FIRST REVISION TEST - 2025

Standard XII

Reg.No.

BUSINESS MATHEMATICS AND STATISTICS

Time : 3.00 hrs **Part – I** *Marks : 90*

I. Choose the correct answer: **20 x 1 = 20**

1. The rank of m x n matrix whose elements are unity is
   a) m b) 0 c) n d) 1
2. If $|A_n X_n| = 3$ and $|adj\ A| = 243$, then the value of the value of 'n' is _____.
   a) 6 b) 4 c) 7 d) 5
3. The value of $\int \frac{\sin 2x}{2\sin x} dx$ is
   a) $\cos x + c$ b) $\sin x + c$ c) $\frac{1}{2}\cos x + c$ d) $\frac{1}{2}\sin x + c$
4. $\int \sqrt{e^x}\, dx$ =
   a) $\frac{1}{2}\sqrt{e^x} + c$ b) $\sqrt{e^x} + c$ c) $\frac{1}{2\sqrt{e^x}} + c$ d) $2\sqrt{e^x} + c$
5. The profit of a function P(x) is maximum when
   a) MR = 0 b) MC – MR = 0 c) MC + MR = 0 d) MC = 0
6. The demand function for the marginal function $MR = 100 - 9x^2$ is
   a) $100x - 9x^2$ b) $100 - 3x^2$ c) $100 + 9x^2$ d) $100x - 3x^2$
7. The differential equation formed by eliminating A and B from $y = e^{-2x}(A\cos x + B\sin x)$ is
   a) $y_2 - 4y_1 - 5 = 0$ b) $y_2 - 4y_1 + 5 = 0$ c) $y_2 + 4y_1 + 5 = 0$ d) $y_2 + 4y_1 - 5 = 0$
8. The particular integral of $(3D^2 + D - 14)y = 13e^{2x}$ is
   a) $\frac{x^2}{2}e^{2x}$ b) $\frac{x}{2}e^{2x}$ c) $13x\,e^{2x}$ d) $x\,e^{2x}$
9. $E \equiv$ _____. a) $1 + \nabla$ b) $1 + \Delta$ c) $1 - \Delta$ d) $1 - \nabla$
10. $E(Ey_o)$ =
    a) y_2 b) y_o c) y_3 d) y_1
11. $E(X - E(X))$ is equal to
    a) 0 b) E(X) c) E(X) – X d) V(X)
12. If $p(x) = \frac{1}{10}$, x = 10 then E(X) is: a) 1 b) zero c) –1 d) $\frac{6}{8}$
13. Normal Distribution was invented by
    a) Gauss b) Laplace c) James Bernoulli d) De-moivre
14. In a parametric Distribution the mean is equal to variance is
    a) Normal b) Poisson c) Binomial d) All of the above
15. A finite subset of statistical individuals in a population is called _____.
    a) Universe b) A sample c) Census d) A population
16. An estimator is sample statistics used to estimate a
    a) Sample size b) Population parameter
    c) Census d) Biased estimate
17. Fisher's price index number is the _____ between Laspeyre's and Paasche's price index number.
    a) Arithmetic mean b) Geometric mean
    c) Harmonic mean d) Both (a) and (c)

18. The seasonal variation means the variations occurring with in
    a) A month b) Some years c) A week d) A year
19. The transportation problem is said to be unbalanced if _____.
    a) m = n b) Total supply ≠ Total demand
    c) m + n – 1 d) total supply = total demand
20. North west corner refers to _____.
    a) Bottom right corner b) Top left corner
    c) Bottom left corner d) Top right corner

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory) **7 x 2 = 14**

21. Find the rank of the matrix : $\begin{bmatrix} 0 & -1 & 5 \\ 2 & 4 & -6 \\ 1 & 1 & 5 \end{bmatrix}$
22. Evaluate : $\int 2^x \, dx$
23. Find the area bounded by the curve y = 4x + 3 with x-axis between the lines x = 1 and x = 4.
24. Evaluate : $\Delta(\log ax)$
25. The following information is the probability distribution of successes.

No. of successes X = x	0	1	2
Probability P(x)	$\frac{6}{11}$	$\frac{9}{22}$	$\frac{1}{22}$

    Determine the expected number of success.
26. Define : Binomial Distribution.
27. Write any two advantages of single Probability Statement.
28. Solve : $\frac{dy}{dx} = xy + x + y + 1$
29. Give mathematical form of assignment problem.
30. For $\Sigma p_0 q_0 = 1974$, $\Sigma p_1 q_0 = 3140$, $\Sigma p_1 q_1 = 2005$. Find the cost of living index by Aggregate Expenditure method.

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory) **7 x 3 = 21**

31. Find k if the equation x + 2y – 3z = –2, 3x – y – 2z = 1, 2x + 3y – 5z = k are consistent.
32. If MR = 20 – 5x + $3x^2$, Find total revenue function.
33. Solve : 9y'' – 12y' + 4y = 0
34. Find the missing entry in the following table.

x	0	1	2	3	4
y_x	1	3	9	–	81

35. Consider a random variable X with probability density function
    $f(x) = \begin{cases} 4x^3 & , \text{ if } 0 < x < 1 \\ 0 & , \text{ otherwise} \end{cases}$ Find E(X) and V(X)
36. In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.

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

38. Construct the cost of living index number for 2011 on the basis of 2007 from the given data using family budget method.

Commodities	Price		Weights
	2007	2011	
A	350	400	40
B	175	250	35
C	100	115	15
D	75	105	20
E	60	80	25

39. From the following pay off matrix, find the optimal decision under each of the following rule (i) Maxmin (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

40. Evaluate : $\int \frac{1}{\sqrt{x+2}-\sqrt{x+3}}\,dx$

Part - IV

IV. Answer all the questions. **7 x 5 = 35**

41. a) Solve by cramer's rule : $x + y + z = 4$, $2x - y + 3z = 1$, $3x + 2y - z = 1$

(OR)

b) The population of a certain town is as follows.

Year : X	1941	1951	1961	1971	1981	1991
Population in lakhs : Y	20	24	29	36	46	51

Using appropriate interpolation formula, estimate the population during the period 1946.

42. a) Evaluate the integral as the limit of a sum $\int_1^2 (2x+1)dx$

(OR)

b) Find the probability of guessing correctly atleast six of the ten answer in a TRUE/ FALSE objective test.

43. a) Find the consumer's surplus and producer's surplus for the demand function $P_d = 25 - 3x$ and Supply function $P_s = 5 + 2x$

(OR)

b) X is normally distributed with mean 12 and S.D 4. Find $P(X \le 20)$ and $P(0 \le X \le 12)$ $[P(0 < Z < 2) = 0.4772]$

44. a) Solve : $(D^2 - 2D + 1)y = e^{2x} + e^x$ *(OR)*

b) An ambulance service claims that it takes on an average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licences ambulance services, has then 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.

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) Solve : $\frac{dy}{dx} + \frac{y}{x} = x^3$

46. a) Compute (i) Laspeyre's (ii) Paasche's (iii) Fisher's index number for the year 2010 from the following data.

Commodity	Price		Quantiy	
	2000	2010	2000	2010
A	12	14	18	16
B	15	16	20	15
C	14	15	24	20
D	12	12	29	23

(OR)

b) The probability function of a random variable X is given by

$$P(x) = \begin{cases} 1/4 & \text{for } x = -2 \\ 1/4 & \text{for } x = 0 \\ 1/2 & \text{for } x = 10 \\ 0 & \text{, elsewher} \end{cases}$$

Evaluate the following probabilities.

i) $P(X \le 0)$ (ii) $P(X < 0)$ (iii) $P(1 \times 1 \le 2)$ (iv) $P(0 \le X \le 10)$

47. a) Given below are the values of sample mean $(\bar{X})$ and the range (R) for ten samples of size 5 each. Draw mean chart comment on the state of control of the process.

Sample Number	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	43	49	37	44	45	37	51	46	43	47
R	5	6	5	7	7	4	8	6	4	6

Given the following control chart constraint for: n = 5, $A_2 = 0.58$, $D_3 = 0$ and $D_4 = 2.115$

(OR)

b) Obtain an initial basic feasible solution to the following transportation problem using Vogel's approximation method.

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

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