HALF YEARLY EXAMINATIONS – 2022
BUSINESS MATHEMATICS & STATISTICS

CLASS: 12

TIME: 3 Hrs
MAX. MARKS: 90

PART – I

Note: (i) Answer all the questions. **20x1=20**

(ii) Choose the most appropriate answer from the given four alternatives and write the option code and the correstponding answer.

1. If A = $\begin{bmatrix} 2 & 0 \\ 0 & 8 \end{bmatrix}$ then P(A) is
   a. 0 b. 1 c. 2 d. n
2. If A is a square matrix of order n then $|adj\ A|$ =
   a. $|A|^{n-1}$ b. $|A|^{n}$ c. $|A|^{n+1}$ d. none of these
3. $\int \sqrt{e^x}\, dx$ is
   a. $\sqrt{e^x} + c$ b. $2\sqrt{e^x} + c$ c. $\frac{1}{2}\sqrt{e^x} + c$ d. $\frac{1}{2\sqrt{e^x}} + c$
4. $\int_0^{\frac{\pi}{3}} \tan x\, dx$ is
   a. log 2 b. 0 c. $\log\sqrt{2}$ d. 2 log 2
5. The profit of a function P(x) is maximum when
   a. Mc–MR=0 b. Mc=0 c. MR=0 d. Mc+MR=0
6. Area bounded by y = $|x|$ between the limits 0 and 2 is
   a. 4 Sq. units b. 1 Sq. units c. 3 Sq. units d. 2 Sq. units
7. The order and degree of the differential equation $\sqrt{\frac{d^2y}{dx^2}} = \sqrt{\frac{dy}{dx} + 5}$ are respectively
   a. 2 and 3 b. 3 and 2 c. 2 and 1 d. 2 and 2
8. The P.I. of $(3D^2+D-14)y = 13xe^{2x}$ is
   a. $\frac{xe^{2x}}{2}$ b. xe^{2x} c. $\frac{x^2e^{2x}}{2}$ d. $13xe^{2x}$
9. E= ____________
   a. $1+\Delta$ b. $1-\Delta$ c. $1+\nabla$ d. $1-\nabla$
10. If $f(x) = x^2+2x+2$ and the interval of differencing is unity then $\Delta f(x)$ is
    a. 2x-3 b. 2x+3 c. x+3 d. x-3
11. If we have f(x) = 2x, $0 \le x \le 1$ then f(x) is a
    a. probability distribution b. probability density function
    c. distribution function d. continuous random variable
12. Given E(x) = 5 and E(Y) = -2 then E(X-Y) is
    a. 3 b. 5 c. 7 d. -2
13. If x~ N (9,81) the standard normal variate Z will be
    a. $Z = \frac{x-81}{9}$ b. $Z = \frac{x-9}{81}$ c. $Z = \frac{x-9}{9}$ d. $Z = \frac{9-x}{9}$
14. The mean and variance of the binomial distribution are
    a. np,nq b. np, npq c. npq, np d. pq, np
15. The standard error of sample mean is
    a. $\frac{\sigma}{\sqrt{2n}}$ b. $\frac{\sigma}{n}$ c. $\frac{\sigma}{\sqrt{n}}$ d. $\frac{\sigma^2}{\sqrt{n}}$
16. Type I error is
    a. Accept H_0 when it is true b. Accept H_0 when it is false
    c. Reject H_0 when it is true d. Reject H_0 when it is false
17. The additive model of the time series with the components T,S,C and I is
    a. y= T+S+CxI b. y = T+SxCxI c. y = T+S+C+I d. y = T+SxC+I
18. Laspeyre's index = 110, Paasche's index = 108, then Fisher's Ideal index is equal to
    a. 110 b. 108 c. 100 d. 109

19. A type of decision – making environment is

a. certainty b. uncertainty c. risk d. all of the above.

20. In a non-degenerate solution, number of allocations is

a. Not equal to m+n+1 b. Equal to m+n-1

c. Equal to m+n+1 d. Not equal to m+n-1

PART – II

Note: Answer any 7 questions. Question no. 30 is compulsory. **7x2=14**

21. Find the rank of the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 4 & -3 & 4 \\ -2 & 4 & -4 \end{bmatrix}$

22. Evaluate $\int \frac{Cos2x+2sin2x}{Cos2x} dx$

23. Find the area of the region bounded by the parabola $y=4-x^2$, x-axis and the lines x=0, x=2

24. Solve: $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 8y = 0$

25. If $f(x)=x^2+3x$ then show that $\Delta f(x)=2x+4$ take h=1

26. A fair coin is tossed 6 times. Find the probability that exactly 2 heads occur.

27. The mortality rate for a certain disease is 7 in 1000. What is the probability for just 2 deaths on account of this disease in a group of 400? (Given $e^{-2.8}=0.06$)

28. Find the sample size for the given standard deviation 10 and the standard error with respect of sample mean is 3.

29. Fit a trend line by the method of Semi-averages for the given data

Year	2000	2001	2002	2003	2004	2005	2006
Production	105	115	120	100	110	125	135

30. Solve the equations by using cramer's rule:

$5x + 3y = 17, 3x + 7y = 31$

PART – III

Note: Answer any 7 questions. Question No.40 is compulsory. **7 x 3 = 21**

31. Evaluate: $\int_0^\infty e^{-4x} x^4 \, dx$

32. From the following table, find the missing value.

x	2	3	4	5	6
$f(x)$	45.0	49.2	54.1	-	67.4

33. In a business venture, a man can make a profit of Rs. 2,000 with a probability of 0.4 or have a loss of Rs. 1000 with a probability of 0.6. What is his expected variance and standard deviation of profit.

34. A die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Find the standard error of the proportion for an unbiased die.

35. Give mathematical form of Assignment problem.

36. For the marginal revenue function $MR=6-3x^2-x^3$, find the revenue function and demand function.

37. solve: $\frac{dy}{dx} + y\ tanx = cos^3x$

38. Following pay – off matrix, which is the optimal decision under each of the following rule. (i) maximin (ii) minimax

Act	States of Nature			
	S_1	S_2	S_3	S_4
A_1	14	9	10	5
A_2	11	10	8	7
A_3	9	10	10	11
A_4	8	10	11	13

39. Write down any three chief characteristics of normal probability curve.

40. Three jobs A,B and C one to be assigned to three machines U,V and W. The processing cost for each job machine combination is shown in the matrix given below. Determine the allocation that minimizes the overall processing cost.

Job	Machine U	Machine V	Machine W
A	17	25	31
B	10	25	16
C	12	14	11

(Cost is in Rs. Per unit)

PART – IV

Note: Answer all the questions **7x5 = 35**

41. (a) Two products A and B Currently share the market with shares 50% and 50% each respectively. Each week some brand switching takes place. of those who bought A the previous week, 60% buy it again whereas 40% switch over to B. of those who bought B the previous week, 80% buy it again whereas 20% switch over to A. Find their shares after one week and after two weeks. If the price war continues, when is the equilibrium reached?

(or)

(b) Evaluate the integral as the limit of a sum $\int_1^2 x^2\,dx$.

42. (a) suppose that the quantity demanded $Q_d = 29 - 2p - 5\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied $Q_s = 5 + 4p$, where 'p' is the price. Find the equilibrium price for market clearance.

(or)

(b) An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can they conclude at 5% level of significance.

43. (a) A firm has found that the cost C of producing x tonnes of certain product by the equation $x\frac{dc}{dx} = \frac{3}{x} - c$ and c = 2 when $x = 1$. Find the relationship between c and x.

(or)

(b) Find the consumer's surplus and producer's surplus for the demand function $P_d = 25 - x$ and supply function $P_s = 5 + 2x$.

44. (a) Calculate Fisher's index number to the following data. Also show that it satisfies Time Reversal Test.

Commodidty	2016 Price (`)	2016 Quantity (kg)	2017 Price (`)	2017 Quantity (kg)
Food	40	12	65	14
Fuel	72	14	78	20
Clothing	36	10	36	15
Wheat	20	6	42	4
Others	46	8	52	6

(or)

(b) Fit a straight line trend by the method of least squares to the following data.

Year	2000	2001	2002	2003	2004	2005	2006
Production of sugarcane	40	45	46	42	47	50	46

45. (a) Using Lagrange's interpolation formula, find $y(10)$ from the following table.

x	5	6	9	11
y	12	13	14	16

(or)

(b) A random Variable x has the following probability function.

Value of x = x	0	1	2	3	4	5	6	7
$P(x)$	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Find K (ii) Evaluate $p(x<6)$, $p(x\geq 6)$ and $p(0<x<5)$

(iii) If $P(x\leq x)>\frac{1}{2}$, then find the minimum value of x.

46. (a) Calculate the seasonal index for the quarterly production of a product using the method of simple averages.

Year	I Quarter	II Quarter	III Quarter	IV Quarter
2008	72	68	62	76
2009	78	74	78	72
2010	74	70	72	76
2011	76	74	74	72
2012	72	72	76	78

(or)

(b) Evaluate $\int \frac{3x^2+6x+1}{(x+3)(x^2+1)}dx$

47. (a). Find the initial basic feasible solution of the following transportation problem using North-West corner rule

	I	II	III	IV	Supply
A	5	1	3	3	34
B	3	3	5	4	15
C	6	4	4	3	12
D	4	1	4	5	19
Demand	21	25	17	17	

(or)

(b) The average daily salé of 550 branch offices was `150 thousand and standard deviation is `15 thousand. Assuring the distribution to be normal, indicate how many branches have sales between

(i) `1,25,000 and `1,45,000 (ii) `1,40,000 and `1,60,000

Value of Z	1.67	0.33	0.67
Area	0.4525	0.1293	0.2486

Prepared By
S. Venkatesan.
9842953273.

Half yearly Exam Key - 2022-23
XII - Business maths - Trichy Dt.

Part - I (one marks)

1. (c) 2
2. (a) $|A|^{n-1}$
3. (b) $2\sqrt{e}x + c$
4. (a) $\log 2$
5. (a) $MC - MR = 0$
6. (d) 2 sq. units
7. (d) 2 and 2
8. (b) $x e^{2x}$
9. (b) $2x+3$
10. (a) $1+\Delta$
11. (b) Probability density function.
12. (c) 7
13. (c) $z = \frac{x-9}{9}$
14. (b) np, npq
15. (c) $\frac{\sigma}{\sqrt{n}}$
16. (c) Reject H_0 when it is true.
17. (c) $y = T+S+C+I$
18. (d) 109
19. (d) All the above
20. (b) $m+n-1$ equal to

Part - II (Two marks)

(21) $A = \begin{pmatrix} -1 & 2 & -2 \\ 4 & -3 & 4 \\ -2 & 4 & -4 \end{pmatrix}$

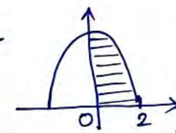
$|A| = 0 \quad \therefore \rho(A) \neq 3$

Consider $\begin{vmatrix} -1 & 2 \\ 4 & -3 \end{vmatrix} = -5 \neq 0$

$\therefore \rho(A) = 2.$

(22) $y = 4 - x^2$

$A = \int_0^2 y\,dx$



$= \int_0^2 (4-x^2)\,dx = \left(4x - \frac{x^3}{3}\right)_0^2$

$A = \frac{16}{3}$ sq. units.

(23) $\int \frac{\cos 2x + 2\sin^2 x}{\cos^2 x}\,dx$

$= \int \frac{1 - 2\sin^2 x + 2\sin^2 x}{\cos^2 x}\,dx$

$= \int \sec^2 x\,dx$

$= \tan x + c$

(24) The A.E is

$m^2 - 6m + 8 = 0$

$(m-2)(m-4) = 0$

$m = 2, 4$

$\therefore CF = Ae^{2x} + Be^{4x}$

and $P.I = 0$

$\therefore y = Ae^{2x} + Be^{4x}$

(25) $\Delta f(x) = f(x+h) - f(x)$

$h = 1,$

$\Delta f(x) = f(x+1) - f(x)$

$\Delta f(x) = [(x+1)^2 + 3(x+1)] - [x^2+3x]$

$= x^2 + 2x + 1 + 3x + 3 - x^2 - 3x$

$= 2x + 4.$

(26) $n = 6$

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

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

$p(x=2) = 6C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^{6-2}$

$= \frac{{}^{3}\cancel{6}\times 5}{\cancel{2}\times 1} \times \frac{1}{4} \times \frac{1}{16}$

$P(x=2) = \frac{15}{64}$

(27) $p = \frac{7}{1000}$; $n = 400$

$\lambda = np = 400 \times \frac{7}{1000}$

$\lambda = 2.8$

$P(x=2) = \frac{e^{-2.8}(2.8)^2}{2!}$

$= \frac{(0.06)(2.8)^2}{2} = 0.2352$

(28) $\sigma = 10$

$S.E = 3$

$S.E = \frac{\sigma}{\sqrt{n}}$

$3 = \frac{10}{\sqrt{n}}$

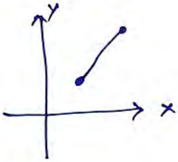
$\sqrt{n} = \frac{10}{3}$

$n = \frac{100}{9} = 11.11$

$\boxed{n = 11}$

(29)

Year	Production	Avg
2000	105	
2001	115	113.33
2002	120	
2003	(100)	
2004	110	
2005	125	123.33
2006	135	



(30) $\Delta = 26$

$\Delta x = 26$

$\Delta y = 104$

$x = \frac{\Delta x}{\Delta} = \frac{26}{26} = 1$

$y = \frac{\Delta y}{\Delta} = \frac{104}{26} = 4$

Part-III (Three marks)

(31) $\int_0^\infty e^{-4x} x^4 \, dx$

$= \frac{4!}{(4)^5} = \frac{3}{128}$

(32) $\Delta^4 y_0 = 0$

$(E-1)^4 y_0 = 0$

$E^4 y_0 - 4E^3 y_0 + 6E^2 y_0 - 4E y_0 + y_0 = 0$

$y_4 - 4y_3 + 6y_2 - 4y_1 + y_0 = 0$

$67.4 - 4y_3 + 6(54.1) - 4(49.2) + 45 = 0$

$4y_3 = 240.2$

$y_3 = 60.05$

(33)

x:	-1000	2000
$p(x)$:	0.6	0.4

$E(x) = -600 + 800$

$E(x) = 200$

$E(x^2) = 6,00,000 + 16,00,000$

$E(x^2) = 22,00,000$

$V(x) = E(x^2) - [E(x)]^2$

$= 22,00,000 - 40000$

$V(x) = 21,60,000$

$S.D = \sqrt{V(x)} = 1469.69$

(34) $n = 9000$

$p = \frac{3240}{9000} = 0.36$

$P = P(3 \text{ or } 4) = \frac{2}{6} = \frac{1}{3}$

$Q = 1 - \frac{1}{3} = \frac{2}{3}$

$S.E = \sqrt{\frac{PQ}{n}} = \sqrt{\frac{\frac{1}{3} \times \frac{2}{3}}{9000}}$

$S.E = 0.00496$

(35) $Z = \sum_{i=1}^{m} \sum_{j=1}^{n} C_{ij} x_{ij}$

$\sum_{i=1}^{n} x_{ij} = 1, \; j = 1, 2 \dots n$

$\sum_{j=1}^{n} x_{ij} = 1, \; i = 1, 2 \dots n$ and $x_{ij} = 0$ or 1 $\forall \, i, j$

(36)

$MR = 6 - 3x^2 - x^3$

$R = \int (6 - 3x^2 - x^3) dx$

$R = 6x - x^3 - \frac{x^4}{4} + k$

when $R = 0$, $x = 0 \Rightarrow k = 0$

$\therefore R = 6x - x^3 - \frac{x^4}{4}$

$\therefore p = 6 - x^2 - \frac{x^3}{4}$

(37) $P = \tan x$, $Q = \cos^3 x$

$I.F = e^{\int p dx} = e^{\int \tan x dx}$

$I.F = e^{\log \sec x} = \sec x$

The soln is

$y \cdot \sec x = \int \cos^3 x \cdot \sec x \, dx + c$

$= \int \cos^2 x \, dx$

$= \int \frac{1 + \cos 2x}{2} dx$

$y \sec x = \frac{1}{2}\left(x + \frac{\sin 2x}{2}\right) + c$

(38)

Max (5, 7, 8, 9) = 9

A_3 is best.

Min (14, 11, 11, 13) = 11

A_2 and A_3 are best.

(39) (i) The curve is bell shaped and symmetrical about $x = \mu$

(ii) Mean, Median and Mode of the distribution coincide.

(iii) The total area under the normal curve is equal to unity.

(iv) For a given μ and σ, there is only one normal distribution.

(v) The point of inflexion are given by $x = \mu \pm \sigma$

(40)

	U	V	W
A	⊠	[0]	9
B	[0]	7	1
C	6	⊠	[0]

Job	machine	cost
A	V	25
B	U	10
C	W	11
		₹46

Part IV (five marks)

(41) (a) $T = \begin{array}{c} \\ A \\ B \end{array}\begin{pmatrix} A & B \\ 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix}$

After one week,

$(0.5 \;\; 0.5)\begin{pmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix} = \overset{A \quad B}{(0.4 \;\; 0.6)}$

After two week,

$(0.4 \;\; 0.6)\begin{pmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix} = \overset{A \quad B}{(0.36 \;\; 0.64)}$

At equilibrium,

$(A \;\; B)\begin{pmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix} = (A \;\; B)$

$0.6A + 0.2B = A$

$0.6A + 0.2(1 - A) = A$

$0.6A + 0.2 - 0.2A = A$

$0.2 = 0.6A \Rightarrow A = 33\%$

$\therefore B = 67\%$

41) (b)

$$\int_a^b f(x) = \lim_{\substack{n\to\infty \\ h\to 0}} \sum_{r=1}^{n} h\, f(a+rh)$$

$a=1,\ b=2,\ h=\frac{1}{n}$ $\quad f(a+rh)=\left(1+\frac{r}{n}\right)^2$

$$f(a+rh) = 1+\frac{2r}{n}+\frac{r^2}{n^2}$$

$$\int_1^2 x^2 dx = \lim_{n\to\infty}\sum_{r=1}^{n}\frac{1}{n}\left[1+\frac{2r}{n}+\frac{r^2}{n^2}\right]$$

$$= \lim_{n\to\infty}\sum_{r=1}^{n}\left[\frac{1}{n}+\frac{2r}{n^2}+\frac{r^2}{n^3}\right]$$

$$= \lim_{n\to\infty}\left[\frac{1}{n}(n)+\frac{2}{n^2}\frac{n(n+1)}{2}+\frac{1}{n^3}\left(\frac{n(n+1)(2n+1)}{6}\right)\right]$$

$$= \lim_{n\to\infty}\left[1+\left(1+\frac{1}{n}\right)+\frac{\left(1+\frac{1}{n}\right)\left(2+\frac{1}{n}\right)}{6}\right]$$

$$= 1+1+\frac{2}{6} = \frac{7}{3}$$

42) (a) $Q_d = Q_s$

$$29-2p-5\frac{dp}{dt}+\frac{d^2p}{dt^2} = 5+4p$$

$$\frac{d^2p}{dt^2}-5\frac{dp}{dt}-6p = -24$$

$$(D^2-5D-6)p = -24$$

The A.E is $m^2-5m-6=0$

$$(m-6)(m+1)=0 \Rightarrow m=6,-1$$

$$CF = Ae^{6t}+Be^{-t}$$

$$P.I = \frac{1}{D^2-5D-6}(-24) = \frac{-24}{-6}$$

$$P.I = 4$$

$\therefore$ The general sol is

$$y = Ae^{6t}+Be^{-t}+4$$

42) (b) $n=50,\ \bar{x}=9.3$
$s=1.6;\ \mu=8.9$

$H_0: \mu = 8.9$

$H_1: \mu \neq 8.9$

$$Z = \frac{\bar{x}-\mu}{\sigma} = \frac{9.3-8.9}{\frac{1.6}{\sqrt{30}}} = \frac{0.4}{0.2263}$$

$|Z| = 1.7676$

At 5% level $Z_{\alpha/2} = 1.96$

$1.7676 < 1.96$

$|Z| < Z_{\alpha/2}$

$\therefore$ Ho is accepted.

43) (a)

$$x\frac{dc}{dx} = \frac{3}{x}-c$$

$$\frac{dc}{dx}+\frac{c}{x} = \frac{3}{x^2}$$

$$\therefore p=\frac{1}{x};\ Q=\frac{3}{x^2}$$

$$\int p\,dx = \int \frac{1}{x}dx = \log x$$

$$\therefore I.F = e^{\int p dx} = x$$

The general sol is

$$c.x = \int \frac{3}{x^2}\cdot x\,dx + K$$

$$c.x = 3\log x + K$$

$x=1,\ c=2 \Rightarrow K=2$

$$\therefore cx = 3\log x + 2.$$

43) (b)

$P_d = P_s$

$25-3x = 5+2x$

$\Rightarrow x = 4$

$\therefore x_0 = 4$

when $x_0 = 4$, $P_0 = 25-12 = 13$

$\therefore CS = \int_0^4 (25-3x)dx - 13(4)$

$= \left(25x - \frac{3x^2}{2}\right)_0^4 - 52$

$= 100 - \frac{48}{2} - 52$

CS = 24 units

$PS = (13)(4) - \int_0^4 (2x+5)dx$

$= 52 - [x^2+5x]_0^4$

$= 52-16-20$

PS = 16 units.

44) (a)

Commodity	p_0q_0	p_0q_1	p_1q_0	p_1q_1
Food	480	560	780	910
Fuel	1008	1440	1092	1560
clothing	360	540	360	540
wheat	120	80	252	168
others	368	276	416	312
Total	2336	2896	2900	3490

$P_{01}^F = 122.3$

$P_{01} \times P_{10} = 1$

44) (b)

Year (x)	Y	X = x-2003	X^2	XY	Trend value (Y_t)
2000	40	-3	9	-120	42.04
2001	45	-2	4	-90	43.07
2002	46	-1	1	-46	44.11
2003	42	0	0	0	45.14
2004	47	1	1	47	46.18
2005	50	2	4	100	47.22
2006	46	3	9	138	48.25
Total	316	0	28	29	

$a = \frac{\Sigma Y}{n} = \frac{316}{7} = 45.143$

$b = \frac{\Sigma XY}{\Sigma X^2} = \frac{29}{28} = 1.036$

The line of best fit is

$Y = a+bX \Rightarrow Y = 45.143 + 1.036X$

$Y = 45.143 + 1.036(x-2003)$.

45) (a) $y(x)$ Formula (*)

then

$y(10) = \frac{4(1)(-1)(12)}{(-1)(-4)(-6)} + \frac{5(1)(-1)(13)}{(1)(-3)(-5)}$

$+ \frac{(5)(4)(-1)(14)}{4(3)(-2)} + \frac{(5)(4)(1)(16)}{(6)(5)(2)}$

$= \frac{1}{6}(12) - \frac{13}{3} + \frac{5(14)}{6} + \frac{64}{12}$

$y(10) = 14.6663$

45) (b) (i) $\Sigma p(x) = 1$

$10k^2 + 9k - 1 = 0 \Rightarrow k = \frac{1}{10}$

$(10k-1)(k+1) = 0$

(ii) $p(X<6) = \frac{81}{100}$

$p(X \geq 6) = \frac{19}{100}$

$p(0<X<5) = \frac{8}{10}$

(iii) $p(X \leq x) > \frac{1}{2}$

when $x=0$, $p(X\leq 0) = 0$

when $x=1$, $p(X \leq 1) = 0.1$

when $x=2$, $p(X\leq 2) = 0.3$

when $x=3$, $p(X \leq 3) = 0.5$

when $x=4$, $p(X\leq 4) = 0.8 > \frac{1}{2}$

46 (a)

Year	I-Q	II-Q	III-Q	IV-Q
Total	372	358	362	374
Avg	74.4	71.6	72.4	72.8

Grand Avg = 73.3

$$S.I = \frac{\text{Avg of I-Q}}{\text{Grand Avg}} \times 100$$

S.I for I-Q = 101.50
S.I for II-Q = 97.68
S.I for III-Q = 98.77
S.I for IV-Q = 102.04

46 (b)

$$\int \frac{3x^2+6x+1}{(x+3)(x^2+1)}\,dx = \int\left(\frac{1}{x+3} + \frac{2x}{x^2+1}\right)dx$$

$$= \log|x+3| + \log|x^2+1| + C$$

$$= \log|x^3+3x^2+x+3| + C$$

47 (a) Final Allocation

	I	II	III	IV	a_i
A	(21) 5	(13) 1	3	3	34
B	3	(12) 3	(3) 5	4	15
C	6	4	(12) 4	3	12
D	4	1	(2) 4	(17) 5	19
b_j	21	25	17	17	

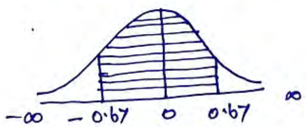
Transportation schedule: → I ; → II
B → II, B → III, C → III, D → III, D → IV
Total cost = ₹.310

47 (b)

(i) $x = 125 \Rightarrow z = -1.667$
$x = 145 \Rightarrow z = -0.33$

$P(-1.667 \le z \le -0.33) =$
$= 0.4525 - 0.1293 = 0.3232$
∴ Required no/. of branches = 178

(ii) $x = 140 \Rightarrow z = -0.67$
$x = 160 \Rightarrow z = 0.67$



$P(-0.67 < z < 0.67)$
$= 2\,P(0 < z < 0.67)$
$= 2 \times 0.2486$
$= 0.4972$
Required no/. of branches = 273

Prepared By.
S. Venkatesan.
Dalmia Hr. Sec. School.
Dalmiapuram.
Trichy - Dt.
Cell: 9842953273.