ANNAMALAI UNIVERSITY

DIRECTORATE OF DISTANCE EDUCATION

018 – M.Sc., Mathematics

Third Semester 2022-2023

INTERNAL ASSESSMENT – ASSIGNMENT TOPICS

This booklet contains assignment topics for the Third semester. Students have to write and submit assignment for FIVE papers as per the instructions given below.

1. Assignment should be in the own handwritten of the students concerned and not type-written or printed or photocopied.
2. Assignment should be written only A4 paper on one side.
3. All assignments (with enrollment number marked on the top right hand corner on all pages) should be put in an envelope with superscription "**M.Sc., Mathematics** -**Assignments**" and send to **The Director, Directorate of Distance Education, Annamalai Nagar -608 002** by registered post.
4. No notice will be taken on assignments which are not properly filled in with enrolment number and the title of the papers.
5. Students should send full set of assignments for all papers. Partial assignments will not be considered.

ASSIGNMENT INSTRUCTIONS

You are expected to write the answers for all the FIVE questions for each course.

Each answer should not exceed 5-pages.

Each assignment carries 25 marks (5 questions X 5 marks = 25 marks)

Date to Remember

Last Date for Submission: **01/11/2022**

Last Date for submission with late fee Rs.300/-

Assignment sent after **15/11/2022** will not be considered for valuation

Dr. R.SINGARAVEL

Director

(5x5=25)

Course 3.1. COMPLEX ANALYSIS - I

1. Show that the real and imaginary parts of an analytic function are harmonic. .
2. State and Prove Luca's theorem.
3. Prove that, every rational function has a representation by partial fractions
4. Show that, every convergent sequence is a Cauchy sequence.
5. State and prove Cauchy's Theorem for a rectangle

(5x5=25)

Course 3.2. SET TOPOLOGY

1. Let X be metric space. Show that, a subset G of X is open $\Leftrightarrow$ G is a union of open spheres
2. Let X be a complete metric space, and Y be a subspace of X . Prove that, Y is complete $\Leftrightarrow$ Y is closed.
3. State and Prove Baire's Theorem
4. State and Prove Lindelof's Theorem
5. a) Show that, any continuous image of a compact space is compact
   b). Prove that, every closed and bounded subspace of the real line is compact

(5x5=25)

Course 3.3. GRAPH THEORY

1. Prove that The number of edges in a tree on ν vertices is ν-1 .
2. Prove that For a graph G with ε, = v-1, the following statements are equivalent
   1. G is connected
   2. G is Acyclic
   3. G is a tree
3. State and Prove Hall's Theorem
4. State and Prove Tutte's Theorem.
5. Prove that a bipartite graph G has a perfect matching iff $|N(S)| \geq |S|$ for all $S \subset V(G)$..

(5x5=25)

Couse 3.4. PROBABILITY THEORY

1. If two dice are thrown, what is the probability that the sum is
   a) Greater than 8 and
   b) neither 7 nor 11?
2. State and Prove Inversion Theorem
3. Find the mean and Variance of Bionomial Distributions from MGF.
4. Let (X,Y) be a bivariate normal rv with parameters $\mu_1, \mu_2, \sigma_1^2, \sigma_2^2$, and ρ, and let U= aX +b, $a \neq 0$, and
   V = cY +d, $c \neq 0$. Find the joint distribution of (U,V).
5. The regression lines of Y on X and X on Y are respectively
   Y=aX+b and X=cY+d

   Show that the ratio of the S.D's of y and X is $\sqrt{a/c}$ and the arithmetic means are

   $\overline{X} = (bc + d)/(1 - ac)$ $\overline{Y} = (ad + b)/(1 - ac)$

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