

Name:  
Enrolment No:



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

**Course: Elementary Mathematics**  
**Program: M Sc Chemistry**  
**Course Code: MATH7010**

**Semester: I**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Section A**  
**( Attempt all questions)**

1.	Write the equation of the line through the points (1, -1) and (3, 5)	[4]	CO1
2.	Differentiate $(4x^2 + 9x + 3)^2$	[4]	CO2
3.	Evaluate $\int_1^2 (2x^2 + 3x - 1)dx$	[4]	CO3
4.	Given that $A = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix}$ , find the matrix X such that $5A+2B=2X$	[4]	CO4
5.	If three unbiased coins are tossed simultaneously, find the probability of getting all three heads.	[4]	CO5

**SECTION B**  
**(Q6-Q9 are compulsory and Q10 has internal choice)**

6.	Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg.	[8]	CO5
7.	A person has undertaken a construction job. The probabilities are 0.65 that there will be strike, 0.80 that the construction job will be completed on time if there is no strike, and 0.32 that the construction job will be completed on time if there is a strike. Determine the probability that the construction job will be completed on time.	[8]	CO5
8.	Evaluate $\int x^2 \cos x dx$	[8]	CO3

9.	Express the matrix $\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.	[8]	CO4
10.	Find the second derivative of $x^2 \sin 4x \log x$ OR For $y = \sin x + \cos x$ verify that $\frac{d^2y}{dx^2} + \frac{dy}{dx} + 2 \sin x = 0$	[8]	CO2
<b>SECTION C</b> <b>(Q11 is compulsory and Q12 has internal choice)</b>			
11.A	Evaluate the coordinates of the point which divides the line segment joining (1,2) & (5,6) in the ratio of 1:3, verify it by calculating the distance of the point from the end points using distance formula.	[10]	CO1
11.B	Solve the following system of linear equations $x + 4y + 3z = 12$ $4x + 7y + z = 19$ $x + 3y + 8z = 15$	[10]	CO4
12 A	Evaluate $\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial^2 u}{\partial x^2}, \frac{\partial^2 u}{\partial y^2}$ and $\frac{\partial^2 u}{\partial x \partial y}$ for the function $u = 4xy^2 + 3yx^2$ also verify that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ OR Find two positive numbers whose sum is 15 and the sum of whose squares is minimum.	[10]	CO2
12 B	In a factory which manufactures bolts, machines A, B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their outputs, 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it is manufactured by the machine B? OR Find the mean, variance and standard deviation of the number obtained on a throw of an unbiased die.	[10]	CO5