

Total No. of Questions :10]

SEAT No. :

P3540

[5560]-192

[Total No. of Pages :2

T.E. (Information Technology)
THEORY OF COMPUTATION
(2012 Pattern) (Semester-I) (314442)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer the questions Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q.10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic calculator is allowed*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Construct FA that accepts odd number of ones & any number of zeros. [6]
b) Define regular sets. List out closure properties of regular sets. [4]

OR

- Q2)** a) Design a Moore machine to generate 1's compliment of the given binary number. [5]
b) Construct FSM for divisibility by 3 tester for decimal number. [5]

- Q3)** a) Define the following and give appropriate examples. [4]
i) Derivation Tree
ii) Context free grammar [4]
b) Convert right linear grammar to its equivalent left linear grammar. [6]
 $S \rightarrow bB$
 $B \rightarrow bC$
 $B \rightarrow aB$
 $C \rightarrow a$
 $B \rightarrow b$

OR

- Q4)** a) Convert following CFG to CNF [6]
 $S \rightarrow aaaaS$
 $S \rightarrow aaaa$
b) Write a short note on the applications of CFG. [4]

P.T.O.

Q5) a) Design a PDA that checks wellformedness of parentheses. Simulate PDA for $(()) (())$. [9]

b) Define post machine. Compare FA, PDA and post machines. [9]

OR

Q6) a) Construct PDA from CFG $S \rightarrow SS \mid (S) \mid ()$ Derive for $(())$. [9]

b) Design a PM to accept language $L = \{a^n b^{n+1}, n \geq 0\}$. [9]

Q7) a) Design a TM that recognizes strings containing equal number of zeros and equal number of ones. [8]

b) Explain the following for a TM- [8]

- i) Power of TM over finite state machine
- ii) Universal TM.

OR

Q8) a) Design a TM that performs the addition of two unary numbers. [8]

b) Write a short note on: [8]

- i) Church Turing Hypothesis.
- ii) Post correspondence problem.

Q9) a) Write a short note on decidable problems concerning. [8]

- i) Context free languages
- ii) Turing machines

b) State and prove Halting problem of Turing Machine is unsolvable. [8]

OR

Q10) a) Write short note on unsolvability of Turing machine. [8]

b) Define decidability. How to prove the given language is undecidable? List some undecidable problems. [8]

