Name: Enrolment No:	⑪ **UPES** UNIVERSITY WITH A PURPOSE

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

4.	**Fill in the blanks.**		
	(i) Marginal revenue is _____ of total revenue. (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) (iii) Property tax is _____ Cost. (iv) If demand and supply of a commodity is denoted by Q_1^d and Q_1^s then condition of equilibrium is _____. (v) $\int e^{3x^2} x\, dx$ can be solved using the _____ method of integration.	5	CO1
5.	**Fill in the blanks.** (i) If f(x) is continuous and odd function over [a,-a] then $$\int_{-a}^{a} f(x)dx = \text{_____}$$ (ii) The function $y = x^2 - 2x + 3$ has a minima at_____. (iii) If a function f(x) has a point of minima at $x = c$ and $f''(c)$____0. (iv) If $y = [f(x)]^n$ where f(x) is function of x and n is real number then $$\frac{dy}{dx} = \text{_____}$$ (vi) If $y = \frac{u}{v}$ where u and v are function of x and v≠0 then $$\frac{dy}{dx} = \text{_____}$$	5	CO1
6.	**Fill in the blanks:** a) $$\int_{2}^{\overline{}} (x^3) = 0$$ b) If production is zero then _____ is equal to fixed cost. c) Relationship between _____ and quantity demanded is called demand function. d) $\dfrac{Revenue}{quantity\ sold}$ Is also called _____ function 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.	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.		20	CO4

Month	Sales of units			Total commission
	A	**B**	**C**	**drawn(₹)**
January	90	100	20	800
February	130	50	40	900
March	60	100	30	850

Using Matrix methods find out the rate of commission of items **A, B, and C.**

b) If, MC is marginal cost and MR is marginal revenue and

$$MC = 20 + \frac{x}{30}, and \ MR = 35,$$

The fixed cost is 2500, determine the maximum profit and profit maximising level output.