Q.P. Code: 25528

Duration: 3 hours   **Total marks: 80**

Note (1) Question No. 1 is compulsory

     (2) Attempt any three questions from remaining questions

     (3) Draw suitable diagrams wherever necessary

     (4) Assume suitable data, if necessary

Q 1. (a) Find the CFG for the regular expression (10)*(110+01)*.   (**05**)

   (b) Write short note on Universal Turing Machine.   (**05**)

   (c) Difference between FA and PDA   (**05**)

   (d) Design moore machine to convert each occurrence of 111 to 101   (**05**)

Q 2. (a) Construct NFA with epsilon which accept a language consisting the string of any (**10**)

     number of a's followed by any number of b's followed by any number of c's.

     Also convert it into NFA without epsilon.

   (b) Design a Moore and Mealy machine for a binary input sequence such that if   (**10**)

     it has a substring 011 the machine outputs A if input has substring 001 it

     outputs B otherwise it outputs C.

Q 3   (a) Minimize the following DFA where A is a start state and B, C and E are   (**10**)

     final states.

∂	0	1
A	D	B
B	C	F
C	C	F
D	A	E
E	C	F
F	F	F

(b) Use pumping lemma prove that whether following language is regular or not **(10)**

$(a^n b^n c^n \mid n >= 1)$

Q 4 (a) Define context free grammer. Obtain the CFG for the following refular expression: **(10)**

$(110 + 11)^* (10)^*$

(b) Convert given CFG to GNF where $V=\{S,A\}$, $T=\{0,1\}$ and P is **(10)**

S→AA|0

A→SS|1

Q 5 (a) Design a PDA to accept a string of balanced parentheses. The parentheses **(10)**

to be considered (,), {, }.

(b) Construct TM for L= $\{a^n b^n c^n \mid n >= 1\}$ **(10)**

Q 6 Write short notes on (Any two) **(20)**

(a) Pumping Lemma for Regular Languages

(b) Recursive and Recursively enumerable languages

(c) Unsolvable Problems