

AE-811

M.A / M.Sc. (Final)
Term End Examination, 2016-17

MATHEMATICS

Optional

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. (a) Write down the Shannon entropy and its properties.
(b) Explain instantaneous codes and optimal codes.
2. (a) Write down the converse to the coding theorem for time discrete Gaussian channel.

(2)

- (b) Explain the uniquely decipherable codes and noiseless coding problem.
- 3. Write down the necessary and sufficient condition for the existence of instantaneous codes.
- 4. (a) Explain information functions.
(b) Define subadditivity and nonnegativity.
- 5. (a) Explain the fundamental equation of information.
(b) Define information functions continuous at the origin and nonnegative bounded information function.
- 6. (a) Define the measurable information function and entropy.
(b) Explain joint and conditional entropies with example.
- 7. Write the Axiomatic characterizations of the Shannon entropy due to Tverberg and Leo.
- 8. (a) Explain maximality and stability.
(b) Define the time continuous Gaussian Channel Band.

(3)

9. (a) Explain in brief about continuity and branching.
- (b) Write down the properties of transformation.
10. Write down the fundamental theorem of information theory and its strong and converses.
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