(3hours) **Total Marks: 80**

N.B: **(1) Question No. 1 is compulsory.**
(2) Attempt any three questions out of remaining five questions.
(3) Make suitable assumptions wherever necessary.

Q.1. a) Differentiate between System software & Application software. [05]

b) What is Left recursion? Check if the following grammar is left recursive, and take necessary action if it exists: [05]

$$S \rightarrow SS+ \mid SS* \mid a$$

c) Discuss the forward reference problem in assembler with suitable example. [05]

d) Explain different functions of loader in detail. [05]

Q.2. a) Explain any five code optimization in compiler designing with suitable example. [10]

b) Explain with the help of flow chart the working of two pass assembler along with databases used. [10]

Q.3. a) Explain Design of Direct Linking Loader. [10]

b) Construct LL(1) parsing table for the following grammar: [10]

$S \rightarrow aBDh$
$B \rightarrow cC$
$C \rightarrow bC \mid \varepsilon$
$D \rightarrow EF$
$E \rightarrow g \mid \varepsilon$
$F \rightarrow f \mid \varepsilon$

Q.4. a) Generate 3-address code for the following C program and construct flow graph with the help of basic blocks : (assume 4 memory locations for integer): [10]

```
min=a[0];
for (i=1;i<n;i++)
  if(a[i]>max)
     max=a[i];
flag=1;
```

b) With reference to MACRO, explain the following tables with suitable example: [10]
i) MNT ii) MDT iii) ALA

Q.5. a) Explain design issues in code generation in detail. [10]

b) Explain Phases of compiler with following example [10]

$$a = a * b - 5 * 3 / c$$

Q.6. Write short note on: [20]
a) Three address code representation
b) YACC
c) Parameterized Macros
d) Syntax directed translation

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