

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION DECEMBER 2023
(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	Rank of $A = \text{Rank of } (A, B)$, then the system is _____. a) consistent b) inconsistent c) either consistent (or) inconsistent d) neither consistent nor inconsistent	K1	CO1
	2	The sum of the Eigen values of $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ are a) 0 b) 3 c) 5 d) 7	K2	CO2
2	3	In auxiliary equation, if the roots are real and equal then the solution is _____. a) $(A + B)e^{mx}$ b) $(A + Bx)e^{mx}$ c) $(A - B)e^{mx}$ d) $(A - Bx)e^{mx}$	K1	CO1
	4	The partial differential equation formed from $z = (x + y)f(x^2 - y^2)$ is _____. a) $px + qy = z$ b) $py + qx = z$ c) $py - qx = z$ d) $px - qy = z$	K2	CO2
3	5	Gaussian elimination method, original equations are transformed by using _____. a) Row operations b) Column operations c) Mathematical operations d) Subset operation	K1	CO1
	6	Gauss Seidal method is also termed as a method of _____. a) Successive displacement b) Eliminations c) False Positions d) Iterations	K2	CO2

Cont...

4	7	Newton's forward difference formula gives $\left(\frac{d^2y}{dx^2}\right)_{x=x_0} = \underline{\hspace{2cm}}$ a) $\frac{1}{h}\left(\Delta^2y_0 - \Delta^3y_0 + \frac{11}{12}\Delta^4y_0 + \dots\right)$ b) $\frac{1}{h^2}\left(\Delta^2y_0 - \Delta^3y_0 + \frac{11}{12}\Delta^4y_0 + \dots\right)$ c) $\frac{1}{h}\left(\Delta^2y_0 + \Delta^3y_0 + \frac{11}{12}\Delta^4y_0 + \dots\right)$ d) $\frac{1}{h^2}\left(\Delta^2y_0 - \Delta^3y_0 - \frac{11}{12}\Delta^4y_0 - \dots\right)$	K1	CO1
	8	The Trapezoidal rule approximates the integral by the _____ of n trapezoids. a) difference b) sum c) product d) cross product	K2	CO2
5	9	The improved Euler method is based on the averages of _____ a) lines b) chords c) slopes d) points	K1	CO1
	10	If $y' = x + y$, $y(0) = 2$, then the value of (x_0, y_0) is _____ a) (1, 2) b) (2, 1) c) (0, 2) d) (2, 0)	K2	CO2

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 matrix $A = \begin{pmatrix} -2 & -1 & -1 \\ 12 & 8 & 6 \\ 10 & 5 & 6 \end{pmatrix}$	K2	CO4
		(OR)		
	11.b.	Illustrate the Eigen value of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$		
2	12.a.	Solve $(D^2 - 3D + 2)y = e^{4x}$	K2	CO4
		(OR)		
	12.b.	Solve $x \frac{\partial z}{\partial x} = 2x + y + 3z$		

3	13.a.	Solve the system of equation by Gaussian Elimination method. $2x + 3y - z = 5, \quad 4x + 4y - 3z = 3, \quad 2x - 3y + 2z = 2.$	K3	CO4																
	(OR)																			
	13.b.	Solve the following systems of equation by Gauss- Jacobi methods $10x + 2y + z = 9, \quad x + 10y - z = -22,$ $-2x + 3y + 10z = 22.$																		
4	14.a.	From the following table of values of x and y obtain $\frac{dy}{dx}$ for $x = 1.05$	K3	CO4																
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <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> </tbody> </table>				x	1	1.05	1.1	1.15	1.2	1.25	1.3	y	1	1.025	1.049	1.072	1.095	1.118	1.14
	x	1			1.05	1.1	1.15	1.2	1.25	1.3										
y	1	1.025	1.049	1.072	1.095	1.118	1.14													
(OR)																				
	14.b.	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule by taking $h=0.2$.																		
5	15.a.	Compute $y(0.3)$ taking $h = 0.1$ given $y' = y - \frac{2x}{y}, y(0)=1$ using Improved Euler's method.	K3	CO5																
	(OR)																			
	15.b.	Find $y(0.1)$ and $y(0.2)$ by Modified Euler's method given that $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$																		

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	Identify the following equations $2x - y + z = 7, \quad 3x + y - 5z = 13, \quad x + y + z = 5$ are consistent and solve them.	K3	CO3
2	17	Solve $(D^2 - 3D + 2)y = \sin 2x.$	K3	CO3
3	18	Solve by Gauss-Jordan method $5x - 2y + 3z = 18, \quad x + 7y - 3z = -22, \quad 2x - y + 6z = 22.$	K3	CO5
4	19	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule	K3	CO4
5	20	Using Runge-Kutta method of fourth order to find $y(0.1)$ and $y(0.2)$ given that $\frac{dy}{dx} = \frac{2xy}{1+x^2} + 1, y(0) = 0$	K3	CO5

Z-Z-Z END