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.

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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.

(*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 Axionmatic characterizations of the Shannon entropy due to Tverberg and Leo.

8. (*a*) Explain maximality and stability.

(*b*) Define the time continuous Gaussian Channel Band.

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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