(Please write your Exam Roll No.) Exam Roll No. ....6073....

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] APRIL – MAY 2019

Paper Code: ETCS-302 **Subject: Compiler Design**

(Batch 2013 Onwards)

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q no.1 which is compulsory. Select one question from each unit.

Q1 Attempt **any five** parts from the following:- **(5x5=25)**

(a) What do you mean by 'pass' in a compiler? Differentiate between a multipass and single pass compiler.

(b) Why do we need to have lexical analyzer generators? What are its advantages?

(c) What are the responsibilities of Loader, Linker and Assembler in the compiler environment?

(d) Explain cross compiler with a suitable example.

(e) Write a regular expression for each of the following sets of binary strings. Use only the basic operations.
(i) contains the substring 110
(ii) doesn't contain 110 as prefix

(f) Left factor the following grammar: E→E+T | E
T→int | (E)

(g) Differentiate between SDD and SDT.

UNIT-I

Q2 (a) Prove that the following grammar is LL(l) by constructing predictive parsing tale. **(5)**

N→A B N→B A
A→a A→C A C
B→b B→C B C
C→a

(b) Write SLR parser for following grammar **(7.5)**

S->R R->R b
R->a

Q3 (a) What is operator precedence grammar? Construct the operator precedence parser for following. **(7.5)**

S→aIJh I→IbSe | c
J→KLkr K→d
L→p

(b) Is following grammar left recursive? If yes remove it. **(5)**

S→A B A→ C B | b
C→S a B→b

UNIT-II

Q4 (a) Consider the following SDTS (Syntax Directed Translation Scheme): **(7.5)**

E→E/T {E.val=E_1.val*T.val}
E→E+T {E.val=E_1.val-T.val}
E→T {E.val=T.val}
T→F {T.val=F.val}
F→2/4/6 {F.val=2} {F.val=4} {F.val=6}

Using the above SDTS, construct the parse tree for the expression: 4/2+6/2 and evaluate 'E.val' at root of the tree.

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(b) Explain S-attribute and L-attribute with example. (5)

Q5 (a) What are different representation of three address statements, illustrate with example. (5)

(b) Write three address code for following code segment. (7.5)

```
int a[10], b[10], dot_prod, i;
int* a1; int*b1;
dot_prod=0;
a1=a;
b1=b;
for (i=0; i<10; i++)
    dot_prod+=*a1++* *b1++;
```

UNIT-III

Q6 (a) What is symbol table? Why symbol table is required? What type of data structures are used for its implementation? (7.5)

(b) What are static and dynamic storage allocation schemes used for data in compiler? (5)

Q7 (a) What is lexical phase, syntactic and semantic phase errors? (7.5)

(b) Discuss storage mechanism in block structured and non-block structured languages. (5)

UNIT-IV

Q8 (a) What are the main steps in local optimizations? Optimize the following three address code and analyze how this is reducing execution time. (7.5)

```
PROD=0
I=1
T1=4*I
T2=addr(A)-4
T3=T2[T1]
T4=addr(B)-4
T5=T4[T1]
T6=T3*T5
PROD=PROD+T6
I=I+1
If I<=30 goto (stmt 3)
```

(b) Explain peephole optimization. (5)

Q9 (a) What is DAG? Draw the DAG for the following statement: (7.5)

```
T8=D+E
T6=A+B
T5=T6-C
T4=T5*T8
T3=T4-E
T2=T6-T4
T1=T2*T3
```

(b) Explain data flow analysis with reaching definitions. (5)

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