PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(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 $(10 \times 1 = 10)$

Module No.	Question No.	Question	K Level	CO
1	1	If the Rank of $\begin{pmatrix} 1 & 3 \\ 4 & 5 \end{pmatrix}$ is a) 1 b) 2 c) 3 d) 4	K1	CO1
	2	The Eigen values of $\begin{pmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{pmatrix}$ are a) 3,5,3 b) 3,4,1 c) 4,6,0 d) 0,0,1	K2	CO2
2	3	$D(\sin \alpha x) = $ _____ a) $\sin x$ b) $\cos x$ c) $\alpha \cos \alpha x$ d) $\sin \alpha x$	K1	CO1
	4	Which of the following statement is correct for the given partial differential equation? $\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = \frac{\partial^2 u}{\partial x^2}$ a) it is linear equation of order two b) it is non-linear equation of order two c) it is linear equation of order one d) it is non-linear equation of order one	K2	CO2
3	5	Gauss Elimination the given system of simultaneous equations transformed into a) Upper-triangular matrix b) Diagonal matrix c) Unit matrix d) Transpose matrix	K1	CO1
	6	In Gauss Jordan method, _____ transformations are allowed . a) Diagonal b)Column c)Row d) Square	K2	CO2
4	7	In numerical integration the width of the subinterval is given by a) $h = \frac{x_n - x_0}{n}$ b) $h = \frac{x_n + x_0}{n}$ c) $h = \frac{x_0 - x_n}{n}$ d) $h = \frac{x_0 + x_n}{n}$	K1	CO1
	8	Simpson's $\frac{1}{3}$ rule is applicable only when the number of subintervals is _____ . a) odd b) even c) either odd or even d) neither odd nor even	K2	CO2
5	9	The modified Euler method is based on the average of _____ a) lines b) chords c)slopes d) points	K1	CO1
	10	If $y'' = 1 - 2yy'$ with $y(0) = 1$ and $y_0' = -1$, then the initial value of y_0'' is ------------ a) -1 b) 3 c) -8 d) 34	K2	CO2

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks $(5 \times 7 = 35)$

Module No.	Question No.	Question	K Level	CO
1	11.a.	Solve that the equations are consistent. $x + 2y = 3$ $y - z = 2$ $x + y + z = 1$	K2	CO4
		(OR)		
	11.b.	Find the rank of matrix A=$\begin{pmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ 2 & 13 & 10 \end{pmatrix}$		
2	12.a.	Solve $(3D^2 - 4D + 5)y = 3e^{2x}$	K2	CO4
		(OR)		
	12.b.	Solve $p^2 + q^2 = npq$		
3	13.a.	Solve the system by Gaussian –Elimination method $x + y + 3z = 6$, $x + 3y + z = 8$, $2x + y + z = 5$.	K3	CO4
		(OR)		
	13.b.	Solve the system by Gauss-Seidal method $10x - 5y - 2z = 3$, $4x - 10y + 3z = -3$, $x + 6y + 10z = -3$		
4	14.a.	By Dividing the range into ten equal parts, evaluate $\int_0^\pi \sin x \, dx$ by Trapezoidal rule	K3	CO4
		(OR)		
	14.b.	Evaluate $\int_0^1 \frac{x^2 dx}{1 + x^3}$ by Simpson's $\frac{1}{3}$ rule with h=0.25		
5	15.a.	Using Euler's method, solve the equation $y' = x + y, y(0) = 1$ with h = 0.2 and obtain $y(0.2)$ and $y(0.4)$.	K3	CO5
		(OR)		
	15.b.	Find $y(1.2)$ by Modified Euler's method given that $y' = \frac{2y}{x} + x^2, y(1) = 0.5$		

SECTION - C (30 Marks)
Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks $(3 \times 10 = 30)$

Module No.	Question No.	Question	K Level	CO
1	16	Find the Eigen values and Eigen vectors of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$	K3	CO3
2	17	Solve $(D^2 + 3D + 2)y = x^2$	K3	CO3
3	18	Solve the following systems of equation by Gauss- Jacobi methods $20x + 2y + 6z = 28$, $x + 20y + 9z = -23$, $2x - 7y - 20z = -57$.	K3	CO5
4	19	From the following table of values of x and y obtain $\frac{dy}{dx}$ and $\frac{d^2 y}{dx^2}$ for $x = 1.25$ <table><tr><td>x</td><td>1</td><td>1.05</td><td>1.1</td><td>1.15</td><td>1.2</td><td>1.25</td><td>1.3</td></tr><tr><td>y</td><td>1</td><td>1.025</td><td>1.049</td><td>1.072</td><td>1.095</td><td>1.118</td><td>1.14</td></tr></table>	K3	CO4
5	20	Using Runge-Kutta method of fourth order to find $y(0.7)$ and $y(0.8)$ given that $y' = y - x^2, y(0.6) = 1.7379$	K3	CO5

Z-Z-Z   END