Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV• EXAMINATION – SUMMER 2015

Subject Code: 2140105 **Date:**26/**05/2015**

Subject Name: Numerical Methods

Time: 10:30am-1.30pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Find the positive root of equation $x - \cos x = 0$ upto four decimal places by Bisection method. **07**

(b) Use stirling's formula to find $y(28)$ given that $y(20) = 49225, y(25) = 48316, y(30) = 47236, y(35) = 45926 \,\&\, y(40) = 44306$. **07**

Q.2 **(a)** Evaluate the integral $\int_0^6 \frac{1}{1+x^2} dx$ by Trapezoidal and Simpson's 1/3 rule, where h=1. **07**

(b) Solve the following system of linear equations by Gauss-seidel method **07**
$28x + 4y - z = 32, 2x + 17y + 4z = 35, x + 3y + 10z = 24.$

OR

(b) Solve the following equations by Gauss-Jacobi's method **07**
$27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$

Q.3 **(a)** Use the Langrange's formula to find the form of $f(x)$, given that **07**

x	0	2	3	6
$f(x)$	648	704	729	792

(b) Solve by Taylor's series method $y' = y - \frac{2x}{y}, y(0) = 1$ for $x = 0.1 \,\&\, x = -0.1$ **07**

OR

Q.3 **(a)** Using Newton's divided difference formula, find $f(8)$, where given that **07**
$f(1) = 3, f(3) = 31, f(6) = 223, f(10) = 1011, f(11) = 1343$.

(b) Using Picard's method, solve $y' = x^2 - y, y(0) = 1$ for $x = 0.2$ **07**

Q.4 **(a)** Calculate $y(0.2)$, given that $y' = x + y, y(0) = 1$, taking h=0.1 by Fourth order Rung-Kutta method. **07**

(b) By using Newton Raphson's method find the root of equation $x^4 - x - 10 = 0$ which in near to $x = 2$, correct to the three decimal places. **07**

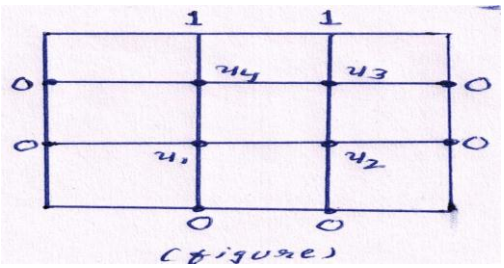
OR

Q.4 **(a)** Using Newton's forward difference method find the approximate value of $f(1.3)$ from the following given data **07**

x	1	2	3	4
$f(x)$	1.1	4.2	9.3	16.4

(b) Using Newton Raphson's method to find the value of $\sqrt{15}$ & $(701)^{\frac{1}{3}}$ **07**

Q.5 **(a)** Solve the p.d.e. $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ for given figure by Jacobi's method. **07**



(b) Fit a polynomial of the second degree to the data points given in the following table: **07**

x	0	1.0	2.0
y	1.0	6.0	17.0

OR

Q.5 **(a)** Given a table values for the function as **07**

x	500	1000	2000	4000	6000
y	0.20	0.33	0.38	0.45	0.51

Fit a curve of the form $y = a + b\sqrt{x}$.

(b) Using False-position method , find the real root of $x\log_{10} x - 1.2 = 0$ correct to four decimal places . **07**

****