

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) $f(x) = f(1-x) \quad \forall x \in \{0,1\}$
(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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