

AH – 1551 CV-19
M.A./M.Sc. (Final)
Term End Examination 2019-20
MATHEMATICS
Paper-VII
Information Theory

Time : Three Hours]

[Maximum Marks : 100

[Minimum Pass Marks : 36

नोट : किन्हीं पाँच प्रश्नों के उत्तर दीजिए। सभी प्रश्नों के अंक समान हैं।

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

1. Explain shannon entropy and its Analytical properties.
2. (a) Write a short note on noiseless coding.
(b) Explain the time Continuous Gaussian Channel band.
3. (a) What is transformation? Write its properties.
(b) Explain in brief about continuity and branching.
4. (a) Prove that every information function f .
(i) $f(1) = f(0) = 0$
(ii) $f(x) = f(1-x) \quad \forall \quad x \in \{0,1\}$
(b) Prove that the shannon information function is only information function continuous on $\{0,1\}$
5. State and prove fundamental theorem of Information theory.
6. Define the following.
(i) Normalizer
(ii) Real observer
(iii) expansibility
(iv) Looping
(v) construction of optimal codes
7. Explain the channel capacity decoding schemes.
8. (a) explain the characteristics of the time continuous Gaussian-channel band.
(b) Explain instantaneous codes and optimal codes.
9. Write the axiomatic characterization of the shannon entropy due to shannon and fuddeer.
10. (a) State and prove converse to the coding theorem for time discrete Gaussian channel.
(b) Explain Axioms for a measure of uncertainty.

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