Home Assignment-2022
M.A./M.Sc. in Mathematics Programme
Final Year
Directorate of Open and Distance Learning
Dibrugarh University

MATH - 201

Topology and Functional Analysis

Assignment 1:   (5+5)

(i)   Show that compactness is closed hereditary.

(ii)   Show that a real valued continuous function on a connected space has intermediate value property.

Assignment 2:   (10)

(i)   Show that if a norm is induced by an inner product then the parallelogram law holds. Is the converse true? Justify your answer.

Math - 202

Measure Theory & Computer Programme

Assignment 1:   (5+5)

(i)   Show that the union of two outer measurable set is outer measurable.
(ii)   State and prove dominated convergence theorem.

Assignment 2:   (5+5)

(i)   Write short note on operators in C-programming.
(ii)   Write a program in C to find first 100 Fibonacci numbers and their sum.

Math - 203

Advance Fluid Dynamics

Assignment 1:   (10)

(i)   Derive Navier-Stokes equations of motion for a viscous incompressible fluid.

Assignment 2:   (10)

(i)   Derive Prandtl's boundary layer equations

Math - 204

Numerical Analysis

Assignment 1:   (10)

(i) Using LU-decomposition method, solve the following system of equations
$$x_1 + x_2 + x_3 = 3$$
$$2x_1 - x_2 + 3x_3 = 16$$
$$3x_1 + x_2 - x_3 = -3$$

Assignment 2:   (10)

(i)   Describe the general least squares method. Also obtain the normal equations to fit the line $y = a + bx$.

MATH - 205(A)

Number Theory

Assignment 1:   (10)

(i)   If p is an odd prime and m is the least integer satisfying $mp = x_1^2 + x_2^2 + x_3^2 + x_4^2$ with $1 \leq m \leq p$, then show that $m=1$.

Assignment 2:   (4+6)

(i)   Define algebraic number. What are algebraic integers?

(ii)   Find all primes of $Q(\sqrt{3})$

MATH-205 (B)

Operator Theory

Assignment 1:   (5+5)

(i)   Show that the set of all linear operators on a vector space into itself forms algebra.

(ii)   Prove that the spectrum of a bounded linear operator on a complex Banach space is open.

Assignment 2:   (5+5)

(i)   Show that a self adjoint linear operator is symmetric.

(ii)   Show that the eigen values of an unitary matrix have absolute value 1.

MATH 205(C)
Magnetohydrodynamics

Assignment 1:   (10)

(i)   Deduce the low frequency approximation to Ampere- Maxwell equations.

Assignment 2:   (10)

(i)   Discuss boundary conditions on magnetic field for fluid/solid interface for all possible cases.

MATH - 206(A)

Graph Theory

Assignment 1: (10)

    (i)   Define a cut-set. Prove that every circuit has an even number of edges in common with any cut-set.

Assignment2: (10)

    (i)   Explain the concept of data structure. Discuss briefly different data structure operations.

MATH - 206(B)

Abstract Algebra

Assignment 1: (5+5)

    (i)   State and prove the fundamental theorem of R-homomorphism.
    (ii)   Prove that every extension of Q is separable.

Assignment2: (5+5)

    (i)   Define a free module. Show that any two bases for a free module M over a commutative ring R have the same cardinality.

    (ii)   Show that in an Artinian ring, the radical is nilpotent.

MATH - 206 (C)

Nonlinear Dynamical System

Assignment 1: (10)

    (i)   What do you mean by bifurcation of a system? Formulate one physical system in which bifurcation occurs for changing values of the parameter. Draw bifurcation diagram.

Assignment 2: (10)

    (i)   Define fixed point of a system in the context of flow. Give its geometrical interpretation. How do you relate this concept with the usual notation of fixed point in a continuous dynamical system.