GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Second Semester Regular) Examinations, May – 2024

23BBSBS12001 – Engineering Mathematics - II

(Common to all Branches except Biotechnology)

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

	Question	CO #	Blooms Level
a.	State the conditions for the existence of Laplace Transformation of *f(t)*.	CO1	K1
b.	Find the unit normal vector to the surface $2x + 3y + 4z = 24$	CO2	K2
c.	Find the Laplace transformation of $e^{2t} * \cos 4t$	CO2	K2
d.	State D'Alembert's Ratio Test.	CO2	K1
e.	Form a partial differential equation by Eliminating the arbitrary constants from $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$	CO1	K2

PART – B **(10 x 5 = 50 Marks)**

<u>Answer ***ALL*** questions</u>

	Question	Marks	CO #	Blooms Level
2. a.	Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$.	5	CO3	K3
b.	Solve $z - q^2 y - p^2 x = 0$.	5	CO3	K3
	(OR)			
c.	Solve $x(y-z)p + y(z-x)q = z(x-y)$ by Lagrange's method.	5	CO3	K3
d.	Solve the PDE $px + qy + pq = 0$ by Charpit's method.	5	CO3	K3
3.a.	Test the Convergence of the series $\sum \left[\frac{nx}{n+1}\right]^n, \ (x > \mathbf{0})$.	5	C04	K3
b.	Verify that the series is Convergent or Divergent $\sum_{n=0}^{\infty} \frac{(20+30i)^n}{n!}$	5	C04	K3
	(OR)			
c.	Solve the Differential equation $y'' - 4y' + 3y = 0$ by power series method	5	C04	K3
d.	Test the Convergence of the series $\sum (x^n / \text{n}), \ (\text{x}>\mathbf{0})$	5	C04	K3
4.a.	Find the Laplace transformation of the following function $\frac{\cos 2t - \cos 3t}{t}$	5	C05	K3
b.	Find $\text{L}^{-1}\left[\frac{1-7s}{(s-3)(s-1)(s+2)}\right]$	5	C05	K3
	(OR)			
c.	Solve the following integral equation $y(t) = te^t - 2e^t \int_0^t e^{-\tau} y(\tau) d\tau$	5	C05	K3
d.	Find the inverse Laplace transformation of $\frac{s^2}{(s^4+a^4)}$	5	C05	K3
5.a.	Calculate $\oint_C \mathbf{F} \cdot d\mathbf{r}$ where the Force $F = [xy, x^2y^2]$ and work in the displacement along C in the quarter - circle from (2,0) to (0,2) with centre at (0,0).	5	CO3	K3

b.	Find the Directional derivative of f at the point P in the direction of vector a, *where* $f = \frac{1}{\sqrt{x^2+y^2+z^2}}$, P: (2, 0, 5) and a = i + j +k.	5	CO3	K3
	(OR)			
c.	By using Greens theorem evaluate $\oint_C \mathbf{F} \cdot d\mathbf{r}$, where $F = \frac{e^y}{x} i + (e^y lnx + 2x) j$ and $R: 1 + x^4 \leq y \leq 2$	5	CO3	K3
d.	Evaluate $\int_0^3 \int_{-y}^{y} (x^2 + y^2) dx\, dy$ by changing the order of integration.	5	CO3	K3
6.a.	Using Gauss Divergence theorem, Evaluate the integral $\iint_S F.\hat{n}\, dA$, if $F = [x^3, y^3, z^3]$ and S is the sphere $x^2 + y^2 + z^2 = 9$	5	CO5	K3
b.	Calculate $\oint_C \mathbf{F} \cdot d\boldsymbol{s}$ with Arc Length as Parameter where $f = \sqrt{2 + x^2 + 3y^2}$ $C : r = [t, t, t^2],\ 0 \leq t \leq 3$	5	CO5	K3
	(OR)			
c.	Using Greens theorem, Evaluate the line Integral over the Curve C, where C is the rectangle with vertices (0,0), (2, 0), (2, 3), (0,3) and $F[x^2 e^y, y^2 e^x]$.	5	CO6	K3
d.	Evaluate the Integral $\int_{(0,1,2)}^{(1,-1,7)} 3x^2 dx + 2zydy + y^2 dz$ by showing F has potential and integral is path independent.	5	CO6	K3

--- End of Paper ---