

# SECOND REVISION TEST - 2025

## Standard XII

 Reg.No. 

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## BUSINESS MATHEMATICS AND STATISTICS

Time : 3.00 hrs

Part - I

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Marks : 90

20 x 1 = 20

I. Choose the correct answer:

1. The rank of the unit matrix of order n is
  - a)  $n - 1$
  - b)  $n$
  - c)  $n + 1$
  - d)  $n^2$
2. In a transition probability matrix, all the entries are greater than or equal to \_\_\_\_\_
  - a) 2
  - b) 1
  - c) 0
  - d) 3
3. The value of  $\int \frac{\log x}{x} dx$   $x > 0$  is
  - a)  $\frac{1}{2}(\log x)^2 + c$
  - b)  $-\frac{1}{2}(\log x)^2 + c$
  - c)  $-\frac{2}{x^2} + c$
  - d)  $\frac{2}{x^2} + c$
4.  $\sqrt[n]{n}$  is
  - a)  $(n - 1)!$
  - b)  $n!$
  - c)  $n\sqrt[n]{n}$
  - d)  $(n - 1)\sqrt[n]{n}$
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. If the marginal revenue of a firm is constant, then the demand function is
  - a) MR
  - b) MC
  - c)  $C(x)$
  - d) AC
7. The integrating factor of D.E  $\frac{dx}{dy} + Px = Q$  is
  - a)  $e^{\int P dx}$
  - b)  $e^{-\int P dy}$
  - c)  $\int P dy$
  - d)  $e^{\int P dy}$
8. A homogeneous P.E. of the form  $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$  can be solved by making substitution
  - a)  $y = vx$
  - b)  $v = yx$
  - c)  $x = vy$
  - d)  $x = v$
9.  $E \equiv$ 
  - a)  $1 + \Delta$
  - b)  $1 - \Delta$
  - c)  $1 + \nabla$
  - d)  $1 - \nabla$
10. Lagrange's interpolation formula can be used for
  - a) Equal intervals only
  - b) Unequal intervals only
  - c) Both equal and unequal intervals
  - d) None
11. If  $E(X) = 5$ ,  $E(Y) = -2$ , then  $E(X - Y) =$ 
  - a) 3
  - b) 5
  - c) 7
  - d) -2
12.  $E[(X - E(X))^2] =$  \_\_\_\_\_
  - a)  $E(X)$
  - b)  $E(X^2)$
  - c)  $V(X)$
  - d) S.D(X)
13. Normal distribution was invented by
  - a) Laplace
  - b) De-Noivre
  - c) Gauss
  - d) All
14. If for a binomial distribution  $b(n, p)$  mean = 4, variance =  $\frac{4}{3}$  then  $P(X \geq 5) =$ 
  - a)  $\left(\frac{2}{3}\right)^6$
  - b)  $\left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)$
  - c)  $\left(\frac{1}{3}\right)^6$
  - d)  $4\left(\frac{2}{3}\right)^6$

15. Any statistical measure computed from sample data is \_\_\_\_\_  
 a) Parameter b) Statistic  
 c) Infinite measure d) Uncountable measure
16. The standard error of sample mean \_\_\_\_\_  
 a)  $\frac{\sigma}{\sqrt{2n}}$  b)  $\frac{\sigma}{n}$  c)  $\frac{\sigma}{\sqrt{n}}$  d)  $\frac{\sigma^2}{\sqrt{n}}$
17. The value of 'b' in trend line  $y = a + bx$  is  
 a) always +ve b) always -ve c) either +ve or -ve d) 0
18. R is calculated using \_\_\_\_\_  
 a)  $x_{\max} - x_{\min}$  b)  $x_{\min} - x_{\max}$  c)  $\bar{x}_{\max} - \bar{x}_{\min}$  d)  $\bar{\bar{x}}_{\max} - \bar{\bar{x}}_{\min}$
19. The penalty in VAM represents difference between the first \_\_\_\_\_  
 a) Two largest cost b) Largest & smallest costs  
 c) Smallest two costs d) None
20. In an assignment problem involving 4 worker & 3 jobs, the total no. of assignments possible are  
 a) 4 b) 3 c) 7 d) 12

## Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory)

7 x 2 = 14

21. Evaluate :  $\int_0^1 (x^3 + 7x^2 - 5x) dx$

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22. Find order & degree  $(2 - y'')^2 = y''^2 + 2y'$

23. The discrete random variable X show that  $k = 0.1$

|        |   |    |    |    |
|--------|---|----|----|----|
| X =    | 1 | 2  | 3  | 4  |
| P(x) = | k | 2k | 3k | 4k |

24. Total cost of 11 pencils & 3 erasers is ₹64 and total cost of 8 pencils & 3 erasers is ₹49. Find the cost of each pencil & eraser by Cramer's rule.
25. Calculate the area bounded by parabola  $y^2 = 4ax$  & its latus rectum.
26. What are the properties of continuous random variable?
27. The mean of Binomial distribution is 20, S.D = 4, find the parameters 'n' of distribution.
28. Mention two branches of statistical inference.
29. State two normal equations used in fitting a straight line.
30. Give Mathematical form of assignment problem.

## Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory)

7 x 3 = 21

31. Find the rank of  $A = \begin{pmatrix} -2 & 1 & 3 & 4 \\ 0 & 1 & 1 & 2 \\ 1 & 3 & 4 & 7 \end{pmatrix}$

32. Evaluate :  $\int x^3 e^x dx$

33. If  $MR = 20 - 5x + 3x^2$ , find total revenue function.

34. Solve:  $(1 - x) dy - (1 + y) dx = 0$

35. If  $h = 1$ , prove that  $f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$

36. Given the probability mass function of discrete random variable, What is the value of  $E(3x + 2x^2)$

|      |     |     |     |     |
|------|-----|-----|-----|-----|
| x    | 0   | 1   | 2   | 3   |
| P(X) | 0.2 | 0.1 | 0.4 | 0.3 |

37. Defects in yarn manufactured by a local mill can be approximately by a distribution with mean of 1.2 defects for every 6 metres of length. If lengths of 6 metres are to be inspected, find the probability of less than 2 defects.
38. The standard deviation of a sample of size 50 is 6.3. Determine the standard error whose population S.D is 6 ?
39. Fit a trend line by method of semi-average

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

40. Three jobs A,B,C assigned to three machines u, r, w. Determine the allocation that minimizes the overall processing cost.

|     |   |         |    |    |
|-----|---|---------|----|----|
|     |   | Machine |    |    |
|     |   | u       | v  | w  |
| Job | A | 17      | 25 | 31 |
|     | B | 10      | 25 | 16 |
|     | C | 12      | 14 | 11 |

[Cost in ₹]

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## Part - IV

## IV. Answer all the questions.

41. a) Investigate for what value of 'a', 'b' the following equations  $x + y + z = 6$ ,  $x + 2y + 3z = 10$ ,  $x + 2y + az = b$  have (i) no solution (ii) unique solution (iii) infinite number of solutions.

7 x 5 = 35

(OR)

- b) Calculate the seasonal indices from the following data using average method.

|      |     |      |       |      |
|------|-----|------|-------|------|
|      | I Q | II Q | III Q | IV Q |
| 2008 | 72  | 68   | 62    | 76   |
| 2009 | 78  | 74   | 78    | 72   |
| 2010 | 74  | 70   | 72    | 76   |
| 2011 | 76  | 74   | 74    | 72   |
| 2012 | 72  | 72   | 76    | 68   |

42. a) Evaluate  $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$  (OR)

- b) Solve:  $(D^2 + D - 6)y = e^{3x} + e^{-3x}$

43. a) Find missing terms :

|   |   |   |   |    |   |    |
|---|---|---|---|----|---|----|
| x | 0 | 1 | 2 | 3  | 4 | 5  |
| y | 0 | - | 8 | 15 | - | 35 |

(OR)

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XII Bus.Maths

- b) A continuous random variable  $x$  (i) find  $k$  (ii) Evaluate  $P(X < 6)$ ,  $P(P \geq 6)$ ,  
 $P(0 < X < 5)$

|        |   |     |      |      |      |       |        |          |
|--------|---|-----|------|------|------|-------|--------|----------|
| $x$    | 0 | 1   | 2    | 3    | 4    | 5     | 6      | 7        |
| $p(X)$ | 0 | $k$ | $2k$ | $2k$ | $3k$ | $k^2$ | $2k^2$ | $7k^2+k$ |

44. a) Write the properties of Mathematical expectation.

(OR)

- b) Assuming one in 80 births is a case of twins, calculate the probability of 20 or more sets of twins on a day when 30 birth occur. [ $e^{-0.375} = 0.6873$ ]

45. a) If the height of 500 students are normally distributed with mean 68 & S.D 3 inches, how many students of height (a) greater than 72 (b) less than or equal to 64 inches (c) between 65 and 71 inches.

(OR)

- b) The wages of factory workers are assumed to be normally distributed with mean & variance 25. A random sample of 50 workers gives total wages ₹2550. Test hypothesis  $\mu = 52$  against alternative hypothesis  $\mu = 4a$  at 1% level of significance.

46. a) Construct the laspeyre's, Paasche's & Fisher's price index number. Comment on result.

|           | Base year |          | Current year |          |
|-----------|-----------|----------|--------------|----------|
|           | Price     | Quantity | Price        | Quantity |
| Rice      | 15        | 5        | 16           | 8        |
| Wheat     | 10        | 6        | 18           | 9        |
| Rent      | 8         | 7        | 15           | 8        |
| Fuel      | 9         | 5        | 12           | 6        |
| Transport | 11        | 4        | 11           | 7        |
| Others    | 16        | 6        | 15           | 10       |

(OR)

- b) The demand and supply function of commodity are  $P_d = 18 - 2x - x^2$ ,  $P_s = 2x - 3$ , find the consumer's surplus and producer's surplus at equilibrium price.

47. a) Evaluate using limit as sum  $s \int_0^1 (x+4) dx$

(OR)

- b) Solve by NWC method :

|   | D  | E  | F  | G  | Supply |
|---|----|----|----|----|--------|
| A | 11 | 13 | 17 | 14 | 250    |
| B | 16 | 18 | 14 | 10 | 300    |
| C | 21 | 24 | 13 | 10 | 400    |

Demand 200 225 275 250

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