

# 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)  $e^{\int Pdx}$
  - b)  $e^{-\int Pdy}$
  - c)  $\int Pdy$
  - d)  $e^{\int Pdy}$
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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- 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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