AI-1551 CV-19

M.A./M.Sc. (Final)

Term End Examination, 2020-21

Mathematics

Paper- VII Information Theory

Time: - Three Hours] **[Maximum Marks: 100]** **[Minimum Pass Marks: 36]**

Note: Answer any five questions. All questions carry equal marks.

1. State and prove the fundamental theorem of information theory.
2. State and prove necessary and sufficient condition for the existence of instantaneous Codes.
3. Explain transformation what are the relations with shannon entropy of it?
4. Explain shannon entropy and it's Properties?
5. (a) Explain ingredients of noiseless coding problem.

   (b) Explain Joint and Conditional entropies with example.
6. Define the following:-

   (i) Continuous channels. (ii) Looping. (iii) Construction of optimal Codes. (iii) Real observer.
7. (i) Explain uncertainty Principle of an absolutely Continuous random variable.

   (ii) Explain strong and weak Converses.
8. (a) explain additivity and subadditivity of a measures of entropy.

   (b) Explain in brief about continuity and branching.
9. Derive the general Solution of the fundamental equation of information.
10. Define the following:-

    (i) Normalizer. (ii) Information function. (iii) Expansibility. (iv) Ideal observer.

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