

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**Online End Semester Examination, May 2020**

**Course: Business Mathematics**  
**Program: BBA(FAS/CORE/EPRCC)**  
**Course code: DSQT 1001**  
**Instructions: All the questions are compulsory.**

**Semester: I**  
**Time: 3 Hours**  
**Max. Marks: 100**

**SECTION A**

**( 6x5=30 Marks)**

1.	<p><b>State True or False.</b></p> <p>i) Rank of <math>\begin{bmatrix} 0 &amp; 2 \\ 0 &amp; 2 \end{bmatrix}</math> is 2.</p> <p>ii) Matrix <math>A = \begin{bmatrix} 3 &amp; 2 \\ 6 &amp; 4 \end{bmatrix}</math> is singular matrix.</p> <p>iii) Inverse of Matrix <math>X = \begin{bmatrix} 5 &amp; 1 \\ 8 &amp; 2 \end{bmatrix}</math> do not exist.</p> <p>iv) For a given set <math>b \in \{\{b\}\}</math>.</p> <p>v) Set A and B are disjoint sets then <math>A \cap B = \phi</math>.</p>	<b>5</b>	<b>CO1</b>
2.	<p><b>State True or False.</b></p> <p>i) If <math>U = \{1,2,3,4,5,6\}</math> is universal set and <math>A = \{1,2,3\}</math>, then <math>U - A = A</math></p> <p>ii) If X is a matrix and  <math display="block">\begin{bmatrix} 1 &amp; 4 &amp; 3 \\ 2 &amp; 2 &amp; 3 \end{bmatrix} * X * \begin{bmatrix} 1 &amp; 4 &amp; 3 \\ 2 &amp; 2 &amp; 3 \end{bmatrix} = \begin{bmatrix} 10 &amp; 4 &amp; 9 \\ 10 &amp; 4 &amp; 9 \end{bmatrix}</math> Then order of matrix X is <math>2 \times 3</math></p> <p>iii) Following series is an Arithmetic Progression  <math>3 + 5 + 7 + 9 + 12 + \dots</math></p> <p>iv) If <math>y = f(u)</math> and <math>u = f(x)</math> then  <math display="block">\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}</math></p> <p>v) A square matrix is said to be diagonal matrix if <math>a_{ij} = 0</math> for <math>i \neq j</math>.</p>	<b>5</b>	<b>CO1</b>
3.	<p><b>State True or False.</b></p> <p>a) Matrix inverse exist only when determinant is zero.</p> <p>b) Sum of following series is 216  <math display="block">-\frac{1}{4} + \frac{1}{2} - 1 + 2 - 4 + 8 \dots \dots \dots \infty</math></p> <p>c) For given sets A,B,C  <math display="block">(A \cup B) \cup C = A \cup (B \cup C)</math></p> <p>d) For two matrix A and B  <math display="block">(A - B)' = A' - B'</math></p> <p>e) Derivative of <math>a^x</math> is also <math>a^x</math> where a is constant.</p>	<b>5</b>	<b>CO1</b>

4.	<p><b>Fill in the blanks.</b></p> <p>(i) Marginal revenue is _____ of total revenue.</p> <p>(ii) In case of price demand under normal condition of demand, <math>x_d</math> _____ as <math>p</math> increases. (where <math>x_d</math> is quantity demanded of commodity <math>p</math> is price of commodity)</p> <p>(iii) Property tax is _____ Cost.</p> <p>(iv) If demand and supply of a commodity is denoted by <math>Q_1^d</math> and <math>Q_1^s</math> then condition of equilibrium is _____.</p> <p>(v) <math>\int e^{3x^2} x dx</math> can be solved using the _____ method of integration.</p>	5	CO1
5.	<p><b>Fill in the blanks.</b></p> <p>(i) If <math>f(x)</math> is continuous and odd function over <math>[a, -a]</math> then  <math display="block">\int_{-a}^a f(x) dx = \underline{\hspace{2cm}}</math></p> <p>(ii) The function <math>y = x^2 - 2x + 3</math> has a minima at _____.</p> <p>(iii) If a function <math>f(x)</math> has a point of minima at <math>x = c</math> and <math>f''(c) \underline{\hspace{1cm}} 0</math>.</p> <p>(iv) If <math>y = [f(x)]^n</math> where <math>f(x)</math> is function of <math>x</math> and <math>n</math> is real number then  <math display="block">\frac{dy}{dx} = \underline{\hspace{2cm}}</math></p> <p>(vi) If <math>y = \frac{u}{v}</math> where <math>u</math> and <math>v</math> are function of <math>x</math> and <math>v \neq 0</math> then  <math display="block">\frac{dy}{dx} = \underline{\hspace{2cm}}</math></p>	5	CO1
6.	<p><b>Fill in the blanks:</b></p> <p>a)  <math display="block">\int_2^{\hspace{1cm}} (x^3) = 0</math></p> <p>b) If production is zero then _____ is equal to fixed cost.</p> <p>c) Relationship between _____ and quantity demanded is called demand function.</p> <p>d) <math>\frac{\text{Revenue}}{\text{quantity sold}}</math> Is also called _____ function</p> <p>e) If for any function at <math>x=c</math>, first derivative is zero and second derivative is negative then at <math>x=c</math> function will have its _____ value.</p>	5	CO1

**SECTION B**

**( 5x10=50 Marks)**

1.	Integrate the following function: $\int_{-4}^{-1} x^2(3 - 4x)dx$	<b>10</b>	<b>CO2</b>
2.	Find the value of the Determinant $\begin{vmatrix} 3 & 2 & 0 \\ 2 & 1 & 3 \\ -5 & -1 & 4 \end{vmatrix}$	<b>10</b>	<b>CO2</b>
3.	Find the maximum and minimum value of $f(x) = x^3 - 12x^2 + 36x + 17$	<b>10</b>	<b>CO2</b>
4.	Differentiate the following function with respect to x: $y = \frac{2x^2 + 3x + 7}{x^2 + 7}$	<b>10</b>	<b>CO3</b>
5.	Find the derivative of the following function $\frac{(\log x)^2}{x}$	<b>10</b>	<b>CO3</b>

**SECTION C**

**( 1x20=20 Marks)**

1	<p>a) A salesman has the following record of sales during three months for three items which have different rate of commission.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Month</th> <th colspan="3">Sales of units</th> <th rowspan="2">Total commission drawn(₹)</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>January</td> <td>90</td> <td>100</td> <td>20</td> <td>800</td> </tr> <tr> <td>February</td> <td>130</td> <td>50</td> <td>40</td> <td>900</td> </tr> <tr> <td>March</td> <td>60</td> <td>100</td> <td>30</td> <td>850</td> </tr> </tbody> </table> <p>Using Matrix methods find out the rate of commission of items <b>A, B, and C.</b></p> <p>b) If, MC is marginal cost and MR is marginal revenue and <math display="block">MC = 20 + \frac{x}{30}, \text{ and } MR = 35,</math> The fixed cost is 2500, determine the maximum profit and profit maximising level output.</p>	Month	Sales of units			Total commission drawn(₹)	A	B	C	January	90	100	20	800	February	130	50	40	900	March	60	100	30	850	<b>20</b>	<b>CO4</b>
Month	Sales of units			Total commission drawn(₹)																						
	A	B	C																							
January	90	100	20	800																						
February	130	50	40	900																						
March	60	100	30	850																						