K L University
Department of Mathematics
Course Handout for II Year B.Tech PROGRAM
(ECE/EEE/ME)
A.Y.2015-16, II Semester
COMPLEX VARIABLES AND DISCRETE MATHEMATICS

COURSE CODE: 13 BS202 **L – T – P : 3 – 0 – 0**

SYLLABUS (As approved by BoS):

Complex variables: Analyticity functions, Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions. Milne-Thompson method. Line integral, Cauchy's integral theorem, Cauchy's integral formula. Generalized integral formula. Expansion in Taylor, McLaren's and Laurent series. Types of singularities, Residues, Cauchy residue theorem. Evaluation of integrals by using residues. Bilinear transformations and its applications

Special functions: Bessel functions, Recurrence relations for $J_n(x)$, orthogonality of Bessel functions, generating function for $J_n(x)$, integral form of Bessel functions. Jacobi series. Legendre's equation Rodrigues formula, Legendre's polynomials, generating function for $P_n(x)$, Recurrence relations for $P_n(x)$ and orthogonality of Legendre's polynomials**.**

Difference equations: Introduction, definition, difference equation of first and second order. Formation of difference equation. Linear difference equation. Rules for finding CF and PI. Simultaneous difference equations with constant coefficients. Applications to deflection of a loaded string**.**

Graph theory: Basic concepts of Graphs. Sub graphs, Matrix representation of graphs. Adjacency, incidence matrices. Isomorphic graphs. Paths and circuits. Eulerian and Hamiltonian graphs, multi-graphs(Problems and theorems without proof). Planar graphs. Euler's formula. Graph coloring, covering, chromatic number(Problems and theorems without proof). Trees, directed trees and binary trees. Decision trees, spanning trees. Properties. Algorithm for spanning trees. Minimum spanning tree**.**

BoS Approved Text books:

1 Advanced engineering mathematics,(10 th edition), Erwin Kreyszig. JOHN WILEY & SONS, INC

2. Discrete mathematical structures with applications in computer science, J P Trembly, R. Manohar. TMH pub.

3. Discrete mathematics for computer scientists & Mathematicians, J L Mott, A. Kandel, J P Baker, PHI.

BoS Approved Reference Books:

1. Higher Engineering Mathematics, By Dr. B.S. Grewal. Publisher: Khanna, New Delhi.
2. Discrete mathematics, Malik,sen 6th ed., Cengage Learning.
3. Discrete mathematics for computer science, Stein, Drysdale and Bogart.

Other Books, References: (As recommended for reference by the course team, if any)

1.Complex Variables and applications,7th edition, R V Churchil and J W Brown, McGraw hill pub, New Delhi. (Supplementary reading)

2.J A Bondy and USR murty, Graph theory with applications (back ground material on the history of graph theory) .This book is available online here

3.Discrete Mathematics, Kenith Rosen, PHI publishers.

KL UNIVERSITY: GUNTUR

II/IV B.Tech, SECOND SEMESTER, **Y14 BATCH**

TEST-1 MODEL PAPER

Branch : **ECE/EEE/ME**

Course code &Title: **(13 BS 202) Complex Variables and Discrete Mathematics**

Name of the Course coordinator : **Dr. B V Appa Rao**

Time :90 Minutes **Max.marks:30**

CO1	**COI 1**	**BTL:2**	**MARKS: 2x6= 12**

1. a) In an electric field, the potential function is $\log(x^2+y^2)$, find the flux function and the complex potential function.

   b) Construct the linear fractional transformation which maps the points z= 2, i, -2 into the points w = 1, i, -1 respectively

(OR)

2a) In a two dimensional fluid flow, the stream function $\Psi = \tan^{-1}(y/x)$ is given, find the velocity potential φ.

2b) Construct the Mobius transformation that maps $z_1=0, z_2=1, z_3= i$ into the points $w_1=1+i, w_2=0, w_3=2$.

CO1	**COI 2**	**BTL:2**	**MARKS: 2x4= 8**

3a) Evaluate $\int_C z^2 dz$ where C is the boundary of the triangle with vertices 0, 2 and 2i. Verify the result by the Cauchy's theorem.

3b) Represent the function f(z)= $\frac{4z+3}{z(z-3)(z-2)}$ as Laurent series

(i) with in |z|=1 (ii)In the annulus region |z|=2 and |z|=3 (iii) exterior to |z|=3.

(OR)

4a) Apply Cauchy's integral formula, evaluate $\int_C \frac{e^{2z}}{(z-1)(z-5)}dz$ where C is the circle |z|=5.

4b) Expand f(z) = $\frac{2z^3+1}{z^2+1}$ as a Taylor's series about the point z = i.

CO1	**COI 3**	**BTL:2**	**MARKS: 2x5= 10**

5a) Using residue theorem evaluate $\int_C \frac{\sin z}{(z-1)^2(z^2+9)}\,dz$, where C is $|z-3i|=1$.

5b) Apply the calculus of residues. evaluate $\int_0^{2\pi} \frac{d\theta}{(a+b\sin\theta)}, (a>b>0)$.

(OR)

6a) Evaluate , $\int_C \frac{z^2}{z+1}dz$ by Cauchy's integral formula , stating clearly the contour taken. Verify the result by the residue theorem.

6b) Apply the calculus of residues, evaluate $\int_0^{2\pi} \frac{d\theta}{(5-3\cos\theta)}$.

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