GIET UNIVERSITY, GUNUPUR - 765022

B. Tech (First Semester) Regular Examinations, December - 2023

23BBSBS11001 - Engineering Mathematics -I

(Common to all branches except Biotech)

Time: 3 hrs | Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

	Q.1. Answer *ALL* questions	CO #	Blooms Level
a.	Find the period of Sin 2x and sketch the graph of the same in $[0,2\pi]$.	CO5	K2
b.	Write the critical points of the function $f(x) = (2x+1)(x-2)^{2/3}$	CO2	K2
c.	Define Algebraic Multiplicity and Geometric Multiplicity.	CO1	K1
d.	Find the complimentary solution of $\frac{d^3y}{dx^3} = 0$	CO4	K2
e.	Define Integrating factor and find the integrating factor of $y\,dx - x\,dy = 0$	CO3	K1

PART – B **(10 x 5 = 50 Marks)**

	Answer *ALL* questions	Marks	CO #	Blooms Level
2. a.	Find the Eigen values and Eigen vectors of the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$	5	CO1	K3
b.	Test the consistency and hence solve the system of following equations $5x + 3y + 7z = 4$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$	5	CO1	K3
	(OR)			
c.	Diagonalize the matrix $\begin{bmatrix} -19 & 7 \\ -42 & 16 \end{bmatrix}$	5	CO1	K3
d.	Prove that the absolute value of determinant of an unitary matrix is 1.	5	CO 1	K2
3.a.	Find the maximum and minimum values of the function $Z = \sin x + \sin y + \sin(x+y)$	7	CO 2	K3
b.	If $Z = \tan^{-1}\frac{y}{x}$ then find the value of $Z_{xx} + Z_{yy}$	3	CO2	K2
	(OR)			
c.	If $Z = f(x+ay) + \phi(x-ay)$ then prove that $\frac{\partial^2 Z}{\partial y^2} = a^2 \frac{\partial^2 Z}{\partial x^2}$	5	CO2	K3
d.	Find the point where the function $u = xy(1 - x - y)$ is maximum or minimum.	5	CO2	K3
4.a.	Solve the differential equation $\frac{dy}{dx} = \frac{y}{x+\sqrt{xy}}$	6	CO3	K2
b.	Solve the differential equation $y\,dx - x\,dy + \log x\,dx = 0$	4	CO3	K2
	(OR)			

c.	Solve $\frac{y}{x}\frac{dy}{dx}+\frac{2(x^2+y^2)-1}{x^2+y^2+1}=0$	5	CO3	K2
d.	Solve the differential equation $(4x-6y-1)\,dx+(3y-2x-2)dy=0$	5	CO3	K2
5.a.	Solve by Operator method $y''-2y'+3y=e^x \sin x$	5	CO4	K5
b.	Solve by method of undetermined coefficients $y''-2y'+3y=x^2+\cos x$	5	CO4	K2
	(OR)			
c.	Solve by method of variation of parameters $y''-2y'+2y=e^x \tan x$	5	CO4	K2
d.	Solve $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=e^x$	5	CO4	K3
6.a.	Find the Fourier series of $f(x)=x^2,\ 0<x<2\pi$	6	CO5	K2
b.	Find the Fourier series of $f(x)=\begin{cases} x, & -\frac{\pi}{2}<x<\frac{\pi}{2} \\ 0, & \frac{\pi}{2}<x<\frac{3\pi}{2} \end{cases}$	4	CO5	K2
	(OR)			
c.	Find the Fourier series of $f(x)=\begin{cases} -x, & \text{if } -1<x<0 \\ x, & \text{if } 0<x<1 \end{cases}$	4	CO5	K2
d.	Find the Fourier series of $f(x)=\lvert\sin x\rvert,\ 0<x<2\pi$	6	CO5	K2

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