



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 199419**

Roll No.

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**B. Tech.**

(SEM. IV) THEORY EXAMINATION, 2014-15

**ENGG MATHEMATICS - III**

Time : 3 Hours]

[Total Marks : 100

**Note:** Attempt all questions from each Section as indicated. The symbols have their usual meaning.

1 Attempt any FOUR parts of the following: (5×4=20)

- (a) Using C – R equations show that  $f(z) = |z|^2$  is not analytical at any point.
- (b) State Cauchy's integral formula. Hence evaluate:

$$\int_c \frac{2z+1}{z^2+z} dz \quad \text{where } C \text{ is } |z| = \frac{1}{2}.$$

- (c) Expand  $\frac{1}{Z^2 - 3Z + 2}$  in the region  $1 < |z| < 2$ .
- (d) Find the analytic function whose real part is  $e^{2x} (x \cos 2y - y \sin 2y)$

- (e) Evaluate the integral:

$$\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$$

- (f) Determine the poles of the following function and residue at each pole:

$$f(z) = \frac{z^2}{(z-1)^2(z+2)}$$

and hence evaluate

$$\int_c f(z) dz, \text{ where } C: |z|=3.$$

- 2 Attempt any TWO parts of the following: (10×2=20)

- (a) Find the Fourier cosine transform of  $\frac{1}{1+x^2}$  and hence

find Fourier sine transform of  $\frac{x}{1+x^2}$ .

- (b) Find the inverse Z-transform of:

$$f(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}$$

- (c) Solve the following difference equation:

$$y_{k+2} + 4y_{k+1} + 3y_k = 3^k; \text{ given } y_0 = 0 \text{ and } y_1 = 1.$$

3 Attempt any TWO parts of the following: (10×2=20)

- (a) Using the method of least square fit a curve of the form  $y = a b^x$  to the following data:

X	2	3	4	5	6
Y	8.3	15.4	33.1	65.2	127.4

- (b) Find the mean and variance of Binomial distribution.  
(c) The first four moments of a distribution about  $x = 4$  are 1, 4, 10 and 45. Calculate the moments about the mean and comment upon the Skewness and Kurtosis of the distribution.

4 Attempt any TWO parts of the following: (10×2=20)

- (a) Using Newton-Raphson method, find real root of equation  $3x - \cos x - 1 = 0$  correct up to four decimal places. Also find the order of convergence of the method.  
(b) From the given data

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

find the polynomial in  $x$  and hence find the value of  $f(8)$ .

- (c) Estimate from the following table the number of students who obtained marks between 40 and 45:

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

5 Attempt any TWO parts of the following: (10×2=20)

(a) Apply Gauss - Seidal Method to solve the equations (three iterations) :

$$2x+10y+z = 55$$

$$10x+y+2z = 44$$

$$x+2y+10z = 61$$

(b) Find  $\int_0^6 \frac{e^x}{1+x} dx$  approximately using Simpson's  $\frac{1}{3}$  rule

and Simpson's  $\frac{3}{8}$  rule, dividing the range into 6 equal parts.

(c) Given the initial value

problem  $\frac{dy}{dx} = 1 + y^2$ ;  $y(0) = 0$ . Find

$y(0.2)$ ,  $y(0.4)$  by Runge - Kutta fourth - order.

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