

CBCS SCHEME

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15CS54

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Automata Theory and Computability

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Explain the different functions performed on strings with example. (05 Marks)
- b. Define DFSM. Construct the DFSM for the language $L = \{w : w \text{ is the string representing floating numbers}\}$. (05 Marks)
- c. Draw a DFA to accept strings of a's and b's such that:
 - (i) Language has even number of a's and odd number of b's. (06 Marks)
 - (ii) Language has not more than three a's. (06 Marks)

OR

2. a. Convert the following NDFSM to DFSM:

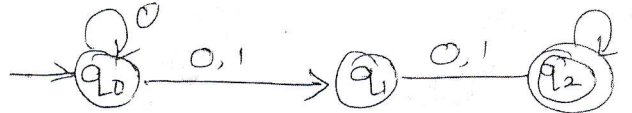


Fig.Q2(a)

(06 Marks)

- b. Minimize the following DFSM:

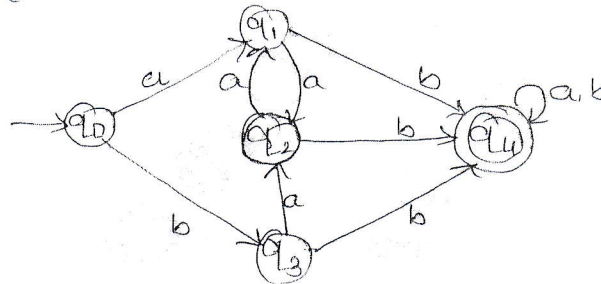


Fig.Q2(b)

(06 Marks)

- c. Define Moore machine and Mealy machine. (04 Marks)

Module-2

3. a. Define Regular Expression Work the RE for the languages.
 - $L = \{a^n b^m : (m + n) \text{ is even}\}$
 - $L = \{\text{String of a's and b's whose 3rd symbol from right is a}\}$ (06 Marks)
- b. Build a regular expression from an FSM.

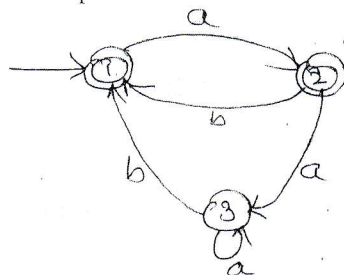


Fig.Q3(b)

(06 Marks)

- c. Convert regular expression $(a + b)^* b(a + b)$ to NDFSM. (04 Marks)

(04 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

OR

- 4 a. State and prove the pumping lemma for regular languages. (06 Marks)
 b. Show that the $L = \{a^n : n \text{ is prime}\}$ is not a regular. (04 Marks)
 c. Prove that regular language are closed under complement, intersection, difference reverse and letter substitution. (06 Marks)

Module-3

- 5 a. Define Context Free Grammar. Write the grammar for balanced parentheses. (04 Marks)
 b. When a grammar is said to be ambiguous, show that expression grammar is ambiguous. Write unambiguous grammar for the same. (08 Marks)
 c. Eliminate ϵ -rules from the given grammar.
 $S \rightarrow aTa$
 $T \rightarrow ABC$
 $A \rightarrow aA|C$
 $B \rightarrow Bb|C$
 $C \rightarrow C|\epsilon$ (04 Marks)

OR

- 6 a. Define Push Down Automata. Construct the PDA for $L = \{a^n b^{2n} : w \in \{a, b\}^*\}$. Write transition diagram. Test that the "aaabbbbb" string is accepted by the model or rejected by the model. (08 Marks)
 b. Convert the following grammar to CNF:
 $S \rightarrow aACa$
 $A \rightarrow B|a$
 $B \rightarrow C|c$
 $C \rightarrow cC|\epsilon$ (08 Marks)

Module-4

- 7 a. Prove that Content Free Languages are closed under union, concatenation, Kleene star, reverse and letter substitution. (08 Marks)
 b. Show that the $L = \{a^n b^n c^n : n \geq 0\}$ is not a Content Free Language. (08 Marks)

OR

- 8 a. With a neat diagram, explain the working of Turing Machine. (04 Marks)
 b. Explain different techniques for turing machine construction. (04 Marks)
 c. Design a turing machine M to recognize the language $\{1^n 2^n 3^n \mid n \geq 1\}$ (08 Marks)

Module-5

- 9 a. Explain the variant turing machine models in detail. (08 Marks)
 b. Explain the working of linear bounded automation. (08 Marks)

OR

- 10 Write short notes on the following:
 a. Decidable and undecidable language
 b. Halting problem of turing machine
 c. Quantum computers
 d. Church Turing Thesis (16 Marks)

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Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Advanced Java and J2EE

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Autoboxing? Write a java program that demonstrates how autoboxing and unboxing takes place in expression evaluation. (08 Marks)
b. What are Annotations? Explain the following Built-in annotation with an example program :
i) Override ii) Inherited. (08 Marks)

OR

- 2 a. Explain the following methods of java.lang.Enum with an example program.
i) ordinal() ii) compareTo() iii) equals() (08 Marks)
b. Explain how to obtain Annotations at Run Time by use of Reflection. (08 Marks)

Module-2

- 3 a. Discuss the following collection interfaces : i) Queue ii) List. (08 Marks)
b. Demonstrate linked list for collections with an example. (08 Marks)

OR

- 4 a. Explain how collections can be accessed using an iterator. (08 Marks)
b. Explain the following legacy classes with an example i) Hashtable ii) TreeSet. (08 Marks)

Module-3

- 5 a. Explain why do we need strings. Briefly explain different ways of creating strings. (05 Marks)
b. Write a program to remove duplicate character in a given string and display new string without any duplicates. (05 Marks)
c. Explain how string can be modified in Java with different methods. (06 Marks)

OR

- 6 a. What is String Buffer? Explain how it is different from strings. (06 Marks)
b. Explain the following String Buffer methods.
i) insert() ii) append() iii) substring() iv) replace() (06 Marks)
c. Explain how to check the occurrences of a substring or character in a given string. (04 Marks)

Module-4

- 7 a. Explain the life cycle of a servlet. (04 Marks)
b. Demonstrate how servlet can accept parameters from HTML. (06 Marks)
c. Explain how cookies can be handled using servlets. (06 Marks)

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OR

- 8 a. Explain how session trading can be done with servlets. (04 Marks)
b. Demonstrate how parameters can be accessed from HTML using JSP. (06 Marks)
c. Explain how cookies can be handled using JSP. (06 Marks)

Module-5

- 9 a. List and explain various JDBC driver types. (09 Marks)
b. Explain what are the basic steps involved in database connection. (07 Marks)

OR

- 10 a. List and explain various statement objects in JDBC. (07 Marks)
b. What is Result set? Explain types of Result sets in JDBC. (05 Marks)
c. Explain the types of exception occurred in JDBC. (04 Marks)

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