UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

CSC 222: AUTOMATA THEORY

DATE: APRIL 6, 2018   TIME: 11:00 AM – 1:00 PM

INSTRUCTIONS:

Answer Question ONE and ANY other two Questions

QUESTION ONE (30 MARKS)

a) Describe the term set   (2 marks)

b) Distinguish between the following terms as used in set theorem citing with examples

   i)   Finite and infinite set   (3 marks)

   ii)   Union and intersection of sets   (3 marks)

   iii) Difference and complementation of sets   (3 marks)

c) Describe the term "function of a set" citing with example   (3 marks)

d) Distinguish between domain and range of a function   (4 marks)

e) Distinguish between cycle and path   (4 marks)

f) Distinguish between parent and child with reference to automata theory   (4 marks)

g) Explain about regular languages   (4 marks)

QUESTION TWO (20 MARKS)

a)   Explain in detail about" PUSH DOWN AUTOMATA"   (10 marks)

b)   Describe the term string   (2 marks)

c) Given the following two strings WV whereby $w = a, b, c$: and $v = a, b$

Write down the reverse of w^R

    i) $|\lambda|$ (2 marks)

    ii) $|WV|$ (3 marks)

    iii) W'' (3 marks)

QUESTION THREE (20 MARKS)

a) Describe the term language as used in automata   (2 marks)

b) Given the following languages $L_1 and L_2$ whereby

$$L_1 = \langle a, ba, abc \rangle$$
$$L_2 = \langle bcb, b \rangle$$
$$find L_1 L_2$$

(11 marks)

c) Describe the term "automaton"   (2 marks)

d) Briefly discuss the five parts of automaton   (5 marks)

QUESTION FOUR (20 MARKS)

a) Distinguish between DFAs and NFAs   (4 marks)

b) Describe the term regular as used to construct DFAs for a given Language

(2 marks)

c) Given the following as regular DFAs, build a DFA for it

$\langle a^n b^m : n, m \geq 1 \rangle$ (8 marks)

d) Describe the Three basic expressions   (3 marks)

e) Describe the following terms as used in DFAs regular expressions in Automata Theory.

    i)   Regular grammar   (1 mark)

    ii) Productions   (1 mark)

    iii) Terminal symbols   (1 mark)

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