

PD-366-S.E.-CV-19
M.A./M.Sc. MATHEMATICS (3rd Semester)
Examination, Dec.-2020
INFORMATION THEORY-I

Time : Three Hours]

[Maximum Marks : 80

Note : Answer from both the Sections as directed. The figures in the right-hand margin indicate marks.

Section-A

1. Answer the following questions:- 1x10=10
- (a) What is Entropy?
 - (b) What is Entropy Symmetry?
 - (c) Explain Recursivity?
 - (d) Define joint Shannon entropy of two discrete random variables.
 - (e) Find the value of $I(X, Y)$
 - (f) What is mutual information? Explain.
 - (g) Explain maximality.
 - (h) Explain stability.
 - (i) What is normalization?
 - (j) What is continuity?
2. Answer the following questions:- 2x5=10
- (a) Explain Shannon Entropy?
 - (b) What is nonnegative bounded information function?
 - (c) Explain expansibility.
 - (d) Explain Additivity and subadditivity.
 - (e) What is conditional entropy?

Section-B

12x5=60

- Answer all questions.
3. Write the axiomatic characterization of the Shannon entropy due to Shannon and Faddor.
- OR
- State and prove the fundamental theorem of information theory.
4. What are the strong and weak converses of information theory?
- OR
- What are the measurable information function?
5. Explain the Axiomatic characterization of the Shannon entropy due to Tverberg and Leo.
- OR
- Explain Transformation and its properties.
6. Write short notes on expansibility and boundedness.
- OR
- Write down the interconnection between additivity, subadditivity and non negativity.
7. What are the axioms of measure of uncertainty? Explain.
- OR
- Write down the properties of Shannon entropy.