Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, December 2022

Course: Remedial Mathematics

Semester : I

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

BT Biomedical/Biotechnical,

B.Sc. FND/Microbiology/Clinical Research

Course Code: BP106RMT

Duration : 3 Hours Max. Marks: 100

Instructions: All questions are compulsory

S. No.	Section A	Marks	COs
	Short answer questions/ MCQ/T&F		
	(20Qx1.5M= 30 Marks)		
Q 1	If $A = \begin{bmatrix} 2 & 4 \\ a & -5 \\ 3 & d \end{bmatrix}$ and $B = \begin{bmatrix} 2 & b \\ 1 & -c \\ 3 & 2 \end{bmatrix}$ are equal, then the value of	1.5	CO1
	<i>a</i> , <i>b</i> , <i>c</i> , <i>d</i> is:		
	a. $a = 1, b = 4, c = 5, d = 2$		
	b. $a = 1, b = 4, c = -5, d = 2$ c. $a = 1, b = 4, c = 5, d = -2$		
	c. $a = 1, b = 4, c = 5, a = -2$ d. $a = -1, b = 4, c = 5, d = 2$		
02		1.5	C01
Q2.	A matrix contains 48 elements then which of the following cannot be the number of rows:	1.5	COI
	b. 18		
	c. 8		
02	d. 24	1.5	
Q3.	Find the cofactor of 3 in the matrix $A = \begin{pmatrix} 2 & 5 & -6 \\ 4 & 3 & 0 \\ 1 & 0 & -2 \end{pmatrix}$	1.5	CO1
Q4.	For matrices $A = \begin{pmatrix} 2 & -3 \\ 0 & 2 \\ 7 & -2 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -2 & 0 \\ 5 & 1 & 2 \end{pmatrix}$, which of the	1.5	CO1
	following is the matrix $3(A^T + 2B)$?		
	a. $\begin{pmatrix} 12 & 12 & 21 \\ 21 & -12 & -6 \end{pmatrix}$		
	b. $\begin{pmatrix} 4 & 7 \\ -4 & 4 \\ 7 & 2 \end{pmatrix}$		

	(12 -12 21)		
	c. $\begin{pmatrix} 12 & -12 & 21 \\ 21 & 12 & 6 \end{pmatrix}$		
	d. The matrix is undefined		
Q5.	The value of resultant matrix multiplication $(7 \ 5 \ 3) \begin{pmatrix} 7 \\ 3 \end{pmatrix}$ is:	1.5	CO1
	(2)		
	a. 70 b. 49		
	6. 49 c. 15		
	d. 6		
Q6.	Two lines $3x - y + 4 = 0$ and $ax + 2y - 3 = 0$ are parallel, then	1.5	CO2
Qu.	a is equal to:	1.5	002
	a3		
	b6		
	c0.5		
	d. 3		
Q7.	Which point is on the line $3x - 5y - 9 = 0$	1.5	CO2
_	a. (-4, -1)		
	b. (1,-2)		
	c. (-3,-2)		
	d. (-2, -3)		
Q8.	Which line is parallel to the line $x - 6 = 0$?	1.5	CO2
	a. $x = -2$		
	b. $y = 5$		
	c. y = 2x + 3		
	d. $y - 1 = 0$		
Q9.	What is the <i>y</i> intercept of the line $5x - 3y + 30 = 0$?	1.5	CO2
Q10.	What is the slope of the line $-5x + 8y - 2 = 0$?	1.5	CO2
Q11.	If $f(x) = loge^{tanx}$ then $f'(x) = ?$	1.5	CO3
Q12.	Second derivative of <i>cosx</i> is given by:	1.5	CO3
	a. <i>—sinx</i>		
	b. <i>sinx</i>		
	c. cosx		
0.10	d. –cosx		
Q13.	If $x = sin\theta$, $y = cos\theta$, then $\frac{dy}{dx} = ?$	1.5	CO3
Q14.	Evaluate $I = \int \left(x^2 + \frac{2}{x^3} - 7\right) dx$	1.5	CO3
Q15.	$\int 4^x dx = ?$	1.5	CO3
	a. $4^{x} log 4 + c$		
	b. $\frac{4^x}{\log 4} + c$		
	c. $\frac{4^{x+1}}{x+1} + c$		
016	d. none	1.5	CO3
Q16.	Laplace transform of <i>t</i> . <i>sinat</i> is given by:	1.5	005

	a. $\frac{2s}{(s^2-a^2)}$ b. $\frac{2s}{(s^2+a^2)}$		
	$ \begin{array}{c} 0. (s^2 + a^2) \\ 2as \end{array} $		
	C. $\frac{2as}{(s^2+a^2)}$		
	d. $\frac{2}{(s^2 + a^2)}$		
Q17.	What is the Laplace transform of t^2 ?	1.5	CO3
Q18.	Find the value of $\lim_{x \to 1} \frac{x^3 - 1}{x - 1}$	1.5	CO1
Q19.	If $log_{10}(x-3) + log_{10}x = log_{10}10$ then the value is x is given	1.5	CO1
	by:		
	a. 2		
	b. 1		
	c. 10		
<u></u>	d. 5 Define triangular matrix with the help of an example	15	CO1
Q20.	Define triangular matrix with the help of an example.	1.5	
	Section B		
	(4Qx5M=20 Marks)		
	pt any 4 questions		
Q 1	Determine the value of x if the distance between the points	5	CO2
	(x, -1) and $(3, 2)$ is 5.		
Q 2	Find the equation of a line which passes through the point	5	CO2
Ľ	$(-2, 3)$ and makes an angle of 30° with the positive direction		-
	of the <i>x</i> -axis.		
Q 3	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$	5	CO3
Q 3 Q 4	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$	5	CO3 CO3
-	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$ Apply the rule of integration by substitution to evaluate		
Q 4	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$	5	CO3
Q 4	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$ Apply the rule of integration by substitution to evaluate $I = \int 2x^3\sqrt{(x^2 + 4)} dx$ Section C	5	CO3
Q 4 Q 5	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$ Apply the rule of integration by substitution to evaluate $I = \int 2x^3\sqrt{(x^2 + 4)} dx$ Section C(2Qx15M=30 Marks)	<u>5</u> 5	CO3 CO3
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Q 4 Q 5	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$ Apply the rule of integration by substitution to evaluate $I = \int 2x^3\sqrt{(x^2 + 4)} dx$ Section C(2Qx15M=30 Marks)The total number of units of three products $P = 8, Q = 50 \& R = 0$ that processed by three machines $A, B and C$ is	<u>5</u> 5	CO3 CO3
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Q 4 Q 5	Evaluate $\frac{dy}{dx}$ when $y = cos\sqrt{x}\log sinx$ Evaluate the Laplace transform of $(t^2 + 4t + 2)e^{3t}$ Apply the rule of integration by substitution to evaluate $I = \int 2x^3\sqrt{(x^2 + 4)} dx$ Section C (2Qx15M=30 Marks)The total number of units of three products $P = 8, Q = 50 \& R = 0$ that processed by three machines A, B and C is given by the matrixA B C	<u>5</u> 5	CO3 CO3

	In a culture, bacteria increase at the rate proportional to the		
	number of bacteria present. If there are 200 bacteria initially		
	and are doubled in 4 hours, find the number of bacteria present		
	9 hours later. $(2^{\frac{9}{4}} = 4.76)$		
Q 2	Evaluate the integral <i>I</i> using the method of partial fractions	15	CO3
	$I = \int \frac{3x - 2}{(x - 1)^2 (x + 3)} dx$		
	Section D		-
	(2Qx10M=20 Marks)		
Q 1	Find the ratio in which the line $3x + y - 9 = 0$ divides the line	10	CO2
	segment joining $A(1,3)$ and $B(2,7)$.		
Q 2	Without expanding the determinant show that	10	CO1
	$\begin{vmatrix} b+c & bc & b^2c^2 \\ c+a & ca & c^2a^2 \\ a+b & ab & a^2b^2 \end{vmatrix} = 0$		
	OR		
	Determine whether the matrix A is invertible or not. If it is		
	invertible then apply adjoint method to find the inverse of		
	matrix A:		
	[2 6 3]		
	$A = \begin{bmatrix} 2 & 6 & 3 \\ 4 & -1 & 3 \\ 1 & 3 & 2 \end{bmatrix}$		