K20P 1263

Reg. No. : .....

Name : .....

III Semester Master of Computer Application (M.C.A.)/M.C.A. (Lateral Entry) Degree (C.B.S.S. – Reg./Suppl.(Including Mercy Chance)/Imp.) Examination, November 2020
(2014 Admission Onwards)
MCA 3C15 : THEORY OF COMPUTATION

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **any ten** questions. **Each** question carries **three** marks.

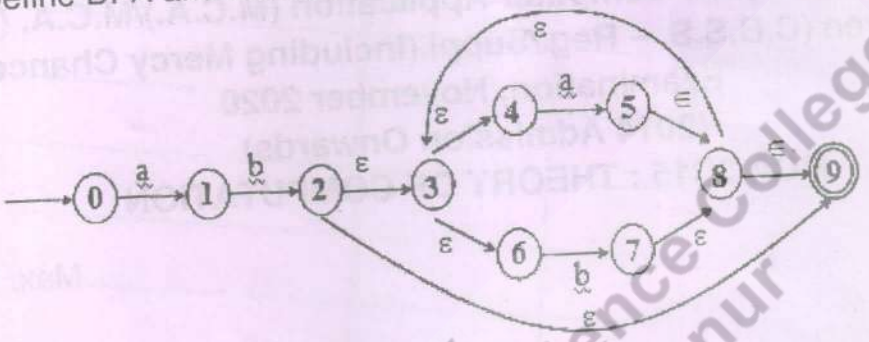
1. What are the difference between DFA and NFA ?
2. Define grammar.
3. Design an accepter for integers in C.
4. Obtain a regular expression to accept a language consisting of strings of a's and b's of odd length.
5. Write a note on derivation trees.
6. Explain context free grammars.
7. Explain Chomsky normal form.
8. Explain pushdown automata.
9. Write a note on turing's thesis.
10. What are closure properties of CFL ?
11. Write a note on turing machines with a stay-option.
12. Write a note on turin machines with more complex storage. **(10×3=30)**

P.T.O.

SECTION – B

Answer **all** questions. **Each** question carries **ten** marks.

13. a) Define DFA and convert the following NFA to its equivalent DFA.



OR

b) i) If r is a regular expression, then show that there exists some nondeterministic finite accepter that accepts L(r). (5+5)

ii) Show that the language

$L = \{awa : w \in \{a, b\}^*\}$ is regular.

14. a) i) Find a regular expression for the set

A) $\{a^n b^m : n \geq 3, m \text{ is even}\}$

B) $\{a^n b^m : (n + m) \text{ is even}\}$

ii) Show that the language

$L = \{a^n b^m : n \neq m\}$ is context-free.

OR

b) i) Show that $L = \{ww^R : w \in \Sigma^*\}$ is not regular. (4+6)

ii) Prove that family of regular languages is closed under union, intersection and concatenation.

15. a) Eliminate useless symbols and productions from G = (V,T,S,P) where (5+5)

V = {S,A,B,C} and T = {a, b} with P consisting of

$S \rightarrow aS|A|C$

$A \rightarrow a,$

$B \rightarrow aa,$

$C \rightarrow aCb.$

OR

b) Construct an NPDA for the language 10

$L = \{w \in \{a, b\}^* : n_a(w) = n_b(w)\}.$

16. a) Sate and prove pumping lemma for context free languages. **10**

OR

b) Design a Turing machine that accepts $L = \{a^n b^n c^n : n \geq 1\}$.

17. a) Explain : **10**

i) Linear Bounded Automata. **(5+5)**

ii) Universal Turing Machine.

OR

b) Explain Turing machine halting problem with an example and prove that is undecidable. **10**

(5×10=50)