

Second Revision Examination - 2025
BUSINESS MATHEMATICS AND STATISTICS

PART - A

20 x 1 = 20

Answer all the questions. Choose the correct answer

1. If $\frac{x^2}{8} = 0$ then the value of x is a) $-\frac{5}{6}$ b) $\frac{5}{6}$ c) $-\frac{16}{5}$ d) $\frac{16}{5}$
2. If A is a matrix of order 'n' then |Adj A| is a) |A|ⁿ⁻¹ b) |A|ⁿ c) |A|ⁿ⁺¹ d) |A|²ⁿ
3. The number of diagonals in a polygon of n sides is equal to a) ${}^n C_2$ b) ${}^n C_2 - 2$ c) ${}^n C_2 - n$ d) ${}^n C_2 - 1$
4. The number of ways to arrange the letters of the word "CHEESE" is a) 120 b) 240 c) 720 d) 6
5. The focus of the parabola $x^2 = 16y$ is a) (4, 0) b) (-4, 0) c) (0, 4) d) (0, -4)
6. In the equation of the circle $x^2 + y^2 = 16$ then y intercept is a) 4 b) 16 c) ± 4 d) ± 16
7. The value of $\sin(-420^\circ)$ is a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $\frac{1}{2}$ d) $-\frac{1}{2}$
8. $\sec^{-1} \frac{2}{3} + \operatorname{cosec}^{-1} \frac{2}{3} =$ a) $-\pi/2$ b) $\pi/2$ c) π d) $-\pi$
9. $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} =$ a) 1 b) ∞ c) $-\infty$ d) θ
10. $\frac{d}{dx} \left(\frac{1}{x} \right)$ is equal to a) $-\frac{1}{x^2}$ b) $\frac{-1}{x}$ c) $\log x$ d) $\frac{1}{x^2}$
11. Profit P(x) is maximum when a) MR = MC b) MR = 0 c) MC = AC d) TR = AC
12. The percentage of income on 7% stock at Rs.80 is a) 9% b) 8.75% c) 8% d) 7%
13. An annuity in which payments are made at the beginning of each payment period is called a) Annuity due b) An immediate annuity c) Perpetual annuity d) None of these
14. If $u = e^{x^2}$, then $\frac{\partial u}{\partial x}$ is equal to a) $2xe^{x^2}$ b) e^{x^2} c) $2e^{x^2}$ d) 0
15. Median is same as a) Q_1 b) Q_2 c) Q_3 d) D_2
16. The events A and B are independent if a) $P(A \cap B) = 0$ b) $P(A \cap B) = P(A) \times P(B)$ c) $P(A \cap B) = P(A) + P(B)$ d) $P(A \cup B) = P(A) \times P(B)$
17. The correlation coefficient a) $r = \pm \sqrt{b_{xy} \times b_{yx}}$ b) $r = \frac{1}{b_{xy} \times b_{yx}}$ c) $r = b_{xy} \times b_{yx}$ d) $r = \pm \sqrt{\frac{1}{b_{xy} \times b_{yx}}}$
18. The term regression was introduced by a) R.A. Fisher b) Sir. Francis Galton c) Karl Pearson d) Croxton and Cowden
19. A solution which maximizes or minimizes the given LPP is called a) a solution b) a feasible solution c) an optimal solution d) none of these
20. In critical path analysis the word CPM mean a) critical path method b) crush project management c) critical project management d) critical path management

PART - B

7 x 2 = 14

Answer any 7 questions. Q.No.30 is compulsory.

21. Evaluate $\frac{x^2 + x + 1}{x - 1} \cdot \frac{x}{x}$
22. If ${}^n C_4 = {}^n C_5$, find ${}^{12} C_n$
23. Find the centre and radius of the circle $x^2 + y^2 - 22x - 4y + 25 = 0$
24. Find $\sin 105^\circ + \cos 105^\circ$
25. Differentiate : $\sin^3 x$
26. If $z = (ax + b)(cy + d)$, then find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$
27. Find the annual rate of interest to get a perpetuity of Rs.675 for every half yearly from the present value of Rs.30,000.
28. Find D_2 and D_5 for the following series. 22, 4, 2, 12, 16, 6, 10, 18, 14, 20, 8
29. From the following data calculate the correlation coefficient $\Sigma xy = 120$, $\Sigma x^2 = 90$ $\Sigma y^2 = 640$.
30. Develop a network based on the following information.

	A	B	C	D	E	F	G	H
Activity	-	-	A	B	C,D	C,D	E	F
Immediate predecessor								

PART - C

7 x 3 = 21

Answer any 7 questions. Q.No.40 is compulsory.

31. Prove that $\frac{1}{a} \ln \frac{b+c}{a} + \frac{1}{b} \ln \frac{c+a}{b} + \frac{1}{c} \ln \frac{a+b}{c} = 0$

32. Find n if $\frac{1}{9!} + \frac{1}{10!} = \frac{n}{11!}$

33. Find the value of k so that the line $3x + 4y - k = 0$ is a tangent $x^2 + y^2 - 64 = 0$

34. Prove that $\frac{\sin(180^\circ - \theta)\cos(90^\circ + \theta)\tan(270^\circ - \theta)\cot(360^\circ - \theta)}{\sin(360^\circ - \theta)\cos(360^\circ - \theta)\sin(270^\circ - \theta)\operatorname{cosec}(-\theta)}$

35. If $f(x) = \frac{x^7 - 128}{x^5 - 32}$, then find $\lim_{x \rightarrow 2} f(x)$

36. For the function $y = x^3 + 19$, find the values of x when its marginal value is equal to 27.

37. Find the amount of annuity of ₹2000 payable at the end of each year for 4 years of money is worth 10% compounded annually. $[(1.1)^4 = 1.4641]$

38. From the following data compute the value of Harmonic Mean.

Marks	10	20	25	40	50
No. of students	20	30	50	15	5

39. Find the means of X and Y variables them from the following two regression equations.

$2y - x - 50 = 0$
 $3y - 2x - 10 = 0.$

40. Draw a network diagram for the following activities.

Activity code	A	B	C	D	E	F	G	H	I	J	K
Predecessor activity	-	A	A	A	B	C	C	C, D	E, F	G, H	I, J

Answer all the questions.

PART - D

7 x 5 = 35

41. a) Show that the matrices $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 2 & 1 \\ 5 & 5 & 5 \\ 1 & 3 & 1 \\ 5 & 5 & 5 \\ 1 & 2 & 4 \\ 5 & 5 & 5 \end{bmatrix}$ are inverses of each other. (OR)

b) Suppose the inter-industry flow of the product of two sectors X and Y are given as under.

Production sector	Consumption sector		Domestic demand	Gross output
	X	Y		
X	15	10	10	35
Y	20	30	15	65

Find the gross output when the domestic demand changes to 12 for X and 18 for Y.

42. a) Resolve the partial fractions for the following. $\frac{1}{(x^2 + 4)(x + 1)}$ (OR)

b) A manufacturer produces 80 TV sets at a cost of 2,20,000 and 125 TV sets at a cost of 2,87,500. Assuming the cost curve to be linear, find the linear expression of the given information. Also estimate the cost of 95 TV sets.

43. a) Solve $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$ (OR) b) Differentiate $\sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$

44. a) Find the absolute (global) maximum and absolute minimum of the function.

$f(x) = 3x^5 - 25x^3 + 60x + 1$ in the interval $[-2, 1]$ (OR)

b) A person purchases a machine on 1st January 2009 and agrees to pay 10 installments each of ₹12,000 at the end of every year inclusive of compound rate of 15%. Find the present value of the machine. $[(1.15)^{10} = 4.016]$.

45. a) Compute Quartile deviation from the following data.

CI	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	12	19	5	10	9	6	6

(OR)

b) In a shooting test the probability of hitting the target are $\frac{3}{4}$ for A, $\frac{1}{2}$ for B and $\frac{2}{3}$ for C. If all of them fire at the same target, calculate the probabilities that (i) All the three hit the target (ii) Only one of them hits the target (iii) At least one of them hits the target

46. a) The following are the ranks obtained by 10 students in Statistics and Mathematics.

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	1	4	2	5	3	9	7	10	6	8

Find the rank correlation coefficient. (OR)

b) Calculate the regression coefficient and obtain the lines of regression for the following data.

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

120000

47. a) Calculate the earliest start time, earliest finish time, latest start time and latest finish time of each activity of the project given below and determine the Critical path of the project and duration to complete the project.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration (in week)	8	7	12	4	10	3	5	10	7	4

(OR)

b) Solve the following LPP Maximize $Z = 2x_1 + 5x_2$ subject to conditions $x_1 + 4x_2 \leq 24$, $3x_1 + x_2 \leq 21$

$x_1 + x_2 \leq 9$ and $x_1, x_2 \geq 0$