q*' and last term is '*r*', then show that the sum of all terms is $\frac{(p+r)(q+r-2p)}{2(q-p)}$.