

**2010**

**Full Marks – 70**

**Time – As in the programme**

The questions are of equal value.

Answer ALL questions.

**RESTAURANT AUTOMATION SYSTEM**

1. A restaurant owner wants to computerize his order processing, billing and accounting activities . He also wants the computer to generate stabilities reports about sales of different items. A major goal of this computerization is to make supply ordering more account so that the problem of excess inventory is avoided as well as the problem of non- availability of ingredients required to satisfy orders for some popular items is menimized. The computer showd generate bills whenever food items are sold. Whenever

ingredients are issued for preparation of food items, the data is to be entered in to the computer. Purchase orders are generated on a daily basis, whenever the stock of food grain for any ingredients arrive, the invoice data regarding the quantity and price is entered. If sufficient cash balance is available, cheques are issued immediately against invoices. Monthly sales receipt and expenses data should be general.

Draw DFD upto 3rd level of the above problem. What are the difference between DFD and flow chart. [14

OR

Draw the use case diagram of the above problem with textual representation of each use case. What are the difference between Interaction Diagram and Physical Diagram.

2. Write the advantages and disadvantages of a shared repository. Differentiate between centralized control and Event based control.

[14

OR

Why software developer takes 50% of total development time for designing the user interface. Explain each steps of object-oriented design.

[14

3. Suggest sufficient reasons why software reliability is important. Explain each metrics to measure the software reliability.

[14

OR

Write short notes on:

[14

- (a) Fault avoidance
- (b) Fault tolerance

4. What are the fundamental cognitive limitations, which affect the software engineering. Explain each of the fundamentals. [14

OR

What according to you is a quality software product ? Discuss the stages through which the quality system paradigm and the quality assurance methods have evolved over the years.

5. Explain the three different types maintenance. What is a software configuration management and why it is crucial to the success of large software product development projects.[14

OR

Write short notes on

- (a) Software Reverse engineering  
(b) Change Management. [14

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**Answer ALL questions**

**Unit - I**

1. (a) Why scheduling is needed ? Discuss the role of various schedulers. [ 5
- (b) What is critical section ? [ 2
- (c) Write down the algorithm / code of semaphore implementation for reader writer problem. [ 7

**OR**

- 2 (a) What are the basic condition for deadlock ? Briefly note down the various methods for handling deadlock. [ 7

*[Cont.*

- (b) Write down the algorithm / code of monitor implementation for producer consumer problem. [ 7

### Unit - II

- 3.(a) What is a file ? Illustrate different file attributes and operations. [ 6
- (b) There are 3 frames available and the pages referenced in order is 7, 0, 1, 2, 0, 3, 0, 4, 2 make a comparative study of FIFO, LRU page replacement algorithms, which one is better ? [ 8

OR

4. (a) What is external fragmentation and internal fragmentation ? In paging which one is applicable. [ 4
- (b) Describe different file allocation methods available. [ 10

**Unit - III**

5. (a) Point out the reasons behind the emergence of Advance operating system and mention various types of advance operating system available.
- (b) Illustrate various issues in distributed operating systems. [ 8

OR

6. (a) Describe various communication technology and primitives in a distributed system. [ 8
- (b) How RPC mechanism works ? Depict with a neat diagram. [ 6

**Unit - IV**

7. (a) How logical clock is helpful for synchronising the events in a distributed system. [ 6
- (b) Describe Lamport's algorithmic solution for distributed mutual exclusion. [ 8

OR

8. (a) Causal ordering of events are better represented through the use of vector clocks ? Justify. [8]
- (b) Note down various models of dead lock present in a distributed system. [6]

### Unit - V

9. (a) Why distributed scheduling is needed ? How many types of distributed scheduling algorithms are available ? [4]
- (b) Illustrate with suitable diagrams various system models present in distributed system. [10]

OR

10. (a) Differentiate between load sharing and load balancing. [4]
- (b) Write down the detail algorithm flowchart of the sender initiated distributed scheduling along with components. [10]



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Answer ONE questions from each unit.

Unit - I

1. (a) Compare space division and time division switches. [ 4
- (b) Compare and contrast a circuit switched network and a packet switched network. [10
2. (a) We have a pure ALOHA network with 100 stations. If  $T_{fr} = 1\mu s$ , what is the number of frames/s each station can send to achieve the maximum efficiency. [ 5
- (b) Explain the flow diagram for CSMA / CA protocol. Why CSMA / CD can't be implemented in wireless network. [ 9

[Cont.

## Unit - II

3. (a) What are the differences between classful addressing and classless addressing in IP<sub>v4</sub>.  
[ 4
- (b) An ISP is granted a block of addresses starting with 120.60.4.0 / 22. The ISP wants to distribute these blocks to 100 organisations with each organisation receiving just eight addresses. Design the subblocks. [10
4. (a) What is the size of an ARP packet when the protocol is IP<sub>v4</sub> and the hardware is Ethernet.  
[ 4
- (b) Explain the link state routing protocol with suitable example. [ 7
- (c) What is the purpose of OSPF . [ 3

**Unit - III**

5. (a) What is traffic shaping ? Explain the methods of shape traffic. [10
- (b) What is QOS ? Name the mechanisms that can alleviate congestion. [ 4
6. (a) What is congestion control ? Explain the policies that can prevent congestion. [ 7
- (b) Explain the attributes that can be used to describe a flow of data. [ 7

**Unit - IV**

7. (a) What is wireless network ? Differentiate between cellular network and Ad hoc network. [7
- (b) Explain issues of Ad hoc Network. [ 7
8. (a) Explain DSR protocol. [ 7
- (b) What is the difference between reactive and proactive routing protocol. [ 3

- (c) Discuss the design goal of Ad hoc routing protocol. [4]

### Unit - V

9. (a) Difference between asymmetric key cryptography and a symmetric key cryptography. [5]

- (b) Explain the RSA Algorithm with examples. [9]

10. Write short notes on : [3.5×4]

- (a) FTP
- (b) E-commerce
- (c) Digital signature
- (d) Telnet.

**2010****Full Marks - 70****Time : As in the programme.****The figure in the right hand margin indicate marks.****Answer ALL questions.**

1. (a) Define token, lexeme and pattern ? Find out the tokens and lexemes for the below code segments [ 10

```
fact (x)
```

```
{
```

```
int f = 1;
```

```
for (i = 2, i <= x ; i ++)
```

```
f = f * i;
```

```
return (f)
```

```
}
```

- (b) Define and differentiate front end from back end of a compiler. [ 4

[Cont.

[2]

OR

Construct the NFA for the regular expression

$$(a | b)^* a (a | b)$$

Design the equivalent DFA by applying subset construction rules. [14]

2. Consider the grammar. [14]

$$A \rightarrow aBa$$

$$B \rightarrow bCb | bcD$$

$$C \rightarrow cCc \rightarrow \epsilon$$

$$D \rightarrow Deb | \epsilon$$

Construct LL (I) parsing table for the above grammar? Is the grammar LL (I)?

OR

Construct SLR parsing table for the following grammar. [14]

$$E \rightarrow E + T | T$$

$$T \rightarrow TF | F$$

$$F \rightarrow F^* | a | b$$

3. Consider the following grammar. [14]

$$S \rightarrow CC$$

[Cont.

$$C \rightarrow c C \mid d$$

Construct the LALR parsing table ?

Is the given grammar LALR (I) ?

OR

- (a) What is a type checker ? Define type system and type expression ? [ 7

List some type expressions ?

- (b) Write short notes on : [3.5×2=7

(i) Dynamic checking of types

(ii) Type conversion

4. (a) What is a symbol table ? Discuss the structure of a symbol table ? How it is implemented . [7

- (b) Write short notes on : [3.5×2=7

(i) Dynamic storage allocation

(ii) Syntax tree Vs Post fix notation.

OR

- (a) Define intermediate codes ? What is a three address code ? Generate three address codes for the assignment statement [ 7

$$a := b * - c + b * - c$$

- (b) Write quadruples, triples and indirect triples for the following expression

$$(a * b) - (c / d) + (-c)$$

5. (a) Construct the DAG for the following sequence of statements. [7]

$$X = y/z$$

$$W = p * y$$

$$Y = y * z$$

$$P = W - x$$

Perform code generation assuming only one register is available.

- (b) Generate code for the following expression.

$$d := (a+b) + (a-c) + (a-c)$$

Using code generation algorithm.

OR

- (a) Explain different issues in the design of the code generator. [7]
- (b) What is a basic block ? How it differs from a flow graph ? Explain with a suitable example.



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1. (a) What are the major differences between message-passing and shared-address space computers ? Also outline the Advantages and disadvantages of the two.
- (b) How many parallel step required to add  $n$  numbers ?

**OR**

- (a) Write the different interconnection network for parallel computers. Draw the complete omega network connecting eight inputs and eight outputs.

- (b) The labels in a d-dimensional hypercube use d bits. Fixing any k of these bits, show that the nodes whose label, differ in the remaining d-k bit positions form a (d-k) dimensional subcube composed of  $2^{(d-k)}$  nodes.
2. Write different decomposition techniques used. Explain, in details, about matrix multiplication decomposition. Find the maximum degree of concurrence and critical path length of complete binary tree.

**OR**

- Write All-to-All-Broad cast of message m on a square mesh of p nodes.
3. Calculate speed up and efficiency of computing fibonacci number n on p processors.

**OR**

- (a) Calculate the isoefficiency function of adding numbers.

- (b) Short notes on the following :
- (i) Scalling characteristic of parallel programs.
  - (ii) MPI
4. Describe, in details, a parallel implementation of Cannon's algorithm for matrix-matrix multiplication and calculate the TP.

**OR**

- (a) Describe a parallel formulation of matrix vector multiplication in which the matrix is I-D block partitioned along the rows and the vector is equally partitioned among all the processes. Find the parallel runtime of the above.
  - (b) Describe the DNS algorithm for matrix-matrix multiplication.
5. (a) Explain the parallel merge procedure and find its speed up.
- (b) Write parallel formulation of bitonic sort, assumed that for  $n$  processes available to sort  $n$  items.

**OR**

- (a) Discussed a parallel formulation of odd-even transposition sort.
- (b) Discussed a parallel formulation of bubble sort uses  $n$  processes to sort  $n$  elements. Derive a parallel formulation that uses  $p$  processes. Derive expression for the parallel run time efficiency and isoefficiency function.



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