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## Answer two of the following questions

**Q1.**

  **a.** An urn contains 4 purple and 8 yellow balls. Two balls are drawn from the urn without Replacement (i.e. they are not put back in the urn after being drawn).

    **(i)** What is the entropy of the experiment of choosing the first ball ?

    **(ii)** What is the entropy of second draw given that the first ball is purple?

    **(iii)** What is the entropy of second draw if the colour of the first ball is not known?

  **b.** Write down three example codes, each with the following properties:

    **(i)** non distinct.

    **(ii)** distinct but not instantaneous.

    **(iii)** instantaneous.

**Q2.**

  Design a code using Huffman tree to encode a memoryless source with 8 symbols using a binary encoded alphabet {0,1}, and calculate its efficiency. A sample of the source output is: ABAAACBEDDFGGCCHHB.

**Q3**   **a**. Encode the following messages using the mentioned method:

    **(i)** 70000000003000000000000028 (zero suppression)

    **(ii)** BBABABBABCABABDBAD   (LZW)

  **b.** Decode the following codes using the mentioned coding information:

    **(i)** 11607011512 (a binary using Run length)

    **(ii)** Using LZ77

            (0,0) a
            (0,0) b
            (0,0) r
            (3,1) c
            (2,1) d
            (7,4) r
            (3,2) y

تمنياتي للجميع بالتوفيق

أستاذ المـادة : أيمن الترهوني