GANPAT UNIVERSITY
M. TECH SEM- III (CE) REGULAR EXAMINATION NOV-DEC 2015
3CE302: Compiler Design

Time: 3 Hours]   [Total Marks: 60

Instructions:
1. This Question paper has two sections. Attempt each section in separate answer book.
2. Figures on right indicate marks.
3. Be precise and to the point in answering the descriptive questions.

SECTION-I

Q-1 [A] What is Cross Compiler? Also write good qualities of a compiler in detail? [2]

    [B] Write a CFG for the regular expression (0+1)*10*. [2]

    [C] Consider the following expression in C : [6]
      Sum = a – b * c / 10
      What will be the output after each phases of compiler in detail?

OR

Q-1 [A] What is left recursion in grammar? Explain with an example. [2]

    [B] Write a CFG for the language A={$a^n b^m$ | n,m>=0} [2]

    [C] Remove the unit production from following CFG's: [6]

      1) S → AB   2) S → aC | SB
          A → a   A → bsca
          B → C | b   B → aSB | bBC
          C → D   C → aBC | ad
          D → a

Q-2 [A] Explain shift reduce parser with block diagram. [2]

    [B] Differentiate: Top Down Parser Vs. Bottom Up Parser. [2]

    [C] Eliminate the null production from following CFG's: [6]

      1) S → ABABAB   2) S → aAB | dA
          A→ a | ε   A → bAc | ε
          B→ b | ε   B → dB | ε

OR

Q-2 [A] What is grammar? Explain different types of grammar in detail. [4]

    [B] Construct a predictive parsing table for the following grammar and parse the string "qbbcab". [6]
          S' → S#
          S → qABC
          A → a | bbD
          B → a | ε
          C → b | ε
          D → c | ε

Q-3 [A] Find First() and Follow() for the following grammar. Also check whether grammar is LL(1) or not. Justify your answer. [4]
          S → PQ
          Q → +PQ | ε
          P → RT
          T → *RT
          R → (S) | id

    [B] Discuss R-R conflict and S-R conflict of LR(0), SLR, CLR & LALR with example. [6]

Q-4 **[A]** Construct SLR parsing table for the following grammar: [4]

$$E \rightarrow xTy \mid xFy \mid xTz$$
$$T \rightarrow aE \mid q$$
$$F \rightarrow b$$

[B] Construct LALR parsing table for the following grammar: [6]

$$S \rightarrow aCd \mid bDd \mid aDc \mid bCc$$
$$C \rightarrow a$$
$$D \rightarrow b$$

OR

Q-4 **[A]** Construct operator precedence parsing table for the following grammar: [4]

$$P \rightarrow SR \mid S$$
$$R \rightarrow bSR \mid bS$$
$$S \rightarrow WbS \mid W$$
$$W \rightarrow L*W \mid L$$
$$L \rightarrow id$$

[B] List the method to perform loop optimization. Explain any three in detail with example. [6]

Q-5 **[A]** Construct CLR parsing table for the following grammar: [4]

$$S \rightarrow aABe$$
$$A \rightarrow Abc \mid b$$
$$B \rightarrow d$$

[B] Explain LR parsing algorithm with diagram. Construct LR (0) parsing table for given grammar and check whether string "**aaaabab**" is accepted or not. [6]

$$S \rightarrow BB$$
$$B \rightarrow aB \mid b$$

OR

Q-5 **[A]** What is dead code? Explain dead code elimination in detail with example. [4]

[B] List the errors generate by lexical analysis phase, syntax analysis phase and semantic analysis phase with example. [6]

Q-6 **[A]** Consider the following grammar: [3]

$$A \rightarrow XY \mid Z$$
$$X \rightarrow xXy \mid xy$$
$$Y \rightarrow zYw \mid zw$$
$$Z \rightarrow xZw \mid xWw$$
$$W \rightarrow yWz \mid yz$$

For the string "xxyyzzww", check grammar is ambiguous or not?

[B] What is an operator grammar? Give an example. [2]

[C] Do as directed: [5]

1. Perform the code movement optimization on following code:

```
for ( k = 0; k<= 20; k++)
{
    p = q + 5;
    i = i + (q + 5) + 70;
}
```

2. Perform loop fission on following code:

```
int i=0, a[100], b[100];
while (i < 100)
{
    a[i] = 1;
    b[i] = 2;
    i = i + 1;
}
```

END OF PAPER