

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

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

Course: Business Mathematics	Semester: I
Program: BBA(FAS/CORE/EPRCC)	Time: 3 Hours
Course code: DSQT 1001	Max. Marks: 100

Instructions: All the questions are compulsory.

SECTION A (6x5=30 Marks)

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

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

SECTION B

(5x10=50 Marks)

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

SECTION C

(1x20=20 Marks)

1	a) A salesman has the following record of sales during three months for three items which have different rate of commission. <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> Using Matrix methods find out the rate of commission of items A, B, and C.	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	20	CO4
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March	60	100	30	850																						
	b) If, MC is marginal cost and MR is marginal revenue and $MC = 20 + \frac{x}{30}, \text{ and } MR = 35,$ The fixed cost is 2500, determine the maximum profit and profit maximising level output.																									