UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec' 2019

Course: Business Mathematics   Semester: I
Program: BBA(Core)   Time: 3 Hours
Course code: Max. Marks: 100

Instructions: Please maintain the sequence of answers as per the questions, Initial one hour and last half an hour there will be no exit. Please entangle your graph sheets at last but leaving one page inside your answersheets.

	SECTION A	(10 * 2 Marks Each = 20 Marks)	
Q1.	The value of $y = 3x^2 + 2x - 5$ at x=2 is A. 14 B. 12 C. 13 D. 11	2	CO1
Q2.	Why we take log? A. To make the tedious calculation easier B. To compare two or more extreme opposite figures C. To normalize the data D. All of the above	2	CO1
Q3.	The condition of skew symmetric matrix is A. $A = A^T$ B. $A = -A^T$ C. $A = aA^T$ D. $A = -A$	2	CO1
Q4.	Which of the following is lower triangular matrix? A. $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 0 & 0 \\ 5 & 3 & 0 \end{bmatrix}$ B. $P = \begin{bmatrix} 1 & 7 & 2 \\ 0 & 3 & 8 \\ 0 & 0 & 4 \end{bmatrix}$ C. $P = \begin{bmatrix} 0 & 2 & 4 \\ 4 & 0 & 8 \\ 5 & 3 & 0 \end{bmatrix}$ D. $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 6 & 0 \\ 5 & 3 & 9 \end{bmatrix}$	2	CO1
Q5.	Which of the following value you get if you Integrate $y = xe^{3x^2}$. A. $\frac{1}{3}e^{3x^2} + c$ B. $\frac{1}{12}xe^{3x^2} + c$ C. $\frac{1}{6}e^{3x^2} + c$ D. e^{3x^2}	2	CO1

Q6.	Find the maximum point of this function $y = x^3 - 3x^2 - 24x + 6$ which maximizes the value of y A. X=4 B. X=-4 C. X=2 D. X=-2	2	CO1
Q7.	$P = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix} Q = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ Find PQ. A. $PQ = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$ B. $PQ = \begin{bmatrix} 50 \\ 10 \end{bmatrix}$ C $PQ = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$ D. $PQ = \begin{bmatrix} 5 \\ 10 \end{bmatrix}$	2	CO1
Q8.	Which of the following condition is used to check the viability of system of linear equation. A. Hawkins Simon Condition B. Hawkins Pressure Condition C. Simon Peter Condition D. Michel Porter Condition	2	CO1
Q9.	If two company has to be compared graphically where one company 1 has yearly turnover is Rs. 100000/- and other company 2 has yearly turnover is Rs. 10000000000000/- After applying logarithm what would be the value in the graph for both the company? A. For Company 1 it is 6 and for 2nd company it is 14 B. For Company 1 it is 5 and for 2nd company it is 13 C. For Company 1 it is 6 and for 2nd company it is 13 D. For Company 1 it is 5 and for 2nd company it is 12	2	CO1
Q10.	Matrix A $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & -1 & 4 \end{bmatrix}$ what is the value of AA^T A. $\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 3 \\ 4 & 26 \end{bmatrix}$ B. $\begin{bmatrix} 5 & 1 \\ 1 & 26 \end{bmatrix}$ D. $\begin{bmatrix} 5 & 3 \\ 4 & 26 \end{bmatrix}$	2	CO1
SECTION B		**(4* 5 Marks Each -20 Marks)**	
Q11.	Differentiation $y = 3x^2 + 2x - 5$ at x=5 and find the value.	5	CO2

Q12.	The total cost and total revenue of a firm are given by $C = x^3 - 12x^2 + 48x + 11$ and $R = 83x - 4x^2 - 21$. Find the output
	    (i) When the revenue is maximum
	    (ii) When profit is maximum.
		5	CO2& CO3

Q13.	Find the producers' surplus for the supply function $p = 3 + x^2$	5	CO2& CO3

	When the price is 12.		
Q14.	Find the value of determinant $\begin{bmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 6 & 8 & 10 \end{bmatrix}$	**5**	**CO3**

Section D   (3* 10 - 30 Marks)

Q15.	Test Hawkins-Simon condition for the viability/validity of the system: $$A = \begin{array}{c} steel \\ tools \\ transportation \end{array} \begin{array}{ccc} Steel & tools & transportation \\ \begin{bmatrix} 0.2 & 0.3 & 0.2 \\ 0.4 & 0.1 & 0.2 \\ 0.1 & 0.3 & 0.2 \end{bmatrix} \end{array}$$	**10**	**CO3**
Q16.	10 watches are sold when the price is Rs. 80; 20 watches are sold when the price is Rs. 60. What is the demand equation? Assume the demand curve to be a straight line	**10**	**CO3**

Q17.	The average cost function (AC) takes the form $AC = \dfrac{4}{Q} + 2 - 0.3Q + 0.05Q^2$ and the total revenue function takes the form $TR = 2Q^2 - \dfrac{Q^2}{12}$
	
	    (i) Find profit function for the given market at Q=4
	    (ii) Also, find marginal cost and marginal revenue.
		10	**CO3**

SECTION-D   (30 Marks)
Case Study

Q18.	Financial investment decision making is extremely difficult due to the complexity of the domain. Many factors could influence the change of share prices. Financial Genetic Programming is a genetic programming based forecasting system, which is designed to help users evaluate the impact of factors and explore their interactions in relation to future prices. Users channel into FGP factors that they believe are relevant to the prediction. Examples of such factors may include fundamental factors such as "price-earnings ratio", "inflation rate" and/or technical factors such as "5-days moving average", "63-days trading range breakout", etc. So in order to take decision about investment, an amount of Rs. 50000 is put into three investments at the rates of interest of 6%, 7% and 8% per annum respectively. The total annual income is Rs. 3580. If the combined income from the first two investment is Rs. 700 more than the income from the third, find the amount of each investment by using matrix Inverse method.		**CO4**