	Reg. No.:	
	Name :	

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MID TERM EXAMINATIONS – April 2023

Programme	:	**B.Tech.**	Semester	:	**Summer**
Course Title	:	**Applied Numerical Methods**	Course Code	:	**MAT2003**
Faculty	:	**Dr. Vijay Kumar Patel**	Slot	:	**B11+B12+B13+B14+B15**
Time	:	**1 ½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		Find the solution of following system of equations using Gauss elimination: $2x_1 - 2x_2 + 3x_3 + 21x_4 = 1,$ $x_1 - x_2 + 3x_3 + 2x_4 = 15,$ $-x_1 + 5x_2 - 5x_3 - 2x_4 = -35,$ $3x_1 - 5x_2 + 19x_3 + 3x_4 = 60.$	**10**
2		Perform two iteration of the Gauss-Seidel iteration method for solving the system of equations: $20x_1 + x_2 - 2x_3 = 17,$ $3x_1 + 20x_2 - x_3 = -18,$ $2x_1 - 3x_2 + 20x_3 = 25,$ with initial approximation as $x_i^{(0)} = \frac{b_i}{a_{ii}}, i = 1,2,3.$	**10**
3		Find a real root of the equations $x^2 - 4sin(x) = 0,$ correct to four places of decimal.	**10**

4		The function $f(x) = 4x^3 - 1 - e^{(\frac{x^2}{2})}$ has roots near $x = 1$ and $x = 3$ then (i) If you begin Newton's method at $x = 2$, which root is reached ? (ii) How many iteration to achieve an error less than 10^{-6} ?	**10**
5		The concentration of a certain toxin in a system of lakes downwind of an industrial area has been monitored very accurately at intervals from 1995 to 2009 as shown in the table below. It is believed that the concentration has varied smoothly between these data points. **Year** — **Toxin Concentration** 1995 — 12.0 1997 — 12.7 1999 — 13.0 2001 — 15.2 2003 — 18.2 2005 — 19.8 2007 — 24.1 2009 — 28.1 (i) Interpolate the data with the Lagrange polynomial and use the polynomial to predict the condition of the lakes in 2006. (ii) Repeat (i) with a Newton's interpolation and compare your results.	**10**
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