Name:

Enrolment No:

SAP ID:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Supplementary Examination, May 2022

Course: Mathematics II **Semester: II**
Program: B.Tech CSE (BAO and CSF)
Time: 3 hrs. **Course Code: MATH1005**
Max. Marks: 100
All questions are compulsory.

SECTION A

Instructions: Each question will carry 4 marks.

Q 1	Solve $(D-2)^2 y=(e^x+\sin 2x)$.	**4M**	**CO1**
Q 2	A fair coin tossed twice. Let X be the number of heads that are observed. Construct the probability distribution of X.	**4M**	**CO2**
Q 3	Find the real root of the equation $x^2+4\sin x=0$ correct to four places of decimal using Newton Raphson method.	**4M**	**CO3**
Q 4	Draw the Hasse diagram for the poset $(P(S), \subseteq)$ where $P(S)$ is the power set of $S=\{a,b,c\}$.	**4M**	**CO5**
Q5	Evaluate $\int_{0.6}^{2} ydx$, where y is given by the following table:	**4M**	**CO4**

x:	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
y:	1.23	1.58	2.03	4.32	6.25	8.36	10.23	12.45

SECTION B

Instructions:
Each question will carry 10 marks

Q6	The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that a) at least two will be defective. b) none will be defective.	**10M**	**CO2**
Q7	Solve $\frac{d^2y}{dx^2}-y=\frac{2}{1+e^x}$ by the method of variation of parameters.	**10M**	**CO1**
Q8	Using Runge Kutta's fourth order method to approximate y, when $x=.1$ and $x=.2$, given that $x=0$ when $y=1$ and $\frac{dy}{dx}=x=y$ with $h=0.1$.	**10M**	**CO3**

Q9	Consider $A=\{x \in R: 1<x<2\}$ with ≤ as the partial order find i. All the upper and lower bounds of A ii. Greatest lower bound and least upper bound of A	**10M**	**CO5**
	SECTION C **Instructions: Each question will carry 20 marks**		
Q10	Solve the following system of equations using Gauss-Seidel iterative method correct upto three decimal places: $10x+y+2z=44; 2x+10y+z=51;\ x+2y+10z=61.$ OR From the following table of half – yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 46. Age x : 45 50 55 60 65 Premium y : 114.84 96.16 83.32 74.48 68.48.	**20M**	**CO4**
Q11 A.	Use Picard's method to obtain y for $x=0.2$. Given: $\frac{dy}{dx}=x-y$ with initial condition $y=1$ when $x=0$, upto three approximations.	**10M**	**CO3**
Q11 B.	Given $\frac{dy}{dx}=\frac{y-x}{y+x}$ with $y=1$ for $x=0$. Find y approximately for $x=0.1$ taking $h=0.02$by Euler's method.	**10M**	**CO3**