



Date: 02-11-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**Part A**

**Answer ALL questions:**

**(10 x 2 =20)**

1. Define successor function.
2. What is a non-terminal? Give an example.
3. Define finite automaton.
4. Write a grammar with character set  $\{a,b\}$  to produce all strings starting with “bb”.
5. Briefly explain Turing machine.
6. Define the term: Compiler.
7. What is the purpose of Syntax Analysis?
8. What is Productions Rule in CFG?
9. What is the purpose of Scanner Generators?
10. Why should Optimize the code in the compilation procedure?

**Part B**

**Answer ALL questions:**

**(5 x8 = 40)**

11. (a) State and prove the two distributive laws in sets.  

**Or**

(b) Construct a grammar to produce all palindrome strings on  $\{a, b\}$ .
12. (a) Construct a NFA on  $\{0, 1\}$  to produce all strings of even length and  $\geq 4$ .  

**Or**

(b) Construct a finite state automaton to produce all positive numbers divisible by 3.
13. (a) Elaborately explain the structure of Turing machine.  

**Or**

(b) How to group the Phases of compiler based on its function?
14. (a) How Lexical Analyzer functions? Explain it with suitable example.  

**Or**

(b) How to represent valid tokens of a language and occurrence of symbols in regular expression?
15. (a) Explain loop Optimization with suitable example.  

**Or**

(b) Discuss about Common Sub-Expression elimination in code Optimization phase of the compiler.

**Part C**

**Answer any TWO questions:**

**(2 x 20 = 40)**

16. (a) Elaborately explain the types of grammar. Give the hierarchy and classify them.

(b) Construct FSA for the languages

- (i)  $L(M) = \{a^m b a^n : m \text{ and } n \text{ are odd}\}.$
- (ii)  $L(M) = \{a^m b a^n : m \text{ and } n \text{ are even}\}.$
- (iii)  $L(M) = \{a^m b a^n : m \text{ is even and } n \text{ is odd}\}.$
- (iv)  $L(M) = \{a^m b a^n : m \text{ is odd and } n \text{ is even}\}.$

17. (a) Determine the FSA corresponding to the following NDFSA:

$M = (K, I, \delta, q_0, F)$ , where  $K = \{q_0, q_1, q_2, q_3, q_4\}$ ,  $I = \{a, b\}$  and  $F = \{q_3\}$  and  $\delta$  defined by

$\delta$	$a$	$b$
$q_0$	$[q_1, q_3]$	$[q_3]$
$q_1$	$[q_2, q_3]$	$[q_3]$
$q_2$	$[q_3]$	$[\ ]$
$q_3$	$[q_1, q_2, q_3]$	$[\ ]$
$q_4$	$[q_2, q_3]$	$[q_3]$

(b) Explain various routines of Compiler construction tools in detail.

18. (a) Explain Bottom-Up Parser with an example.

(b) Write a procedure to construct a DAG. Explain it with an example.

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