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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 kutosis based on moments for the followi 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:

$$5x - 2y + z = 4$$
$$7x + y - 5z = 8$$
$$3x + 7y + 4z = 10.$$

d. Express the function $f(x) = \begin{cases} 1 \text{ when } |x| \le 1 \\ 0 \text{ when } |x| > 1 \end{cases}$ 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 positi 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