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Subject Code: AAS0301A

Roll No: _____

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

Course: B.Tech Branch: CSE/IT/CS

Semester: III

Sessional Examination: III

Year: (2021-2022)

Subject Name: Eng. Maths III

Time: 1.15 Hours

[SET-2]

Max. Marks:30

General Instructions:

- This Question paper consists of 2 pages & 5 questions. It comprises of three Sections, A, B, and C.
 - **Section A** - Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
 - **Section B** - Question No-3 is short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
 - **Section C** - Question No. 4 & 5 Long answer type (within unit choice) questions carrying 6 marks each. You need to attempt any one-part a or b.
- Blooms Level:** K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create

	SECTION - A	[8 Marks]	CO	Blooms level
1.	Attempt all parts	(4×1=4)		
a.	The solution of PDE $(D + 4D' + 5)^2 z = 0$ is (i) $z = e^{-5x} f_1(y - 4x) + x e^{-5x} f_2(y - 4x)$ (ii) $z = e^{-5x} f_1(y + 4x) + x e^{-5x} f_2(y + 4x)$ (iii) $z = e^{5x} f_1(y + 4x) + x e^{5x} f_2(y + 4x)$ (iv) None of these	(1)	CO3	K5
b.	PDE: $Bu_{xx} + Au_{xy} + Cu_{yy} + f(x, y, u, u_x, u_y) = 0$ is elliptic if _____	(1)	CO3	K4
c.	While solving a PDE using a Variable Separable method, we equate the ratio to a Constant which? (i) Can be Positive or Negative Integer or Zero (ii) Can be Positive or Negative rational number or Zero (iii) Must be a Positive Integer (iv) Must be a Negative Integer	(1)	CO3	K1
d.	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ is two-dimensional heat equation in _____ state.	(1)	CO3	K1

2. Attempt all parts		(2×2=4)		
a.	Find the P.I. of $(D^2 - 2DD')z = \sin x, \cos 2y$	(2)	CO3	K5
b.	Classify the PDE: $yu_{xx} + (x+y)u_{xy} + xu_{yy} = 0$ about the line $y = x$.	(2)	CO3	K4
SECTION - B		[10 Marks]		
3. Answer any two of the following-		[2×5=10]		
a.	Solve the PDE $4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$ subject to the condition $u(0, y) = 4e^{-y} - e^{-5y}$ by method of separation of variables.	(5)	CO3	K5
b.	Solve the PDE: $(D^2 + DD' - 6D'^2)z = y \sin x$	(5)	CO3	K5
c.	Solve the PDE: $(D^2 - D'^2 - 3D + 3D')z = xy + e^{x+2y}$	(5)	CO3	K5
SECTION - C		[12 Marks]		
4. Answer any one of the following-		[2×6=12]		
a.	A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position is given by $y = y_0 \sin^3 \frac{\pi x}{l}$. If it released from rest from this position, find the displacement $y(x, t)$.	(6)	CO3	K5
b.	Solve the PDE $\frac{\partial^2 u}{\partial y^2} + \frac{\partial u}{\partial x} = 0$ subject to the condition: $u(x, 0) = 0, u(x, \pi) = 0, u(0, y) = 4 \sin 3y$ by method of separation of variables.	(6)	CO3	K5
5. Answer any one of the following-				
a.	Find the temperature of the bar of length 2 whose ends are kept at zero and internal surface insulated by if the initial temperature is $\sin \frac{\pi x}{2} + 3 \sin \frac{5\pi x}{2}$.	(6)	CO3	K5
b.	Find the solution of Laplace equation subject to the condition: $u(0, y) = u(1, y) = u(x, 0) = 0, u(x, 1) = 100 \sin \pi x$	(6)	CO3	K5