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Subject Name: Complex Variables and Numerical Methods

d correct to 07 (c) three decimal places.

> 2x + y + 54z = 11027x + 6y - z = 856x + 15y + 2z = 72

Q.2 (a) Evaluate $\int_{0}^{2+i} z^2 dz$ along the line joining the points (0,0) and (2,1). 03

(b) Determine the mobius transformation that maps $z_1 = 0, z_2 = 1, z_3 = \infty$ 04 onto $w_1 = -1, w_2 = -i, w_3 = 1$ respectively.

(c) Prove that the nth roots of unity are in geometric progression. Also show 07 that their sum is zero. OR

(c) Verify that C-R equation are satisfied at z = 0 for the 07 function $f(z) = \begin{cases} \frac{z^{-2}}{z} & \text{if } z \neq 0\\ 0 & \text{if } z = 0 \end{cases}$

Q.3 (a) Evaluate
$$\oint_C \left[\frac{3}{z-i} + \frac{6}{(z-i)^2}\right] dz$$
, where $C: |z| = 2$. 03

(b) Find the radius of convergence of 04

$$\sum_{n=1}^{\infty} \left(\frac{6n+1}{2n+5}\right)^2 (z-2i)^n$$
(c) Using the residue theorem, evaluate
$$\int_0^{2\pi} \frac{d\theta}{5-3sin\theta}$$
07

(c)

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Q.3 (a) Expand
$$f(z) = \frac{z-1}{z+1}$$
 as a Taylor's series about the point $z = 0$. 03

(b) Check whether f(z) = sinz is analytic or not. If analytic find its 04 derivative.

OR

Evaluate $\oint_C \frac{z^2 - z^2 + z - 1}{z^2 + 4z} dz$ counter clockwise around C, where C is 07 (c) |z| = 1 and |z| = 3

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Subject Code:2141905

Time: 02:30 PM TO 05:30 PM

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Seat No.:

Q.1 (a)

(b)

1

Total Marks: 70

Date:22/11/2018

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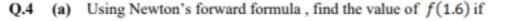
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03

03

03

03



| х | 1 | 1.4 | 1.8 | 2.2 |
|------|------|------|------|-----|
| f(x) | 3.49 | 4.82 | 5.96 | 6.5 |

 (b)
 Find the Lagrange interpolating polynomial from the following data
 04

 x
 0
 1
 4
 5

(c) Find a root of $x^4 - x^3 + 10x + 7 = 0$ correct to three decimal places between a = -2 and b = -1 by Newton-Raphson method. 07

24

39

OR

x + y + z = 92x - 3y + 4z = 13

Q.4 (a) Solve the system of equation by Gauss elimination method.

3

(b) Compute f(8) from the following values using Newton's Divided 04 difference formula

3x + 4y + 5z = 40

| х | 4 | 5 | 7 | 10 | д. | 13 |
|------|----|-----|-----|-----|------|------|
| f(x) | 48 | 100 | 294 | 900 | 1210 | 2028 |

(c) Evaluate $\int_0^6 \frac{1}{1+x} dx$, taking h = 1 and using Simpson's $\frac{1}{3}$ rule. Hence obtain approximate value of log, 7.

Q.5 (a) Evaluate
$$\Delta^n e^x$$

f(x)

1

- (b) Use power method to find the largest of Eigen values of the 04 matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$
- (c) Use Euler's method to obtain an approximate value of y(0.4) for the 07 differential equation y' = x + y, y(0) = 1 with h = 0.1.

OR

Q.5 (a) Prove that $hD = log(1 + \Delta)$

- (b) Evaluate I = $\int_{-1}^{1} \frac{dx}{1+x^2}$ by one point, two point and three point O4 Gaussian formula.
- (c) Determine y(0.1), y(0.2) correct upto four decimal places by fourth order 07 Runge-Kutta method from $\frac{dy}{dx} = 2x + y, y(0) = 1$

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