## 140005

## COMPUTER APPLICATIONS

Time : 3 hours

Full Marks: 200

10×2=20

 $10 \times 2 = 20$ 

SEAL

## Instructions :

- (1) Answer all questions following the directions.
- (2) The figures in the margin indicate full marks for the questions.

1. Answer the following questions (any two) :

(a) Simplify the following Karnaugh's map

 $f(A, B, C, D) = \sum (0, 1, 2, 4, 6, 8, 11, 12)$ 

Draw the logic diagram for the resultant Boolean expression using AND, OR and NOT gates.

- (b) Differentiate between struct and union. When is union preferred over struct? Give one example for each.
- (c) Explain function overloading in C++ with an example.
- 2. Answer the following questions (any two) :
  - (a) Compare array and list. State where they stand in the context of speed, space, reliability, insertion, deletion and access operation.
  - (b) Describe an algorithm to evaluate postfix expression using stack.
  - (c) Consider the following list :

31, 28, 17, 62, 3, 42, 86, 25, 45, 52

Sort the above list using heap sort algorithm. Show all the intermediate steps.

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3. Answer the following questions (any two) :

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- (a) What are the parameters based on which a scheduling algorithm is analysed? Compare FCFS (First Come First Serve) and SRTN (Shortest Remaining Time Next) scheduling techniques for the following data set :

Sl. No.	Process ID	Arrival Time (hh : mm : ss)	Requested CPU Time (in second)
1	P1	09:00:00	<b>3</b>
· 2	P2	09:00:02	2
3	P3	09:00:03	1
4	P4	09:00:05	4
5	P5	09:00:06	3

(b) Find hit ratio for the following sequence of page request using First-in First-out (FIFO), Optimal (OPT) and Least Recently Used (LRU) algorithms. Assume there are four frames and initially all the frames are empty :

1, 2, 3, 2, 5, 6, 3, 4, 6, 3, 7, 3, 1, 5, 3, 6, 3, 4, 2, 4, 3, 4, 5, 1.

(c) What are the different tasks to be performed by file management system? Draw the hierarchical model of a file system and explain different modules.

4. Answer the following questions (any two) :

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- (a) Construct a minimized DFA from the regular expression  $(x+y)x(x+y)^*$ . Trace for a string w = xxyx.
- (b) Find a grammar G' in CNF equivalent to G,

 $S \rightarrow aAD, A \rightarrow aB|bAB, B \rightarrow b, B \rightarrow b, D \rightarrow d$ 

(c) Describe with suitable example the data structures used in an assembler.

5. Answer the following questions (any two) :

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 (a) Describe the following terms with reference to virtual memory : TLB, Page Map Table, Least Recently Used, Page Table Base Register, Virtual Address

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- (b) What is the difference between a loosely coupled and a tightly coupled MIMD computer? What are the relative advantages of these two types of MIMD computers? Explain your answer with a suitable block diagram.
  - (c) Explain how pipelining is implemented in surperscalar processor.
- 6. Answer the following questions (any two) : 10×2=20
  - (a) What is the difference between requirement analysis and requirement specification? Using suitable example, explain different types of requirement problems that should be identified and resolved during the requirement analysis activity.
  - (b) Explain unit testing and integration testing processes with suitable example.
  - (c) What is software quality? Describe the SEI-CMM software quality model.
- 7. Answer the following questions (any two) : 10×2=20
  - (a) What is the closure set of Functional Dependency? Given a relation R(A, B, C, D) with FD's  $F = \{A \rightarrow B, A \rightarrow C, C \rightarrow D\}$ . Consider the decomposition of R into R1(A, B, C) with FD's  $F1 = \{A \rightarrow B, A \rightarrow C\}$  and R2(C, D) with FD  $F2 = \{C \rightarrow D\}$ . Is the decomposition lossless and dependency preserving? Explain.
  - (b) Consider the employee database, where the primary keys are underlined : employee (employee-name, street, city) works (employee-name, company-name, salary) company (company-name, city) manager (employee-name, manager-name)

Give an expression in SQL for each of the following queries :

- (i) Find the names of all employees who work for 'State Bank of India'.
- (ii) Find the names and cities of residence of all employees who work for 'Vijaya Bank'.

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- (iii) Find the names, street, addresses, and cities of residence of all employees who work for 'State Bank of India' and earn more than ₹ 1,00,000.
- (iv) Find all employees in the database who live in the same cities as the companies for which they work.
  - (v) Find all employees in the database who live in the same cities and on the same streets as do their managers.
- (c) Using Oracle PL/SQL, create a Trigger on table 'Employee' for Not Allowing Insert/Update/Delete Operations on Friday.
- 8. Answer the following questions (any two) : 10×2=20
  - (a) Write the Bresenham's line drawing algorithm. Using the algorithm, draw a line from (10, 10) to (20, 16).
  - (b) Find the pixel location approximating the first octant of a circle having a centre (10, 13) and radius of 5 unit using mid-point circle drawing algorithm.
  - (c) What is clipping? Describe Cohen-Sutherland line clipping algorithm.
- 9. Answer the following questions (any two) :
  - (a) Explain with a neat diagram, how frequency division multiplexing (FDM) works. Why is a statistical time division multiplexing more efficient than a synchronous time division multiplexing? Explain.
  - (b) Compare the TCP header with UDP header. List the fields in the TCP header which are missing from UDP header. Give the reason for this absence.
  - (c) What is meant by address resolution protocol (ARP)? How is mapping performed between IP address into an MCA address? Explain.
- **10.** Answer the following questions (any *two*) :
  - (a) Differentiate between e-commerce and e-business. Explain Internet and WWW tools which aid e-commerce.
  - (b) Define digital cash or e-cash. Explain digital payment in detail.
  - (c) Explain threats to network security and network security solutions.

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