Name:	
Enrolment No:	

Instructions: All questions are compulsory.

S. No.	Section A **Short answer questions/ MCQ/T&F** **(20Qx1.5M= 30 Marks)**	Marks	COs
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 c. 3×3 d. 3×4	1.5	CO1
Q2.	The cofactor of 4 in $\begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & 2 \\ 3 & 2 & 1 \end{bmatrix}$ is: a. 0 b. -8 c. 8 d. -4	1.5	CO1
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 $A^2 - A + I = O$ then inverse of then the inverse of A is: a. $I - A$ b. $A - I$ c. A d. $A + I$	1.5	CO1

Q6.	The slope of a line $ax + by + c = 0$ is:
	
	   a. $\dfrac{a}{b}$
	
	   b. $-\dfrac{a}{b}$
	
	   c. $\dfrac{c}{b}$
	
	   d. $-\dfrac{c}{b}$
		1.5	CO2

Q7.	The lines $3x + 4y = 9$ and $6x + 8y = 15$ are parallel:
	
	   a. True
	   b. False
		1.5	CO2

Q8.	Find the distance of $(5, 12)$ from the origin.	1.5	CO2
Q9.	Write the condition for two lines to be perpendicular.	1.5	CO2

Q10.	$\int_0^2 (x^2 + 2)\, dx$ is equal to:
	
	   a. $\dfrac{24}{3}$
	
	   b. $\dfrac{25}{3}$
	
	   c. $\dfrac{26}{3}$
	
	   d. $\dfrac{27}{3}$
		1.5	CO2

Q11.	$\int_0^\pi \sin^2 x\, dx =$
	
	   a. $\dfrac{\pi}{2}$
	
	   b. $\dfrac{\pi}{4}$
	
	   c. 2π
	   d. 4π
		1.5	CO2

Q12.	If $f(x) = x^4 + 5x^3 - 11x^2 - 45x + 60$ then find $f''(x)$.	1.5	CO3
Q13.	Write the formula of $\dfrac{d}{dx}(uv)$ where u & v are the functions of x.	1.5	CO3

Q14.	$\dfrac{d}{dx}(sinx\ cosx)$ is equal to:
	
	   a. $cos^2x + sin^2x$
	   b. $sin^2x - cos^2x$
	   c. $cos^2x - sin^2x$
	   d. $-2cos^2x$
		1.5	CO3

Q15.	If $f(x) = \dfrac{e^x}{x^2}$ then, $f'(1)$ is:
	
	   a. e
	   b. $-e$
	   c. $2e$
	   d. $-2e$
		1.5	CO3

Q16.	If u & v are two functions of x then write the formula for integration of uv.	1.5	CO2

Q17.	Integration of xe^x is given by:
	
	   a. $e^x(x + 1)$
	   b. $-e^x(x + 1)$
		1.5	CO2

	c. $e^x(x-1)$ d. xe^x		
Q18.	Define upper triangular matrix.	1.5	CO1
Q19.	Find the value of $\lim\limits_{x\to 8}\frac{x^2-64}{x-8}$	1.5	CO1
Q20.	The function $f(x)=x^3-4x^2+4x+3$ defined on $[-1,3]$ has: a. Minimum value -6 at $x=-1$ b. Minimum value 6 at $x=3$ c. Minimum value 3 at $x=2$ d. None of these	1.5	CO3

Section B
(4Qx5M=20 Marks)

Attempt any 4 questions out of 5.

Q 1	Find the equation of a line passing through the point $(3,-2)$ and perpendicular to the line $x-3y+5=0$.	5	CO2
Q 2	Show that the points $A(-3,-3), B(3,3)\ \&\ C(-3\sqrt{3},3\sqrt{3})$ are the vertices of equilateral triangle.	5	CO2
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)

All questions are compulsory Q1 has internal choice.

Q 1	A pharmaceutical company produces three medicines using 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 N doubles in 4 hours, find how many hours the number of bacteria will be $16N$.	15	CO4
Q 2	Evaluate the integral I using the method of partial fractions $$I=\int\frac{x+4}{(3+2x-x^2)}\,dx$$	15	CO3

	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 $(3, 4)$ and the sum of its intercept on the axes is 14.	**10**	**CO2**
Q 2	Apply Cramer's rule to solve the following system of equations: $$x + y + z = 6$$ $$y + 3z = 11$$ $$x - 2y + z = 0$$ **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: $$A = \begin{bmatrix} 2 & 6 & 3 \\ 4 & -1 & 3 \\ 1 & 3 & 2 \end{bmatrix}$$	**10**	**CO1**