Assignment 1
FN204
Algorithms in Ancient India

February 22, 2018

Instructions:

- Due date for submission: 6^{th} March 2017.
- Attempt all questions from Part A OR any 3 from Part B.
- Numbers to the right of each question indicate the marks.
- In case of Part B, a soft copy of the code along with the sample input and output should be submitted.
- In case of Part B, modularity, and documentation will carry 10 marks.

PART A

1. Write the krama pāṭha and Ganapāṭha for the following string of a mantra. (10)
   दꣳ॒ष्ना युवाकवः नासत्या पृक्तबर्हिषः
2. Classify each akṣara in the following śloka into laghu and guru.
   प्रत्यादिष्टं समरशिरसः कान्दीशीभूयनष्टं (5)
3. Explain Kedar Bhatt's procedure for prastāra for generating all combinations of 4 aksharas, explaining at each step how it is arrived at from the previous one. (10)
4. Explain why Kedar Bhatt did not need any algorithm for Naṣṭa. (5)
5. Explain the algorithm to get the positions of chandas with 1 laghu, 2 laghus, etc. in a prastāra of 4 syllables (10)

PART B

1. Write a programme to generate the Ghanapāṭha of a mantra.
   Test it with the following string of a Mantra.
   दस्रा युवाकवः नासत्या पृक्तबर्हिषः
   For the purpose of input, instead of Devanagari, use the following roman transliterated string.
   dasrA yuvAkavaH nAsatyA pqktabarhiRaH
   (Note: We have used lower case letters for short vowels and upper case for long vowels. Also note the use of 'q' and 'R'.)

2. Write a programme to classify a given string of akṣaras into laghu guru.
   Assume that the input is in WX notation. (https://en.wikipedia.org/wiki/WX_notation)

3. Write a programme to generate the sequence of binary numbers of n bits recursively following Piṅgala's algorithm.

4. Write a programme to generate the sequence of binary numbers of n bits following Kedara's algorithm.

5. Write a programme that implements Piṅgala's algorithm to calculate 2^n.