

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^{th} divided difference and n^{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