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**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**



Ph.D. (First Semester) Examinations, December – 2024

**23SPPEMT1011/ SPPEMT1011 –Computational Mathematics
(Mathematics)**

Time: 3 hrs

Maximum: 70 Marks

The figures in the right hand margin indicate marks.

Answer ANY FIVE Questions.

(14 x 5 = 70 Marks) Marks

- 1.a. Solve the differential equation using Laplace Transform $4y'' - 4y' + 37y = 0$, $y(0)=3$, $y'(0)=10$ 7
- b. Find the interpolating polynomial by using Newton divided difference formula for the following data: 7

X	-1	0	2	3
F(x)	-8	3	1	12

2. Transform the equation to normal form and solve it. $U_{xx} - 2U_{xy} + U_{yy} = 0$ 14
3. Derive the two-step Adams-Bashforth method by using Taylor's theorem 14
4. Derive the D'Alembert's solution of the one dimensional wave equation. 14
- 5.a. Solve the system of equations by using Comparison method $3x - 2y = 2$, $7x + 3y = 43$ 8
- b. Find the value of $f(x)$ at $x=15$ from the following table 6

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

- 6.a. Derive the Trapezoidal formula. 9
- b. Explain about implicit and explicit of a function with example. 5
7. Solve the differential equation using Laplace Transform $y'' + 9y = \sin t$ if $0 < t < \pi$, and 0 if $t > \pi$, $y(0)=0$ and $y'(0)=4$ 14
- 8.a. Find the value of $\int_0^\infty \sqrt{y} e^{-y^2} dy$ 7
- b. Find the solution of the differential equation $y' = x^2 - y^2$ in the range $0 < x < 2$ for the boundary condition $y=0$ at $x=0$ (Apply Milne's method) 7

---End of Paper---