

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, December 2018**

**Course: Business Mathematics**

**Semester: I**

**Programme: BBA(LM)**

**Time: 03 hrs.**

**Max. Marks:**

**100**

**Instructions: Section A- All questions are compulsory**

**Section B- Attempt Any 4 questions of 5 marks each**

**Section C- All questions are compulsory**

**Section D- Attempt Any 2 questions of 15 marks each.**


**SECTION A**

S. No.		Marks	CO
Q 1	State True or False : The inverse exist only for non singular matrices. (a) True (b) False	2	CO2
Q2	Find the Rank of a Matrix. $A = \begin{pmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{pmatrix}$ (a) 1 (b) 2 (c) 3 (d) 0	2	CO2
Q3	What is $a$ , if $B$ is a singular matrix ? $B = \begin{pmatrix} 1 & 4 \\ 2 & a \end{pmatrix}$ (a) 5 (b) 6 (c) 7 (d) 8	2	CO2
Q4	Find the 15th term of a sequence 20,15,10 (a) -45 (b) -55 (c) -50 (d) 0	2	CO1

Q5	How many terms are there in 20,25,30.....140 (a) 22 (b) 25 (c) 23 (d) 24	2	CO1
Q6	If $A = \{ 2,3,5,6,7,9 \}$ and $B = \{ 5,6,9,10,14 \}$ then $A \cup B$ is (a) $\{ 1,3,5,6,8,9 \}$ (b) $\{ 2,4,6,8,9,10 \}$ (c) $\{ 2,3,5,6,7,9,10,14 \}$ (d) $\{ 2,3,5,9,10,15 \}$	2	CO4
Q7	The members of the set $S = \{ x   x \text{ is the square of an integer and } x < 100 \}$ is _____  a) $\{ 0, 2, 4, 5, 9, 58, 49, 56, 99, 12 \}$ b) $\{ 0, 1, 4, 9, 16, 25, 36, 49, 64, 81 \}$ c) $\{ 1, 4, 9, 16, 25, 36, 64, 81, 85, 99 \}$ d) $\{ 0, 1, 4, 9, 16, 25, 36, 49, 64, 121 \}$	2	CO1
Q8	If first derivative is zero for $x=a$ and second derivative at $x=a$ is greater than zero the function will be maximum at $x=a$ . (a) True (b) False	2	CO1
Q9	Given $y=x^3$ then $dy/dx$ is (a) $3x^2$ (b) $x^2$ (c) $2x^3$ (d) $3x$	2	CO1
Q10	Which of the following is the in-definite integral of $x^2 + 7$ ? (a) $2x+c$ (b) $x^3+7x$ (c) $x^3/2+7x$ (d) $x^3/3+7x+c$	2	CO1
<b>SECTION B</b>			
Q1	Using Cramer's Rule, solve the following system of linear equations: $3x - 4y + 5z = -6$ $x + y - 2z = -1$ $2x + 3y + z = 5$	5	CO2

Q2	From 50 students taking examinations in Mathematics, Physics and Chemistry, each of the student has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry and at most 20 Physics and Chemistry. What is the largest possible number that could have passed all three examination?	5	CO4
Q3	Solve the following system by using the Gauss-Jordan elimination method $x + 2y - 3z = 2$ $6x + 3y - 9z = 6$ $7x + 14y - 21z = 13$	5	CO2
Q4	Find the maxima, minima and the point of inflexion for the following functions (i) $y=x^3+10x^2-25x-40$ (ii) $y=x^4-6x^2+1$	5	CO1
Q5	Find the integral of (a) $\int x(3x^2+1)^{1/2}dx$ (b) $\int (6x-5)(3x^2-5x+8)^{-1/2}$	5	CO1
<b>SECTION-C</b>			
Q1	In an engineering workshop there are 10 machines for drilling,8 machines for turning and 7 machines for grinding. Three types of brackets are made. Type I brackets require 0 minutes for drilling,5 minutes for turning and 4 minutes for grinding. The corresponding times for type II and type III brackets are 3,3,2 and 3,2,2 minutes respectively. How many brackets of each type should be produced per hour so that all the machines remain fully occupied during an hour?	6	CO3
Q2	In a competition, a school awarded medals in different categories. 36 medals in dance, 12 medals in dramatics and 18 medals in music. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories? Draw Venn diagram and Write Properties	6	CO4
Q3	(a) Find Income Elasticity of Demand if $x=2Y^2$ (b) Find elasticity of Demand of a function $p=-2x^2+3x+150$ at $x=8$	6	CO3

Q4	Find the elasticity of supply for the following function (a) $x=2p+p^2$ at $p=5$ and $p=7$ (b) $p=x^2$ at $x=5$	6	CO3
Q5	A wholesaler of pencil charges Rs 24 per dozen on orders of 50 dozens or less. For orders in excess of 50 dozens, the price is reduced by 20 paise per dozen in excess of 50 dozens. Find the size of order that maximises his total revenue.	6	CO3
<b>SECTION-D</b>			
Q1	(a)The marginal Cost function of a firm is $MC=5+3e^x$ , where x denotes thousand of units of output. Find (i)Total cost C, If $C(0)=250$ (ii)Average cost AC (iii) Evaluate TC for 500 Units of output  (b) A company suffers a loss of Rs 110 if its product does not sell at all. Marginal Revenues and Marginal Cost Functions for the products is given by $MR= 50-4x$ and $MC= -10+x$ . Determine the profit function and the equilibrium level of output . Also find the Maximum profit and the breakeven point.	15	CO3
Q2	(a) A company suffers a loss Rs 1000 if its product does not sell at all. The marginal revenue and marginal cost of the firm are given as $MR= 40-2x$ and $MC= x^2-22x+40$ respectively, where x denotes the level of output. Find the equilibrium output and the maximum profits.  (b) If the demand function is $x= 3p^2-40p+93$ , find the consumer's surplus when the consumer purchases 25 units of commodity.	15	CO3
Q3	a)Solve the following linear equations by using Cramers rule $4y + z = 2$ $2x + 6y - 2z = 3$ $4x + 8y - 5z = 4$  (b) The demand law for a commodity is $p=20-2x-x^2$ Find The consumers surplus when quantity demanded is 3 units.	15	CO2 & CO3

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**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
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**Course: Business Mathematics** **Semester: I**  
**Programme: BBA(FAS)**  
**Time: 03 hrs.** **Max. Marks: 100**

**Instructions: Section A- All questions are compulsory**  
**Section B- Attempt any 4 question of 5 marks each.**  
**Section C- All questions are compulsory.**  
**Section D- Attempt any 2 questions of 15 marks each.**

**SECTION A**

S. No.	Question	Marks	CO
Q 1	State True or False : The inverse does not exist for singular matrices. (a) True (b) False	2	CO2
Q2	Find the Rank of a Matrix. $A = \begin{pmatrix} 7 & -1 & 0 \\ 1 & 1 & 4 \\ 13 & -3 & -4 \end{pmatrix}$  (a) 1 (b) 2 (c) 3 (d) 0	2	CO2
Q3	What is $a$ , if $B$ is a singular matrix ? $B = \begin{pmatrix} 4 & 6 \\ 2 & a \end{pmatrix}$ (a) 2 (b) 3 (c) 4 (d) 6	2	CO2
Q4	If the common difference of an arithmetic sequence is 4 and sixth term is 15, find the first term of the sequence. (a) -9 (b) -5 (c) 11/5 (d) 35	2	CO1

Q5	Which term of the AP : 5, 11, 17, ... is 119 ?  (a) 15 (b) 20 (c) 25 (d) 30	2	CO1
Q6	If $A = \{1, 2, 3, 5, 8, 12\}$ and $B = \{5, 8, 9, 12, 14\}$ then $A \cup B$ is (a) $\{1, 3, 5, 6, 8, 9\}$ (b) $\{2, 4, 6, 8, 9, 10\}$ (c) $\{1, 2, 3, 5, 8, 9, 12, 14\}$ (d) $\{2, 3, 5, 9, 10, 15\}$	2	CO4
Q7	The members of the set $S = \{x   x \text{ is the square of an integer and } x = 100\}$ is _____  a) $\{0, 2, 4, 5, 9, 58, 49, 56, 99, 12\}$ b) $\{0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100\}$ c) $\{1, 4, 9, 16, 25, 36, 64, 81, 85, 99, 100\}$ d) $\{0, 1, 4, 9, 16, 25, 36, 49, 64, 121\}$	2	CO1
Q8	If first derivative is zero for $x = a$ and second derivative at $x = a$ is greater than zero then the function will be minimum at $x = a$ . (a) True (b) False	2	CO1
Q9	Given $y = x^4$ then $dy/dx$ is  (a) $4x^2$ (b) $x^3$ (c) $4x^3$ (d) $3x^2$	2	CO1
Q10	Which of the following is the in-definite integral of $x^3 + 9$ ? (a) $3x + c$ (b) $x^3 + 9x$ (c) $x^4/2 + 9x$ (d) $x^4/4 + 9x + c + 7$ ?	2	CO1
<b>SECTION B</b>			
Q1	Using Cramer's Rule, solve the following system of linear equations: $x + 2y - z = 3$ $3x + y + z = 4$ $x - y + 2z = 6$	5	CO2

Q2	An investigator interviewed 100 students to determine their preference for three drinks: milk (M), coffee (C), and tea (T). He reported the following: 10 students had all three drinks, 20 had milk and coffee, 30 had coffee and tea, 25 had milk and tea, 12 had milk only, 5 had coffee only, and 8 had tea only. How many students did not take any of the three drinks? Show with Venn diagram and use properties	5	CO4
Q3	Solve the following system by using the Gauss-Jordan elimination method $x + 2y + z = 2$ $2x + 4y + 3z = 3$ $3x + 6y + 5z = 4$	5	CO2
Q4	Find the maxima, minima and the point of inflection for the following functions (i) $y = x^3 + 6x^2 + 12x + 1$ (ii) $y = -x^3 + 3x^2 + 9x - 27$	5	CO1
Q5	Find the integral of (a) $\int (x^4 + 1)^3 x^3 dx$ (b) $\int (6x - 5)(3x^2 - 5x + 8)^{-1/2}$	5	CO1
<b>SECTION-C</b>			
Q1	The number of professors, readers and lecturers in three educational institutions are 5, 10, 3, 10, 25, 8 and 12, 20, 6 respectively. If the total wage bill per month of the respective institution is Rs 280000, 655000 and 600000. Find the average salary of an employee in each category.	6	CO3
Q2	The supply function of a commodity is $p = (9 - x)^{1/2}$ and the quantity sold is 7 units. Find the producer's surplus.	6	CO3
Q3	(a) Find Income Elasticity of Demand if $x = 4Y^2$ (b) Find elasticity of Demand of a function $p = -2x^2 + 4x + 50$ at $x = 5$	6	CO3
Q4	Find the elasticity of supply for the following function (a) $x = 2p + p^2$ at $p = 5$ and $p = 7$ (b) $p = x^2$ at $x = 5$	6	CO3

Q5	A wholesaler of apples charges Rs 24 per dozen on orders of 50 dozens or less. For orders in excess of 50 dozens, the price is reduced by 20 paise per dozen in excess of 50 dozens. Find the size of order that maximises his total revenue.	6	CO3
<b>SECTION-D</b>			
Q1	(a)-If the marginal revenue function is $MR=240-4x$ . Find the total revenue and the demand function. At what level of output is total revenue maximum.Find maximum total revenue.  (b) If the marginal revenue of a firm is given by $MR=30-10x+x^2$ .Find the total revenue of the Firm at 12 units of output.	15	CO3
Q2	(a) A monopolist demand function is $x=210-3p$ , where p is price and x is the quantity demanded. If the total cost function of the monopolist is $x^2+6x+10$ , find the consumer's surplus at the equilibrium.  (b)Marginal cost of a function is $MC=4+6x+30x^2$ ,where x is the number of units of output and cost is measured in rupees. Find the firm's total cost function given the fixed costs are Rs 500.	15	CO3
Q3	a)Solve the following linear equations by using Cramers rule $3x+4y + z = 5$ $2x + 3y + z = 4$ $x - y +2z = 9$  (b)In a competition, a school awarded medals in different categories. 36 medals in dance, 12 medals in dramatics and 18 medals in music. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories? Draw Venn diagram and Write Properties	15	CO2 & CO4