Code No. : 6316

FACULTY OF INFORMATICS

B.E.III/IV (I.T.) I SEMESTER (Main) Examination, Nov./Dec., 2009

THEORY OF AUTOMATA

Time : 3 Hours] **[Max. Marks : 75**

Answer **all** questions of Part – A. Answer **five** questions from Part – B.

PART – A [25 Marks]

1. Distinguish between DFA and NFA. (3)
2. Define Regular Expression and give one example. (2)
3. Define parse tree and give one example. (3)
4. Define Ambiguity Grammar. (2)
5. Define PDA. (2)
6. State pumping lemma for CFL's. (3)
7. Write any three programming techniques for Turing Machines. (3)
8. Define Restricted Turing Machine. (2)
9. What is meant by undecidability ? (2)
10. What is NP-complete problem ? (3)

PART – B (5 × 10 = 50 Marks)

11. (a) Convert the following NFA to a DFA. (5)

	0	1
→p	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

(b) Convert the following regular expression to NFA with E-transitions. (5)
(0 + 1)1*

12. Minimize the following DFA and draw the transition diagram. (10)

	0	1
→A	B	A
B	A	C
C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

13. (a) Find a Greibach normal form (GNF) grammar equivalent to the following CFG. (6)
$S \rightarrow AA/0$
$A \rightarrow SS/1$
(b) Write the closure properties of CFL's. (4)

14. Construct a turing machine that computes the proper subtraction function defined by $m \dot{-} n = m - n$ if $m \geq n$
$= 0$ if $m < n$
and also draw the transition diagram. (10)

15. (a) What is post correspondence problem ? And test whether the following PCP instance has a solution or not.
A = (01, 001, 10)
B = (011, 10, 00) (6)
(b) Write the properties of Recursive and Recursively enumerable languages. (4)

16. (a) Construct a PDA to accept
$\{a^n b^m a^n | \ m,n \geq 1\}$ with null store. (6)
(b) Show that the following grammar is ambiguous.
$S \rightarrow aS \mid aSbS \mid \in$.
Take the string as abb. (4)

17. Write short notes on :
(a) Intractable problems. (4)
(b) Useless symbols. (3)
(c) Closure properties of Regular languages. (3)
