

MANONMANIAM SUNDARANAR UNIVERSITY
DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION
INTERNAL ASSIGNMENT V Semester BSc Mathematics

Name of the Programme : ABSTRACT ALGEBRA

1. a) Prove that the order of every element in a finite cyclic group divides the order of the group.
(or)
b) State and prove Lagrange's Theorem.
2. a) Prove that an isomorphism preserves group operation.
(or)
b) Give an example of a quotient ring that is not an integral domain.

Name of the Programme : REAL ANALYSIS

- 1 a) Prove that every open ball is an open set in a metric space.
(or)
b) State and prove Cantor's Intersection Theorem.
2. a) Distinguish between continuity and uniform continuity with examples.
(or)
b) Give two examples of compact metric spaces and justify.

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Name of the Programme : MATHEMATICAL MODELING

1. a) Explain with examples how simplifications are used in building a mathematical model.
(or)
b) Explain the assumptions involved in growth and decay models.
2. a) Explain immigration models and write their governing equations.
(or)
b) Write short notes on: i) Forward difference ii) Backward difference

Name of the Programme : NUMBER THEORY

1. a) Use mathematical induction to prove the Binomial Theorem.
(or)
b) State and prove the Division Algorithm.
2. a) State and prove the Fundamental Theorem of Arithmetic.
(or)
b) State and prove Fermat's Little Theorem.

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Name of the Programme : DISCRETE MATHEMATICS

1. a) Explain negation, conjunction, and disjunction with suitable truth tables.
(or)
b) Explain ordering and uniqueness of normal forms.
2. a) Explain the properties of lattices: commutative, associative, absorption, idempotent. (or)
b) Define predicate, statement function, and quantifiers with examples.

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Name of the Programme : COMBINATORIAL MATHEMATICS

1. a) Distinguish between ordered and unordered selections with examples.

(or)

b) Explain with an example how many ways n people can be paired up into $n/2$ disjoint pairs.

2. a) Derive the closed-form expression for Fibonacci numbers using generating functions.

(or)

b) Prove any two fundamental equations of Balanced Incomplete Block Designs.

Name of the Programme : STATISTICS WITH EXCEL PROGRAMMING

1. a) Distinguish between frequency, relative frequency, and cumulative frequency.

(or)

b) Define correlation coefficient. Explain how Excel is used to compute it.

2. a) Describe the procedure to compute the median using Excel.

(or)

b) Compare mean, median, mode, and midrange with suitable examples.

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