Seat No.: \_\_\_\_\_

Enrolment No.

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION - WINTER 2018

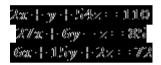
Subject Code:2141905 Date:22/11/2018

**Subject Name: Complex Variables and Numerical Methods** 

Time: 02:30 PM TO 05:30 PM **Total Marks: 70** 

**Instructions:** 

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Find the roots of the equation  $\mathbb{Z}^2 + \mathbb{Z} \mathbb{Z} + \mathbb{Z} \times \mathbb{Z} = \mathbb{Z}$ 03 **Q.1** 
  - Show that f(x) := x(x) is differentiable only at x := 0 and f'(0) := 0. 04
  - Solve the following system of equation by Gauss-Seidal method correct to 07 three decimal places.



- **Q.2** 03 (a) Evaluate And along the line joining the points (O,O) word (A,1)
  - Determine the mobius transformation that maps  $x_1 : 0, x_2 : 1, x_3 : 0$ 04 onto  $\mathbb{R}_{\mathbb{R}}^{n} : \cdots \cdot \mathbb{I}_{n} \mathbb{R}_{n}^{n} : \cdots \cdot \mathbb{I}_{n} \mathbb{R}_{n}^{n} : \mathbb{I}$  respectively.
  - Prove that the roots of unity are in geometric progression. Also show 07 that their sum is zero.

## OR

- are satisfied at 07 Verify that C-R equation for the function [[[Z]
- 0.3 03 (a) elz, witness es C: |z| **Evaluate** 
  - Find the radius of convergence of 04
  - **(c)** Using the residue theorem, evaluate

## OR

- **Q.3** 03 as a Taylor's series about the point \*:: 0. Expand /
  - 04 derivative.
  - **(c)** 07 counter clockwise around C, where C is **Evaluate** : : 11. oggradi

07

03 0.4 Using Newton's forward formula, find the value of f(1.6) if 1 1.4 1.8 2.2 3.49 f(x)4.82 5.96 6.5 **(b)** Find the Lagrange interpolating polynomial from the following data 04 5 X 1 3 24 39 f(x)Find a root of  $x^4 - x^3 + 10x + 7 = 0$  correct to three decimal places 07 between at : : A second between by Newton-Raphson method. OR **Q.4** (a) Solve the system of equation by Gauss elimination method. 03 **エー・ッ・ト・**ン::9  $-33\mathbf{w} \cdot | \cdot 4\mathbf{w} = 1.3$ 38数 - | - 桑w - | - 15×::桑の Compute from the following values using Newton's Divided 04 difference formula X 4 7 10 11 13 48 100 294 900 1210 2028 f(x)07 **(c)** taking a::1 and using Simpson's rule. Hence Evaluate obtain approximate value of week. Evaluate Amagaz **Q.5** 03 (a) Use power method to find the largest of Eigen values of the **(b)** 04 matrix A := Use Euler's method to obtain an approximate value of w(A) for the 07 differential equation y' : :x + y, y(0) : :1 with h : :0.1.OR **Q.5** 03 (a) Prove that MI : llevgy([1], **(b)** 04 Evaluate I =by one point, two point and three point Gaussian formula. Determine y(0.1), y (0.2) correct upto four decimal places by fourth order 07 Runge-Kutta method from

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