Name:

**Enrolment No:** 



## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination (Online), Jan.-Feb. 2021

**Course:** Engineering Mathematics

Semester: I

Course Code: MATH 1036

Time: 03 hrs.

Programme: B.Tech. (All SoCS Batches)

Max. Marks: 100

**SECTION - A** 

 $6 \times 5 = 30 \text{ Marks}$ 

- 1. Each Question will carry 5 Marks
- 2. Instruction: Select the correct option(s)

Q 1	Given the system of linear equations $x - 4y + 5z = -1$ , $2x - y + 3z = 1$ ,	CO1
	3x + 2y + z = 3  has:	

A. Unique solution B. No Solution

C. Infinitely many solutions D. None of these

Q 2 If  $y_n(x) = p^n[1 + (-1)^n sin2px]^{1/2}$ , then the value of  $y_8(0)$  when p = 1/4 is:

A. 
$$\left(\frac{1}{4}\right)^{1/8}$$
 B.  $\left(\frac{1}{4}\right)^{1/4}$  C.  $\left(\frac{1}{4}\right)^{8}$  D.  $\left(\frac{1}{4}\right)^{4}$ 

Q 3 Find the particular integral of 
$$(D^2 + 5D + 6)y = e^x$$
:

A.  $\frac{e^x}{12}$  B.  $\frac{e^x}{6}$  C.  $\frac{e^x}{24}$  D.  $\frac{e^x}{30}$ 

Q 4 A number x is chosen at random from the numbers -2, -1, 0, 1, 2. Then the probability that  $x^2 < 2$  is?

A. 1/5 B. 2/5 C. 3/5 D. 4/5

Q 5 Using Newton-Raphson method, find the real root of xsinx + cosx = 0 CO5 which is near  $x = \pi$  correct to three decimal places:

A. 2.798 B. 1.798 C. 3.823 D. 3.141

Q 6 The value of  $\int_0^1 \frac{dx}{1+x}$  by Simpson's 1/3 rule is:

CO5

A. 0.96315 B. 0.63915 C. 0.69315 D. 0.69915

## **SECTION – B**

10 X 5 = 50 Marks

- 1. Each question will carry 10 marks
- 2. Instruction: Answer on a separate white sheet, upload the solution as image.

Q 1	Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and hence compute $A^{-1}$ .	CO1
Q 2	Change the order of integration and hence evaluate $\int_0^a \int_{\sqrt{ax}}^a \frac{y^2 dx dy}{\sqrt{y^4 - a^2 x^2}}$ .	CO2

Q 3	A slider in a machine moves along a fixed straight rod. Its distance $x$ (in cm) $C$								CO5
	along the rod is given at various times $t$ (in sec.).								
	t:	0	0.1	0.2	0.3	0.4	0.5	0.6	
	x:	30.28	31.43	32.98	33.54	33.97	33.48	32.13.	
	Evalu	ate $\frac{dx}{dt}$ a	t $t = 0.1$ .						
Q 4	accide proba fatal a	ent during bility tha accident in	g a year is t in a mir n a year.	1/2400. Une employ:	ndividual co Jse Poisson ing 200 mi	s distribuners there	tion to calc will be at	culate the least one	CO4
Q 5	Solve	e, by the 1	nethod of	variation	of paramete	$\frac{d^2y}{dx^2}$ –	$y = \frac{2}{1 + e^x}$	<del>.</del>	CO3
					OR				
	Solve	$(1-x^2)$	$\frac{d^2y}{dx^2} - 2z$	$x\frac{dy}{dx} + 2y$	r=0 given	that $y = x$	ι is a soluti	ion.	
	ah Owa	ation oou	wing 20 M		ction – C		1	$\mathbf{X} \ 20 = 20$	) Marks
1 For	_	suon car	1 162 70 1A1						
1. Eac 2. Ins	tructio		er on a se	parate wh	ite sheet, u	ıpload the	solution a	s image.	
	Solve 20 <i>x</i> + <b>a</b> )	the syste $y - 2z$ Jacobi	m of linea = 17; 3.	or equation $x + 20y -$	z = -18;	-			CO5
2. Ins	Solve 20 <i>x</i> + <b>a</b> ) <b>b</b> )	the syste $y - 2z$ Jacobi's Gauss	m of linea = 17; 3. s iteration - Seidel it	ar equation $x + 20y - 100$ method, eration me	z = -18; ethod.  OR	2x - 3y	y + 20z = 2	25. Using	CO5
2. Ins	Solve 20 <i>x</i> + <b>a</b> ) <b>b</b> )	the syste $y - 2z$ Jacobi': Gauss	m of linea = 17; 3. s iteration - Seidel it	ar equation $x + 20y - 20y - 20y = 20y - 20y = $	as $z = -18$ ; ethod.	2x - 3y find the nu	y + 20z = 1 merical sol	25. Using	CO5