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# PRESIDENCY UNIVERSITY BENGALURU

## Department of Research & Development

### Mid - Term Examinations - AUGUST 2024

**Odd Semester:** Ph.D. Course Work

**Course Code:** ECE843

**Course Name:** Compressive Sensing

**Department:** ECE

**Date:** 12-08-2024

**Time:** 09.30am to 11.00am

**Max Marks:** 50

**Weightage:** 25%

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#### Instructions:

- (i) Read all questions carefully and answer accordingly.
  - (ii) Do not write any matter on the question paper other than roll number.
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#### PART A (THOUGHT PROVOKING)

**Answer all the Questions. Each question carries 5 marks.**

**(4Qx 5M= 20M)**

1. Explain the basic principle of compressive sensing and how it allows for signal acquisition at rates lower than the Nyquist rate.
2. Compare and contrast Basis Pursuit (BP) and Orthogonal Matching Pursuit (OMP) as methods for reconstructing signals in compressive sensing.
3. Define sparsity and incoherence in the context of compressive sensing and explain their importance for signal reconstruction.
4. What are the most common algorithms used for signal reconstruction in compressive sensing?

#### PART B (PROBLEM SOLVING)

**Answer all the Questions. Each question carries 10 marks.**

**(3Qx 10M= 30M)**

1. Describe in detail the steps involved in reconstructing a signal using compressive sensing. Illustrate your answer with a relevant algorithm, such as Basis Pursuit or Orthogonal Matching Pursuit, and discuss the computational challenges involved.
2. How does compressive sensing handle signals that are not strictly sparse but compressible? Describe the approach and any modifications needed in the reconstruction algorithms.
3. Discuss the role of optimization techniques in compressive sensing. Compare and contrast different optimization algorithms used for signal reconstruction, such as Basis Pursuit, LASSO, and CoSaMP.