**QP Code : 1749**

(3 hours)                                   [Total Marks: 100]

Note:   i. Q. No. 1 is compulsory
        ii. Attempt any four questions out of the remaining six questions.
        iii. Figures to the right indicate full marks
        iv. Make suitable assumptions wherever necessary with proper justification

Q.1)a) Define DFA and state applications of FA in brief.                        (05)
     b) Obtain a grammar to generate language L = $\{0^n12^n|n>=0\}$            (05)
     c) Differentiate between PDA and Non-deterministic PDA.                    (05)
     d) Convert the following regular expression to NFA with ∈-transaction.     (05)

Q.2 a) Design a Moore and Mealy machine to convert substring "aba" into "abb".  (10)
    b) Construct PDA accepting language L=$\{a^nb^n|n>=0\}$                      (10)

Q.3 a) Convert the following NFA to DFA:-                                        (10)

| ∈ | 0 | 1 |
|---|---|---|
| →p | {p, q} | {p} |
| q | {r, s} | {t} |
| r | {p, r} | {t} |
| *s | -- | - |
| *t | — | - |

    b) Explain CNF and GNF. Convert the following grammar into CNF.             (10)
       S →ASB|∈
       A →AaS|a
       B →SBS|A|bb

Q.4) a) Generate leftmost and rightmost derivation, parse tree for the string (~~p>(p>~~q)) for the
grammar:-                                                                       (10)
            S→ (S)|s>S|~S|p|q
     b) Design a PDA for the language L=$\{wcw^R|$ w ∈$\{a,b\}^*\}$             (10)

Q.5) a) What is regular expression? Give formal definition of a regular expression. Design a DFA
corresponding to RE:                                                            (10)
             (a+b)*aba(a+b)*
     b) Design a PDA for the following grammar and test whether $010^4$ is in the language defined by PDA.
        S→ 0BB                                                                  (10)
        B→ 0S|1S|0

Q.6) a) Design a Turing machine to subtract 2 numbers (m and n are two integers and m-n is to be
evaluated) assume m>n.                                                          (10)
     b) Design a Turing machine that recognizes well formed parenthesis.        (10)

Q.7) Write a note on: (any four)                                                (20)
        a)Chomsky hierarchy.
        b)Variants of Turing machine.
        c) Recursive and Recursively enumerable languages.
        d) Closure properties of CFG.
        e) Rice theorem.

**QP-Con. 10117-15.**

Course: T.E. (SEM.-V) (REV.-2007) (COMPUTER ENGG.) (Prog-T2815)

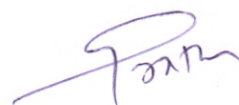Code: 1749

Correction:

---

### Correction: Q. 1 d. to be read as

### Q.1 d. Convert the following regular expression to NFA with ε-transaction $\qquad$ (01 + 10)*(01)*

---

Query Update time: 07/12/2015 03:40 PM

No student for T·E sem·V

Computer Old Nov·Dec·15

(P·P·gawade)

(Senior·Supervisor)