

DEPARTMENT OF MATHEMATICS

5TH SEMESTER

MATH-H-CC-T-11

Partial Differential Equations & Applications

1. Reduce the following first order PDE into canonical form and hence find its general solution.

$$z_x - z_y = z$$

5

2. Find the integral surface of the linear partial differential equation $x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$ which contains the straight line $x + y = 0, z = 1$.

5

MATH-H-CC-T-12

Group Theory II

1. Let G be a group and the mapping $f: G \rightarrow G$ is defined by $f(x) = x^{-1}, x \in G$. Then show that f is an automorphism if and only if G is abelian. 5
2. Prove that the commutator subgroup of a group G is the normal subgroup of G . 5

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MATH-H-DSE-T-1A

Linear Programming

1. If i -th variable of primal problem is unrestricted in sign then show that the i -th constraint of dual is equal in sign. 5

2. Solve by two phase method

$$\text{Maximize } z = 5x_1 + 8x_2$$

$$\text{subject to } 3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

5

MATH-H-DSE-T-1B

Point Set Topology

1. Prove that the set of real number is uncountable. 5
2. State and prove Schroeder-Bernstein Theorem. 5

MATH-H-DSE-T-2A

Probability and Statistics

1. For any three event A, B, C prove that,

$$P(A \cup B \cup C)$$

$$= P(A) + P(B) + P(C) - P(A \cap B)$$

$$- P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$$

5

2. State and prove bayes' Theorem. 5