UNIVERSITY OF PETROLEUM & ENERGY STUDIES
EndSemester Examination – December, 2021

Program:B.COM (Hons)   **Semester:I**
Subject/Course: Business Mathematics   **Max. Marks: 100**
Course Code: DSQT1001   **Duration: 3 Hours**

Q.No.	Section A (Type the Answers in test box)	10Q×2M=20M	COs
	Question	**Marks**	**COs**
1	a) Find the missing terms in the geometric sequence ..., 4, ___, ___, ___, ___, 12500, ...	2	CO 1
2	b) Suppose we have the arithmetic sequence 3, 8, 13, 18, 23, 28, 33, ... Find a_{202}	2	CO 1
3	Which of the following two sets are equal? (a) A = {1, 2} and B = {1} (b) A = {1, 2} and B = {1, 2, 3} (c) A = {1, 2, 3} and B = {2, 1, 3} (d) A = {1, 2, 4} and B = {1, 2, 3}	2	CO 1
4	IF A = [5, 6, 7] and B = [7, 8, 9] then A ∪ B is equal to (a) [5, 6, 7, 8, 9] (b) [5, 6, 7] (c) [7, 8, 9] (d) None of these	2	CO 1
5	If $\begin{bmatrix} 1-x & 2 \\ 8 & 6 \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 8 & 6 \end{bmatrix}$ then x = (a) ±6 (b) 6 (c) -5 (d) 7	2	CO1
6	Differentiate $\sin(3x+2)$	2	CO1
7	Differentiate $\log(5x-2)$	2	CO1
8	if p − 1, p + 3, 3p − 1 are in AP, then p is equal to (a) 4 (b) -4	2	CO1

	(c) 2 (d) -2		
9	Evaluate the indefinite integral $\int (30x^5 + 8x^3 - 12x^2)\, dx$	2	CO1
10	Evaluate the indefinite integral $\int x^2 (3 - 10x^3)^4\, dx$	2	CO1

1. **Each question will carry 15 marks**
2. **Instruction: Write short/ brief notes**

	Section-B (Scan and upload)	4Q×5M=20M	
1.	a) Simplify the matrix operation $\left(\begin{bmatrix} -4 & -1 \\ -6 & -5 \\ -3 & -2 \end{bmatrix} + \begin{bmatrix} -3 & -1 \\ -6 & 0 \\ 2 & 4 \end{bmatrix} \right) \cdot \begin{bmatrix} 4 \\ 0 \end{bmatrix}$	5	CO 2
2.	b) Solve the equation $-3A - \begin{bmatrix} -9 \\ -5 \\ -3 \\ 0 \end{bmatrix} = \begin{bmatrix} -9 \\ -1 \\ 21 \\ -3 \end{bmatrix}$	5	CO 2
3.	c) Evaluate the determinant $\begin{vmatrix} -4 & -5 & -7 \\ 1 & -6 & -1 \\ 0 & -2 & 1 \end{vmatrix}$	5	CO 2

Q.No.		Marks	CO
4.	A manufacturing company finds that the daily cost of producing x items of a product is given by C(x)=210x+7000. If each item is sold for Rs. 350, find the minimum number that must be produced and sold daily to ensure no loss.	5	CO 3

Q.No.	**Section-C** (Scan and upload)	3Q×10M=30M	
1	i) If A= $\begin{bmatrix} 2 & 3 \\ 4 & 6 \end{bmatrix}$ & B= = $\begin{bmatrix} -1 & 2 \\ 2 & 6 \end{bmatrix}$ Verify that $AB' = B'A'$ where B' & A' are transpose of matrix B & A respectively.	10	CO 3

2	A company's marginal cost function is given by $MC = 100 - 2Q + 0.6Q^2$. Calculate the cost in increasing production from:
	  1. 5 to 10 units
	  2. 10 to 15 units.
		10	CO 3

3	a) For the time-independent Markov chain described by the picture below, what is its transition matrix? b) If the initial state is [0.6 0.4] find the state of the system after two periods. OR The average cost function (AC) for a product is given by AC =0 .006x^2 − 0.02x-30 + $\frac{5000}{x}$; where x is the output. Find (i) the marginal cost function (ii) the marginal cost when 50 units are produced.	10	CO3

Q.No.	**Section-D** (Scan and upload)	2Q×15M=30M	

1	Let C(x) be the cost of producing x calculators and $C(x) = 1800 + 10x + 0.02\,x^2$ dollars. a) Find the marginal cost function. b) Find marginal Cost at x= 500 and give units. c) Find the actual cost of the 501th calculator and compare with marginal cost at x=500.	15	CO4
2	Yesterday, the price of envelopes was \$3 a box, and Aarush was willing to buy 10 boxes. Today, the price has gone up to \$3.75 a box, and now he is willing to buy 8 boxes. Is Aarush's demand for envelopes elastic or inelastic? What is Aarush's elasticity of demand? OR The total revenue received from the sale of x units of a product is given by $R(x) = 12x + 2x^2 + 6$. Find (i) the average revenue (ii) the marginal revenue (iii) marginal revenue at x = 50	15	CO4