

Printed pages: 02

Roll No. 

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Sub Code: RAS 301

Paper ID: 9 0 1 9

**B.Tech.**  
**(SEM III) THEORY EXAMINATION 2017-18**  
**Mathematics -III**

Time: 3 Hours

Total Marks: 70

- Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.  
2. Any special paper specific instruction.

**SECTION A**

1. Attempt *all* questions in brief. 2 x 7 = 14

- a. Define analytic function with an example.
- b. Define the Binomial distribution with mean and variance.
- c. Write the normal equation for the curve  $y = \frac{a}{x} + bx$
- d. Give comparison between Regulafalsi method and Newton Raphson method
- e. Write the relation between  $n^{\text{th}}$  divided difference and  $n^{\text{th}}$  forward difference.
- f. What do you mean by initial value problem
- g. Find  $Z^{-1}\left(\frac{5}{5z-1}\right)$

**SECTION B**

2. Attempt any *three* of the following: 7 x 3 = 21

- a. Give an example of a function in which Cauchy Riemann Equations are satisfied yet the function is not analytic at the origin. Justify your answer.
- b. Find the measure of Sskewness and kurtosis based on moments for the following distribution and draw your conclusion

|               |        |         |         |         |         |  |  |
|---------------|--------|---------|---------|---------|---------|--|--|
| Marks         | 5 – 15 | 15 – 25 | 25 – 35 | 35 – 45 | 45 – 55 |  |  |
| No.ofstudents | 1      | 3       | 5       | 7       | 4       |  |  |

- c. Decompose  $A = \begin{bmatrix} 5 & -2 & 1 \\ 7 & 1 & -5 \\ 3 & 7 & 4 \end{bmatrix}$  in the form LU, where L is lower triangular matrix and U is upper triangular matrix and hence solve the system of equations:

$$\begin{aligned} 5x - 2y + z &= 4 \\ 7x + y - 5z &= 8 \\ 3x + 7y + 4z &= 10. \end{aligned}$$

- d. Express the function  $f(x) = \begin{cases} 1 & \text{when } |x| \leq 1 \\ 0 & \text{when } |x| > 1 \end{cases}$  as a Fourier Integral.

Hence evaluate  $\int_0^{\infty} \frac{\sin \lambda \cos \lambda x}{\lambda} d\lambda$ .

- e. Given the initial value problem  $\frac{dy}{dx} = x^3 - y^3$ ,  $y(0) = 1$ . Find the numerical solution of differential equation at  $x = 0.6$  with  $h = 0.2$  by using Runge-Kutta method of Fourth order.

## SECTION C

3. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Evaluate the integration:  $\int_0^{\pi} \sin^4 \theta d\theta$ .
- (b) State and prove the Cauchy Integral formula. Also evaluate  $\int_C \frac{1}{(z^2+4)^2} dz = \frac{\pi}{16}$ , where C is the circle  $|z - i| = 2$ ,

4. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Find 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), where F(z) is given by  
 (i)  $\frac{z}{(z+2)(z+3)}$  (ii)  $\frac{7z-11z^2}{(z-1)(z-2)(z+3)}$ .

5. Attempt any *one* part of the following:

7 x 1 = 7

- (a) In a partially distributed laboratory record of an analysis of a correlation data, the following result are legible:  
 Variance of  $x = 9$   
 Regression equation:  $8x - 10y = 66 = 0, 40x - 18y = 214$ .  
 What were (a) the mean of  $x$  and  $y$ . (b) the standard deviation of  $y$  and the coefficient of  $x$  and  $y$ :
- (b) Find the mean and variance of normal distribution.

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Find the real root of the equation  $x^3 - 2x + 5 = 0$  by method of False position correct to three decimal places.
- (b) State and prove the Lagrange interpolation formula. Find the interpolating polynomial by By Lagrange interpolation formula for the given data

|     |    |    |    |    |
|-----|----|----|----|----|
| $x$ | 5  | 6  | 9  | 11 |
| $y$ | 12 | 13 | 14 | 16 |

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Apply Simpson's 3/8 th rule to obtain approximate value of (i)  $\int_0^{\pi/2} e^{\sin x} dx$  (ii)  $\int_0^{0.3} (2x - x^2)^{1/2} dx$  using Simpson's rule with 6 interval.
- (b) Find  $x$  for which  $y$  is maximum and find the max value of  $y$

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| $x$ | 1.2    | 1.3    | 1.4    | 1.5    | 1.6    |
| $y$ | 0.9320 | 0.9636 | 0.9855 | 0.9975 | 0.9996 |