MT

2018 ____ ____ 1100 **Seat No.** | | | | | | | |

MT - MATHEMATICS (71) algebra - SEMI PRELIM - I - PAPER - V

Time : 2 Hours **(Answer Paper)** **Max. Marks : 40**

A.1. (A) Solve the following : (Any 4)

1. Ratio of radius to diameter of a circle = $\frac{r}{d}$ **1**

$= \frac{r}{2r} = \frac{1}{2}$

$= 1 : 2$

2. Here, maximum frequency is 25 and it is of 2. **1**

$\therefore$ mode = 2

$\therefore$ Mode of children under 14 years is 2.

3. **1**

Sr. No.	Individuals	Age	Taxable income (₹)	Will have to pay income tax or not
1.	Miss. Nikita	27	₹ 2,34,000	NO
2.	Mr. Desilva	81	₹ 4,50,000	NO

4. Ratio of 36 to 90 $= \frac{36}{90}$ **1**

$= \frac{18 \times 2}{18 \times 5} = \frac{2}{5}$

$= 2 : 5$

5. Mean $= \frac{\text{Sum of observations}}{\text{Number of observations}}$

$= \frac{10 + 7 + 5 + 3 + 9 + 6 + 9}{7}$

$= \frac{49}{7}$

$\therefore$ Mean = 7

$\therefore$ Mean production of soyabean is 7 quintals per acre. **1**

6. % of Income used for daily expense = 90
% of Income deposited in bank = 3
∴ % of Income held in hand = 100 – (90 +3)
= 100 – 93
= 7 **1**

A.1. (B) Solve the following : (Any 2)

1. $\frac{9.2}{5.1}, \frac{3.4}{7.1}$

$9.2 \times 7.1 = 65.32$

$3.4 \times 5.1 = 17.34$ **1**

Now, $65.32 > 17.34$

∴ $9.2 \times 7.1 > 3.4 \times 5.1$

∴ $\boxed{\frac{9.2}{5.1} > \frac{3.4}{7.1}}$ **1**

2. Data in ascending order : 50, 60, 65, 70, 70, 80, 85, 90, 95, 95
Here $n = 10$ (even number)

∴ Median = Mean of $\left(\frac{n}{2}\right)$ th term

and $\left(\frac{n+2}{2}\right)$ th the term.

∴ $\frac{n}{2} = \frac{10}{2}$ = 5th term and

$\frac{n+2}{2} = \frac{10+2}{2} = \frac{12}{2}$ = 6th term. **1**

5th term = 70 and 6th term = 80

∴ Median $= \frac{70+80}{2} = \frac{150}{2} = 75$

∴ Median weight of tomato's is 75 grams. **1**

3. Let the total amount received by Alka each month be ₹ x.
Alka's expenditure = 90% of the total amount

∴ Alka's saving = (100 – 90)%
= 10% of the total amount

But she saves ₹120 per month ..... [Given] **1**

∴ 10% of x = 120

$\therefore \quad \frac{10}{100} \times x = 120$

$\therefore \quad x = \frac{120 \times 100}{10}$

$\therefore \quad x = 1200$

$\therefore$ Amount received by Alka each month is ₹1200. **1**

A.2. (A) Solve the following :

1. (A) –75 **1**

2. (B) B2B **1**

3. (C) (5, 8) **1**

4. (A) 5325 **1**

A.2. (B) Solve the following : (Any 2)

1. The A.P. 12, 16, 20, 24.....

Here $a = 12$, $d = 16 - 12 = 4$, $t_{24} = ?$

$t_n = a + (n-1)\,d$

$\therefore \quad t_{24} = 12 + (24-1)\,4 \qquad (\because n = 24)$ **1**

$= 12 + 23 \times 4$

$= 12 + 92$

$\therefore \quad t_{24} = 104$

Thus 24th term of the A.P. is 104. **1**

2. Input tax (ITC) = ₹ 1,00,500

Output tax = ₹ 1,22,500 **1**

$\therefore$ GST payable = Output tax – ITC

= 1,22,500 – 1,00,500

$\therefore$ GST = ₹ 22,000

$\therefore$ **The GST payable by Chetana Stores is ₹ 22,000** **1**

3. (i) Total no. of workers = 10,000

Total 10,000 workers

corresponds to central angle = 360°

The measure of central angle for construction = 72°

$\therefore$ No. of professionals in construction industry

$= \frac{\text{Central angle for construction}}{360} \times \text{Total}$

$= \frac{72}{360} \times 10{,}000 = 2{,}000$

$\therefore$ **No. of workers in construction = 2,000** **1**

(ii) The measure of central angle for administration = 36°

$\therefore$ No. of people in administration

$= \frac{\text{Central angle for administration}}{360} \times \text{Total}$

$= \frac{36}{360} \times 10{,}000 = 1{,}000$

$\therefore$ **No. of workers in administration = 1,000** **1**

A.3. (A) Solve the following activity : (Any 2)

1. Assumed Mean (A) = 550

Toll collected (in rupees)	**Class Mark (x_i)**	$d_i = x_i - A = x_i - 550$	**No. of vehicles (f_i)**	$f_i d_i$
300 - 400	350	–200	80	–16000
400 - 500	450	–100	110	–11000
500 - 600	550 ← A	0	120	0
600 - 700	650	100	70	7000
700 - 800	750	200	40	8000
Total			$N = \Sigma f_i = 420$	$\Sigma f_i d_i = -12000$

1

$\bar{d} = \frac{\Sigma f_i d_i}{\Sigma f_i}$

$= \frac{-12000}{420}$

$= -28.57$

Mean $(\bar{x}) = A + \bar{d}$

$= 550 + (-28.57)$

$= 521.43$

$\therefore$ **Mean of the money collected is ₹ 521.43.** **1**

2. Face value = ₹ 10, Premium = ₹ 2

∴ Market value = Face value + Premium = 10 + 2 **1**

= ₹ 12

∴ No. of Shares = $\frac{\text{Total Investment}}{\text{Market value}}$

$= \frac{12000}{12}$

$= 1000$

∴ Smita has purchased **1000** shares. **1**

3. $a = 6,\ d = 3\ ,\ S_{27} = ?$

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

∴ $S_{27} = \frac{27}{2}\ [12 + (27-1)\ 3\ ]$ **1**

$= \frac{27}{2} \times 90$

$= 27 \times 45$

∴ S_{27} = **1215** **1**

A.3. (B) Solve the following activity : (Any 2)

1. $t_n = a + (n-1)\ d$

∴ $t_{17} = a + (17-1)\ d$

∴ $t_{17} = a + 16d$ ...(I)

Also, $t_{10} = a + (10-1)\ d$

$t_{10} = a + 9d$ ...(II) **1**

Now, $t_{17} = t_{10} + 7$ ...(Given)

∴ $a + 16d = a + 9d + 7$...[From (i) and (ii)]

∴ $7d = 7$

∴ $d = \frac{7}{7}$

∴ $d = 1$

∴ **The common difference is 1.** **1**

2. MV = ₹ 200

Brokerage = 0.3%

Brokerage per share = 0.3% of ₹ 200

$$= \frac{0.3}{100} \times 200$$

$= ₹\ 0.60$ **1**

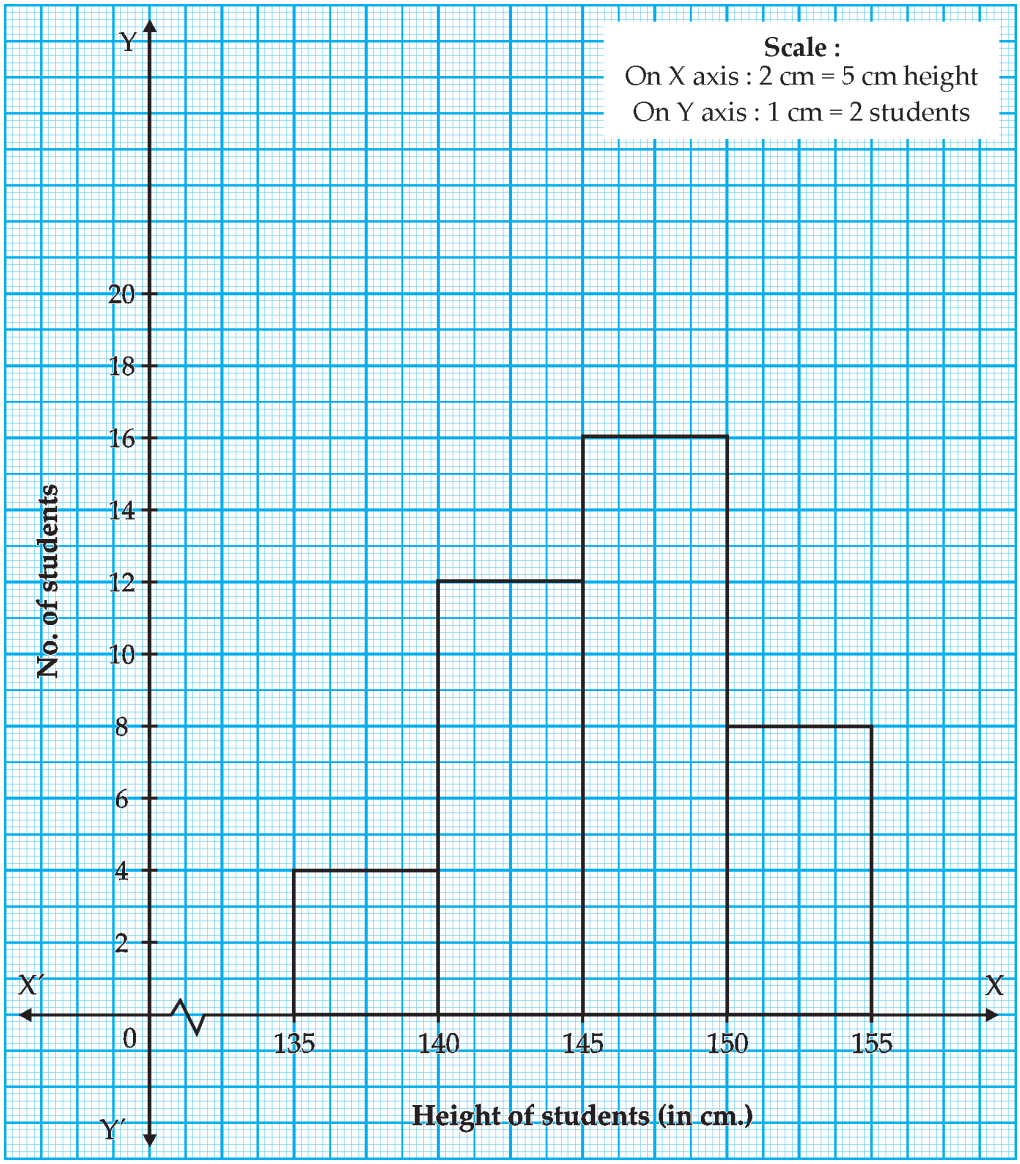
Purchase value per share = Market value + Brokerage

$= 200 + 0.60$

$= ₹\ 200.60$

$\therefore$ **Purchase value of the share is ₹ 200.60** **1**

3. **2**



A.4. **Solve the following : (Any 3)**

1.

Class interval *(Units of electricity)*	Frequency *(No. of families)*
0 - 20	13
20 - 40	50
40 - 60	70 $\rightarrow f_0$
60 - 80	100 $\rightarrow f_1$
80 - 100	80 $\rightarrow f_2$
100 - 120	17

f_1 = Maximum frequency = 100.

The corresponding class 60 - 80 is modal class. **1**

f_0 = 70, f_2 = 80, L = 60 and h = 20

$$\textbf{Mode} = L + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

$$= 60 + \left[\frac{100 - 70}{2 \times 100 - 70 - 80}\right] \times 20$$ **1**

$$= 60 + \frac{30}{50} \times 20$$

$$= 60 + 12$$

$$= 72$$

∴ **Mode of no. of units consumed is 72** **1**

2. The natural numbers from 10 to 250 divisible by 4 are: 12, 16, 20, ... 248

Here t_1 = 12, t_2 = 16, t_3 = 20, ...

$t_2 - t_1 = 16 - 12 = 4$, $t_3 - t_2 = 20 - 16 = 4$

This shows that the difference between any two consecutive terms is constant. **1**

∴ The given sequence is an A.P., where a = 12, d = 4,

let t_n = 248, n = ?

$t_n = a + (n - 1)\, d$

∴ $248 = 12 + (n - 1)\, 4$

∴ $248 - 12 = 4n - 4$ **1**

∴ $236 = 4n - 4$

∴ $236 + 4 = 4n$

∴ $4n = 240$

∴ $n = \frac{240}{4}$

∴ $n = 60$ **1**

3. Input tax (ITC) = 5% of ₹ 85,000

$= \frac{5}{100} \times 85000$ **1**

∴ ITC = ₹ 4250

Output tax = 5% of ₹ 90,000

$= \frac{5}{100} \times 90000$

∴ Output tax = ₹ 4500

∴ GST Payable = Output Tax – ITC **1**

= 4500 – 4250

∴ GST = ₹ 250

∴ **ITC = ₹ 4250 and GST payable = ₹ 250** **1**

4. Here, $t_1 = a = -5$, $t_n = 45$, $S_n = 120$, $n = ?$, $d = ?$

∴ Now $S_n = \frac{n}{2}[t_1 + t_n]$

∴ $120 = \frac{n}{2}[-5 + 45]$

∴ $240 = n[40]$

∴ $n = \frac{240}{40}$

∴ $n = 6$ **1**

∴ $t_n = a + (n-1)d$

∴ $45 = -5 + (6-1)d$

∴ $45 = -5 + 5d$

∴ $45 + 5 = 5d$

∴ $5d = 50$

∴ $d = \frac{50}{5}$

∴ $d = 10$ **1**

Thus, there are 6 terms in the A.P and the common difference is 10. **1**

A.5 Solve the following : (Any 1)

1. All the transactions are done in Maharashtra.

For Anna Patil in Thane:

Taxable value of Vaccum Cleaner = ₹ 14,000

Rate of GST = 28%

∴ GST = 28% of 14,000

$= \frac{28}{100} \times 14000$

∴ GST = ₹ 3920 **1**

∴ CGST (shown in the tax invoice of Anna Patil) $= \frac{3920}{2}$

= ₹ 1960

∴ **CGST = SGST = ₹ 1960 shown in the tax invoice of Anna Patil** **1**

For Shopkeeper in Vasai:

Input tax credit (ITC) for shopkeeper = ₹ 3920

Taxable value at which Vaccum cleaner sold to customer = ₹ 16,800

Rate of GST = 28%

∴ GST = 28% of ₹ 16800

$= \frac{28}{100} \times 16800$

∴ GST = ₹ 4704

∴ CGST charged by shopkeeper = $\frac{4704}{2}$

= ₹ 2352

∴ **CGST = SGST = ₹ 2352 charged by the shopkeeper.** **1**

∴ Now, GST to be paid by shopkeepr at Vasai

= Output tax – ITC

= 4704 – 3920

= ₹ 784

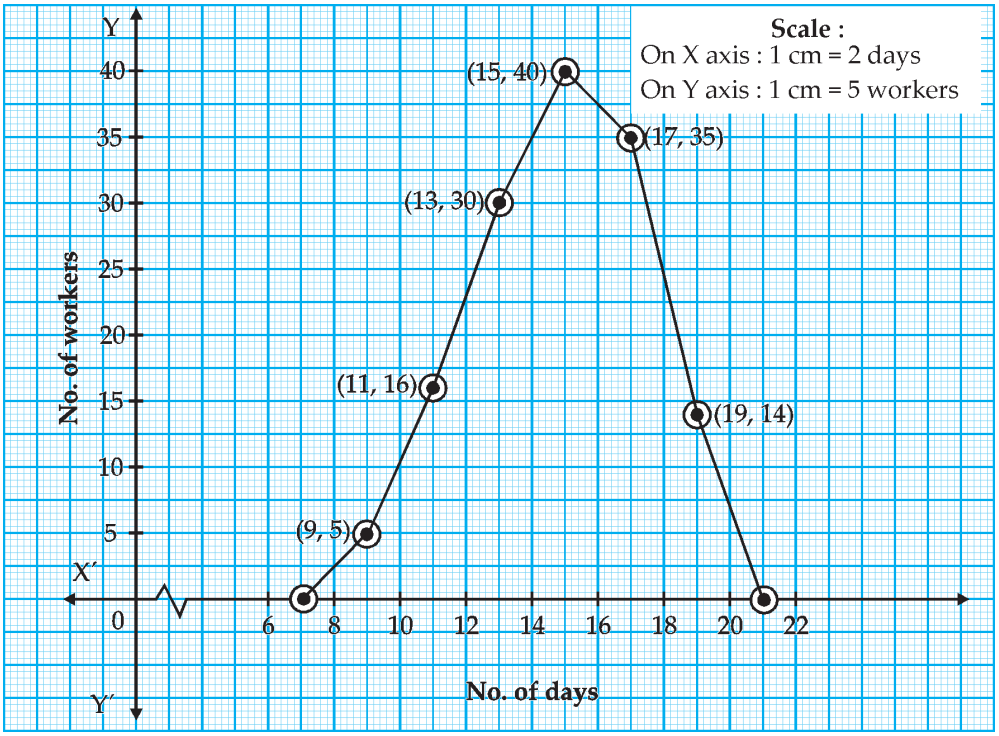
∴ CGST to be paid by shopkeeper at Vasai = $\frac{784}{2}$ = ₹ 392

∴ **CGST = SGST = ₹ 392 to be paid by shopkeeper in Vasai** **1**

2.

Class	Class mark	Frequency	Coordinate of points
6 - 8	7	0	(7, 0)
8 - 10	9	5	(9, 5)
10 - 12	11	16	(11, 16)
12 - 14	13	30	(13, 30)
14 - 16	15	40	(15, 40)
16 - 18	17	35	(17, 35)
18 - 20	19	14	(19, 14)
20 - 22	21	0	(21, 0)

1



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A.6 **Solve the following : (Any 1)**

1. First make continuous classes

Class intervals *(vehicle speed)*	**Continuous class intervals**	**Frequency (No. of vehicles)**	**Cumulative frequency** *(less than type)*
60 - 64	59.5 - 64.5	10	10
65 - 69	64.5 - 69.5	34	44
70 - 74	69.5 - 74.5	55	99 → *c.f.*
75 - 79	**74.5 - 79.5**	85 → *f*	184
80 - 84	79.5 - 84.5	10	194
85 - 89	84.5 - 89.5	6	200
Total		**200 ← N**	

1

Here, total frequency (N) = 200.

$\therefore \frac{N}{2} = \frac{200}{2} = 100$ and $h = 5$

Cumulative frequency (less than type) which is just greater than 100 is 184.

$\therefore$ Corresponding class 74.5 - 79.5 is the median class.

$\therefore$ $f = 85$, $c.f. = 99$, $L = 74.5$

$$\textbf{Median} = L + \left[\frac{\frac{N}{2} - c.f.}{f}\right] \times h$$

$$= 74.5 + \left[\frac{100 - 99}{85}\right] \times 5$$

$$= 74.5 + \frac{1}{85} \times 5$$ **1**

$$= 74.5 + 0.058$$

$$= 74.559 \approx 75 \text{ (approx)}$$

$\therefore$ **Median of speed of the vehicles is 75 km/h (approx)** **1**

2. **Tax Invoice**

Supplier : M/s Shruti Electicals
401/B, Jijamata Road, Andheri (East)
Mumbai - 400 093, Maharashtra
Tel.: 022-6232685

Invoice No. : 64

GSTIN : 27PQRST1234H126

Invoice Date: 31.01.2018

Sr. No.	HSN Code	Name of Product	Rate (₹)	Quantity	Taxable amount	CGST		SGST		Total (₹)
						Rate	Tax	Rate	Tax	
(1)	8507	Mobile Battery	200	1	₹ 200	6%	12	6%	12	224
(2)	8518	Head phone	750	1	₹ 750	9%	67.50	9%	67.50	885
				Grand Total	**₹ 950**		**79.50**		**79.50**	**1109**

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