LATE 81/67/0 3 SET- A

Name: **Student University Roll No.:**	**Printed Pages:**
School of Engineering **First Sessional Examination, Even Semester (AS: 2023-24)**	
B. Tech: All **Year: First**	**Semester: II**
Course Title: Differential Equations and Fourier Analysis **Course Code: NBS4201**	**Max Marks: 30** **Time: 1 *hr***

Instructions if any: Read the questions Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**		**Marks**
a)	Find the order & degree of differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - \left(\frac{dy}{dx}\right)^3 - 1 = 0$	**CO1**	**1**
b)	Find the complete solution of $\frac{d^4y}{dx^4} - y = 0$	**CO1**	**1**
c)	Find the particular integral of $(D^2 + 6D + 9)y = 5e^{3x}$	**CO1**	**1**
d)	Write the part of complementary function of $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if it satisfies $1 + P + Q = 0$.	**CO1**	**1**
e)	Reduce the equation $x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$ into linear differential equation with constant coefficients.	**CO1**	**1**
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**		**Marks**
a)	Solve the following differential equation $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} - 6y = \sin 3x$	**CO1**	**7.5**
b)	Solve the following simultaneous differential equations $Dx + Dy + 3x = \sin t$ $Dx + y - x = \cos t$	**CO1**	**7.5**
c)	Solve $x^2\frac{d^2y}{dx^2} - (2x-1)\frac{dy}{dx} + (x-1)y = 0$, given that $y = e^x$ is an integral included in the complementary function.	**CO1**	**7.5**
d)	Solve the homogeneous differential equation $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$	**CO1**	**7.5**
	SECTION 'C'		**Marks**
	Q.N.3. Attempt any one part of the following:		
a)	Solve $x\frac{d^2y}{dx^2} + (4x^2-1)\frac{dy}{dx} + 4x^3y = 2x^3$, by changing the independent variable.	**CO1**	**10**
b)	Use variation of parameters method to solve $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$	**CO1**	**10**
c)	Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 3y = 2xe^{3x}$	**CO1**	**10**

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	ALL	65

SET-B

Name:	**Printed Pages:**
Student University Roll No.:	
School of Engineering	
First Sessional Examination, Even Semester (AS: 2023-24)	
B. Tech: All **Year: First**	**Semester: II**
Course Title: Differential Equations and Fourier Analysis	**Max Marks: 30** **Time: 1 hr**
Course Code: NBS4201	

Instructions if any: Read the questions Carefully.

				Marks
	SECTION 'A'			
Q.N.1. Attempt all parts of the following:				
a)	Find the order & degree of differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=\left(\frac{d^2y}{dx^2}\right)^2$	CO1	1	
b)	Find the particular integral of $(D^2-1)y=\log 5$	CO1	1	
c)	Find the complete solution of $\frac{d^5y}{dx^5}-\frac{d^3y}{dx^3}=0$	CO1	1	
d)	Write the part of complementary function of $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ if it satisfies $P+Qx=0$.	CO1	1	
e)	Reduce the Legender homogeneous differential equation $(3x+2)^2\frac{d^2y}{dx^2}+3(3x+2)\frac{dy}{dx}-36y=0$ into linear differential equation with constant coefficients.	CO1	1	
	SECTION 'B'			Marks
Q.N.2. Attempt any two parts of the following:				
a)	Solve the following differential equation $\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=\sin 2x$	CO1	7.5	
b)	Solve the following simultaneous differential equations $Dx+5x-2y=t$, $Dy+2x+y=0$	CO1	7.5	
c)	Solve $\frac{d^2y}{dx^2}-4x\frac{dy}{dx}+(4x^2-2)y=0$, given that $y=e^{x^2}$ is an integral included in the complementary function.	CO1	7.5	
d)	Solve the homogeneous differential equation $(3x+2)^2\frac{d^2y}{dx^2}-(3x+2)\frac{dy}{dx}-12y=6x$	CO1	7.5	
	SECTION 'C'			Marks
Q.N.3. Attempt any one part of the following:				
a)	Solve $\frac{d^2y}{dx^2}-\frac{1}{x}\frac{dy}{dx}+4x^2y=x^4$, by changing the independent variable.	CO1	10	
b)	Apply the method of variation of parameters to solve $\frac{d^2y}{dx^2}+y=\sec x$	CO1	10	
c)	Solve $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=xe^{3x}$	CO1	10	

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