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06CS52

# Fifth Semester B.E. Degree Examination, June-July 2009
## System Software

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

### PART – A

1 a. With reference to SIC/XE machine architecture explain
   i) Instruction format
   ii) Address modes
   iii) Data formats
   iv) Registers. **(12 Marks)**

   b. Write a program for SIC/XE to add 2 arrays each having 100 elements & each element 1 word in length and store the result back in memory. **(05 Marks)**

   c. With reference to SIC standard version explain instruction format. **(03 Marks)**

2 a. Write algorithm of pass 2 of 2 pass assembler. Also, explain briefly the data structures used and for what purpose they are used in pass-2 **(14 Marks)**

   b. Explain the need of relocation of a program. Explain how it is implemented. **(06 Marks)**

3 a. Explain absolute and relative expressions. How these are processed by an assembler? **(06 Marks)**

   b. What are control sections? How are they processed? **(08 Marks)**

   c. What is the difficulty encountered in implementing one pass assembler and how is it solved? **(06 Marks)**

4 a. What is dynamic binding? Explain the process of loading and calling of subroutine using dynamic binding. **(10 Marks)**

   b. What is relocating loader? Explain two methods for specifying relocation as a part of object program. **(10 Marks)**

### PART – B

5 a. Explain briefly structure of a typical editor with the help of suitable block diagram. **(12 Marks)**

   b. Explain different debugging functions and capabilities. **(08 Marks)**

6 a. List the different tables used for a macro processor. Explain their functions. **(06 Marks)**

   b. Discuss the points to be taken care while designing a general purpose macro processor. **(08 Marks)**

   c. Explain conditional macro expansions. **(06 Marks)**

7 a. What is a regular expression? Explain any 8 characteristics that form a regular expression. **(10 Marks)**

   b. Explain the structure of a lex program. **(06 Marks)**

   c. Write a lex program to handle numbers, strings, commands and new drives. **(04 Marks)**

8 a. Write a yacc program to evaluate the arithmetic expressions. Consider all possible cases. **(08 Marks)**

   b. Write short notes on
   i) Macro processor within language translator.
   ii) Variables & typed tokens.
   iii) Unique label generation within macros. **(12 Marks)**

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06CS53

# Fifth Semester B.E. Degree Examination, June-July 2009
## Operating Systems

Time: 3 hrs. Max. Marks:100

**Note :** ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
***2. Assume missing data if any.***

### PART - A

1 a. Explain the role of operating system with user and system viewpoints. **(07 Marks)**
b. Give the features of symmetric and asymmetric multiprocessing systems. **(04 Marks)**
c. Discuss the operating system functions
i) that are helpful to user.
ii) that are meant for ensuring the efficient operation of system. **(09 Marks)**

2 a. Describe the process states with the help of state diagram. **(06 Marks)**
b. Discuss various multithreading models with diagram. **(06 Marks)**
c. Consider the following set of processes.

| Process | Burst time | Arrival time | Priority |
|---|---|---|---|
| P1 | 10 | 0 | 2 |
| P2 | 5 | 2 | 1 |
| P3 | 2 | 3 | 0 |
| P4 | 20 | 5 | 3 |

Table Q2(c)

Draw Gantt charts and calculate average waiting time, average turnaround time using following CPU scheduling algorithms.
i) Preemptive shortest Job First.
ii) Non preemptive priority ( 0 = HIGH Priority). **(08 Marks)**

3 a. What are the three requirements to be met by a solution to the critical section problem? Explain. **(06 Marks)**
b. Describe the Bounded – buffer problem and give a solution for the same using semaphores. Write the structure of producer and consumer processes. **(08 Marks)**
c. Describe the following : i) Semaphore ii) Wait ( ) operation
iii) Signal ( ) operation. **(06 Marks)**

4 a. Consider the following snapshot of a system.

| | Allocation | | | Maximum | | | Available | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C |
| $P_0$ | 0 | 1 | 0 | 7 | 5 | 3 | 3 | 3 | 2 |
| $P_1$ | 2 | 0 | 0 | 3 | 2 | 2 | | | |
| $P_2$ | 3 | 0 | 2 | 9 | 0 | 2 | | | |
| $P_3$ | 2 | 1 | 1 | 2 | 2 | 2 | | | |
| $P_4$ | 0 | 0 | 2 | 4 | 3 | 3 | | | |

Table Q4(a)

Answer following questions using Bankers algorithm.
i) Is the system in a safe state?
ii) If a request from P1 arrives for (1, 0, 2), can the request be granted immediately? **(09 Marks)**

b. Discuss the various approaches, used for deadlock recovery. **(06 Marks)**

c. Consider the Resource allocation graphs given in fig.Q4(c) (i) and (ii), check whether deadlock exists in the system, if yes, identify the processes involved in deadlock. **(05 Marks)**

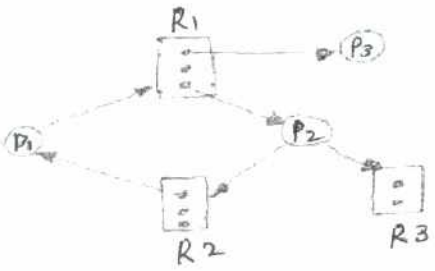


Fig.Q4(c) (i)

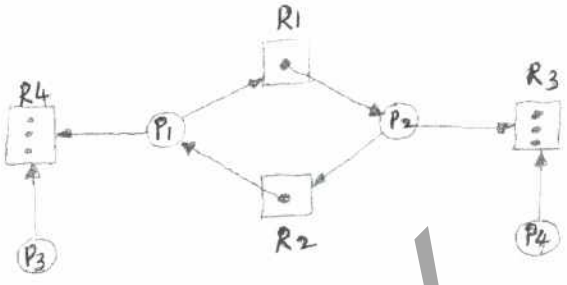


Fig. Q4(c) (ii)

## PART - B

5 a. Assume we have a paged memory system with associative registers (TLBs) to hold the most active page table entries. If the page table is normally held in memory and memory access time is 1micro second, what would be the effective access time if 85% of all memory references find their entries in the associative registers. Assume that associative registers access time is zero. **(04 Marks)**

b. Give the differences between : i) Internal and external fragmentation ii) Paging and segmentation. **(06 Marks)**

c. Discuss the steps involved in handling page fault, with diagram. **(06 Marks)**

d. Consider the following page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 . How many page faults would occur for FIFO page replacement algorithm, assuming three frames? **(04 Marks)**

6 a. Discuss the following in brief : i) File Attributes ii) File types iii) Sequential File Access iv) Tree Structured Directories. **(12 Marks)**

b. Explain contiguous, linked and indexed methods of allocating disk space. **(08 Marks)**

7 a. Explain the following disk scheduling algorithms in brief with examples.
i) F C F S Scheduling ii) S S T F Scheduling iii) S C A N Scheduling
iv) L O O K Scheduling. **(12 Marks)**

b. Describe the access matrix model used for protection in a computer system. **(08 Marks)**

8 Write short notes on any FOUR of the following:

a. Components of LINUX system.

b. Process management in LINUX.

c. Inter process communication.

d. Dynamic loading.

e. Process Control Block ( PCB). **(20 Marks)**

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06CS54

# Fifth Semester B.E. Degree Examination, June-July 2009
## Database Management System

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions choosing at least two from each part.***

### Part A

1 a. Define the following terms:
i) Database ii) Canned transaction iii) Data model
iv) Metadata v) Database designer. **(10 Marks)**

b. Explain characteristic of the database approach. **(05 Marks)**

c. What are the responsibilities of database administrators? **(05 Marks)**

2 a. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meanings. **(10 Marks)**

b. With respect to ER model, explain with examples,
i) Strong entity ii) Weak entity iii) Participation constraints
iv) Cardinality ratio v) Recurring relationships. **(10 Marks)**

3 a. Define the following terms with an example for each,
i) Super key ii) Domain iii) Tuple iv) Nulls
v) A relational database schema S. vi) The Entity integrity constraint. **(12 Marks)**

b. Explain : i) Domain constraints ii) Semantic integrity constraints
iii) Functional dependency constraint with examples. **(08 Marks)**

4 a. Given the schema
EMP (Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, DNo)
DEPT(Dname, Dnumber, MgrSSN, Mgrstartdate)
DEPT-LOC(Dnumber, Dloc), Project(Pname, Pnumber, Ploc, Dnum)
WORKS-ON(ESSN, PNO, Hours)
Give the relation algebra expression for the following:
i) List female employees from DNo = 20 earning more than 50000.
ii) List 'CSE' department details.
iii) Retrieve the first name, last name and salary of all employees who work in department number 50.
iv) Retrieve the name of the manager of each department.
v) Retrieve the name and address of all employees who work for the sports department.
vi) Retrieve the names of employees who have no dependents. **(12 Marks)**

b. With respect to SQL, explain with example
i) The drop command
ii) The alter command. **(08 Marks)**

### Part B

5 a. Explain Insert, Delete and Update statements in SQL with example. **(08 Marks)**

b. Write a note on Aggregate functions in SQL with examples. **(12 Marks)**

6 a. What is the need for normalization? Explain the first, second and third normal forms with examples. **(14 Marks)**

b. Explain informal design guidelines for relation schemas. **(06 Marks)**

7 a. Explain multivalued dependency and fourth normal form (4NF) with examples. **(10 Marks)**

b. Explain i) Inclusion dependencies ii) Domain key normal form. **(10 Marks)**

8 a. Explain properties of a transaction with state transition diagram. **(10 Marks)**

b. What is a schedule? Explain with examples serial, nonserial and conflict serializable schedules. **(10 Marks)**

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06CS55

# Fifth Semester B.E. Degree Examination, June-July 2009
## Computer Networks - I

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions selecting at least Two questions from each part.***

### PART – A

1 a. With neat diagram explain mesh topology and star topology with application of each. **(06 Marks)**

b. What are standards? Name any four standard organizations. **(06 Marks)**

c. Explain OSI reference model with functions of following layers
i) Physical layer; ii) Data link layer; iii) Network layer. **(08 Marks)**

2 a. Explain three causes for transmission impairments. **(06 Marks)**

b. Describe with neat waveform any two polar line coding schemes. **(06 Marks)**

c. Give data rate formula suggested by Nyquist and Shannon. Low pass communication has BW of 1 MHz. What is Shannon capacity of channel if SNR is 40 db? What bit rate is attainable using 8-level pulses? **(08 Marks)**

3 a. With neat waveform, explain three methods of digital to analog conversion. Draw waveform with input data 110100. **(06 Marks)**

b. What is multiplexing? With neat diagram explain FDM. **(06 Marks)**

c. What is TDM? Four sources create 250 characters per second. The frame contains one character from each source and one extra bit for synchronization. Find: i) The data rate of each source; ii) Duration of each character in each source; iii) The frame rate; iv) Duration of output frame; v) Frame size in bits; vi) Data rate of link. **(08 Marks)**

4 a. Describe the physical and transmission characteristic of following:
i) Twisted pair cable; ii) Fiber optic cable. **(06 Marks)**

b. What is hamming distance? Explain simple parity check code C (5, 4) with d min = 2. How many bits can be corrected? **(06 Marks)**

c. What is CRC? If the generating polynomial for CRC code is $x^4 + x^3 + 1$ and message word is 11110000, determine check bits and coded word. **(08 Marks)**

### PART - B

5 a. Differentiate between character oriented and bit oriented format for framing. **(06 Marks)**

b. Explain salient features of
i) Stop – and – wait protocol; ii) Stop – and – wait ARQ protocol. **(08 Marks)**

c. Explain briefly about point-to-point protocol. **(06 Marks)**

6 a. What is Random Access? Explain following Random access protocols.
i) Slotted ALOHA; ii) CSMA / CD. **(06 Marks)**

b. What is channelization? Explain CDMA. **(06 Marks)**

c. Describe frame format for IEEE 802.3 MAC frame. What are salient features of fast Ethernet? **(08 Marks)**

7 a. Describe the MAC layers in IEEE 802.11 standard. **(06 Marks)**

b. In brief explain blue tooth layers. **(06 Marks)**

c. Bring out differences between Repeaters, Bridges, Routers and Gateways. **(08 Marks)**

8 a. Explain SONET multiplexing. **(06 Marks)**

b. With neat diagram describe ATM architecture. **(06 Marks)**

c. Discuss SONET STS – 1 frame format. Find data rate of an STS – 3 signals. **(08 Marks)**

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06CS56

# Fifth Semester B.E. Degree Examination, June-July 2009
# Formal Languages and Automata Theory

Time: 3 hrs. Max. Marks:100

**Note :** ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
***2. Assume missing data if any.***

## PART - A

1 a. Define i) Powers of an alphabet ii) N F A. **(04 Marks)**

b. Design a DFA to accept the following language over the alphabet { 0, 1}.
i) L = {ω | ω is a even number} ii) L = $\{(01)^i 1^{2j} \mid i \geq 1, j \geq 1\}$
iii) The set of strings either start with 01 or end with 01. **(10 Marks)**

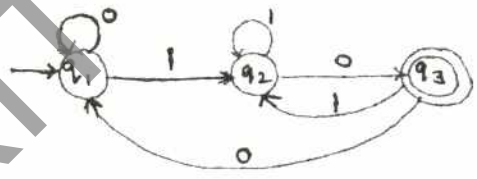
c. Consider the following ε – NFA. **(06 Marks)**

| | ε | a | b | c |
|---|---|---|---|---|
| → p | ϕ | {p} | {q} | {r} |
| q | {p} | {q} | {r} | ϕ |
| * s | {q} | {r} | ϕ | {p} |

i) Compute the ε – closure of each state ii) Convert the automation to a DFA.

2 a. Define Regular Expression. Write the regular expression for the following languages:
i) Language of all strings ω such that ω contains exactly one 1 an even number of 0's
ii) Set of strings over {0, 1, 2} containing atleast one 0 and atleast one 1. **(10 Marks)**

b. Convert the following DFA to a regular expression using the state elimination technique. **(06 Marks)**




c. Prove that if R be a regular expression then there exists some ε - NFA that accepts L(R). **(04 Marks)**

3 a. i) State and prove pumping Lemma for regular languages.
ii) Prove that the following language is not regular : $L = \{0^n 1^{n+1} \mid n > 0\}$.
iii) Prove that if L is a regular language over alphabet ∑ - then $\overline{L}$ is also a regular language. **(12 Marks)**

b. Minimize the following DFA using Table filling algorithm. **(08 Marks)**

| | 0 | 1 |
|---|---|---|
| → A | B | A |
| B | A | C |
| C | D | B |
| * D | D | A |
| E | D | F |
| F | G | E |
| G | F | G |

4 a. Construct the CFG for the following Languages
i) $L = \{a^{2n} b^m \mid n \geq 0, m \geq 0\}$ ii) $L = \{ 0^i 1^j 2^k \mid i = j \text{ or } j = k \}$ and Generate left most derivation for the string 0 1 1 2 2. **(10 Marks)**

b. Define Ambiguous Grammar. Prove that the following grammar is Ambiguous. Find an unambiguous grammar. $S \rightarrow a\,S \mid a\,S\,b\,S \mid \varepsilon$ **(10 Marks)**

## PART - B

5 a. Discuss the languages accepted by a PDA. Design a PDA for the language that accepts the strings with $n_a(w) < n_b(w)$ [number of a's less than number of b's]. Where $w \in (a + b)^*$ and show the instantaneous descriptions of the PDA on input a b b a b. **(14 Marks)**

b. Convert the following grammar to a PDA that accepts the same language by empty stack. $S \rightarrow 0\,S\,1 \mid A \quad ; \quad A \rightarrow 1\,A\,0 \mid s \mid \varepsilon$. **(06 Marks)**

6 a. What are Useless Productions? Remove all useless productions, unit productions and all $\varepsilon$ – productions from the grammar : **(10 Marks)**

$S \rightarrow a\,A \mid a\,B \quad ; \quad A \rightarrow a\,a\,A \mid B \mid \varepsilon \quad ; \quad B \rightarrow b \mid b\,B \quad ; \quad D \rightarrow B$

b. Define CNF. Convert the follwing CFG to CNF.

$S \rightarrow A\,S\,B \mid \varepsilon \quad ; \quad A \rightarrow a\,A\,S \mid a \quad ; \quad B \rightarrow S\,b\,S \mid A \mid b\,b.$ **(10 Marks)**

7 a. What is Turing Machine and Multi tape Turing Machine? Show that the language accepted by these machines are same. **(08 Marks)**

b. Design a Turing Machine for the language to accept the set of strings with equal number of 0's and 1's and also give the instantaneous description for the input 110100. **(12 Marks)**

8 Write short notes on:
a. Applications of CFG.
b. Homomorphism.
c. Recursive Languages.
d. Post's correspondence problem. **(20 Marks)**

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