MARKING SCHEME (SET-2)

SECTION – A

1.	(a)1	5.	(c) a skew symmetric matrix	9.	(a) 1.4π cm/s	13.	(b) parameter	17.	(b) 5000
2.	(d) 4	6.	(a) 4	10.	(d)126	14.	(d) none of these	18.	(d) 10
3.	(b) 600	7.	(c)216	11.	(c) 32	15.	(b) parts of a year	19.	c
4.	(c) 7.2min	8.	(d) t^2	12.	(c) 1.48	16.	(b) 4	20.	b

SECTION-B

21	$x \equiv 23(mod\ 7)$ $x = 23 + 7\,p\,, \quad p \in Z$ $x = 23, 30\,, 47, \ldots\ldots$ $x = \ 30\ as\ 21 \leq x < 31$	 1 1
22	Length of course = 500 meters Time taken by B to cover by 60 meters = 12 seconds. ∴ time taken by B to cover the course = $\left(\frac{12}{60} \times 500\right) = 100$ seconds ∴time taken by B to cover the course=$(100 - 12)$ seconds = 88 seconds = 1 minute 28 seconds **OR** Part filled by the pump in 1 hour = $\frac{1}{2}$ Net part filled by the pump and leak in 1 hour = $\frac{3}{7}$ Emptying work done by the leak in 1 hour = $\frac{1}{2} - \frac{3}{7} = \frac{7-6}{14} = \frac{1}{14}$ Leak can empty the tank in 14 hours.	 1 1 1 1
23	As the points P (3,-2), Q (8, 8) and R (k, 2) are collinear Area of triangle PQR = $\frac{1}{2}\begin{vmatrix} 3 & -2 & 1 \\ 8 & 8 & 1 \\ k & 2 & 1 \end{vmatrix} = 0$ Solving above determinant, we get, | 3(8-2) +2(8-k) +1(16-8k)| = 0 |18 + 16 – 2k +16 -8k | = 0 -10k + 50 | = 0 -10k + 50) = 0 k = 5	 1 1
24	Given current value of investment= Rs. 60000 Cost of investment = Rs. 50000 Rate of return = $\frac{60000-50000}{50000}$ X 100% = 20%	 1 1
25	Let number of necklaces and bracelets produced by firm per day be x and y, respectively. Clearly, x ≥ 0, y ≥ 0 ∵ Total number of necklaces and bracelets that the firm can handle per day is at most 24. ∴ x + y ≤ 24 Since it takes one hour to make a bracelet and half an hour to make a necklace and maximum number of hours available per day is 16. ∴ 12x + y ≤ 16 ⇒ x + 2y ≤ 32 Let Z be the profit function. Then, Z = 100x + 300y	1 1

	∴ The given LPP reduces to Maximise Z = 100x + 300y subject to, $x + y \leq 24$ $x + 2y \leq 32$ and $x, y \geq 0$	

SECTION-C

26.	Speed downstream=6 km/h, Speed upstream= 4 km/h , Total Time taken= 1 hour Distance = 2.4 km **OR** Let initially liquids P and Q be 5x and 7x litres respectively in the vessel. After drawing off 12 litres of mixture Quantity of liquid P left in the mixture = $5x - \frac{5}{12}X\ 12 = 5x - 5$ litres Quantity of liquid Q left in the mixture = $7x - \frac{7}{12}X\ 12 = 7x - 7$ litres So, quantity of liquid P= (5x -5 +12) litres = 5x +7 litres quantity of liquid Q= (5x -5 +12) litres As per the question = $\frac{9}{7} = \frac{5x+7}{7x-7}$ 63 x – 63 = 35x + 49 Solving we get , x = 4 Hence the quantity of liquid P was 5 X4 = 20 litres and quantity of liquid Q was 7 X4 = 28 litres	1 1 1 1/2 1/2 1 1
27	Here C= 900000, S= 270000,annual depreciation = 70000 Let useful life be n years. Now annual depreciation =$\frac{C-S}{n}$ n= 9 years	1 1 1
28	4.067 , 4 , 4.03, 4.40, 4.40, 3.73	½*6=3
29	$i = .06$ P= R + $\frac{R}{i}$= 3120+ 3120/.06 $getting\ P = Rs\ 55120$	1 1 1
30	Getting $f'(x) = 6x^2 + 18x + 12$ $f(x) = 6\,(x+1)(x+2)$ For increasing$f'(x) > 0\ \ and for decreasing f'(x) < 0$ Increasing $(-\infty, -2) \cup (-1, \infty)$ Decreasing $(-2\,, -1)$ **OR** (i) We have, C= $\frac{x^2}{25} + 2x$, so , the average cost function AC is given by AC= $\frac{C}{x}$ or AC= $\frac{x}{25} + 2$ (ii) MC is given by $\frac{2x}{25} + 2$ (iii) MC= 2.4 This means that , if the production is increased by 1 unit from 5 units to 6 units , then the cost of additional unit is approx 2.4.	**1** **1** **1** **1** **1/2** **1** **1/2**
31	Write $\mu = 2\ cm \bar{X} = 2.01 cm n = 10\ \ s^2 = .004 cm^2$ Define H_0 and H_1 Getting t= .476 The difference in the values of sample mean and population mean is not significant.	1 1 1

SECTION D

32	Let cost of onion, wheat and rice per kg. be x,y and z respectively. Equations: 4x+3y+2z=60, 2x+4y+6z=90, 6x+2y+3z=70 Det(A)= 50, $A^{-1} = \frac{1}{50}\begin{pmatrix} 0 & -5 & 10 \\ 30 & 0 & -20 \\ -20 & 10 & 10 \end{pmatrix}$ X=5, Y=8,Z=8	 2 2 1
33	Let $\frac{3x-2}{(x+1)(x-2)^2} = \frac{A}{(x+1)} + \frac{B}{(x-2)} + \frac{C}{(x-2)^2}$ A= - 5/9, B= 5/9 , C= 4/3 After integrating, answer is $-\frac{5}{9}log\|x+1\| + \frac{5}{9}log\|x-2\| - \frac{4}{3(x-2)} + c$ **OR** : $\int_1^4 \|x-5\|\, dx = \int_1^4 -(x-5)dx$ $= -\left(\frac{x^2}{2} - 5x\right)_1^4 = \frac{15}{2}$	1 2 2 1+1 2 1
34	SV=200 X 100= 20000, EV=30000 , CAGR= 22.47% Let n number of years $CAGR = \left(\left(\frac{EV}{SV}\right)^{\frac{1}{n}} - 1\right) X\ 100$ n = 2 years nearly	1.5 1.5 2
35	p = .05, n=100 getting $\mu = np = 5$ (1) P(none is defective)= .007 (2) P(5 defective bulbs)= .1822 **OR** $Z = \frac{X-\mu}{6.25}$ When X=20 Z= -1.6 When X= 40 Z= 1.6 P(20<X<40)= .8904 Number of students scoring between 20 and 40 = 1781(approx) When X= 25 , Z= -.8 P(X<25)= .2119 Number of students scoring less than 25= 424	1.5 1.5 2 1/2 1 1 1 1 1/2

SECTION E

36	(i) (0,8) (ii) -32 (iii) (5,0) (iv) 15(Each 1 marks)	
37	(i) 0.15 (1 marks) (ii) 0.3 (1 marks) (iii) 0.3 **OR** 0.75(2 marks)	
38	$\frac{dm}{dt}\alpha - m, \frac{dm}{dt} = -km,\ p = 1\ and q = 1\ ,\ 2p + 3q = 5$ $m = m_0 e^{-kt}$ **OR** $\left(1 - \frac{1.1}{100}\right) m_0 = m_0 e^{-25k}$, k=.000443	1/2 1/2 1 2 & 2