HOME ASSIGNMENT
Mathematics (Final Year)
(2023)
Directorate of Open and Distance Learning
Dibrugarh University

MATH - 201

Topology and Functional Analysis

Assignment 1: (5+5)

(i) Show that if $f: X \to Y$ is a continuous function then for every sequence $\{x_n\}$ in X converging to say x, $f\{x_n\}$ converges to $f(x)$. The converse holds if X is first countable.

(ii) Prove: Let Y be subspace of a topological space X and A, B are subsets of Y. If A and B are separated in X. Then they are separated in Y.

Assignment 2: (10)

(i) Define a Banach space. When is a Banach space said to be complete? Show that closed subspace of a Banach space is complete.

Math - 202

Measure Theory & Computer Programme

Assignment 1: (5+5)

(i) Show that any function defined on a set of measure zero is measurable.
(ii) Prove that a bounded function is Riemann integrable if and only if it is continuous almost everywhere.

Assignment 2: (5+5)

(i) Write a simple program for subtraction of two numbers.
(ii) Write a brief description on various types of loops used in a c-program.

Math - 203

Advance Fluid Dynamics

Assignment 1:

(10)

(i) Discuss Hagen-Poiseuille flow through a circular pipe for viscous fluid theory.

Assignment 2:

(5+5)

(i) Write short notes on the following
(a) Newtonian and Non-Newtonian fluids.
(b) Weissenberg and Merrington effects.

Math - 204

Numerical Analysis

Assignment 1:

(10)

(i) Discuss Newton-Raphson method. Also find its rate of convergence.

Assignment 2:

(10)

(i) Describe Milne's predictor-corrector method. Also show that its truncation error is of order 5.

MATH - 205(A)

Number Theory

Assignment 1:

(5+5)

(i) Find the successor of $\frac{4}{9}$ in F_{13}

(ii) Show that for $n>=1$ we have $p^d(n)=p^0(n)$

Assignment 2:

(10)

(i) Show that any periodic simple continued fraction is a quadratic irrational number and conversely.

MATH-205 (B)

Operator Theory

Assignment 1: (5+5)

(i) Show that the range of a compact linear operator is separable.

(ii) Find the eigenvalues and eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 2 \\ -8 & 11 \end{bmatrix}$$

Assignment 2: (5+5)

(i) Show that the sum of two projections is a projection iff they are orthogonal.

(ii) Define and illustrate multiplication and differential operators with suitable examples.

MATH 205(C)

Magnetohydrodynamics

Assignment 1: (10)

(i) Derive Magnetic induction equation. Explain significance of each term.

Assignment 2: (10)

(i) Show that body force and surface stresses are equivalent.

MATH - 206(A)

Graph Theory

Assignment 1: (10)

(i) Discuss different matchings in a graph with the help of an example.

Assignment2: (10)

(i) Discuss Dijkstra's shortest path algorithm.

MATH - 206(B)

Abstract Algebra

Assignment 1: (5+5)

(i) Show that a finite extension of a finite field is separable.

(ii) Use Galois Theory to prove the fundamental theorem of algebra.

Assignment2: (10)

(i) Show that every Noetherian ring with unity has a maximal ideal. Examine whether quotient ring of an Artinian ring is Artinian.

MATH - 206 (C)

Nonlinear Dynamical System

Assignment 1: (10)

(i) What do you mean by transcritical bifurcation? Discuss it in detail with a suitable example.

Assignment 2: (10)

(i) Define Mandelbrot set and discuss its method of construction.
