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Analysis & Design of Algorithms (1110)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question from each unit.
5. Figure to the right indicate full marks.
6. Assume suitable data, if necessary.

UNIT – I

1. a) i) Define algorithms ? State and explain various applications of it? 5
- ii) Find the Asymptotic time complexity of the function $f(n) = (n-5)^2 \in O(n^2)$. 5
- b) Perform the operation of merge sort an array $A = (5, 2, 4, 7, 1, 3, 2, 6)$ and write algorithm for the same? 5
- c) i) What do you mean by performance analysis of algorithm ? 5
- ii) Write a note on Asymptotic Notation. 5

UNIT- II

2. a) Write the algorithm for binary search ? Explain giving suitable example the number of comparisons required ? 10

- b) i) Consider the list of elements (7, 2, 6, 4, 0, 3, 9, 5) perform the quick sort, calculate its time complexity for balanced and unbalanced partition and write the algorithm for it. 5
- ii) Explain indicator random variable. 5
- c) i) Explain Hiring problem. 4
- ii) Write randomized hiring problem and calculate its time complexity ? 6

UNIT - III

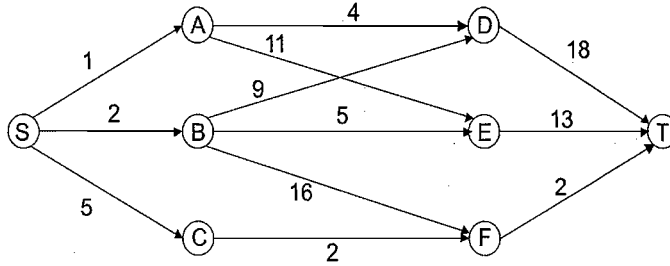
3. a) i) Define backtracking. Explain with suitable example. 4
- ii) Draw a state space tree for 4-queen problem ? 6
- b) i) State and explain graph coloring problem ? How backtracking approach is useful for assigning different colors to adjacent vertices for the following graph. 6
- ```

graph TD
 V1((V1)) --- V2((V2))
 V1 --- V3((V3))
 V1 --- V4((V4))
 V2 --- V3
 V3 --- V4

```
- ii) Write a note on Hamiltonian cycle. 4
- c) i) Solve the following knapsack problem, draw the tree  
 $(P_1 \quad P_2 \quad P_3) = (40, 30, 50, 10)$   
 $(W_1, \quad W_2, \quad W_3, \quad W_4) = (2, 5, 10, 5)$   
 where  $n = 4, W = 16$ . 5
- ii) Explain lower bound theory for comparison tree sorting and searching ? 5

## UNIT – IV

4. a) Calculate the minimum cost path from source to destination in multistage graph using dynamic strategy ? 10



- b) Obtain the tour for the following graph given by adjacency matrix. 10

$$\begin{bmatrix} 0 & 5 & 6 & 20 \\ 10 & 0 & 9 & 10 \\ 15 & 13 & 0 & 12 \\ 10 & 8 & 9 & 0 \end{bmatrix}$$

- c) i) Explain how job sequencing with deadlines can be solved using greedy approach ? 5
- ii) Compare the greedy algorithm and dynamic programming method? 5

## UNIT – V

5. a) State and explain Cook's theorem ? 10
- b) i) Define P and NP class problem with the help of example. 6
- ii) Explain Boolean satisfiability problem with some suitable example? 4
- c) i) What is a decision problem ? Explain. 5
- ii) When are problems said to be intractable ? 5

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## Operating Systems (1080)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Figures to the right indicate full marks.
6. Draw suitable diagrams wherever necessary.

### UNIT – I

- |    |    |     |                                                                      |   |
|----|----|-----|----------------------------------------------------------------------|---|
| 1. | a) | i)  | Discuss necessity of SPOOLING.                                       | 6 |
|    |    | ii) | Explain following system calls for process management                | 4 |
|    |    |     | a) CHANGE PRIORITY      b) SUSPEND                                   |   |
|    | b) | i)  | Explain O. S. view of process with suitable diagram.                 | 6 |
|    |    | ii) | Describe data structure created for controlling progress of process. | 4 |
|    | c) | i)  | List types of O. S.? Also explain RTOS in brief.                     | 5 |
|    |    | ii) | Discuss the concept of virtual machine.                              | 5 |

### UNIT – II

- |    |    |     |                                                               |   |
|----|----|-----|---------------------------------------------------------------|---|
| 2. | a) | i)  | Discuss Dijkstra's semaphore.                                 | 6 |
|    |    | ii) | Explain MLQ with feedback.                                    | 4 |
|    | b) | i)  | Explain highest response ratio next algorithm for scheduling. | 5 |
|    |    | ii) | Write a short note on monitors.                               | 5 |

- c) Consider following jobs to be executing on an uniprocessor. 10

| Job            | A. T. | B. T. | Priority |
|----------------|-------|-------|----------|
| P <sub>1</sub> | 0     | 17    | 4        |
| P <sub>2</sub> | 2     | 13    | 3        |
| P <sub>3</sub> | 3     | 11    | 2        |
| P <sub>4</sub> | 6     | 7     | 3        |
| P <sub>5</sub> | 10    | 1     | 1        |

Draw Gantt Chart and Calculate average waiting Time & Turnaround Time for

- i) Non preemptive SJF                      ii) Priority based preemptive.

### UNIT – III

3. a) i) Define deadly embrace? Also write steps of safety algorithms. 5  
 ii) Write the contents of U-area for UNIX process. 5  
 b) i) Discuss resource preemption in recovery from deadlock. 5  
 ii) Draw process state transition diagram in UNIX? Also write data structures required to describe state of a UNIX process. 5  
 c) i) Explain following system calls in UNIX. 5  
 a) exec ()                      b) exit ()  
 ii) Explain in brief any one method of non-contiguous memory allocation. 5

### UNIT – IV

4. a) i) Explain acyclic graph directory. 5  
 ii) Differentiate between authentication and authorization with suitable diagram. 5  
 b) i) Explain demand paging. 5  
 ii) What is belady's anomaly? Explain. 5  
 c) Discuss generic security & protection set-ups in an O.S. with suitable diagram. 10

### UNIT – V

5. a) i) Discuss C-LOOK in brief. 5  
 ii) Explain i-node. 5  
 b) i) Discuss factors Considered for selection of disk scheduling algo. 5  
 ii) Explain in brief low level formatting & boot block in disk management. 5  
 c) Discuss architectural models for distributed O.S. 10

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## Database Management System (1100)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Figures to the right indicate full marks.
6. Assume suitable data wherever necessary.

### UNIT – I

- |    |                                                    |    |
|----|----------------------------------------------------|----|
| 1. | i) What is data abstraction ? Explain.             | 5  |
|    | ii) Explain five main functions of DBA.            | 5  |
| 2. | Draw and explain overall system structure of DBMS. | 10 |
| 3. | Compare record base data models in detail.         | 10 |

### UNIT – II

- |    |                                                                                                                                                                                                                                                                                                   |    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 4. | i) Explain attribute and domain with example.                                                                                                                                                                                                                                                     | 4  |
|    | ii) What is view ? Why views are created ? How views are created ?                                                                                                                                                                                                                                | 6  |
| 5. | What are different operations in relational algebra ? Explain with example.                                                                                                                                                                                                                       | 10 |
| 6. | Consider the following relational schema –<br>Sailors ( <u>sid</u> , sname, rating, age, nationality)<br>Boat ( <u>bid</u> , bname, color, capacity)<br>Reserves (sid, bid, day)<br>Solve the following queries in relational algebra or tuple relational calculus or domain relational calculus. | 10 |

- i) Find the names of sailors who have reserved red boat on Monday.
- ii) Find details of sailors who have reserved red and green boat.
- iii) Find the details of boat reserved by sailor 'RAM'.
- iv) Find the names of sailors who have reserved at least one boat.
- v) Find the names and age of Indian sailor with a rating above 7.

### UNIT – III

7. Consider relational database in Q. 6 and solve following queries in SQL. 10
- i) Find details of sailors who have reserved boat on Friday.
  - ii) Find the number of sailors whose rating is in between 5 and 10.
  - iii) Find the details of youngest sailor.
  - iv) Find the number of boats reserved by each sailor.
  - v) Find details of sailor who have reserved all red boats.
8. Write short note on : 10
- i) Embedded SQL.
  - ii) Dynamic SQL.
9. i) Explain all DDL commands in detail.
- ii) Explain query optimization with neat diagram. 10

### UNIT – IV

10. What is normalization ? Explain 2NF and 3NF. 10
11. What is multi-valued dependency ? How it can be removed. 10
12. Explain deferred database modification and immediate database modification with example. 10

### UNIT – V

13. Explain features of OODBMS and ORDBMS. 10
14. Explain the concept of OID ? 10
15. Explain the ways that can be used to create persistent objects. 10

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चलन - 054

## Software Engineering (1090)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub questions form each Unit.
5. Draw neat diagram wherever necessary.

### UNIT- I

1. a) Give in detail the generic view of software engineering. **10**  
b) As we move outward along the process flow path of spiral model, What can you say about the software that is being developed or maintained? **10**  
c) For each of the following documents, indicate in which phase (s) of software life cycle it is produced with respect to waterfall model. **10**  
Final User Manual  
Architectural Design  
SQA plan  
Module specification  
Source code  
Statement of work  
Test plan  
Preliminary User manual  
Detailed Design  
Cost Estimate.  
Project plan  
Test Report  
Documentation.

चलन - 054

**UNIT – II**

2. a) Explain the concept of Information engineering in detail. 10
- b) Explain the classification of risks associated with software development process. 10
- c) What is the need of feasibility study in software Engineering? Discuss it various types. 10

**UNIT – III**

3. a) What is DFD? Explain with notations and give one example. 10
- b) What is FAST? Explain in detail. 10
- c) Explain Functional modelling and Behavioural modelling. 10

**UNIT – IV**

4. a) Discuss the design fundamentals for software designing. 10
- b) Explain cohesion and transaction flow. 10
- c) Explain with neat diagram that how the analysis model is translated into software design. 10

**UNIT – V**

5. a) What is software testing? Explain strategic approach for software testing. 10
- b) Explain loop- testing with suitable example. 10
- c) What is validation Testing? Explain the different types of validation testing in detail. 10

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## Microprocessor - III (1070)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** subquestions from each unit.
5. Draw neat diagrams wherever required.
6. Assume suitable data, if necessary.
7. Figures to right indicate full marks.

### UNIT – I

1. a) Draw and explain architecture of 80386 DX. 10
- b) Draw and explain programming model of 80386 DX. 10
- c) Differentiate between 80386 SX and 80386 DX. 10

### UNIT – II

2. a) Explain in detail debug registers of 80386 DX. 10
- b) Draw and explain the 64-bit segment descriptor format. 10
- c) Explain address translation mechanism provided by paging. 10

### UNIT – III

3. a) Explain with neat diagram, the task switching mechanism in 80386 DX. 10

- b) Write short notes on :
- i) Extension to TSS. 5
  - ii) I/O premission bit map. 5
- c) Explain privilege level protection through conforming code segment. 10

#### UNIT – IV

4. a) Explain the exception processing in protected mode of 80386. 10
- b) Explain in detail processor – coprocessor interface with neat sketch. 10
- c) List and explain register set of 80387 NDP. 10

#### UNIT – V

5. a) Draw and explain in detail pentium architecture. 10
- b) Enlist & explain salient features of pentium. 10
- c) Write a short note on Intel chipset. 10

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चलन - 056

## System Programming (1050)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub-questions from each unit.

### UNIT - I

1. a) What is system programming? Explain components of system programming. **10**  
b) Explain pass - I of two pass Assembler with flowchart and databases. **10**  
c) What is problem of forward reference? How this problem can be handled in single pass Assembler. **10**

### UNIT - II

2. a) What is Macro? Explain pass - II of Macro processor with flowchart. **10**  
b) What is Loader ? Explain compile and - Go Loader & Absolute loading schemes in detail? **10**  
c) What is direct linking loader? Explain the design of direct linking Loader. **10**

### UNIT - III

3. a) What is Compiler? Explain various compilers. **10**

चलन - 056

- b) Explain the phase structure of compiler. 10
- c) What is code optimization? Explain all code optimization techniques in detail. 10

**UNIT - IV**

4. a) What is parsing? Explain types of parsing with advantages and disadvantages. 10
- b) Explain Recursive Descent parser with algorithm. 10
- c) Explain shift Reduce parser and predictive parser. 10

**UNIT - V**

5. a) What is memory allocation? Explain various memory allocation Techniques. 10
- b) What is interprocess communication ? Explain various interprocess communication Techniques. 10
- c) Explain Hash Table organization in detail with example. 10

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## Theory of Computer Science (1020)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

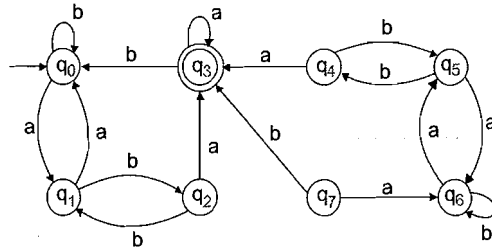
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions form each unit.
5. Figures to the right indicate full marks.
6. Assume suitable data if necessary.

### UNIT – I

1. For a binary tree T with n vertices, show that minimum possible height is  $\lceil \log_2 (n+1) \rceil$  ( $\lceil K \rceil$  is the smallest integer  $\geq K$ ) and maximum possible height is  $(n-1)/2$ . 10
2. i) Explain the properties of trees. 5  
 ii) Convert following NFA to its equivalent DFA. 5

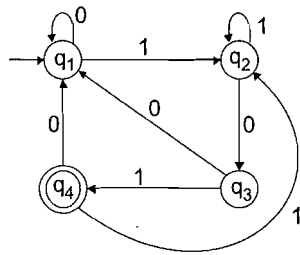
| $\delta$<br>Q \ $\Sigma$ |  | 0    | 1  |
|--------------------------|--|------|----|
|                          |  |      |    |
| $\rightarrow p$          |  | p, q | p  |
| q                        |  | r    | r  |
| r                        |  | s    | -- |
| $\odot s$                |  | s    | s  |

3. Construct minimum state automaton equivalent to following. 10



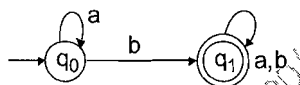
## UNIT – II

4. i) Prove that  $P + PQ^*Q = a^*b Q^*$  Where  $p = b + aa^*b$  and is a regular expression. 5
- ii) Show that  $L = \{a^i b^j c^k \mid k > i + j\}$  is not regular. 5
5. Construct DFA accepting language represented by  $(a+b)^*abb$  10
6. Find the regular expression corresponding to the following. 10



## UNIT – III

7. i) Construct Regular grammar for following finite automata. 5



- ii) Convert following left-linear grammar to its equivalent right linear grammar. 5

$S \rightarrow B1 \mid A0 \mid C0$   
 $A \rightarrow C0 \mid A1 \mid B1 \mid 0$   
 $B \rightarrow B1 \mid 1$   
 $C \rightarrow A0$

8. What is ambiguous grammar? Explain it with example. 10



9. Eliminate useless symbols from the following grammar. 10

$S \rightarrow AB$   
 $A \rightarrow bc \mid b$   
 $C \rightarrow bC$   
 $B \rightarrow b$

#### UNIT - IV

10. Construct a PDA for accepting language. 10

$L = \{w \in w^c \mid w \in (a, b)^*\}$  by the final state.

11. Construct PDA which checks the well-formedness of parentheses. 10

12. Write Markova algorithm to find 2's complement of a given binary number. 10

#### UNIT - V

13. Construct Turing machine for language  $L = \{a^n b^n \mid n \geq 1\}$  10

14. Differentiate between finite state machine and Turing machine. 10

15. Write short note on. 10

- i) Universal TM.
- ii) Multitask TM.

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चलन - 058

## Computer Graphics (1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Assume suitable data if necessary.
6. Figures to right indicate full marks.

### UNIT I

1. a) Write and explain Digital differential analyzer (DDA) algorithm for line generation, with general requirements of line drawing. 10  
b) Explain Display file, Display processor, Display interpreter in short. 10  
c) Write and explain General Bresenham's algorithm for Ole generation. 10

### UNIT II

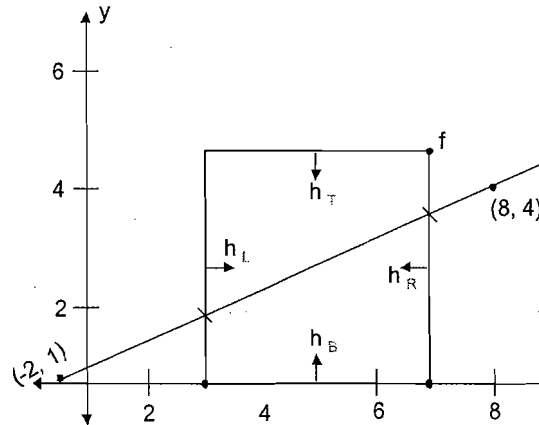
2. a) Explain scan line algorithm for polygon filling. 10  
b) Write and explain Segment transformation with scaling, translation parameters. 10  
c) Write short note on edge fill algo, fence fill algorithm with eg. 10

### UNIT III

3. a) Explain 2 Dimension (2D) Rotation, Scaling, translation with eg. 10  
b) Explain 3 Dimension (3D) Rotation, Scaling, translatio with eg. 10  
c) Write & explain 2 Dimension Rotation about an arbitrary point. 10

## UNIT IV

4. a) Write and explain cohen Sutherland outcode algorithm with eg. 10
- b) Consider a line from  $P_1(-2, 1)$  to  $P_2(8, 4)$  clipped rectangle region R as shown in below fig, the line  $P_1P_2$  calculates intersection point using Cyrus-beck algorithm. 10



- c) Explain Back face reinoud algorithm, Z-buffer algo in short. 10

## UNIT V

5. a) Explain & draw Bezier curve algorithm with eg. 10
- b) Explan Graphics Kernal system with Basic primitives. 10
- c) Write & explain concept in Animation & simulation. 10

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चलन - 059

## Computer Network (1030)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question from each unit.
5. Draw neat diagrams wherever necessary.
6. Assume suitable data if required.

### UNIT – I

1. a) Explain Design issues of Data Link Layer ? 10  
b) i) What is PAR, Piggybacking & concept of sliding window protocols ? 5  
ii) Explain various multiple access protocols. 5  
c) Explain various types & functions of Bridge ? 10

### UNIT – II

2. a) Explain Address space, notation, classfull & classless Addressing of IPV<sub>4</sub> ? 10  
b) i) What is Netid, Hostid, Subnet, Subnetmask & Supernetting in IPV<sub>4</sub> ? 5  
ii) What is network Address, Two level & Three level Hirarchy, Address Allocation & Address translation ? 5

- c) Explain Address structure & space of IPV<sub>6</sub> ? What are the advantages of IPV<sub>6</sub> ? Also explain methods of transition of IPV<sub>4</sub> to IPV<sub>6</sub>. 10

### UNIT – III

3. a) Explain various Address mapping protocols of Network layer ? 10
- b) Explain frame format, error reporting, query message & debugging tools used by ICMP for flow control & error control ? 10
- c) Explain Group management, message types, message format, Query Router, Encapsulation & operation of IGMP ? 10

### UNIT – IV

4. a) Explain with neat example Link state knowledge diagram, Building of Routing table, creation & flooding of LSP, formation of shortest path tree & preparation of Routing table of Link state routing protocols ? 10
- b) Explain the concept of speaker node, Initialization, sharing, updating, loop prevention, policy Routing & optimization of path vector Routing protocol ? 10
- c) Explain with neat diagram flooding, RPF, RPB & RPM of DVMRP ? 10

### UNIT – V

5. a) Explain with neat diagram TCP segment, TCP connection, flow control & Error control of TCP ? 10
- b) What is congestion ? What are the reasons of occurrence of congestion ? What are congestion control Algorithms ? 10
- c) What is QoS ? What are parameters of flow ? Explain the techniques to improve the QoS ? 10

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चलन - 060

## Microprocessor - II (1010)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figure to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Attempt **any two** sub-questions from each question in such a way that **one** question will get attempted for maximum 20 Marks.

1. a) Draw and explain block diagram of 8254. 10  
b) i) Explain I/O port address decoding techniques. 6  
ii) Write a short note on FAT. 4  
c) Write an assembly language program to initialise 8255 in the following configuration. 10
  - 1) Port A - Output with handshake
  - 2) Port B - Input with handshake
  - 3) Port C<sub>L</sub> - output
  - 4) Port C<sub>U</sub> - input
2. a) Draw and explain block diagram of 8251. 10  
b) With neat sketch, explain ADC interfacing with microprocessor 8086. Also write the assembly language program for the same. 10  
c) Explain static and multiplexed display approach of interfacing 7-segment displays. 10

- |    |       |                                                                                                                     |    |
|----|-------|---------------------------------------------------------------------------------------------------------------------|----|
| 3. | a)    | Explain VGA display adapter in detail.                                                                              | 10 |
|    | b) i) | Write short notes on DMA channel and I/O channel.                                                                   | 6  |
|    | ii)   | Write short note on memory map in IBM PC.                                                                           | 4  |
|    | c)    | Explain in detail CPU nucleus logic.                                                                                | 10 |
| 4. | a)    | Draw and explain organization of hard disk controller.                                                              | 10 |
|    | b)    | Explain with neat sketch FDC system interface.                                                                      | 10 |
|    | c)    | Explain ISA and EISA bus.                                                                                           | 10 |
| 5. | a)    | What is a microcontroller? How it differs from microprocessor? Give and explain different types of microcontroller. | 10 |
|    | b)    | Explain different times modes of operation for 8051.                                                                | 10 |
|    | c)    | Write short notes on                                                                                                | 5  |
|    | 1)    | PSW (Program status word) in 8051                                                                                   |    |
|    | 2)    | SCON (Serial control Register) in 8051.                                                                             | 5  |

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चलन - 041

## Computer Network (175103 / 225103)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub - questions from each unit.
5. Use of non-programmable calculator is allowed.

### UNIT - I

1. a) Explain the 802.3 Ethernet Frame format in detail. 8
- b) i) Define the type of the following destination addresses. 4
  - a) 4A : 30 : 10 : 21 : 10 : 1A
  - b) 47 : 20 : 1B : 2E : 08 : EE
  - c) FF : FF : FF : FF : FF : FF
- ii) Show how the address 47 : 20 : 1B : 2E : 08 : EE is sent out on the line. 4
- c) i) Explain the TCP/IP product suite with neat diagram. 4
- ii) Explain the following terms with example. 4
  - a) Physical address
  - b) Logical address
  - c) Port address
  - d) Specific address

### UNIT - II

2. a) Explain the IPv4 datagram format with neat diagram. 8
- b) Explain the IPv4 to IPv6 transition strategies in detail. 8

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- c) Find the range of addresses and number of addresses in each range in the following blocks, 8
- i) 200.17.21.128/27
  - ii) 17.34.16.0/23
  - iii) 123.56.77.32/29
  - iv) 182.44.82.16/26

### UNIT – III

3. a) Explain ICMP error reporting and query messages in detail. 8
- b) What is forwarding ? Explain forwarding techniques. 8
- c) Explain source based tree and group shared tree approach in multicast routing protocols. 8

### UNIT - IV

4. a) The following is a dump of a UDP header in hexadecimal format 8  
06 32 00 0D 00 1C E2 17
- i) What is the source port number?
  - ii) What is the destination port number?
  - iii) What is the total length of the user datagram?
  - iv) What is the length of the data?
  - v) Is the packet directed from a client to server or vice versa?
- b) Explain the Open-loop and closed loop congestion control mechanism in detail. 8
- c) Explain three - way handshaking and half - close in TCP connection. 8

### UNIT - V

5. a) Explain symmetric - key cryptography in detail. 8
- b) Explain asymmetric – key cryptography using RSA algorithm. 8
- c) Explain the components of IEEE 802.11 LANs and types of networks. 8

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## Formal Language & Automata Theory

### (175102 / 225102)

P. Pages : 3

Time : Three Hours

Max. Marks : 80

#### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question form each unit.
5. Assume suitable data if necessary.
6. Figure to the right indicate full marks.

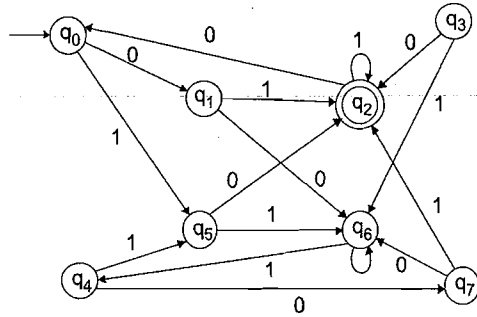
#### UNIT - I

1. a) Construct a Moore machine equivalent to the mealy machine M defined by following table. 8

| Present State    | Next State     |        |                |        |
|------------------|----------------|--------|----------------|--------|
|                  | a = 0          |        | a = 1          |        |
|                  | State          | Output | State          | Output |
| → q <sub>1</sub> | q <sub>1</sub> | 1      | q <sub>2</sub> | 0      |
| q <sub>2</sub>   | q <sub>4</sub> | 1      | q <sub>4</sub> | 1      |
| q <sub>3</sub>   | q <sub>2</sub> | 1      | q <sub>3</sub> | 1      |
| q <sub>4</sub>   | q <sub>3</sub> | 0      | q <sub>1</sub> | 1      |

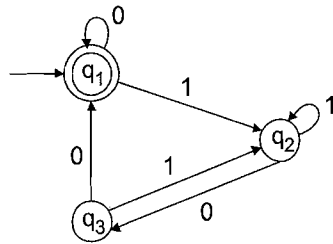
- b) Write a short note on 8
- i) Basic machine.
  - ii) Adjacency matrix.

- c) Construct the minimum state automaton equivalent to the transition diagram given below. 8



### UNIT - II

2. a) Prove that  $(1+00^*1) + (1 + 00^*1) (0+10^*1)^*(0+10^*1)=0^*1(0+10^*1)^*$  8
- b) Construct a regular expression corresponding to the state diagram given below. 8



- c) Construct finite automaton equivalent to the regular expression  $(0+1)^* (00+11)(0+1)^*$  8

### UNIT - III

3. a) Find the reduced grammar equivalent to the grammar G whose productions are 8
- $$\begin{aligned} S &\rightarrow aAa \\ A &\rightarrow Sb|bCC|DaA \\ C &\rightarrow abb|DD \\ E &\rightarrow aC \\ D &\rightarrow aDA \end{aligned}$$
- b) Convert the following grammar to CNF 8
- $$\begin{aligned} S &\rightarrow aAd \\ A &\rightarrow aB|bAB \\ B &\rightarrow b \\ D &\rightarrow d \end{aligned}$$

- c) Convert the following grammar to GNF 8  
 $S \rightarrow AB$   
 $A \rightarrow BS|b$   
 $B \rightarrow SA|a$

**UNIT – IV**

- 4 a) Construct a PDA accepting the set of all strings over  $\{a, b\}$  with equal number of a's and b's 8  
 b) Construct a PDA that accepts the language generated by the CFG 8  
 $S \rightarrow SS|(s)| ( )$   
 c) Let  $\Sigma = \{a, b, c\}$  be the alphabet and  $\Sigma' = \{\alpha, \beta\}$  be the auxiliary alphabet. Write Markov algorithm for duplicating the string in  $\Sigma^*$  8

**UNIT – V**

5. a) Explain Universal Turing Machine (UTM). 8  
 b) Design Turing machine for multiplication of two unary numbers. 8  
 c) Design Turing Machine to find 2's complement of a binary number. 8

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## Principles of Management

(175105 / 225105)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** subquestions from each unit.
5. Draw appropriate diagrams wherever necessary.
6. Figures to the right hand indicates full marks.

### UNIT - I

- |    |                                                                                                   |   |
|----|---------------------------------------------------------------------------------------------------|---|
| 1. | a) Describe any Eight principles of management.                                                   | 8 |
|    | b) What is scientific management ? Explain contribution of F.W. Taylor for scientific management. | 8 |
|    | c) i) What are Resources of organisation?                                                         | 4 |
|    | ii) What are measures of organisation performance.                                                | 4 |

### UNIT - II

- |    |                                                                                      |   |
|----|--------------------------------------------------------------------------------------|---|
| 2. | a) Explain functions of management.                                                  | 8 |
|    | b) What is M. B. O.? Write essential steps, advantages and disadvantages of M. B. O. | 8 |
|    | c) Describe functional organisational structure.                                     | 8 |

**UNIT - III**

3. a) How do you compare Recruitment Vs selection? 8
- b) What is need of Training? Describe on-the-job and off-the-job training. 8
- c) Explain Herzberg's Motivation-Hygiene theory. 8

**UNIT - IV**

4. a) Define project management? Explain 4 phases of Project Life Cycle. 8
- b) What are Roles and Responsibilities of Project Manager? 8
- c) Explain any four elements of Total Quality Management (T.Q. M) 8

**UNIT - V**

5. a) What are Aims and objectives of Industrial phycology? 8
- b) What are Professional and Business ethics? 8
- c) What is Management Information System (M. I. S.)? Write applications of MIS. 8

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## Software Engineering (175101 / 225101)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub-question from each unit.
5. Diagram / Sketches should be given wherever necessary.

### UNIT – I

1. a) What is on Agile Process ? State its principles. 8
- b) What do you mean by evolutionary process flow ? Explain any one evolutionary process model ? 8
- c) Explain software myths in context with manager & customer ? 8

### UNIT – II

2. a) How the requirements of customer can be elicited by using collaborative requirement gathering approach ? 8
- b) Explain IEEE, proposed candidate format for software requirement specification ? 8
- c) Write a note on flow oriented modelling with suitable example ? 8

### UNIT – III

3. a) Explain following design concepts : 8
  - i) Separation of concerns.
  - ii) Modularity.

- |                                                                            |   |
|----------------------------------------------------------------------------|---|
| b) Explain design model in detail ?                                        | 8 |
| c) Draw use-case diagram, Activity diagram & state diagram for ATM system. | 8 |

#### UNIT – IV

- |                                                                                            |   |
|--------------------------------------------------------------------------------------------|---|
| 4. a) What do you mean by software testing ? Explain testing strategies in detail ?        | 8 |
| b) Explain unit testing and integration testing in OO context ?                            | 8 |
| c) Define cyclomatic complexity ? Explain different methods to calculate it with example ? | 8 |

#### UNIT – V

- |                                                                                               |   |
|-----------------------------------------------------------------------------------------------|---|
| 5. a) Who is the important contributor in software engineering practices? Explain in detail ? | 8 |
| b) How decision tree supports make / buy decision ?                                           | 8 |
| c) Define earned value analysis ? Explain in detail ?                                         | 8 |

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**System Programming**  
**(175104 / 225104)**

**P. Pages : 2**

**Time : Three Hours**

**Max. Marks : 80**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub-questions from each unit.
5. Assume suitable data whenever necessary.
6. Draw diagram whenever necessary.

**UNIT - I**

1. a) What is system programming? Also explain various types of system programs? **8**
- b) What is necessary of 2 - pass assembler? Draw flowchart and explain two pass assembler? **8**
- c) Define operating system. Also explain roles of operating system? **8**

**UNIT - II**

2. a) State and explain various databases required for design of 2-pass macro processor? **8**
- b) Explain relocation and linking concept with example? **8**
- c) Explain **8**
  - i) Absolute loader
  - ii) Relocating loader

**UNIT - III**

3. a) Explain design of direct linking loader? **8**

- b) Explain 8  
 i) Binder  
 ii) Dynamic linking  
 iii) Derivation  
 iv) Reduction
- c) What is ambiguity of grammar? How ambiguity is eliminated from the grammar? 8

#### UNIT - IV

4. a) Explain top down parser? What are its limitations? 8  
 b) Explain operator precedence parser? 8  
 c) Explain LEX and YACC? Discuss the interaction between LEX and YACC. 8

#### UNIT - V

5. a) Draw and explain phase structure of compiler? 8  
 b) Explain dynamic data exchange? 8  
 c) Explain 8  
 i) DLL  
 ii) OLE

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