

T.Y.B.SC. (COMPUTER SCIENCE) SEM -V (2014 COURSE) :
SUMMER - 2018
SUBJECT: THEORETICAL COMPUTER SCIENCE

Day: Monday
Date: 23/04/2018

Time: 03.00 PM TO 05.00 PM
Max. Marks: 40

S-2018-0860

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

Q.1 Attempt **ANY TWO** of the following: **(10)**

- a) Design a Moore and Melay machine which outputs 'I' if the input string ends with 'bab' otherwise outputs 'O'.
- b) Write a note on Regular Expression.
- c) Construct DFA over language $\Sigma = \{a, b\}$ such that the string generated will contain equal number of a's followed by equal number of b's.

Q.2 Attempt **ANY TWO** of the following: **(10)**

- a) Construct a TM for language over $L = \{a^n b^n \mid n > 0, \forall n\}$
- b) Convert the given Context Free Grammar into Greibach Normal Form:
 $A_1 \rightarrow A_2 A_3$
 $A_2 \rightarrow A_3 A_1 \mid b$
 $A_3 \rightarrow A_1 A_2 \mid a$
- c) Remove useless symbol from the given grammar,
 $S \rightarrow aB \mid bD$
 $A \rightarrow Bad \mid bSD \mid a$
 $B \rightarrow aSB \mid bBD$
 $D \rightarrow SBF \mid aBD \mid ad$

Q.3 Attempt **ANY TWO** of the following: **(10)**

- a) Explain ambiguity in grammar with suitable example.
- b) Describe pumping lemma for equal sets.
- c) How to convert NFA with ϵ transition to NFA without ϵ transition?

Q.4 Attempt **ANY FIVE** of the following: **(10)**

- a) State any two closure properties of regular sets.
- b) Define Turing machine.
- c) Give leftmost derivation, rightmost derivation and derivation tree for following string, $id+id*id$
Grammar: $E \rightarrow E + E \mid E * E \mid E - E \mid E / E \mid id$
- d) State different types of grammar.
- e) What is left recursion in the grammar?
- f) Prove following theorem by induction,
$$1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$
- g) What is a set? State various operations performed on sets.

* * * * *