Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Mathematics **Semester: I**

Programme: B.Sc., LL.B. (Hons.) Intellectual Property Rights/Food,Health and Environment Law/Medical and Forensic Law 2019 **Time: 03 hrs.**

Course Code : CLNL 1030 **Max. Marks: 100**

Instructions: Scientific calculators are allowed for the examination

SECTION A

S. No.		Marks	CO
Q1	If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, show that $A^2 = (a+d)A - (ad-bc)I$.	**02**	**CO1**
Q2	If $A = \{1,2,3,4,5,8\}$, $B = \{2,3,4,5,6,7,19,15\}$, then find $A \cap B$, $A \cup B$.	**02**	**CO2**
Q3	Represent $\frac{8-i}{5+i}$ in terms of $a+ib$.	**02**	**CO2**
Q4	If $y = \sin(5x^5+9)$, find $\frac{d^2y}{dx^2}$ at $x=0$	**02**	**CO3**
Q5	Show the truth table for $p \vee q$.	**02**	**CO4**

SECTION B

Q 6	A. If p, q and r are three statements, construct the Truth Table of the following proposition $(p \vee \sim q \wedge r)$. B. Show that the statement $[p \wedge (p \rightarrow q)] \rightarrow q$ is a tautology.	**(5×2)= 10**	**CO4**
Q 7	How many terms in the GP 4, 3.6, 3.24, …. are needed so that the sum exceeds 35. **OR** The sum of the first 15 terms of an AP is identical to the sum of the first 18 terms. If the Common difference is -2. Find the first term.	**10**	**CO3**

SECTION-C

Q 8	Evaluate	**(5×2)= 10**	**CO3**

	a) $\lim_{x\to 0}\left(\frac{1}{x}-\frac{1}{e^x-1}\right)$. b) $\lim_{x\to 0}\frac{x-\lvert x\rvert}{x}$		
Q 9	Show that of all rectangles with a given parameter, the square has the largest area.	**10**	**CO3**
	SECTION-D		
Q 10	Find the rank of the following matrix: $\begin{bmatrix} 4 & 0 & 1 & 2 & 4 \\ 6 & 1 & 0 & 0 & 1 \\ 12 & 1 & 2 & 4 & 0 \\ 8 & 0 & 2 & 4 & 8 \\ 9 & 0 & 1 & 2 & 6 \end{bmatrix}$	**20**	**CO1**
Q 11	In a class of 120 students numbered 1 to 120, all even numbered students opt for Physics, those whose numbers are divisible by 5 opt for Chemistry and those whose numbers are divisible by 7 opt for Math. How many opt for none of the three subjects? **OR** 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?	**20**	**CO2**
Q 12	Determine the validity of the following arguments: i. Either I will pass the examination, or, I will not graduate. If I do not graduate, then I will go to Canada. I failed. Thus, I will go to Canada. ii. If the market is free, then there is no inflation. If there is no inflation then there are price controls. Since there are price controls. Therefore, the market is free.	**10**	**CO4**