Name:

Enrolment No:



UPES

Supplementary Examination, December 2023

Course: Remedial Mathematics

Semester : I

Program: Int. BMSC Microbiology/N &D/Clinical Research,

BT Biomedical/Biotechnical,

B.Sc. FND/Microbiology/Clinical Research

Duration: 3 Hours

Max. Marks: 100

Course Code: BP106RMT

Instructions: All questions are compulsory.

S. No.	Section A	Marks	COs
	Short answer questions/ MCQ/T&F		
	(20Qx1.5M= 30 Marks)		
Q 1	The order of Matrix A is 4×4 and B is 4×3 the order of AB is:		
	a. 1 × 3		
	b. 4 × 3	1.5	CO1
	c. 3 × 3		
	d. 3 × 4		
Q2.	The cofactor of 4 in $\begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & 2 \\ 3 & 2 & 1 \end{bmatrix}$ is:		
	a. 0	1.5	CO1
	b8	1.5	COI
	c. 8		
	d4		
Q3.	Find the order of A^T if the matrix $A = \begin{pmatrix} 2 & -3 & 5 \\ 1 & 6 & 9 \end{pmatrix}$	1.5	CO1
Q4.	Check whether the following matrix is invertible:		
	$\begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$	1.5	CO1
Q5.	If $A^2 - A + I = 0$ then inverse of then the inverse of A is:		
	a. $I-A$		
	b. $A-I$	1.5	CO1
	c. A		
	d. $A+I$		

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Q6.	The slope of a line $ax + by + c = 0$ is:		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Qu.			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		a. $\frac{a}{b}$		
Q7. The lines $3x + 4y = 9$ and $6x + 8y = 15$ are parallel: a. True b. False Q8. Find the distance of $(5, 12)$ from the origin. Q9. Write the condition for two lines to be perpendicular. Q10.		b. $-\frac{a}{b}$	1.5	CO2
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Q16. If $u \& v$ are two functions of x then write the formula for integration of uv . CO2				
Q16. If $u \& v$ are two functions of x then write the formula for integration of uv .				
uv.	Q16.			GO.
	-		1.5	CO2
	Q17.	Integration of xe^x is given by:		
a. $e^x(x+1)$ 1.5 CO2			1.5	CO2
b. $-e^x(x+1)$		b. $-e^{x}(x+1)$		

	c. $e^{x}(x-1)$		
	$d. xe^x$		
Q18.	Define upper triangular matrix.	1.5	CO1
Q19.	Find the value of $\lim_{x\to 8} \frac{x^2-64}{x-8}$	1.5	CO1
020		1.0	
Q20.	The function $f(x) = x^3 - 4x^2 + 4x + 3$ defined on $[-1, 3]$ has: a. Minimum value -6 at $x = -1$		
	a. Minimum value -6 at $x = -1$ b. Minimum value 6 at $x = 3$	1.5	CO3
	c. Minimum value 3 at $x = 3$	1.3	03
	d. None of these		
	Section B		
A 44	(4Qx5M=20 Marks)		
	t any 4 questions out of 5.	5	CO2
Q 1	Find the equation of a line passing through the point $(3, -2)$ and	5	CO2
	perpendicular to the line $x - 3y + 5 = 0$.		
Q 2	Show that the points $A(-3,-3)$, $B(3,3)$ & $C(-3\sqrt{3},3\sqrt{3})$ are the	5	CO2
	vertices of equilateral triangle.		
	vertices of equilitating in		
Q 3	Evaluate $\frac{dy}{dx}$ when $y = (3x^4e^x + 5)$	5	CO3
Q 4	Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$	5	CO3
Q 5	Evaluate $I = \int \frac{x}{x^2 - 1} dx$	5	CO3
	Section C		
	(2Qx15M=30 Marks)		
	stions are compulsory Q1 has internal choice.		1
Q 1	A pharmaceutical company produces three medicines using	15	CO4
	ingredients A, B and C. One unit of P requires 1, 2 and 3 units of		
	A, B and C respectively. One unit of Q requires 2, 3 and 2 units		
	of A, B and C respectively. One unit of R requires 1, 2 and 2		
	units of A, B and C respectively. The number of units available		
	for ingredients A, B and C are 8, 14 and 13 units respectively.		
	Using the matrix method, determine the number of units of each		
	medicine to produce to utilize completely the available resources.		
	OR		
	Bacteria increases at the rate proportional to the number of		
	bacteria present. If the original number <i>N</i> doubles in 4 hours, find		
	how many hours the number of bacteria will be 16 <i>N</i> .		
Q 2	Evaluate the integral <i>I</i> using the method of partial fractions	15	CO3
	$I = \int \frac{x+4}{(3+2x-x^2)} dx$		

	Section D				
	(2Qx10M=20 Marks)				
All questions are compulsory Q2 has internal choice.					
Q 1	Find the equation of the line which passes through the point	10	CO2		
	(3, 4) and the sum of its intercept on the axes is 14.				
Q 2	Apply Cramer's rule to solve the following system of equations:	10	CO1		
	x + y + z = 6				
	y + 3z = 11				
	x - 2y + z = 0				
	OR				
	Determine whether the matrix <i>A</i> is invertible or not. If it is				
	invertible then apply adjoint method to find the inverse of matrix				
	<i>A</i> :				
	$A = \begin{bmatrix} 2 & 6 & 3 \\ 4 & -1 & 3 \\ 1 & 3 & 2 \end{bmatrix}$				
	l1 3 2J				