FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2024
MAJOR
BCA1CJ 102 MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

Time : 2 Hrs BL : Bloom's Taxonomy Level (1 to 6) CO : Course Outcome **Maximum Marks : 70**

	Section A			Ceiling Marks : 24
	Answer all questions. Each carries 3 marks.			

No.	Question	M	BL	CO
1.	Explain the operation scalar multiplication with an example.	3	1	CO1
2.	You have a matrix C of order 4×3 and another matrix D of order 3×5. Evaluate the possibility of adding these matrices and the implications of their orders in matrix operations.	3	6	CO1
3.	Define linear independence and provide an example of two vectors that are linearly independent.	3	2	CO4
4.	Define vector, magnitude of a vector and give an example of a vector.	3	1	CO4
5.	Show that $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$ using the vectors $\vec{a} = 3\hat{i} - 4\hat{j} - 5\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}$.	3	5	CO4
6.	Using the result $f'(a) = \lim_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$, find the derivative of $x^2 - 2$ at $x = 10$.	3	3	CO5
7.	Evaluate $\lim_{x \to 0} \dfrac{x - \sin x}{x^3}$.	3	5	CO5
8.	Differentiate the function $y = (x^2 + 1)(x^3 + 3)$.	3	4	CO5
9.	State First and Second fundamental theorem of Integral Calculus.	3	1	CO5
10.	Find the integral $\int_{-1}^{1} |x|\, dx$.	3	5	CO5

	Section B			Ceiling Marks : 36
	Answer all questions. Each carries 6 marks.			

No.	Question	M	BL	CO
11.	Given $P = \begin{bmatrix} 2 & 4 & 6 \\ 1 & 5 & 7 \\ 3 & 0 & 8 \end{bmatrix}$ and $Q = \begin{bmatrix} 0 & 2 & 3 \\ 5 & 6 & 1 \\ 7 & 4 & 9 \end{bmatrix}$. Find $P^T Q^T$.	6	2	CO1
12.	For the matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 1 & 1 & 4 \end{bmatrix}$, find the adjoint of A.	6	2	CO1
13.	Given the matrix $P = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$. a. Calculate the minor and cofactor of all the elements. b. Use minors and cofactors to find the determinant of matrix P.	6	5	CO1
14.	Using Gauss Jordan method solve the system of equations: $$x + y + z = 6$$ $$2y - z = 3$$ $$-x + 3y + 2z = 12$$	6	3	CO3
15.	Find the derivative of $\frac{x}{x-1}$.	6	4	CO5

16.	Integrate the function $(4x + 2)\sqrt{x^2 + x + 1}$ and include the constant of integration.	6	2	CO5

17.	By the method of inspection find the anti-derivative of following functions;
	
	   a. $\cos 3x$
	   b. $(ax + b)^2$
		6	5	CO5

18.	Integrate the function $x(1 - x)^n$ from 0 to 1.	6	5	CO5

Section C
Answer any one question. Each carries 10 marks. (1x10=10 marks)

No.	Question	M	BL	CO
19.	Find the characteristic equation and eigen values of the matrix $\begin{bmatrix} 1 & -1 & 4 \\ 3 & 2 & -1 \\ 2 & 1 & -1 \end{bmatrix}$. Then, calculate the eigen vector of the largest eigen value.	10	4	CO2
20.	a. Find $\frac{d}{dx}((x^2 + 11x + 7)(x + 5))$. b. Find $\frac{d}{dx}(\frac{e^x}{1+x})$.	10	3	CO5

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