

HOME ASSIGNMENT (2022 Batch)
M.A./MSC IN MATHEMATICS
(FOURTH SEMESTER)
CENTRE FOR DISTANCE AND ONLINE EDUCATION
DIBRUGARH UNIVERSITY
(Full Marks 20 for each course.)

(ALL THE QUESTIONS GIVEN BELOW ARE COMPULSORY)

Course : MATH-401 (Functional Analysis)

Assignment – 1

Marks – 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.

Assignment – 2

Marks - 2+2+8=10

- (i) Define orthogonal and orthonormal set of vectors. Suppose S is an orthogonal set of nonzero vectors. Then show that S is linear independent.

Course : MATH-402 (Computer Programme)

Assignment – 1

Marks - 5+5=10

- (i) Write an algorithm to compute the roots of a quadratic equation.
(ii) Write short note on Operators in C-programming

Assignment – 2

Marks - 5+5=10

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

Course: MATH-403(A) (Number Theory)

Assignment – 1

Marks – 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

Marks – 5+5=10

- (i) Define algebraic number. What are algebraic integers?
(ii) Find all primes of $\mathbb{Q}(\sqrt{3})$

Course : MATH-404(A) (Graph Theory)

Assignment – 1

Marks – 10

- (i) Write short notes of the following:
(a) Tree
(b) Loop
(b) Simple digraph
(c) Trail
(d) Directed graph
(e) Complete digraph

Assignment – 2

Marks - 10

- (i) Discuss an algorithm to compute shortest path between all pairs of vertices.

Course: MATH-403(B) (Abstract Algebra)

Assignment – 1

Marks – 10

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

Assignment – 2

Marks – 10

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

Course: MATH-404(B) (Operator Theory)

Assignment – 1

Marks – 10

- (i) Define a compact linear operator. Show that the composition of two compact linear operators is a compact linear operator.

Assignment – 2

Marks – 5+5=10

- (i) Show that a self adjoint linear operator is symmetric.
- (ii) Show that the inverse of a closed linear operator (if exists) is closed.

Course: MATH-403(C) (Magnetohydrodynamics)

Assignment – 1

Marks – 10

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

Assignment – 2

Marks – 10

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

Course: MATH-404(C) (Nonlinear Dynamical System)

Assignment – 1

Marks – 10

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

Assignment – 2

Marks – 10

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

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