

**6/H-73 (vii) (Syllabus-2015)**

**2 0 1 9**

**( April )**

**COMPUTER SCIENCE**

**( Honours )**

**( Software Engineering )**

**( CS-601 T )**

**Marks : 37**

**Time : 2 hours**

*The figures in the margin indicate full marks  
for the questions*

**Answer one question from each Unit**

**UNIT—I**

1. (a) What is a system? Write a short note on the types of system. 1+3=4  
(b) Briefly explain any four ways in which data can be gathered for the purpose of requirement analysis. 4
2. (a) Write a note on any five roles that a systems analyst has to perform. 5  
(b) What are the activities performed during feasibility analysis of a new system? 3

## UNIT—II

3. (a) What is software crisis? Briefly elaborate three factors that have contributed to the making of the present software crisis.  $1+3=4$
- (b) Briefly explain the design phase of the Waterfall model. 2
4. Explain the evolutionary model of software development, highlighting its advantages and disadvantages.  $4+2=6$

## UNIT—III

5. (a) Give a comparison of object-oriented design and function-oriented design. 3
- (b) Elaborate on the properties of a good SRS document. 3
- (c) List some possible effects that may occur due to poor software project planning. 3
6. (a) List out the major shortcomings of function point metric in order to use it as a software project size metric. 3
- (b) Give brief explanation of risk management. 2

- (c) Bookstores get a trade discount of 25% if the order is for 6 copies or more. For orders from libraries and individuals, 5% discount is allowed on orders of 6-19 copies per book title; 10% on orders for 20-49 copies per book title; and 15% on orders for 50 copies or more per book title.

Develop a decision tree for the above process description. 4

## UNIT—IV

7. (a) What are the symbols used for constructing a DFD? Briefly elaborate on some of the shortcomings of the DFD model.  $1+3=4$
- (b) Mention the differences between Activity diagram and State chart diagram. 4
8. (a) What are the differences between a Flow Chart and a Structure Chart? 3
- (b) Compare the relative advantages of textual and graphical user interfaces. 3
- (c) Write down the importance of data dictionary in the context of good software design. 2

UNIT—V

9. (a) What is meant by code review? Why is it required to be completed before performing system testing? 2
- (b) Distinguish between integration testing and system testing. 4
10. (a) What is debugging? Distinguish between fault and failure.  $1+(1+1)=3$
- (b) Explain the terms software reliability and software quality management.  $1\frac{1}{2}\times 2=3$

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**6/H-73 (viii) (a) (Syllabus-2015)**

**2019**

**( April )**

**COMPUTER SCIENCE**

**( Honours )**

**( Compiler Design )**

**( CS-602 AT )**

**Marks : 75**

**Time : 3 hours**

*The figures in the margin indicate full marks  
for the questions*

**Answer one question from each Unit**

**UNIT—I**

1. (a) What is a token? Identify and determine how many tokens are there in the following statement : 2+2=4
- IF (5 EQ MAX) GOTO 150
- (b) What is a compiler? Describe various phases of a compiler. 1+10=11

**( Turn Over )**

( 2 )

2. (a) Construct a deterministic finite automaton (DFA) to recognize an identifier (Note : An identifier can start with a letter followed by either letters or digits). 7
- (b) Express the following using a regular expression :  $2 \times 4 = 8$
- (i) The set of all strings of a's and b's starting with a and ending in aa
  - (ii)  $\{\epsilon, bb, bbbb, bbbbbb, \dots\}$
  - (iii) The set of all strings of  $\{0, 1\}$  containing the substring 00
  - (iv)  $\{a^{2n+1} \mid n > 0\}$

UNIT—II

3. (a) What do you understand by derivation? Consider the grammar  
 $G = \{S \rightarrow aB \mid bA, A \rightarrow aS \mid bAA \mid a, B \rightarrow bS \mid aBB \mid b\}$   
and show the leftmost derivation, the rightmost derivation and the parse tree for the string "aaabbabbbba".  $2+2+2+2=8$
- (b) What is an ambiguous grammar? Determine if the grammar  
 $S \rightarrow aB \mid ab, A \rightarrow aAB \mid a, B \rightarrow ABb \mid b$   
is ambiguous or not.  $3+4=7$

( Continued )

( 3 )

4. (a) Find the FIRST and FOLLOW of each nonterminal in the following grammar and construct the LL (1) parsing table. 10  
 $\{E \rightarrow TE^-, E^- \rightarrow + TE^- \mid \epsilon, T \rightarrow FT^-, T^- \rightarrow *FT^- \mid \epsilon, F \rightarrow (E) \mid id\}$
- (b) Explain operator grammar and the precedence relationship symbols with the help of examples. 5

UNIT—III

5. (a) What is a type expression? Explain with an example any two type expressions.  $2+6=8$
- (b) What do you understand by scope? Differentiate between *current scope* and *open scope*. What are the two methods for implementing symbol tables with nested lexical scoping?  $1+2+4=7$
6. (a) Why is type equivalence important during type checking? Describe the two categories of equivalence.  $2+6=8$
- (b) What is the possible set of operations on a symbol table? Compare linear table versus ordered list with respect to the operations on the tables.  $2+5=7$

( Turn Over )

## UNIT—IV

7. (a) What is a run-time environment? Mention the entities that are to be managed during run time.  $2+3=5$
- (b) Given the following *syntax directed translation* for assigning an expression to an identifier, generate the parse tree and three-address code for the expression  $a + (b - c) * d$ . 4
- (c) For the table below

Grammar rule	Semantic actions
$S \rightarrow id := E$	$S.code := E.code    gen(id.place := E.place)$
$E \rightarrow E_1 + E_2$	$E.place := newtemp();$ $E.code := E_1.code    E_2.code    gen(E.place := E_1.place '+' E_2.place)$
$E \rightarrow E_1 * E_2$	$E.place := newtemp();$ $E.code := E_1.code    E_2.code    gen(E.place := E_1.place '*' E_2.place)$
$E \rightarrow -E_1$	$E.place := newtemp();$ $E.code := E_1.code    gen(E.place := 'uminus' E_1.place)$
$E \rightarrow (E_1)$	$E.place := E_1.place;$ $E.code := E_1.code;$
$E \rightarrow id$	$E.place := id.place;$ $E.code := ''$

answer the following :

- (i) The nonterminal  $E$  has two attributes  $E.place$  for holding the values of  $E$  and  $E.code$  for a

( Continued )

sequence of three-address statements corresponding to the evaluation of  $E$ .

- (ii) The nonterminal  $S$  has only one attribute  $S.code$  which is a sequence of three-address statements
- (iii) The terminal symbol  $id$  has one attribute  $id.place$  containing the name of the variable to be assigned
- (iv) The function  $newtemp()$  without any argument returns a unique new quadruple
- (v) The function  $gen()$  accepts a string and produces a three-address quadruple
- (vi) The operator  $||$  is used to join two three-address code segments

8. (a) What is a display? How does it help in speeding up program execution?  $3+4=7$
- (b) What are the features of three-address code? Show the possible translation of an assignment statement in three-address code.  $4+4=8$

## UNIT—V

9. (a) Why is it necessary to break the intermediate code into basic blocks? Write down the intermediate code for the following code fragment, and show the basic blocks and the control flow within them. 2+6=8

```
begin
  prod = 1
  term = 1
  while term <= 20 do
    prod = prod * term
    term = term + 1
  end
end
```

- (b) What are the two conditions that any optimizing compiler should satisfy? Mention any two factors that influence the optimization process. 3+4=7

10. (a) In the following program, what is the fewest number of registers that are needed without *spilling*? Explain using an inference graph and a colouring of the graph. Also show the program after register allocation. 4+4+4=12

```
a = 10
b = 20
c = 30
```

```
d = a + b
e = c + d
f = c + e
b = c + e
e = b + f
d = 15 + e
return d + f
```

- (b) What do you understand by strength reduction as an optimization technique? 3

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