

**APPLIED MATHEMATICS – Code No. 241**  
**MARKING SCHEME**  
**CLASS - XII (2025 - 26)**  
**(SET 2)**

Q. No.	Questions	Marks
<b>SECTION-A</b>		
1.	<p>Answer C: <b>25 meters</b></p> <p>Since Vijay is faster by 4 secs.  <math>\therefore</math> he beats Samuel by <math>= \frac{100}{16} \times 4 = 25 \text{ meters}</math></p>	1
2.	<p>Answer A) <b>200kg</b></p> <p><math>C = -5\% \quad d = 10\% \quad m = 7\%</math>  <math>(d - m) : (m - c) = 1 : 4</math>                      Quantity sold at 10 % profit <math>= \frac{4}{5} \times 250 = 200 \text{ Kg}</math></p>	1
3.	<p>Answer A) <math>-\frac{1}{2at^3}</math></p> <p><math>\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2a}{2at} = \frac{1}{t} \Rightarrow \frac{d^2y}{dx^2} = -\frac{1}{t^2} \times \frac{dt}{dx} = -\frac{1}{2at^3}</math></p>	1
4.	Answer D) <b>Irregular</b>	1
5.	<p>Answer A): <math>x + y &gt; 2\sqrt{xy}</math></p> <p>For distinct <math>x, y &gt; 0</math>; <math>AM &gt; GM \Rightarrow \frac{x+y}{2} &gt; \sqrt{xy} \Rightarrow x + y &gt; 2\sqrt{xy}</math></p>	1
6.	<p>Answer B) <b>₹40000</b></p> <p><math>P = \frac{R}{i}</math>  <math>= \frac{800}{0.02} = 40000</math></p>	1
7.	<p>Answer A) : <b>0</b></p> <p>The summation of product of <math>a_{ij}</math> of 2<sup>nd</sup> column with corresponding <math>c_{ij}</math> of 3 column = 0</p>	1
8.	Answer C): $\int_a^b  f(y)  dy$	1
9.	<p>Answer B) <b>33</b></p> <p><math>n = 34 \Rightarrow v = 34 - 1 = 33</math></p>	1
10.	<p>Answer B : <b>Inferior Quality</b></p> <p><math>n = 26 \Rightarrow  t  = 3.07 &gt; t_{25}(0.05) = 2.06</math></p>	1
11.	<p>Answer D) 4</p> <p><math> adj(A)  =  A ^{n-1} \Rightarrow  adj(A)  = (-2)^2 = 4</math></p>	1
12.	Answer B: <b>2 and 1</b>	1
13.	Answer A) <b>no solution</b>	1

	If $\Delta = 0$ and at least (one of $\Delta_x, \Delta_y, \Delta_z$ ) $\neq 0$ The system of linear equations has no solution	
14.	Option A) 5% $i = \frac{r}{400}$ $P = \frac{R}{i} \Rightarrow 24000 = \frac{300 \times 400}{r} \Rightarrow r = \frac{120}{24} = 5\%$	1
15.	Answer A) Feasible region	1
16.	Answer B) 2,2 For Poisson distribution Mean = variance = $np = 20000 \times \frac{1}{10000} = 2$	1
17.	Answer: B) $\begin{bmatrix} 4 & 3 \\ -3 & 0 \\ -1 & -2 \end{bmatrix}$ We have, $P = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ & $Q^T = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix} \Rightarrow Q = \begin{bmatrix} -1 & 1 \\ 2 & 2 \\ 1 & 3 \end{bmatrix}$  So, $P - Q = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} -1 & 1 \\ 2 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 4 & 3 \\ -3 & 0 \\ -1 & -2 \end{bmatrix}$ .	1
18.	Answer: C) ₹800 $n = 2\frac{1}{2}$ years = 30 months $I = ₹ 20000 \times \frac{8}{100} \times \frac{5}{2} = ₹ 4000$ $EMI = \frac{P+I}{n}$ $= ₹ \left( \frac{20000+4000}{30} \right) = ₹ 800$	1
	<b>ASSERTION-REASON BASED QUESTIONS</b> (Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (A), (B), (C) and (D) as given below  (A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true but (R) is not the correct explanation of (A). (C) (A) is true but (R) is false. (D) (A) is false but (R) is true.	
19.	Answer C) (A) is true but (R) is false.	1
20.	Answer D) (A) is false but (R) is true	1
	<b>SECTION-B</b> [This section comprises of solution of very short answer type questions (VSA) of 2 marks each]	
21.	A) $17 \equiv 7 \pmod{10}$ $17^2 \equiv 7^2 \pmod{10}$ $17^2 \equiv 49 \pmod{10}$ $17^2 \equiv 9 \pmod{10}$ $(17^2)^2 \equiv 9^2 \pmod{10}$ $17^4 \equiv 81 \pmod{10}$	$\frac{1}{2}$     $\frac{1}{2}$

	$17^4 \equiv 1 \pmod{10}$ $(17^4)^4 \equiv 1^4 \pmod{10}$ $17^4 \equiv 1 \pmod{10}$  Therefore last digit of $17^{16}$ is 1.	$\frac{1}{2}$  $\frac{1}{2}$
	<b>OR</b>	
	B) $4 - 2x \geq 3x + 19$ $-5x \geq 15$ $5x \leq -15$ $x \leq -3$ OR $x \in (-\infty, -3)$	$\frac{1}{2}$ 1 $\frac{1}{2}$
22.	(i) $P(X=0) + P(X=1) + P(X=2) + P(X>2) = 1$  $k + 2k + 3k + 0 = 1$ , $6k = 1$ , $k = 1/6$  ii) $\text{Mean} = \sum px = 0 \times \frac{1}{6} + 1 \times \frac{2}{6} + 2 \times \frac{3}{6} = \frac{4}{3}$	$\frac{1}{2}$ $\frac{1}{2}$  1
23.	Here initial investment value is $IV = ₹5000$ Final investment value $FV = ₹10500$ No of years $(n) = 3$  $\Rightarrow r = \left(\frac{FV}{IV}\right)^{\frac{1}{n}} - 1 = \left(\frac{10500}{5000}\right)^{\frac{1}{3}} - 1$ $= 1.2805 - 1 = 0.2805$  <b>CAGR = 28.05%</b>	$\frac{1}{2}$  $\frac{1}{2}$ $\frac{1}{2}$
24.	$D = \frac{C-S}{n}$ $\Rightarrow 2500 = \frac{25000-12500}{n}$ $\Rightarrow n = \frac{12500}{2500} = 5$ So, after 5 years the value of the machine will be half of its initial value. Value of machine after 6 years = $25000 - 2500 \times 6 = ₹ 10,000$	1  $\frac{1}{2}$  $\frac{1}{2}$
25.	A) Given : $n=150$ and $p = 1.4 \% = 14 / 1000$  $\therefore \lambda = np = 150 \times \frac{14}{1000} = 2.1$  $P(X=2) = \frac{(\lambda^2 e^{-\lambda})}{2!} = \frac{4.41 \times 0.122}{2} = 4.41 \times 0.061 = 0.269$	$\frac{1}{2}$  $\frac{1}{2}$  1
	<b>OR</b>	

	<p><b>B)</b></p> <p>Given : <math>n=6</math> , <math>p= 1/5</math> <math>\lambda = 6/5 =1.2</math></p> $P ( X \geq 2 ) = 1 - [ P ( X =0 ) + P ( X=1 ) ]$ $=1 - [ e^{-\lambda} + \lambda e^{-\lambda} ] = 1 - e^{-\lambda}(1 + \lambda) = 1 - e^{-1.2} ( 1 +1.2 )$ $=1 - ( 0.301 \times 2.2 ) = 1 - 0.6622 = 0. 3378.$	<p>1/2</p> <p>1/2</p> <p>1</p>
<p><b>SECTION-C</b></p> <p><b>[This section comprises of solution short answer type questions (SA) of 3 marks each]</b></p>		
<p>26.</p>	<p>Let's denote the speed of the stream as 's' km/h.</p> <p>Downstream speed = (speed in still water) + (speed of the stream) = <math>15 + s</math> km/h  Upstream speed = (speed in still water) - (speed of the stream) = <math>15 - s</math> km/h  Time taken for downstream journey = distance/speed = <math>30/(15+s)</math> hours  Time taken for upstream journey = distance/speed = <math>30/(15-s)</math> hours</p> <p>Total time taken = 4 hours 30 minutes = 4.5 hours</p> $4.5 = 30/(15+s) + 30/(15-s)$ <p>Solving for 's', we get <math>s = 5</math> km/h</p> <p>Therefore, the speed of the stream is 5 km/h</p>	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p>
<p>27.</p>	<p>A) Given</p> $f(x) = 2x^3 - 9x^2 + 12x - 5$ $f'(x) = 6x^2 - 18x + 12 = 6(x^2 - 3x + 2)$ $f'(x) = 6(x - 1)(x - 2)$ $f'(x) = 0 \Rightarrow x = 1 \text{ and } x = 2 \text{ are the critical points.}$ <p>The intervals are <math>(-\infty, 1)</math> ; <math>(1,2)</math>; <math>(2, \infty)</math></p> <p>Increasing in <math>(-\infty, 1] \cup [2, \infty)</math>,      Decreasing in <math>[1,2]</math></p>	<p>1</p> <p>1/2</p> <p>1/2</p> <p>1</p>
<p><b>OR</b></p>		
	<p>B)</p> <p>a) Average cost function <math>Avg(x) = \frac{C(x)}{x}</math></p> $= \frac{x^3}{3} + x - 15 + \frac{3}{x}$ <p>b)</p> $C(x) = \frac{x^3}{3} + x^2 - 15x + 3.$ <p>Marginal cost = <math>\frac{d}{dx} \left( \frac{x^3}{3} + x^2 - 15x + 3 \right)</math></p> $= x^2 + 2x - 15$ <p>c) <math>MC(25) = 625 + 50 - 15</math></p> $= ₹660$	<p>1</p> <p>1</p> <p>1</p>

28.	<p>A)</p> <p>Let Rs. R be set aside biannually for 10 years in order to have ₹ 500,000 after 10 years  Here S = 500,000. ; n = 10 × 2 = 20  <math>i = \frac{5}{2 \times 100} = 0.025</math>  <math>R = \frac{iS}{(1+i)^n - 1} = \frac{0.025 \times 500,000}{(1.025)^{20} - 1} = \frac{12,500}{1.6386 - 1} = 19,574.07.</math></p>	<p>½</p> <p>2 ½</p>
<b>OR</b>		
	<p>B)</p> <p>Face value C = ₹ 2,000</p> <p>Coupon rate <math>i_d = 10\%</math> annually or 0.1  Therefore R = C × <math>i_d = 2,000 \times 0.1 = ₹ 200</math>  No. of periods before redemption (n) = 5  Yield rate i = 11% or 0.11  Therefore</p> $V = R \left[ \frac{1 - (1+i)^{-n}}{i} \right] + C (1+i)^{-n}$ $= 200 \left[ \frac{1 - (1+0.11)^{-5}}{0.11} \right] + 2000 (1+0.11)^{-5}$ $= 200 \left[ \frac{1 - (1.11)^{-5}}{0.11} \right] + 2000(1.11)^{-5}$ $= 200 \left[ \frac{1 - 0.593451}{0.11} \right] + 2000 (0.593451)$ $= 200 (3.6959) + 1186.902$ $= 739.18 + 1186.902$ $= 1926.08$ <p>Therefore, the value of the bond is ₹ 1,927.</p>	<p>½</p> <p>1</p> <p>½</p> <p>1</p>
29.	<p>Cistern filled by A and B in 5 minutes = <math>5 \left( \frac{1}{12} + \frac{1}{15} \right) = \frac{3}{4}</math></p> <p>Unfilled part of the tank = <math>\frac{1}{4}</math></p> <p>Portion of cistern filled by A, B and C in 1 minute = <math>\frac{1}{12} + \frac{1}{15} - \frac{1}{20} = \frac{1}{10}</math></p> <p>So, <math>\frac{1}{4}</math> of the tank will be filled in = <math>\frac{1}{4} \times 10 = 2</math> mins 30 secs</p> <p>Total time taken to fill the tank = 5 + 2 mins 30 secs = 7 mins 30 secs</p>	<p>1</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p>

30.	<p>Let the number of necklaces manufactured be <math>x</math>, and the number of bracelets manufactured be <math>y</math>.</p> <p>According to question,  <math>x + y \leq 25</math> and</p> $\frac{x}{2} + y \leq 14$ <p>The profit on one necklace is ₹ 100 and the profit on one bracelet is ₹ 300.</p> <p>Let the profit (the objective function) be <math>Z</math>, which has to be maximized.</p> <p>Therefore, required LPP is</p> <p>Maximize <math>Z = 100x + 300y</math></p> <p>Subject to the constraints</p> $x + y \leq 25$ $\frac{x}{2} + y \leq 14$ $x, y \geq 0$	<p>1</p> <p>½</p> <p>1</p> <p>½</p>
31.	<p><math>H_0 : \mu = 0.50</math> mm and <math>H_1 : \mu \neq 0.50</math> mm</p> <p>Thus two tailed test is applied under hypothesis <math>H_0</math></p> $t = \frac{\bar{X} - \mu}{s} \times \sqrt{n-1} = \frac{0.53 - 0.50}{0.03} \times \sqrt{9} = 3$ <p>Since <math>t(=3) &gt; t_{0.025}(2.262)</math>, the null hypothesis <math>H_0</math> can be rejected. Hence we conclude that machine is not working properly.</p>	<p>½</p> <p>1</p> <p>1</p> <p>½</p>
<p><b>SECTION-D</b>  <b>[This section comprises of solution of long answer type questions (LA) of 5 marks each]</b></p>		

32. The matrix equation  $AX = B$  is

$$\begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \\ 2 \end{bmatrix}$$

$$|A| = 10$$

$$\text{adj } A = \begin{bmatrix} 4 & -5 & 1 \\ 2 & 0 & -2 \\ 2 & 5 & 3 \end{bmatrix}^T = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix}$$

$$\text{Here } A^{-1} = \frac{1}{10} \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix}$$

$$\text{So, } \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{10} \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \\ 2 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$$

$$\text{Thus, } x = 2, y = -1, z = 1$$

**OR**

$$\text{Here, } |A| = -(-4 - 3) - (12 + 1) + 2(9 - 1)$$

$$= 7 - 13 + 16 = 10 \neq 0$$

$$\Rightarrow \text{adj}(A) = \begin{bmatrix} -7 & -13 & 8 \\ 2 & -2 & 2 \\ 3 & 7 & -2 \end{bmatrix}^T = \begin{bmatrix} -7 & 2 & 3 \\ -13 & -2 & 7 \\ 8 & 2 & -2 \end{bmatrix}$$

$$\text{Hence } A^{-1} = \frac{1}{10} \begin{bmatrix} -7 & 2 & 3 \\ -13 & -2 & 7 \\ 8 & 2 & -2 \end{bmatrix}$$

$$AA^{-1} = \frac{1}{10} \begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix} \begin{bmatrix} -7 & 2 & 3 \\ -13 & -2 & 7 \\ 8 & 2 & -2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

1/2

1

2

1/2

1

1

2 1/2

1/2

1

33. Here  $C = \frac{x^3}{3} - 7x^2 + 111x + 50$  and  $x = 100 - p$  i.e.,  $p = 100 - x$

(i) R, the revenue function is

$$R = px = (100 - x)x = 100x - x^2$$

(ii) Profit function  $P(x) = R(x) - C(x)$

$$= (100x - x^2) - \left(\frac{x^3}{3} - 7x^2 + 111x + 50\right)$$

$$= -\frac{x^3}{3} + 6x^2 - 11x - 50$$

(iii)  $\frac{dP}{dx} = -x^2 + 12x - 11$

For  $P$  to be maximum,  $\frac{dP}{dx} = 0 \Rightarrow x = 1, 11$

$$\frac{d^2P}{dx^2} = -2x + 12 > 0 \text{ at } x = 1 \text{ and } < 0 \text{ at } x = 11$$

Thus  $P$  is maximum when  $x = 11$

Hence the profit maximizing level of output is 11 units.

Hence, the profit maximising level of output is 11 units

(iv) Maximum profit =  $[P(x)]_{x=11}$

$$= -\frac{(11)^3}{3} + 6(11)^2 - 11(11) - 50$$

$$= 111.33 \text{ or } 111$$

1/2

1

1/2

1

1

1

34.

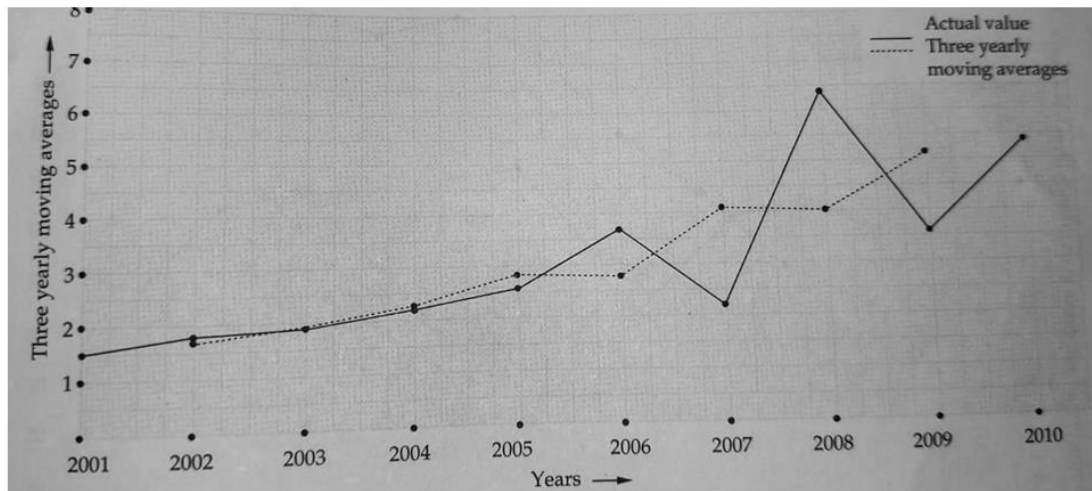
A)

Years	Working days lost in strikes (in lakhs)	Three yearly moving totals	Three yearly moving averages
2001	1.5	-	-
2002	1.8	5.2	1.73
2003	1.9	5.9	1.96
2004	2.2	6.7	2.23
2005	2.6	8.5	2.83
2006	3.7	8.5	2.83
2007	2.2	12.3	4.1
2008	6.4	12.2	4.06
2009	3.6	15.4	5.13
2010	5.4	-	

3

2

The graph of these moving averages



OR

B)

Here, number of observations  $n = 11$  (odd number)

Year (t)	Production (y)	$x = t_i - 1967$	$x^2$	$xy$
1962	2	-5	25	-10
1963	4	-4	16	-16
1964	3	-3	9	-9
1965	4	-2	4	-8
1966	4	-1	1	-4
1967	2	0	0	0
1968	4	1	1	4
1969	9	2	4	18
1970	7	3	9	21
1971	10	4	16	40
1972	8	5	25	40
Total	$\sum y = 57$	$\sum x = 0$	$\sum x^2 = 110$	$\sum xy = 76$

Year 1967 is taken as year of origin.

The normal equations are  $\sum y = na + b\sum x$  and  $\sum xy = a\sum x + b\sum x^2$

Since,  $\sum x = 0$  i.e., deviation from actual mean is zero,

$$\text{we have } a = \frac{\sum y}{n} = \frac{57}{11} = 5.18, b = \frac{\sum xy}{\sum x^2} = \frac{76}{110} = 0.69$$

Therefore, the required equation of the trend line  $y = 5.18 + 0.69x$

The trend values are

1.73, 2.42, 3.11, 3.8, 4.49, 5.18, 5.87, 6.56, 7.25, 7.94, 8.63

2

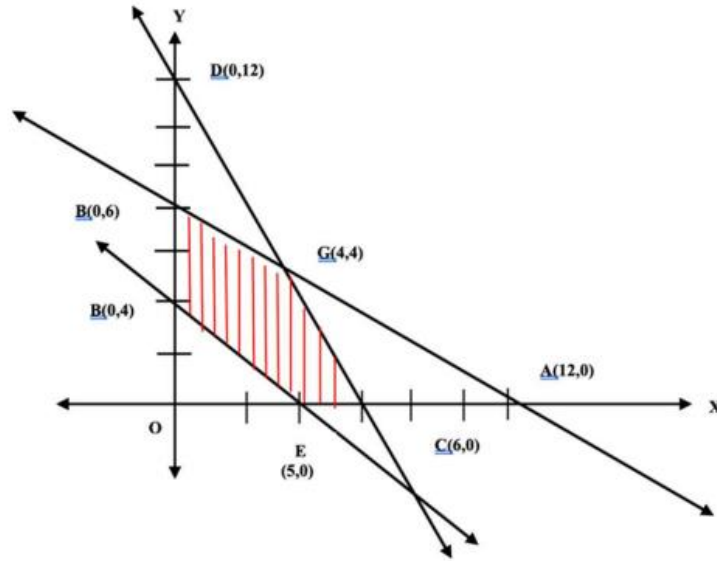
1/2

1

1 1/2

35.	<p>Here <math>P = ₹ 9,50,000</math>, <math>i = \frac{15}{1200} = 0.0125</math></p> <p><math>n = 48</math> months</p> <p>Using the reducing balancing method,</p> $E = \frac{Pi}{1 - (1 + i)^{-n}} = \frac{9,50,000 \times 0.0125}{1 - (1 + 0.0125)^{-48}}$ $= \frac{11875}{1 - (1.0125)^{-48}}$ $= \frac{11875}{1 - 0.5508}$ $= ₹26,435.88$ <p>Total interest paid = <math>n \times \text{EMI} - P</math>  <math>= 48 \times 26,435.88 - 950,000</math>  <math>= ₹3,18,922.24</math></p>	<p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>½</p> <p>1</p> <p>½</p>
<p><b>SECTION-E</b>  <b>[This section comprises solution of 3 case- study based questions of 4 marks each with three sub parts of 1, 1 and 2 marks each respectively]</b></p>		
36.	<p>i)</p> $Z = \frac{X - \mu}{\sigma}$ <p>ii)</p> <p>When <math>X = 25</math>, <math>Z = -0.80</math>  So, <math>P(X &lt; 25) = P(Z &lt; -0.8) = P(Z &gt; 0.8)</math>  <math>= P(Z \geq 0) - P(0 \leq Z \leq 0.8)</math>  <math>= 0.5 - 0.2881 = 0.2119</math></p> <p>iii) A)</p> <p>When <math>X = 20</math>, <math>Z = -1.60</math>  When <math>X = 40</math>, <math>Z = 1.60</math>  <math>\therefore P(20 \leq X \leq 40) = P(-1.60 \leq Z \leq 1.60)</math>  <math>= P(-1.60 \leq Z \leq 0) + P(0 \leq Z \leq 1.60)</math>  <math>= 2P(0 \leq Z \leq 1.60)</math>  <math>= 2 \times 0.4452 = 0.8904</math></p> <p>Thus, out of 2000 students, the expected number of students getting marks between 20 and 40 = <math>2000 \times 0.8904 = 1780.8</math> or 1781</p> <p style="text-align: center;">OR</p> <p>B) <math>P(X &gt; 25) = 1 - P(X &lt; 25)</math>  <math>= 1 - 0.2119 = 0.7881</math>  Number of students who get marks more than 25 = <math>0.7881 \times 2000</math>  <math>= 1576.2</math> or 1576</p>	<p>1</p> <p>1</p> <p>2</p> <p>2</p>
37.	<p>i) Let <math>x</math> and <math>y</math> be the number of units of items M and N respectively.</p> <p>We have : <math>x \geq 0, y \geq 0</math>  <math>x + 2y \leq 12; 2x + y \leq 12; x + \frac{5}{4}y \geq 5.</math>  Max <math>Z = 600x + 400y</math></p>	2

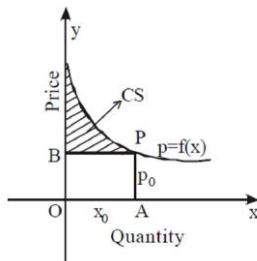
ii)



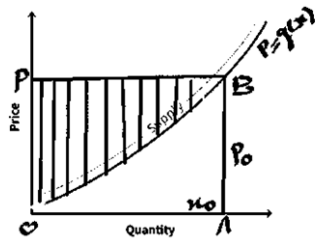
Corner Point	$Z = 600x + 400y$
E : (5,0)	3000
C : (6,0)	3600
<b>G : (4,4)</b>	<b>4000 (Maximum)</b>
B : (0,6)	2400
F : (0,4)	1600

Hence to get maximum profit 4 units of each item M and N are produced.

38. i)



ii)



iii)A)

1 1/2

1/2

1

1

$$900 - x^2 = 2x^2 + 10x + 500$$

Rearrange the terms to form a quadratic equation:

$$0 = 3x^2 + 10x - 400$$

Now, use the quadratic formula to solve for  $x$ :

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-10 \pm \sqrt{10^2 - 4(3)(-400)}}{2(3)}$$

$$x = \frac{-10 \pm \sqrt{100 + 4800}}{6}$$

$$x = \frac{-10 \pm \sqrt{4900}}{6}$$

$$x = \frac{-10 \pm 70}{6}$$

Since the quantity cannot be negative, we use the positive value:

$$x_e = \frac{-10 + 70}{6} = \frac{60}{6} = 10$$

So, the equilibrium quantity is 10 (thousand) tyres.

Now, substitute the equilibrium quantity ( $x_e = 10$ ) into either the demand or supply function to find the equilibrium price ( $p_e$ ). Using the demand function:

$$p_e = D(10) = 90 - \frac{10^2}{10} = 90 - \frac{100}{10} = 90 - 10 = 80$$

The equilibrium price is 80 (thousand) rupees per tyre.

**OR**

**B)**

Given that, the demand function is  $p = 25 - x - x^2$ ,  $p_0 = 19$

$$\therefore 19 = 25 - x - x^2$$

$$\Rightarrow x^2 + x - 6 = 0$$

$$\Rightarrow x = 2 \text{ (or) } x = -3$$

$$\therefore x_0 = 2 \text{ [demand cannot be negative]}$$

$$\therefore p_0 x_0 = 19 \times 2 = 38$$

$$CS = \int_0^2 (25 - x - x^2) dx - 38 = 25x - \frac{x^2}{2} - \frac{x^3}{3} \Big|_0^2 - 38 = 50 - 2 - \frac{8}{3} - 38 = \frac{22}{3}$$

1

1

1

1