

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

Course Math - 101

Real Analysis and Complex Analysis

Assignment 1: (5+5)

- (i) Prove that, Image of a Cauchy sequence under a uniformly continuous function is again a Cauchy sequence.
- (ii) Prove that, If f is continuous on $[a, b]$ then $f \in R(a)$

Assignment 2: (5+5)

- (i) Find the Maclaurin series for $\cos z$.
 - (ii) Find all bilinear transformation which has i and $-i$ as fixed points.
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Course Math - 102

Algebra and Logic

Assignment 1: (5+5)

- (i) Write short note on solvable group and show that subgroup of a solvable group is solvable.
- (ii) Suppose u, v and w are three linearly independent vectors. Examine whether the set $\{u+v-w, u-v-w, u+w\}$ is linearly independent.

Assignment 2: (5+5)

- (i) By using truth table show that $\mathbf{p \vee (q \wedge r)}$ and $\mathbf{(p \vee q) \wedge (p \vee r)}$ are logically equivalent.
 - (ii) Symbolize the following
 - (a) Every natural number is a real number.
 - (b) Some sailors are ignorant
Sameer is a sailor
Therefore, Sameer is ignorant.
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Course Math - 103

Differential Geometry and Tensor

Assignment 1: (10)

- (i) Find the envelope of the family of planes $3a^2x - 3ay + z = a^3$ and show that its edge of regression is the curve of intersection of the surface $y^2 = zx, xy = z$.

Assignment 2: (10)

- (i) Prove that the outer product of two contravariant vectors is a contravariant tensor of order two.

Course Math - 104

Mechanics

Assignment 1: (6+4)

- (i) Derive Euler dynamical equations of motion.
- (ii) Explain Poinsot's inertia ellipsoid.

Assignment 2: (8+2)

- (i) Derive Euler-Lagrange differential equation in calculus of variation.
 - (ii) Show that shortest distance between two points is a straight line.
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Course Math - 105

Differential Equations and Integral Equations

Assignment 1: (10)

- (i) Obtain a solution of Laplace's equation in rectangular Cartesian coordinates (x, y, z) by the method of separation of variables.

Assignment 2: (5+5)

- (i) Establish the relationship between a second order linear differential equation with the corresponding Volterra integral equation.
 - (ii) Find the iterated kernels upto 3rd approximation for the kernel $K(x, t) = x-t$ if $a=0, b=1$.
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Course Math - 106

Inviscid Fluid Mechanics

Assignment 1: (10)

- (i) State and prove Kelvin's minimum energy theorem.

Assignment 2: (10)

- (i) Derive the velocity potential of uniform flow past a stationary sphere.
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