25COC103/ 25PAU103/ 25COE103/ 25AFU103/ 25CBI103/ 22COC103N/
22COE103N/ 24PAU103N/ 22PAU104N/ 22AFU103N/ 22CBI103N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BCom DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Common to Branches – COMMERCE (CA)/ E-COMMERCE/ COMMERCE (PA)/
COMMERCE (A&F)/ COMMERCE (B&I)

MATHEMATICS FOR COMMERCE

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	If the sum of first n terms of a geometric series is $3 - \frac{3^{n+1}}{4^{2n}}$, then its third term is (a) $\frac{3^3}{4^4} - \frac{3^4}{4^6}$ (b) $\frac{3^3}{4^5} - \frac{3^4}{4^8}$ (c) $\frac{3^3}{4^4} - \frac{3^4}{4^7}$ (d) $\frac{3^3}{4^5} - \frac{3^4}{4^7}$	K1	CO1
	2	If the difference between simple interest and compound interest for two years for the sum of Rs 20000 is Rs.50, then the rate of interest is (a) 5% (b) 6% (c) 7% (d) 8%	K2	CO1
2	3	The inverse the matrix of $\begin{pmatrix} -4 & 5 \\ 5 & -6 \end{pmatrix}$ is (a) $\begin{pmatrix} 2 & 3 \\ -5 & 6 \end{pmatrix}$ (b) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (c) $\begin{pmatrix} 6 & 5 \\ 5 & 4 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$	K1	CO2
	4	The product of the matrix $(1 \quad 2 \quad 3)$ and the matrix $\begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$ is (a) (3 4 3) (b) (6) (c) 10 (d) (10)	K2	CO4
3	5	If $x = a\cos\theta; y = a\sin\theta$, then $\frac{dy}{dx}$ is equal to (a) $\tan\theta$ (b) $-\cot\theta$ (c) $\sec^2\theta$ (d) zero	K1	CO4
	6	The value of $\frac{dx}{dy}$, from the relation $\sin y = x\sin(a+y)$, where a is a constant, is (a) $\frac{\sin a}{\sin^2(a+y)}$ (b) $\frac{\sin a}{\sin y}$ (c) zero (d) $\frac{x}{a+y}$	K2	CO2
4	7	The value of $\int_e^{e^2} \frac{1}{x} dx$ is equals to (a) 0 (b) 2 (c) 1 (d) 3	K1	CO3
	8	$\int (x + \frac{1}{x})^2 dx$ is equals to (a) $\frac{x^3}{3} + 2x - \frac{1}{x} + c$ (b) $\frac{x^2}{2} + 3x - \frac{1}{x} + c$ (c) $x^2 + 2x + 2$ (d) $\frac{(x+\frac{1}{x})^3}{3} + c$	K2	CO4
5	9	To use slack variable if constraints are of (a) $\le$ type (b) $\ge$ type (c) equality type (d) both $\le$ and $\ge$ type	K1	CO1
	10	The given linear programming problem has unbounded solution by using graphical method when (a) feasible region is not unbounded (b) feasible region is unbounded (c) feasible region is just a point (d) there does not exist feasible region	K2	CO3

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.	A reduction of 21% in the price of rice enables a person to buy 10.5kg more for Rs.100. Find the original price and reduced price of rice.	K3	CO5
		(OR)		

Page 2
25COC103/ 25PAU103/ 25COE103/ 25AFU103/ 25CBI103/ 22COC103N/
22COE103N/ 24PAU103N/ 22PAU104N/ 22AFU103N/ 22CBI103N

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Module No.	Question No.	Question	K Level	CO
	11.b.	A person borrowed a sum of Rs.3150 from a money lender and agreed to repay the sum in ten monthly instalments of Rs.315 each and the simple interest at the rate of 10% per annum in the 11th instalment. Calculate the interest paid by him.		
2	12.a.	If $A = \begin{pmatrix} 1 & 3 & 2 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{pmatrix}$, then show that $A^3 - 4A^2 - 7A + 9I = 0$.	K2	CO4
		(OR)		
	12.b.	If the matrices $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} a & 1 \\ b & -1 \end{pmatrix}$ satisfy $(A + B)^2 = A^2 + B^2$, then find the values of a and b.		
3	13.a.	Using first principle, find the derivative of $log_e x$ with respect to x.	K1	CO2
		(OR)		
	13.b.	If $y = -x^3 \log x$, then show that $x\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 3x^2 = 0$.		
4	14.a.	Evaluate $\int \frac{3x+5}{x^2+4x+7} dx$.	K3	CO5
		(OR)		
	14.b.	Integrate $\frac{xe^x}{(x+1)^2}$ with respect to x.		
5	15.a.	A farmer has 1000 acres of land on which he can grow corn, wheat or soya-beans. Each acre of corn costs Rs.100 for preparation, requires 7 man-days of work and yields a profit of Rs.30. An acre of wheat costs Rs.120 to prepare, requires 10 man-days of work yields a profit of Rs.40. An acre of soya-beans costs Rs.70 to prepare requires 8 man-days of work yields a profit of Rs.20. If the farmer has Rs.1,00,000 for preparation and can count on 80,000 man-days work. Formulate this as a linear programming problem so as to maximize the profit.	K4	CO5
		(OR)		
	15.b.	Solve graphically the following linear programming problem Minimize $Z = 2x_1 + x_2$ subject to the constraints $x_1 + x_2 \le 30$, $\quad x_2 \ge 3$, $x_2 \le 12$, $\quad x_1 - x_2 \ge 0$; $x_1 \le 20$, $\quad x_1 \ge 0, x_2 \ge 0$.		

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	Find the least number of years for which an annuity of Rs.250 must run in order that the amount just exceeds Rs.5000 at 5% compounded half-yearly.	K1	CO1
2	17	Find the inverse of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{pmatrix}$ and hence solve the system of the equations $x + y + z = 3$, $x + 2y + 3z = 7$, $x + 4y + 9z = 18$.	K2	CO3
3	18	The cost function of product is given by $C(x) = 300x - 10x^2 + \frac{1}{3}x^3$. Compute the (i) output at which the marginal cost is minimum (ii) output at which the average cost is minimum (iii) output at which the average cost equals to marginal cost.	K4	CO5
4	19	The marginal cost function and the marginal revenue function of a product are, respectively, $C'(x) = 4 + 0.08x$ and $R'(x) = 16 + x^2$. Find the total profit given that the total cost for zero output is zero.	K5	CO4
5	20	Solve the following linear programming problem by simplex method. Maximize $Z = 500x_1 + 600x_2 + 1200x_3$ subject to the constraints $2x_1 + 4x_2 + 6x_3 \le 160$, $\quad 3x_1 + 2x_2 + 4x_3 \le 120$, $\quad x_1, x_2, x_3 \ge 0$.	K3	CO5

Z-Z-Z   END