PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2023
(First Semester)

Branch – **COMMERCE (BUSINESS PROCESS SERVICES)**

MATHEMATICS FOR BUSINESS PROCESS

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	The compound interest for Rs. 10,000 for 2 years at 10% p.a. is--------- a) Rs.2000 c) Rs. 2200 b) Rs. 2100 d) Rs. 12,000	K1	CO1
	2	The present value under annuity due is ---------. a) $\frac{A}{i}[1-(1+i)^{-n}]$ b) $A+\frac{A}{i}[1-(1+i)^{-(n-1)}]$ c) $\frac{A}{i}[(1+i)^{n}-1]$ d) $\frac{A}{i}(1+i)[(1+i)^{n}-1]$	K2	CO1
2	3	A square Matrix A is an orthogonal matrix x, if ----. a) AA'=I c) $A=A^{-1}$ b) $AA^{-1}=I$ d) A=A'	K1	CO2
	4	If $A=\begin{pmatrix}3 & 2 & 3\\ 0 & 4 & 0\\ 3 & 8 & 3\end{pmatrix}$, $\rho(A)$ =---------- a) 0 b) 1 c) 2 d) 3	K2	CO2
3	5	$\lvert A-\lambda I\rvert=0$ is called -------- a) Characteristic equation c) eigen value b) Characteristic Polynomial d) eigen vector	K1	CO3
	6	Cayley-Hamilton theorem states that every------- matrix satisfies its own characteristic equation. a) Row b) column c) square d) triangular	K2	CO3
4	7	The second derivative of $y=x^{n}$ is ---------. a) nx^{n+1} b) nx^{n-1} c) $n(n-1)x^{n-2}$ d) $n^{2}x^{n-2}$	K1	CO4
	8	A necessary condition for f(x) being a maximum or a minimum at x=a is --------- a) f(x)=0 b) f'(x)=0 c) f'(a)=0 d) f(a)=0	K2	CO4
5	9	$\int_0^2 x^3dx$ =-------- a) 8 b) 4 c) 0 d) 1	K1	CO5
	10	$\int e^{2x}dx$ =------ a) $\frac{1}{2}e^{2x}+c$ b) $e^{2x}+c$ c) $2e^{2x}+c$ d) $2e^{x}$	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.	Mr. X borrows Rs.1,716. He repays Rs. 250 at the end of each year. In how many years can he clear the debt if the rate of compound interest is 7.5% p.a.?	K2	CO1
		(OR)		
	11.b.	A sum of money amounted to Rs. 1,071 in 6 months and Rs.1,106 in 16 months, Calculate the rate of simple interest.		
2	12.a.	Show that the system of equations 3x-4y=2, 5x+2y=12, -x+3y=1 are consistent.	K2	CO2
		(OR)		
	12.b.	Prove that the matrix $\begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$ is orthogonal.		
3	13.a.	Find the Characteristic equation of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A.	K2	CO3
		(OR)		
	13.b.	Find all the characteristic roots and the characteristic vectors of the matrix $A=\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$.		
4	14.a.	Find $\frac{d}{dx}\left[log_e\left(\frac{x^2+1}{x^2-1}\right)\right]$	K2	CO4
		(OR)		
	14.b.	Find dy/dx if (i) $x^2 + y^2 = 1$ (ii) $xy = c^2$		
5	15.a.	Evaluate (i) $\int \left(x + \frac{1}{x}\right)^2 dx$ (ii) $\int \frac{x^3-x+4}{x^2} dx$	K3	CO5
		(OR)		
	15.b.	Evaluate $\int \frac{3x^3}{(x^2+1)^3} dx$		

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	A certain amount of money was invested at 8% simple interest and after 9 months an equal amount was invested at 10% simple interest. Find the period in which the amount in each case becomes Rs.2,600. How much money was invested in each case?	K2	CO1
2	17	Find the rank of $A = \begin{bmatrix} 1 & 2 & 1 & 2 \\ 1 & 3 & 2 & 2 \\ 2 & 4 & 3 & 4 \\ 3 & 7 & 4 & 6 \end{bmatrix}$.	K2	CO2
3	18	Use Cayley- Hamilton theorem to express $2A^5 - 3A^4 + A^2 - 4I$ as a linear polynomial in A when $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$.	K2	CO3
4	19	Find for what values of x, he following expression is maximum and minimum respectively: $2x^3 - 21x^2 + 36x - 20$ Find also the maximum and the minimum values.	K3	CO4
5	20	(i) Integrate x log x with respect to x. (ii) Evaluate: $\int x\, e^{mx} dx$.	K3	CO5

Z-Z-Z END