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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Common to Branches – **COMPUTER SCIENCE / COMPUTER TECHNOLOGY /**

MATHEMATICS FOR COMPUTING - I

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 rank of a matrix is always, A) Equal to the number of columns B) Greater than the number of rows C) Less than or equal to the smaller of the number of rows or columns D) The square of the number of rows	K1	CO1
	2	Which statement is true if all eigenvalues of a matrix are distinct? A) The matrix is not invertible B) The matrix has linearly dependent eigenvectors C) The matrix must be symmetric D) The matrix can be diagonalized	K2	CO1
2	3	Which of the following is a linear differential equation? A) $y''+y^2=0$ B) $yy''+y'=0$ C) $y''+yy'=0$ D) $y''+xy'+y=0$	K1	CO2
	4	The complete integral for the equation $Z = p^x+qy+pq$ is A) $Z = ax + by + ab$ B) $Z = ax + bx + a^2$ C) $Z = ax + by + b^2$ D) $Z = ax + bx + a$	K2	CO2
3	5	In Gauss elimination, the coefficient matrix is transformed into: A) Upper triangular matrix B) Lower triangular matrix C) Diagonal matrix D) Identity matrix	K1	CO3
	6	Which method converge, if the coefficient matrix is diagonally dominant and non-singular ? A) Jacobi B) seidal C) both D) none	K2	CO3
4	7	The value of interpolation step h in Newton's formulas is: A) $h = x_{i+1} - x_i$(constant for all i) B) $h = x_{i+1} - x_i$(variable) C) $h = x - x_0$ D) $h = x - x_n$	K1	CO4
	8	If the degree of the polynomial used in Newton's interpolation is n, then it requires A) n data points B) $n+1$ data points C) $2n$ data points D) Infinite data points	K2	CO4
5	9	The local truncation error in Euler's method is of order: A) O(h) B) $O(h^2)$ C) $O(h^3)$ D) $O(h^0)$	K1	CO5
	10	The modified Euler's method is also called A) Runge-Kutta 2nd order method B) Newton's method C) Heun's method D) Adams-Bashforth method	K2	CO5

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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 rank of a matrix $A=\begin{pmatrix}1&2&3&4\\2&4&6&8\\1&1&1&1\\0&1&2&3\end{pmatrix}$	k2	CO1
		(OR)		
	11.b.	Find the characteristic equation and inverse of $A=\begin{pmatrix}1&0&2\\0&2&1\\2&0&3\end{pmatrix}$		
2	12.a.	Solve $\frac{dy}{dx}=\frac{y}{x}$, $y(1)=2$.	K3	CO2
		(OR)		
	12.b.	Solve $p^2+q^2=npq$.		
3	13.a.	Solve the system, by Gauss-Elimination method, $2x+3y-z=5; 4x+4y-3z=3; 2x-3y+2z=2$	K3	CO3
		(OR)		
	13.b.	Solve, by using Gauss seidal method , $28x+4y-z=32; x+3y+10z=24; 2x+17y+4z=35$		
4	14.a.	From the following data, find $\frac{dy}{dx}$ for x=1.05 X: 1.00 1.05 1.10 .15 1.20 1.25 1.30 Y: 1.00000 1.02470 1.04881 1.07238 1.09544 1.11803 1.14017	K3	
		(OR)		
	14.b.	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Simpson's rule by dividing the range into 6 equal parts.		
5	15.a.	Use Euler's method , solve the differential equation, $\frac{dy}{dx}=x+y, y(0)=1$ for $x=0.0(0.2)1.0$	K2	CO5
		(OR)		
	15.b.	Use the second-order Runge–Kutta method (RK2) with step size $h=0.1$ to approximate $y(0.1)$, given $\frac{dy}{dx}=x+y, y(0)=1$		

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	Examine the consistency of the following equations and if it is consistent solve the equations 2x+y-z=1 ; x-y+2z =3: 3x+2y+z=4.	K4	CO1
2	17	Solve $(D+1)^2 y = 6te^{-t}$.	K3	CO2
3	18	Solve by using Gauss Jordan method $10x+y+z=12; x+10y+z=12; x+y+10z=12$	K3	CO3
4	19	Compute the first two derivatives of $(x)^{1/3}$ at x=50 and x=56 gives the table below X: 50 51 52 53 54 55 56 Y: 3.6840 3.7084 3.7325 3.7563 3.7798 3.8030 3.8259	K2	CO4
5	20	Apply Modified Euler method with step size $h=0.2$ to estimate $y(0.4)$, given: $\frac{dy}{dx}=x^2+y, y(0)=1$.	K2	CO5

Z-Z-Z END