25CBA103

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

MATHEMATICAL TECHNIQUES FOR BUSINESS ANALYTICS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	An annuity refers to a) A loan with compound interest b) Equal payments made at regular intervals c) A geometric progression d) One-time investment	K1	CO1
	2	Which is correct about Geometric Progression (GP)? a) Successive terms differ by a constant b) Successive terms have a constant ratio c) Always increasing sequence d) Always convergent	K2	CO1
2	3	The identity matrix is always a a) Zero Matrix b) Rectangular Matrix c) Square Matrix d) Column Matrix	K1	CO2
	4	If A $\begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ then $\|A\|$ (determinant) is a) 5 b) 6 c) 7 d) 3	K2	CO2
3	5	The slope of the line joining points $(x1, y1)$ and $(x2, y2)$ is a) $\frac{x2-x1}{y2-y1}$ b) $\frac{y2-y1}{x2-x1}$ c) $(x2-x1)(y2-y1)$ d) $\frac{y1+y2}{x1+x2}$	K1	CO3
	6	If demand curve is given by Dx =100 – 2P, then the slope is a) -2 b) 2 c) 100 d) -100	K2	CO3
4	7	Which rule is used to differentiate f(x) $g(x)$? a) Chain rule b) Quotient Rule c) Product Rule d) Implicit Rule	K1	CO4
	8	The second derivative of $y = x^3$ is a) 3 b) $6x$ c) $3x^2$ d) $6x^2$	K2	CO4
5	9	The integral of Cos x is a) $\sin x + c$ b) $-\sin x + c$ c) $\cos x + c$ d) $\tan x$	K1	CO5
	10	If $\frac{dy}{dx} = 6x$, then y a) $3x^2 + c$ b) $2x^2 + c$ c) $6x^2 + c$ d) $x^3 + c$	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Find the sum to n terms of the series 3, 2, 4/3, 8/9, ...	K3	CO1
		(OR)		
	11.b.	Find the simple interest on Rs.5,000 at 10% for 3 years. Find also the amount.		
2	12.a.	Show that matrix multiplication is not commutative, for the following matrices $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$.	K4	CO2
		(OR)		
	12.b.	Find the adjoint of $\begin{bmatrix} 3 & 1 & 2 \\ 2 & 2 & 5 \\ 4 & 1 & 0 \end{bmatrix}$.		
3	13.a.	Find the condition for the lines $ax + by + c = 0$ and $a_1x+b_1y+c_1 = 0$ to be parallel.	K4	CO3
		(OR)		
	13.b.	Find the equation of the circle with center at (2,-3) and radius 5.		
4	14.a.	If $x = a\cos\theta$, y=b $\sin\theta$, find $\frac{dy}{dx}$	K3	CO4
		(OR)		
	14.b.	The total cost in Rs. of output x *is* given by c = $\frac{2}{3}x + \frac{35}{2}$. Find a cost when output is 4 units.		
5	15.a.	Evaluate $\int \frac{x^3}{(x^2+1)^3}\, dx$.	K4	CO5
		(OR)		
	15.b.	Evaluate $\int_0^1 x(1+x)\, dx$.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	On what sum of money will be the difference between the simple interest and the compound interest for 2 years at 5% per annum be equal to Rs. 50?	K3	CO1
2	17	A company is considering which of the three methods of production it should use to produce three goods A,B and C. The amount of each good produced by each method is show in the matrix. A B C Method 1 4 8 2 Method 2 5 7 1 Method 3 5 3 9 The vector (or row matrix) (10,4,6) represents the profit per unit for the goods A,B and C in order using matrix multiplication. Find which method maximize the total profit.	K4	CO2
3	18	Show that the lines represented by $x^2 - 5xy + 6y^2 = 0$ are perpendicular or not.	K5	CO3
4	19	Differentiate with respect to x if $\frac{2\log x}{x}$.	K2	CO4
5	20	A company's marginal cost function is Mc $(x) = 3x^2 + 2x + 5$ where $x = units\ produced$. Find the total cost function if fixed cost is Rs.100.	K5	CO5

Z-Z-Z END