Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Numerical Methods
Semester: IV
Program: B.Sc (Hons.) Physics/Chemistry/Geology **Time: 03 hrs.**
Course Code: MATH 2017G **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Find $f(x)$ from the following table below. Also find $f(7)$ x: 0, 1, 2, 3, 4, 5, 6 $f(x)$: -1, 3, 19, 53, 111, 199, 323	4	CO1
Q 2	Using Lagrange's formula of interpolation, find $y(9.5)$ given x: 7, 8, 9, 10 y: 3, 1, 1, 9	4	CO3
Q 3	Explain the Milne's Predictor Corrector method.	4	CO6
Q 4	Evaluate the integral $\int_1^{1.5} e^{-x^2} dx$ using Gaussian quadrature 2-point formula.	4	CO4
Q 5	Given the following table, find $y(35)$ by using Bessel's formula x: 20, 30, 40, 50 y: 512, 439, 346, 243	4	CO3

SECTION B
(4Qx10M= 40 Marks)

Q 6	Find the positive root between 3 and 4 correct to three decimal places, by Horner's method, which satisfies the following equation $x^3-2x^2-3x-4=0$.	10	CO2

Q 7	Evaluate the first and second derivatives of y tabulated below at the point $x=0.6$, by Stirling's method x: 0.4 | 0.5 | 0.6 | 0.7 | 0.8 y: 1.5836494 | 1.7974426 | 2.0442376 | 2.3275054 | 2.6510818	**10**	**CO4**
Q 8	Solve the following system of equations by Gauss-Jacobi method (in four steps) $4x+11y-z=33$ $6x+3y+12z=35$ $8x-3y+2z=20$	**10**	**CO5**
Q 9	Using Taylor's series method, find, correct to four decimal places, the value of $y(0.1), y(0.2)$, given that $\frac{dy}{dx}=x^2+y^2$ and $y(0)=1$. **OR** Solve $y'=y-x^2$, $y(0)=1$, by Picard's method upto the third approximation. Hence find the value of $y(0.1), y(0.2)$.	**10**	**CO6**
SECTION-C (2Qx20M=40 Marks)			
Q 10	Derive the Newton Cote's quadrature formula. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (i) Trapezoidal rule (ii) Simpson's one-third rule (iii) Weddle's rule.	**20**	**CO4**
Q 11	Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ given $y(0)=1$ at $x=0.2, 0.4$ **OR** Solve numerically the equation $\frac{dy}{dx}=x+¿\sqrt{y}\vee ¿$with $y(0)=1$ for $0\le x\le 0.6$ in steps of 0.2 using Euler's modified method.	**20**	**CO6**