INDIAN STATISTICAL INSTITUTE
THIRD SEMESTER EXAMINATION, 2023/25 SESSION
PAPER - 11: INFORMATION RETRIEVAL
(MASTER IN LIBRARY INFORMATION SCIENCE)
06th November 2024 (10:00-13:00) (3 Hours)

This Question paper consists of ONE page, and is for 60 Marks. **Attempt Questions or Sub-Questions to score maximum marks**. Please print all your answers in the Answer Booklet provided. Scientific Calculator is allowed.

N.B.: Explain the following, with supporting equations, illustrations, and demonstrations wherever required, and their relevance in **Information Retrieval**. Wherever the demonstration needs to be provided, use the data of your choice.

QUESTION 1.

(i) Information Retrieval in Library Information Science **[04 Marks]**
(ii) Information Dimension computation via $f(\alpha)$ Spectra **[04 Marks]**
(iii) Geometric Music Information retrieval via Hit-Or-Miss Transformation (HMT) **[04 Marks]**
(iv) Generate data, $f(x,y)$, of your choice providing values in the range between 0 and 15. Retrieve the foreground information that is defined as the values greater than mean of the $f(x,y)$, and depict those foreground data with 1sand the rest with 0s. **[04 Marks]**

QUESTION 2. Probabilistic approaches are the best for generating automatic summaries from a collection of documents. Explain the schematic flow involved in document summarization and the computation of the probability that the i^{th} word (w_i) appears k number of times in a document. **[08 Marks]**

QUESTION 3. Delimiter space has a significant geometric complexity. Explain how rectangular granulometry can be employed to characterize the delimiter space quantitatively. **[08 Marks]**

QUESTION 4. Answer one of the following two sub-questions. **[08 Marks]**

(i) Explain indexing in detail. What do you understand by subject indexing?
(ii) Define briefly controlled vocabulary and its contribution to information retrieval.

QUESTION 5. In a database, many grayscale images depict significant information with significant redundancy. If we need to reduce the number of images in the database to fix the storage issues, then we need to compute the ranks for all possible pairs of images in the database. Explain the process of computing the ranks for pairs of images (fi, f). **[08 Marks]**

QUESTION 6. Explain the binary and grayscale morphological interpolations with sample cases relevant to Information Retrieval. **[08 Marks]**

QUESTION 7. Explain Mahalanobis Distance and briefly describe its application in Information Retrieval and data clustering. **[08 Marks]**

QUESTION 8. Generate data of your choice and explain the step-by-step procedure for computing Moran's Index. Briefly describe its application in Information retrieval. **[08 Marks]**

QUESTION 9. What is the spatial interaction between (X^i) and (X^j)? Write about the Modified Gravity Model in Spatial Data Classification. **[08 Marks]**

END OF PAPER