INDIAN STATISTICAL INSTITUTE
THIRD SEMESTER EXAMINATION, 2021/23 SESSION
PAPER - 11: INFORMATION RETRIEVAL
(MASTER IN LIBRARY INFORMATION SCIENCE)
16th November 2022 (10:00-13:00) (3 Hours)

This Question paper consists of two pages. **Attempt Questions or Sub-Questions to score maximum of 60 marks**. Please print all your answers in the Answer Booklet provided. Scientific Calculator is allowed.

QUESTION 1. Write briefly about
  (i) Histogram   **[4 marks]**
  (ii) Role of Information Retrieval in Library Information Science   **[4 marks]**
  (iii) A perspective of Moran's Index in Information Retrieval   **[4 marks]**
  (iv) Skeletonization by Influence Zones (SKIZ), and Weighted SKIZ   **[4 marks]**
  (v) Modified Gravity Model in Spatial Data Classification   **[4 marks]**
  (vi) Precision-Recall Measure   **[4 marks]**

QUESTION 2. Let delimiter-space (X) and text (X^c) represent respectively foreground (in white shade) and background (in black shade). Write briefly about the importance of quantitative description of the delimiter space in the context of document information retrieval. Explain how the geometry of X could be quantitatively characterized via rectangular granulometries. Give full set of equations involved in document summarization. **[10 marks]**

QUESTION 3. In a video movie, nine black and white pictures are shown in a sequence. Due to storage restrictions, 2nd, 4th, 6th and 8th pictures are removed and other pictures are shown below: **[12 marks]**
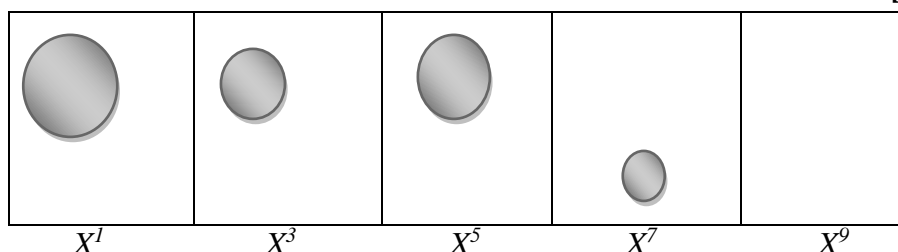
X^1 X^3 X^5 X^7 X^9

Consider the following five logical relationships hold good for the above five pictures that are part of a video movie.

$X^1 \supseteq X^3$; $X^3 \not\subset X^5$; $X^5 \bigcap X^7 = \Phi$; $X^7 \neq \varnothing$; $X^9 = \varnothing$

  i) Provide the Hausdorff-dilation and Hausdorff-erosion distances-based spatial relationships.
  ii) What are the various equations involved to generate median (removed) maps between
        (a) X^1 and X^3, (b) X^3 and X^5, (c) X^5 and X^7, and (d) X^7 and X^9.

QUESTION 4. Explain the Grayscale Morphological Interpolation with the support of illustrations and equations. In Information Retrieval, where do you see the application of grayscale morphological interpolation? **[8 marks]**

QUESTION 5. Write a simple morphology-based algorithm to compute the ranks for pairing the three spatial fields with the similar size configurations **such as** f^1, f^2, and f^3. **[10 marks]**

QUESTION 6. Explain with details of each and every term involved in probabilistic approach based K-Mixture Model—used in the calculation of $P_i(k)$, probability of word (w_i)—that is popular in automatically summarizing the documents. Explain a scenario with the support of equations. **[8 marks]**

QUESTION 7. Demonstrate the computation of Mahalanobis Distance that measures the separation between the two groups. Write your conclusions about the relevance of Mahalanobis Distance in the context of information retrieval. **[8 marks]**

END OF PAPER