

A.P. SET CODE
B

MT - X

2017 ___ 1100 - MT - X - GENERAL MATHEMATICS (71)ALGEBRA- SET - B (E)

Time : 2 Hours

Preliminary Model Answer Paper

Max. Marks : 40

A.1.	Solve ANY FIVE of the following :		
(i)	(a) 2, 4, 6, 8 (b) 1, 3, 5, 7, (c) 10, 12, 14, 16, (d) 100, 102, 104, 106,	1	
(ii)	$y^2 + y^3 + 2 = 0$ i.e. $y^3 + y^2 + 2 = 0$ This is not a quadratic equation \therefore Degree is not 2.	1	
(iii)	No. $5x^2 + 3y^3 = 29$ is not a linear equation in two variables x and y. Because the power of x is 2 and y is 3 and in linear equation the power of x and y should be only 1.	1	
(iv)	Selling price (MP) = ₹ 99 Discount = ₹ 11 m Marked Price (MP) = Selling price + Discount = 99 + 11 = 110	$\frac{1}{2}$	
	m <table border="1" style="display: inline-table;"><tr><td>Marked price = ₹ 110</td></tr></table>	Marked price = ₹ 110	$\frac{1}{2}$
Marked price = ₹ 110			
(v)	Sale Price = ₹ 32000 Rate of CST = 2% CST = Sale Price \times Rate of CST = 32000 \times $\frac{2}{100}$ = 320 \times 2 \therefore CST = ₹ 640	$\frac{1}{2}$	

	$\begin{aligned} \text{Selling Price} &= \text{Sale Price} + \text{CST} \\ &= 32000 + 640 \\ &= ₹ 32640 \end{aligned}$	
	m Selling Price is ₹ 32640	$\frac{1}{2}$
(vi)	<p>11, 16, 21, 26,</p> <p>In the given sequence, $t_1 = 11, t_2 = 16, t_3 = 21, t_4 = 26$ $t_2 - t_1 = 16 - 11 = 5$ $t_3 - t_2 = 21 - 16 = 5$ $t_4 - t_3 = 26 - 21 = 5$</p> <p>The difference between any two consecutive terms is same.</p>	$\frac{1}{2}$
	m The given sequence is an A.P.	$\frac{1}{2}$
A.2.	Solve ANY FOUR of the following :	
(i)	$t_n = n^3 - 3$ For $n = 1,$ $t_1 = 1^3 - 3$ m $t_1 = 1 - 3$ m $t_1 = - 2$ For $n = 2,$ $t_2 = 2^3 - 3$ m $t_2 = 8 - 3$ m $t_2 = 5$ For $n = 3,$ $t_3 = 3^3 - 3$ m $t_3 = 27 - 3$ m $t_3 = 24$ For $n = 4,$ $t_4 = 4^3 - 3$ m $t_4 = 64 - 3$ m $t_4 = 61$ For $n = 5,$ $t_5 = 5^3 - 3$ m $t_5 = 125 - 3$ m $t_5 = 122$	$\frac{1}{2}$
	m The first five terms of the sequence are - 2, 5, 24, 61, 122.	1
(ii)	$(n + 1) (n - 3) = 0$ m $n(n - 3) + 1 (n - 3) = 0$ m $n^2 - 3n + n - 3 = 0$ m $n^2 - 2n - 3 = 0$	1
		1

(iii)	$3x + 5y = 9$(i) $5x + 3y = 7$(ii) Adding (i) and (ii), $3x + 5y = 9$ $5x + 3y = 7$ <hr/> $8x + 8y = 16$ m $x + y = 2$	1 1
(iv)	(a) It represents a direct variation.	2
(v)	Sale = ₹ 25000 Rate of commission = 5% Commission = ? $\text{Commision} = \frac{\text{Sale} \times \text{Rate of commission}}{100}$ $= \frac{2500 \times 5}{100}$ $= ₹ 1250$ m His commission is ₹ 1250.	½ ½ 1
(vi)	Purchase Value = ₹ 14500 Sale Value = ₹16500 VAT Rate = 12.5 % Difference = Sale Value – Purchase Value $= 16500 - 14500$ $= ₹ 2000$ m M-VAT at the rate of 12.5% on ₹ 2000 $= \frac{2000 \times 12.5}{100}$ $= 20 \times 12.5$ $= ₹ 250$ m M-VAT payable is ₹ 250	1 1
A.3.	Solve ANY THREE of the following :	
(i)	4, 18, 12, 16, In the sequence $t_1 = a = 4$ $d = t_2 - t_1 = 8 - 4 = 4$ We know that, $S_n = \frac{n}{2} [2a + (n - 1) d]$	½ ½
m	$S_{25} = \frac{25}{2} [2(4) + (25 - 1) 4]$	½

	$m \quad S_{25} = \frac{25}{2} [8 + 96]$	$\frac{1}{2}$
	$m \quad S_{25} = \frac{25}{2} \times 104$	
	$m \quad S_{25} = 25 \times 52$	
	$m \quad S_{25} = 1300$	
	$m \quad \boxed{\text{The sum of first 25 terms is 1300.}}$	1
(ii)	$y^2 - 11y + 24 = 0$	
	$m \quad y^2 - 8y - 3y + 24 = 0$	1
	$m \quad y(y - 8) - 3(y - 8) = 0$	
	$m \quad (y - 3)(y - 8) = 0$	1
	$m \quad y - 3 = 0 \text{ or } y - 8 = 0$	
	$m \quad y = 3 \text{ or } y = 8$	
	$m \quad \boxed{y = 3 \text{ and } y = 8 \text{ are solutions of given quadratic equation.}}$	1
(iii)	$(a) \quad y \propto \frac{1}{x}$	
	$\therefore y = \frac{K}{x} \quad \text{[Where K is a constant]}$	$\frac{1}{2}$
	<p>When $x = 5$ and $y = 48$.</p>	
	$\therefore 48 = \frac{K}{5}$	
	$\therefore K = 48 \times 5$	
	$\therefore y = \frac{48 \times 5}{x} \quad \text{.....(i) \quad [Equation of variation]}$	$\frac{1}{2}$
	<p>The value of x when $y = 15$ Substituting $y = 15$ in (i),</p>	
	$\therefore 15 = \frac{48 \times 5}{x}$	
	$\therefore x = \frac{48 \times 5}{15}$	$\frac{1}{2}$
	$\therefore x = \frac{48}{3}$	
	$\therefore x = 16$	$\frac{1}{2}$
	<p>When $y = 15$; $x = 16$</p>	

	(b) The value of y when x = 8 Substituting x = 8 in (i), $\therefore y = \frac{48 \times 5}{8}$ $\therefore y = 6 \times 5$ $\therefore y = 30.$ \therefore When x = 8; y = 30.	$\frac{1}{2}$ $\frac{1}{2}$
(iv)	Commission of the agent on total sale = $\frac{9}{100} \times 95000$ = ₹ 8550 Del-credere at 5% = $\frac{5}{100} \times 95000$ = ₹ 4750 Total earning of the agent = 8550 + 4750 = ₹ 13300	$\frac{1}{2}$ $\frac{1}{2}$
m	Total earning of the agent is ₹ 13300.	1
(v)	Selling price of 1 kg of coffee is ₹ 540 by Prabhat Tea Depot Selling price of 10 kg of coffee is ₹ 5600 by Mohan Tea Depot Selling price of 10 kg coffee to customer is ₹ 6000 VAT rate is 5% Selling price of 10 kg of coffee by Prabhat Tea Depot = 540×10 = ₹ 5400 VAT to be paid at the first stage of trading = $5400 \times \frac{5}{100}$ = ₹ 270 Selling price for second stage of trading is ₹ 5600 VAT to be paid at second stage of trading = $5600 \times \frac{5}{100}$ = ₹ 280 Net VAT payable at second stage of trading = ₹ 280 - ₹ 270 = ₹ 10 Selling price for third stage of trading is ₹ 6000 VAT to be paid at the third stage of trading = $6000 \times \frac{5}{100}$ = ₹ 300	1 1

	<p>Net VAT payable at third stage of trading = ₹ 300 – ₹ 280 = ₹ 20</p> <p>M-VAT payable at first stage of trading is ₹ 270. M-VAT payable at second stage is ₹ 10 M-VAT payable at third stage is ₹ 20.</p>	1
A.4.	Solve ANY TWO of the following :	
(i)	<p>$p^2 + 8p + 4 = 0$</p> <p>m $p^2 + 8p = -4$(i)</p> <p>m Third term = $\left[\frac{1}{2} \times \text{coefficient of } p\right]^2$ = $\left[\frac{1}{2} \times 8\right]^2$ = 16</p> <p>Add 16 on both side of (i),</p> <p>m $p^2 + 8p + 16 = -4 + 16$</p> <p>m $(p + 4) = 12$</p> <p>m $p + 4 = \pm\sqrt{12}$ [Taking square root]</p> <p>m $p + 4 = \pm 2\sqrt{3}$</p> <p>m $p = 4 \pm 2\sqrt{3}$</p> <p>m $p = 4 + 2\sqrt{3}$ or $4 - 2\sqrt{3}$</p> <p>m $4 + 2\sqrt{3}$ and $4 - 2\sqrt{3}$ are solutions of given quadratic equation.</p>	<p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p>
(ii)	<p>The electric current is denoted by 'I' and potential difference by 'V'.</p> <p>m $I \propto V$</p> <p>m $I = KV$ [Where K is constant]</p> <p>Substituting $I = 1.5$ and $V = 60$</p> <p>m $1.5 = K \times 60$</p> <p>m $K = \frac{1.5}{60}$</p> <p>m $K = \frac{15}{600} = \frac{1}{40}$</p> <p>m $I = \frac{1}{40} \times V$(i) [Equation of variation]</p> <p>When $V = 100$</p> <p>m $I = \frac{1}{40} \times 100$</p>	<p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p>

	<p>m $I = \frac{10}{4}$</p> <p>m $I = 2.5$</p> <p>m The electric current flowing through the circuit is 2.5 amp when the potential difference is 100 volts.</p>	1
(iii)	<p>Selling Price for dealer = ₹ 1,50,000</p> <p>Selling Price for wholesaler = ₹ 1,80,000</p> <p>Selling Price for retailer = ₹ 2,20,000</p> <p>VAT rate is 12.5%</p> <p>For first sale is dealer to wholesaler</p> <p>Tax paid by wholesaler = Tax collected by Dealer</p> $= 150000 \times \frac{12.5}{100}$ $= 1500 \times 12.5$ $= 150 \times 125$ $= ₹ 18750 \quad \dots(i)$ <p>For second sale i.e Wholesaler to retailer</p> <p>Tax paid by retailer = Tax collected by wholesaler</p> $= 180000 \times \frac{12.5}{100}$ $= 1800 \times 12.5$ $= 180 \times 125$ $= ₹ 22500 \quad \dots(ii)$ <p>Net Vat Payable at second stage = Tax collected on – Tax paid on purchase</p> $= 22500 - 18750$ $= ₹ 3750$ <p>For third sale i.e. retailer to customer</p> <p>Tax paid by customer = Tax collected by retailer</p> $= 220000 \times \frac{12.5}{100}$ $= 2200 \times 12.5$ $= 220 \times 125$ $= ₹ 27500 \quad \dots(iii)$	<p>1</p> <p>1</p> <p>1</p>

	<p>Net VAT payable at third stage = Tax collected on sale – Tax paid on purchase = 27500 – 22500 [From (ii) and (iii)] = ₹ 5000</p>	
	<div style="border: 1px solid black; padding: 5px;"> <p>Tax paid at first stage of trading is ₹ 18750 M-VAT paid at second stage of trading is ₹ 3750. M-VAT paid at third stage of trading is ₹ 5000.</p> </div>	1
A.5.	Solve ANY TWO of the following :	
(i)	<p>Here, $t_1 = a = 25$, $d = 7$, $n = 40$, $S_{40} = ?$ We have,</p> $S_n = \frac{n}{2} [2a + (n - 1) d]$	1
m	$S_{40} = \frac{40}{2} [2 \times 25 + (40 - 1) \times 7]$	1
	$= 20 [50 \times 39 \times 7]$	1
	$= 20 [50 + 273]$	1
	$= 20 \times 323$	
m	$S_{40} = 6460$	
m	<div style="border: 1px solid black; padding: 5px;"> <p>The sum of the first 40 terms of an A.P. is 6460.</p> </div>	1
(ii)	$\frac{x}{2} + \frac{2y}{3} = 1$ <p>Multiplying by 6, $3x + 4y = 6$(i)</p> $\frac{2x}{3} - y = 7$ <p>Multiplying by 3, $2x - 3y = 21$(ii)</p> <p>Multiplying (i) by 3, $9x + 12y = 18$(iii)</p> <p>Multiplying (ii) by 4, $8x - 12y = 84$(iv)</p> <p>Adding (iii) and (iv), $9x + 12y = 18$ $8x - 12y = 84$ <hr style="width: 20%; margin-left: 0;"/> $17x = 102$(v)</p>	1
m	$x = \frac{102}{17}$	
m	$x = 6$	1

	<p>Substituting $x = 6$ in (i),</p> $3(6) + 4y = 6$ <p>m $18 + 4y = 6$</p> <p>m $4y = 6 - 18$</p> <p>m $4y = -12$</p> <p>m $y = -3$</p> <p>m $x = 6$ and $y = -3$ is the solution of the given simultaneous equation.</p>	<p>1</p> <p>1</p>
(iii)	<p>Cash price of ceiling fan = ₹ 1940</p> <p>Cash down payment = ₹ 420</p> <p>m Balance payment = $1940 - 420 = ₹ 1520$</p> <p>Number of instalments = 3</p> <p>m Amount to be paid in 3 instalments = $3x$</p> <p>m Interest charged = $3x - 1500$</p> <p>Now,</p> <p>Principal for first month = ₹ 1520</p> <p>Principal for second month = ₹ $(1520 - x)$</p> <p>Principal for third month = ₹ $(1520 - 2x)$</p> <p>m Total principal for 1 month</p> $= 1520 + (1520 - x) + (1520 - 2x)$ $= ₹ (4560 - 3x)$ <p>Period = $\frac{1}{12}$ years</p> <p>Rate of interest = 16% p.a.</p> <p>m Interest = $\frac{P \times N \times R}{100}$</p> <p>m $3x - 1520 = \frac{(4560 - 3x) \times \frac{1}{12} \times 16}{100}$</p> <p>m $100(3x - 1520) = (4560 - 3x) \times \frac{4}{3}$</p> <p>m $300(3x - 1520) = 18240 - 12x$</p> <p>m $900x - 456000 = 18240 - 12x$</p> <p>m $900x + 12x = 18240 + 456000$</p> <p>m $912x = 474240$</p> <p>m $x = \frac{474240}{912}$</p> <p>m $x = 520$</p> <p>m Amount of each instalment is ₹ 520.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>❖❖❖❖</p>		