

III B. Tech II Semester (R09) Regular Examinations, April/May 2012
MICROPROCESSORS & MICROCONTROLLERS
(Common to EEE, ECE, CSE, EIE & E. Con. E)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Briefly explain the internal architecture of MCS-96.
(b) Discuss about the process memory map of MCS-96.
- 2 (a) What are the advantages of memory segmentation in 8086 microprocessor?
(b) Discuss in brief about assembler directives.
- 3 (a) Write an ALP in 8086 to find the largest and smallest of a set of 8-bit numbers.
(b) Write an ALP in 8086 to add two ASCII numbers.
- 4 (a) Draw the block diagram of 8237 & explain its interfacing to 8086 microprocessor with a neat sketch.
(b) Briefly explain the maximum mode configuration of 8086.
- 5 Sketch and explain the interface of PPI 8255 to the 8086 microprocessor in minimum mode. Interface four 7 segment LEDs to display as a BCD counter.
- 6 (a) A terminal is transmitting asynchronous serial data at 1200 bd. What is the bit time? Assuming 8 data bits, a parity bit and 1 stop bit how long does it take to transmit one character.
(b) Draw necessary circuit to interface 8251 to an 8086 based system with an address 0C0H. Write the sequence of instructions to initialize 8251 for synchronous transmission. (Assume the necessary data).
- 7 (a) Draw the block diagram for multiple 8259A based interrupt system.
(b) Explain about cascading of 8259s and its functioning.
- 8 (a) What is microcontroller? List the features of 8051 microcontroller. Name the five interrupt sources of 8051.
(b) Write an assembly language program in 8051 to find the GCD of two numbers.

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- 1 (a) Explain the architecture of 8086 microprocessor.
(b) Explain the segmentation in 8086 microprocessor. What are the different registers used for this purpose?
- 2 (a) Write an ALP to generate the FIBONOCI series.
(b) Write an ALP in 8086 to find 1's complement of a 16 bit hexadecimal number.
- 3 Explain 8257 DMA interface to 8086 micro processor & what are the registers available in 8257? What are their functions?
- 4 (a) Explain the functional diagram of 8279 keyboard and display controller.
(b) Discuss about DOS and BIOS interrupts.
- 5 (a) Explain IOCO and IOSO register for timer 1 in 80196.
(b) What are the interrupt sources for synchronous serial transmission and reception in 80196? What are the identification flags and local enable bits for these sources?
- 6 Distinguish between Asynchronous and Synchronous data transfer schemes & explain block diagram IC 8251. Explain the logic of 8251 program.
- 7 (a) With neat diagrams explain the five modes of operation of 8253 in detail.
(b) Draw the block diagram of 8253 and explain about each block in detail.
- 8 (a) What is assembly language program? What is the function of SWAP?
(b) List out the steps involved in programming the 8051 to transfer data serially.

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- 1 Explain the instruction set of 8051 microcontroller. Write a program in 8051 to perform multiplication of two numbers using 8051.
- 2 Explain about addressing modes and instruction set of MCS-96 family.
- 3 (a) Write in detail about the addressing modes of 8086 microprocessor.
(b) What are various types of procedures? Give examples.
- 4 (a) Write a program to initialize 8251 in synchronous mode with even parity, single SYNCH character, 7 bit data character. Then receive FFH bytes of data from a remote terminal and store it in the memory at address 5000 H: 2000 H.
(b) Why are the two ground pins on an RS-232C connector not just jumpered together?
- 5 (a) Explain need and importance of DMA.
(b) Discuss about Static RAM & EPROM with reference to 8086.
- 6 (a) Sketch the interfacing of PPI 8255 to the microprocessor.
(b) Interface four 7 segment LEDs to display as a BCD counter.
- 7 (a) It is necessary to serve 18 interrupt requests using 8259's. The address map for the 8259's is given from 0A00H to 0A0FH. Show the complete interface with 8086 system bus. These 18 interrupts are to be requested from interrupt type 040H on words, with edge triggered mode and auto end of interrupt. Give the initialization sequence for all 8259's.
(b) Explain the operating modes of 8259.
- 8 (a) Write an ALP in 8086 to add five 8 bit numbers and the result is 16 bit.
(b) Write an ALP in 8086 to add two 8 bit decimal numbers.

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- 1 (a) Explain the advantages of using the USART chips in microprocessor based systems.
(b) Discuss how 8251 is used for serial communication of data.
- 2 (a) Explain the flag register of 8086.
(b) Explain the concept of memory segmentation.
- 3 (a) Write about interrupt sequence in an 8086 system.
(b) Explain about command words of 8259.
- 4 (a) Write a recursive routine to evaluate the following polynomial $Y = A_0 + A_1X + A_2X^2 + A_3X^3 + \dots + A_NX^N$. The coefficients $A_0, A_1, A_2, \dots, A_N$ are to be successive words in memory and all parameter addresses are to be passed via the stack.
(b) Write a FAR procedure SER WORD that searches a word array for a given word and sets the value of a word parameter to the index of the element in the array if a match is found; otherwise, it puts a -1 in the index word parameter. The parameters are to be passed to the procedure via a parameter address table. Give a sequence for calling SER WORD to search ARRAY 1 of length LENGTH 1 for variable 'ID' and put the index in INDEX 1.
- 5 What is the difference between minimum and maximum modes of 8086 and also explain how 8086 microprocessor can be configured in minimum and maximum modes of operations?
- 6 (a) Explain in brief about programming timer interrupts in 8051.
(b) Discuss the bit format of IP register of 8051.
- 7 (a) Explain the advantages of using the keyboard and display controller chips in microprocessor based system.
(b) Write a program using RST 5.5 interrupt to get an input from keyboard and display it on the display system.
- 8 (a) Explain the historical perspective in development of MCS - 96 family.
(b) Explain the register to register architecture concept of MCS - 96 family.

Code: 9A05601

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III B. Tech II Semester (R09) Regular Examinations, April/May 2012

OBJECT ORIENTED ANALYSIS & DESIGN

(Common to Computer Science & Engineering, Information Technology & Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain about the common division mechanisms of UML in detail.
(b) Explain about behavioral things of UML in detail.
- 2 Define classifier. Explain in detail about different kinds of classifiers provided by UML.
- 3 Define class diagram. Explain about the graphical representation of class diagram with example.
- 4 Explain and draw the sequence diagram for ticket reservation use case in case of an online ticket reservation system.
- 5 What is a use case? Draw a use case diagram for a core banking application. Explain the same by identifying various actors, use cases and relationships.
- 6 Write a short note on the common modeling techniques of time and space.
- 7 (a) Define a node. State the differences between nodes and components. Explain how nodes can be organized.
(b) Enumerate the steps to model the source code using components.
- 8 Your college library issues books to the staff and students. The student and staff do return the books after some time. Draw the class diagram required for the process also draw state chart diagram for any object and also draw component diagram and explain.

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Time: 3 hours

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Answer any FIVE questions
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- 1 Define an object flow. Explain briefly how objects are involved in the flow of control associate with an activity diagram.
- 2 Write a short note on the following:
 - a) Sending and receiving events.
 - b) Time and change events.
 - c) Call event.
 - d) Signal event.
- 3
 - (a) Enumerate the steps to model the client-server systems.
 - (b) What are the properties of components and component diagrams? Explain briefly.
- 4 Explain the two interaction diagrams for "Issue of a Book" and "Renewal of a Book" operations.
- 5 Define modeling. Why do we model? What we can achieve through modeling?
- 6 Explain about association names, roles, multiplicity and aggregation with examples.
- 7 Explain and draw the class diagram for an ATM bank system.
- 8 Explain about the following:
 - (a) Procedural sequencing.
 - (b) Steps involved in modeling the flow of control.

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Time: 3 hours

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Answer any FIVE questions
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- 1 Explain about the following:
(a) Process view.
(b) Package.
(c) Interface.
(d) Transition phase.
- 2 (a) Explain about the class diagrams with examples in detail.
(b) Explain about the component diagrams with examples in detail.
- 3 Explain about different types of relationships in class and object diagrams with examples.
- 4 Explain and draw the collaboration diagram for lend article use case for library management system.
- 5 (a) What is the purpose of a synchronization bar? How are forking and joining used in activity diagram? Illustrate with a neat diagram.
(b) Draw activity diagram to inform a person when a loan is due and explain.
- 6 (a) Differentiate between a process and a thread.
(b) What are the two standard stereotypes that apply to active class?
(c) Explain and model the behavior of an ATM machine with the help of a state chart diagram.
- 7 Enumerate the steps to model the following. Illustrate UML diagrams and explain briefly:
a) Modeling processes and devices.
b) Modeling distribution of components.
- 8 (a) What are the packages in the library system? Explain.
(b) Draw a sequence diagram for the use case lend item and explain.

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(Common to Computer Science & Engineering, Information Technology & Computer Science & Systems Engineering)

Time: 3 hours

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Answer any FIVE questions
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- 1 (a) What are use case diagrams? Explain the properties and importance of use case diagrams.
(b) Draw an extended use case diagram for the soda machine example depicting the 'Extend', 'Include' and generalization relationships.
- 2 (a) Compare and contrast the real-time system with the distributed system.
(b) Enumerate the steps to model the following:
(i) Family of signals.
(ii) Exceptions.
- 3 (a) What are the properties of a well-structured component diagram?
(b) What are the contents, common properties and common uses of component diagrams? Explain briefly.
- 4 (a) Describe the various activities that are performed by various stake holders in a library information system.
(b) Draw and explain the collaboration diagram for the "Add Title" use case.
- 5 (a) Differentiate between process and deployment view of a system in detail.
(b) List out and explain the four phases of SDLC.
- 6 (a) Differentiate between class and object diagrams of UML.
(b) Differentiate between use case diagram and component diagram in detail.
- 7 Explain about the following:
(a) Forward engineer of a class diagram.
(b) Steps involved in modeling simple collaborations with examples.
- 8 (a) Explain about links and associations in detail.
(b) Explain about several kinds of actions model by UML.

Code: 9A05602

1

B.TECH III Year II Semester (R09) Regular Examinations, April/May 2012

UNIX INTERNALS

(Computer Science and Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Draw and explain the architecture of UNIX systems.
(b) Discuss in detail about the sleep and wakeup procedures.
- 2 (a) If several processes contend for a buffer, the kernel guarantees that none of them sleep forever, but it does not guarantee that a process will not be starved out from use of a buffer. Redesign getblk so that a process is guaranteed eventual use of a buffer.
(b) What are the advantages of buffer cache?
- 3 (a) Give brief description about the accessing of inodes.
(b) Explain in detail about the continuous file allocation system.
- 4 (a) What is the purpose of link system call? Write and explain the algorithm for the same.
(b) Write short notes on maintenance of the file system.
- 5 (a) What are regions? Explain their role in the creation of processes.
(b) Describe in detail about the context of a process.
- 6 (a) Explain the security problems that exists if a setuid program is not write protected.
(b) Write a program that a parent and child shares a file access.
- 7 (a) Discuss in detail about the scheduling parameters.
(b) What is profiling? Explain it in detail.
- 8 (a) Explain clists in detail.
(b) Write a program for reading data from disk by using block and raw interfaces.

Code: 9A05602

2

B.TECH III Year II Semester (R09) Regular Examinations, April/May 2012

UNIX INTERNALS

(Computer Science and Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Mention the characteristics of the UNIX file system. Draw and explain the sample file system with a tree structure.
(b) Draw and explain the block diagram for the system kernel.
- 2 What are the different scenarios that the kernel follows in getblk to allocate a buffer for a disk block? Explain them in detail.
- 3 (a) Write short notes on the structure of a regular file.
(b) Write and explain an algorithm for allocation of in-core inodes.
- 4 (a) Discuss in detail about the write system call.
(b) Give brief description about mounting the file system.
- 5 (a) Present a detail note on the u area of a process.
(b) Explain in detail about the interrupts and exceptions of a process.
- 6 (a) How can we change the size of a process? Explain it in detail.
(b) Describe an implementation of the kill system call.
- 7 (a) Explain the various system calls for time.
(b) Explain how to control the process priorities with suitable examples.
- 8 (a) Explain the terminal drivers using the raw mode.
(b) Write a pseudo code for multiplexing windows.

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B.TECH III Year II Semester (R09) Regular Examinations, April/May 2012

UNIX INTERNALS

(Computer Science and Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain in detail about the operating system services.
(b) Present an overview of the file subsystem with a neat block diagram.
- 2 (a) Explain with a neat sketch, the structure of the buffer pool.
(b) Suppose the kernel does a delayed write of a block. What happens when another process takes that block from its hash queue from the free list?
- 3 (a) Discuss in detail about the conversion of a path name to an inode.
(b) Explain the use of super block and also discuss about the different fields used in super block.
- 4 (a) Give brief description about the read system call.
(b) Write a short notes on pipes.
- 5 (a) Draw and explain the process state transition diagram.
(b) Explain in detail about the layout of the kernel.
- 6 (a) What system calls are used for invoking the other programs? Explain them in detail.
(b) Describe in detail about the user id of a process.
- 7 (a) Present a detailed note on fair share schedulers.
(b) Explain the internal system timeouts with example.
- 8 Write short notes on the following:
 - (a) Disk drivers.
 - (b) Terminal driver for canonical mode.

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B.TECH III Year II Semester (R09) Regular Examinations, April/May 2012

UNIX INTERNALS

(Computer Science and Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Draw and explain the block diagram for the system kernel.
(b) Describe in detail about the sleep and wakeup procedures.
- 2 (a) With the help of a neat sketch, explain the buffer header.
(b) Describe an algorithm that asks for and receives any free buffer from the buffer pool.
- 3 Explain the mechanism of assigning an inode to a new file.
- 4 (a) Explain the open system call with its syntax, algorithm and data structure.
(b) Write and explain the algorithm for creating a file.
- 5 Discuss in detail about the following:
 - (a) Allocating a region.
 - (b) Attaching a region to a process.
 - (c) Changing the size of a region.
 - (d) Freeing a region.
- 6 (a) Explain the role of fork in creation of a new process.
(b) Distinguish between exit and wit system calls.
- 7 (a) Explain the various system calls for time.
(b) Explain how to control the process priorities with suitable examples.
- 8 (a) Draw and explain the architecture for driver entry points.
(b) Present an algorithm for closing a device.

III B. Tech II Semester (R09) Regular Examinations, April/May 2012

OPTIMIZING TECHNIQUES

(Common to Computer Science & Engineering & Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

1 (a) State the necessary and sufficiency conditions for the minimum of the single variable function $f(x)$.

(b) Find the minimum of the function:

$$f(x) = 10x^6 - 48x^5 + 15x^4 + 200x^3 - 120x^2 - 480x + 100.$$

2

Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $X_1 = \begin{Bmatrix} 0.0 \\ 0.0 \end{Bmatrix}$ using

Hooke and Jeeves' method. Take $\Delta x_1 = \Delta x_2 = 0.8$ and $\epsilon = 0.1$.

3

A firm produces three products. These products are processed on three different machines. The time required to manufacture one unit of each of three products and the daily capacity of the three machines are given in the table below:

| Machine | Time per unit (minutes) | | | Machine capacity (minutes / day) |
|----------------|-------------------------|----|----|----------------------------------|
| | | | | |
| M ₁ | 2 | 3 | 2 | 440 |
| M ₂ | 4 | -- | 3 | 470 |
| M ₃ | 2 | 5 | -- | 430 |

The profit for product 1, 2, and 3 is Rs. 4, Rs. 3 and Rs. 6 respectively. It is assumed that all the amounts produced are consumed in the market. Formulate the problem as LPP in order to determine the daily number of units to be manufactured for each product.

4

Describe the transportation problem. Formulate the transportation problem as a linear programming problem.

5

Using Lagrange multiplier method solve following problem:

$$\text{Minimize } f(X) = 1/2(x_1^2 + x_2^2 + x_3^2).$$

subject to constraints:

$$g_1(x) = x_1 - x_2 = 0.$$

$$g_2(x) = x_1 + x_2 + x_3 - 1 = 0.$$

6

(a) Explain method of multipliers algorithm.

(b) Describe briefly differences between the MOM and other transformation methods such as SUMT.

- 7 (a) Is it correct to say that in a quadratic programming problem the objective function and the constraints both should be quadratic? If not, give your own comments.
- (b) Derive the Kuhn-Tucker necessary conditions for an optimal solution to a quadratic programming problem.
- 8 A company has three media A, B and C available for advertising the product. The data collected over the past year about the relationship between the sales and frequency of advertisement in the different media as follows:

| Frequency/month | Estimated sales (units) per month | | |
|-----------------|-----------------------------------|-----|-----|
| Media | A | B | C |
| 1 | 125 | 180 | 300 |
| 2 | 225 | 290 | 350 |
| 3 | 260 | 340 | 450 |
| 4 | 300 | 370 | 500 |

The cost of advertisement is Rs. 5000 in media A, Rs.10000 in B and Rs. 20,000 in media C. The total budget allocated for advertising the product is Rs. 40000. Determine the optimal combination of advertising media and frequency.

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- 1 Briefly explain the applications of optimization in engineering.
- 2 Show that the function:
 $f(x) = 3x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3 - 6x_1 - 4x_2 - 2x_3$ is convex.
- 3 Solve the following LP problem using graphical method and give your comment on the result:

$$\begin{aligned} \text{Maximize } Z &= 3X_1 + 2X_2 \\ \text{Subject to } &-2X_1 + 3X_2 \leq 9 \\ &3X_1 - 2X_2 \geq -20 \\ &X_1, X_2 \geq 0. \end{aligned}$$
- 4 Explain the similarities and differences between a transportation problem and assignment problem. Can we use the transportation algorithm to solve the assignment problem. If so illustrate with an example.
- 5 Use the Kuhn-Tucker conditions to solve the following NLPP:

$$\begin{aligned} \text{Maximize } &8x_1^2 + 2x_2^2 \\ \text{subject to the constraints} & \\ &x_1^2 + x_2^2 \leq 9, x_1 \leq 2 \text{ and } x_1, x_2 \geq 0. \end{aligned}$$
- 6 Solve the problem:

$$\begin{aligned} \text{Min } f(x) &= (x_1 - 3)^2 + (x_2 - 3)^2 \\ \text{subject to } g_1(x) &= 1 + x_2^2 - 2x_1 \\ g_2(x) &= 8x_1^2 + 2x_2 \leq 9 \\ &0 \leq x_1 \leq 4 \\ &0 \leq x_2 \leq 4 \end{aligned}$$

with $x^{(0)} = (1, 1)$ by the generalized reduced gradient method.
- 7 Write the equivalent Kuhn-Tucker conditions for the following quadratic problem

$$\begin{aligned} \text{Minimize } f(x) &= -6x_1 + 2x_1^2 - 2x_1x_2 + 2x_2^2 \\ \text{subject to } &x_1 + x_2 = 2 \\ &x_1, x_2 \geq 0 \end{aligned}$$

- 8 (a) Define a dummy arrow used in a network. State two purposes for which it is used.
(b) The following table gives the activities in a construction project and other related information.

| Activity | Optimistic time(t_0) | Most likely time(t_m) | Pessimistic time(t_p) |
|----------|--------------------------|---------------------------|---------------------------|
| 1-2 | 20 | 30 | 46 |
| 1-3 | 9 | 12 | 21 |
| 2-3 | 3 | 5 | 7 |
| 2-4 | 2 | 3 | 4 |
| 3-4 | 1 | 2 | 3 |
| 4-5 | 12 | 18 | 24 |

- (i) Draw a PERT diagram.
(ii) Calculate total project duration.
(iii) Find the probability that the project will be completed in 50 days.

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OPTIMIZING TECHNIQUES

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- 1 The following table lists all the 10 activities that provide a small project –together with their immediate predecessor activity and the estimated time required for each activity.

| Activity | Time in days | Immediate predecessors |
|----------|--------------|------------------------|
| A | 7 | - |
| B | 5 | - |
| C | 12 | - |
| D | 4 | A |
| E | 8 | B |
| F | 15 | B |
| G | 7 | C |
| H | 3 | G |
| I | 14 | D,E |
| J | 6 | F,H |

- (i) Draw the network diagram.
(ii) Determine the earliest start, earliest finish, latest start and latest finish time and the total slack of each activity.
- 2 (a) Explain the concepts of “Branching” and “Bounding” used in the branch and bound algorithm.
(b) What is the meaning “Fathoming” a node? Under what conditions can a node be fathomed in the branch and bound algorithm.
- 3 Find the dimensions of a rectangular prism-type box that has the largest volume when the sum of its length, width, and height is limited to a maximum value of 152 cm. and its length is restricted to a maximum value of 91 cm.
- 4 Find the relative maximum, minimum or saddle point (if any) for the function:
 $f(x_1, x_2) = x_1^3 + x_2^3 - x_1 - 12x_2 + 25$.
- 5 Carry out a single-variable search to minimize the function:
 $f(x) = 3x^2 + \frac{12}{x^3} - 5$ on the interval $\frac{1}{2} \leq x \leq \frac{5}{2}$
Using quadratic-based search method (use four functional evaluations only).

- 6 Minimize $f = 2x_1^2 + x_2^2$ by using the Cauchy method with the starting point (1, 2) (two iterations only).
- 7 Solve the following LP problem using two-phase method:
 Minimize $Z = 15/2 X_1 - 3 X_2$
 Subject to $3 X_1 - X_2 - X_3 \geq 3$
 $X_1 - X_2 + X_3 \geq 2$
 $X_1, X_2, X_3 \geq 0$
- 8 A machine tool company decides to make four subassemblies through four contractors. Each contractor is to receive only one subassembly. The cost of each subassembly is determined by the bids submitted by each contractor and is shown in the table below. Assign the different subassemblies to contractors so as minimize the total cost.

| | | Contractors | | | |
|----------------------|---|--------------------|----|----|----|
| | | 1 | 2 | 3 | 4 |
| Subassemblies | 1 | 15 | 13 | 14 | 17 |
| | 2 | 11 | 12 | 15 | 13 |
| | 3 | 13 | 12 | 10 | 11 |
| | 4 | 15 | 17 | 14 | 16 |

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- 1 A company has three plants at locations A, B, and C which supply to warehouses located at D, E, F, G, and H. Monthly plant capacities are 800, 500, and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400, and 800 units respectively. Unit transportation costs (in rupees) are given below. Determine an optimum distribution for the company in order to minimize the total transportation cost.

| | | To | | | | |
|------|---|----|---|---|---|---|
| | | D | E | F | G | H |
| From | A | 5 | 8 | 6 | 6 | 3 |
| | B | 4 | 7 | 7 | 6 | 6 |
| | C | 8 | 4 | 6 | 6 | 3 |

- 2 Determine minimum of the function:
 $f(x) = 2x^2 + \frac{16}{x}$ with initial point $x_1 = 1$ and step size $\Delta x = 1$ using Powell's method. For convergence parameters use $\left| \frac{\text{Difference in } x}{x} \right| \leq 3 \times 10^{-2}$ $\left| \frac{\text{Difference in } F}{F} \right| \leq 3 \times 10^{-3}$.
- 3 A firm manufactures two products A and B on which the profits earned per unit are Rs. 3 and Rs. 4 respectively. Each product is processed on two machines M_1 and M_2 . Product A requires one minute on M_1 and two minutes on M_2 , while B requires one minute on M_1 and one minute on M_2 . Machine M_1 is available for not more than 7 hrs 30 min, while machine M_2 is available for not more than 10 hrs during any working day. Formulate the problem as LPP in order to determine the number of units of products A and B to be manufactured to get maximum profit.
- 4 Given the function:
 $f(x_1, x_2) = 100(x_2 - x_1^2) + (1 - x_1)^2$ and $x^{(0)} = [-1.2, 1]^T$ $x^{(1)} = [-1.3, 1.07]^T$
 The first two points in a search for x^* , the minimum of f . calculate the search direction at $x^{(1)}$ using the Modified Newton gradient-based method.
- 5 Minimize $Z = (x_1 + 1)(x_2 - 2)$ over the region $x_1 \leq 2, 0 \leq x_2 \leq 1$, by writing the Kuhn-Tucker conditions and obtaining saddle point.

Contd. in Page 2

- 6 (a) What are the characteristics of a direct search method?
(b) State possible convergence criteria that can be used in direct search methods.
- 7 (a) What is the difference between a goal and a constraint as used in goal programming?
(b) What are the drawbacks of using pre-emptive weights in goal programming?
- 8 Draw a critical path for the following information; calculate the probability of meeting the schedule for the last event if schedule time is 26 days.

| Activity | 1-2 | 2-3 | 2-4 | 3-5 | 4-6 | 5-7 | 6-8 | 7-9 | 8-10 | 9-10 | 10-11 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-------|
| t_o | 2 | 1 | 2 | 1 | 1 | 3 | 7 | 4 | 4 | 5 | 1 |
| t_L | 4 | 1 | 4 | 2 | 2 | 5 | 10 | 6 | 7 | 7 | 1 |
| t_p | 7 | 2 | 5 | 3 | 3 | 6 | 13 | 10 | 9 | 10 | 2 |

Code: 9A05604

1

III B. Tech II Semester (R09) Regular Examinations, April/May 2012

DISTRIBUTED SYSTEMS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Define distributed system.
(b) What are the main characteristics of a distributed system?
(c) Why Internet is a distributed system?
- 2 Explain different middleware layers.
- 3 (a) Explain the X.500 directory information tree.
(b) What are the methods for directory access in X.500 directory services?
- 4 How the global states of a distributed as they execute are captured?
- 5 (a) Define deadlock. Explain the procedure for detecting deadlocks with example.
(b) Explain deadlock prevention. Discuss the advantages of locks to resolve deadlocks with example.
- 6 (a) What are the merits of DSM over message passing mechanism? List out its demerits.
(b) Discuss the procedure steps for page fault handling in a release consistency.
- 7 (a) Discuss the correctness criteria for replicated objects with example.
(b) Briefly explain the sequence of events to be performed under active replication.
- 8 (a) Define security. List out and explain security requirements.
(b) Discuss the role of cryptography in security.

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2

III B. Tech II Semester (R09) Regular Examinations, April/May 2012
DISTRIBUTED SYSTEMS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Why concurrency is required in a distributed system? How it is achieved?
(b) What is independent failure? How it is related to a distributed system?
- 2 (a) What are the programming models that have been extended to apply to distributed programs?
(b) How middle ware helps in the provision of a location transparency?
- 3 (a) What is the difference between structure and unstructured peer to peer systems?
(b) What is a squirrel web caching service?
- 4 (a) What are the external and internal synchronization of clocks?
(b) How UNIX make facility uses time for execution?
(c) What is clocks crash failure?
- 5 (a) Define transaction. List out supporting goals. Discuss the role of recoverable objects.
(b) Describe the importance of ACID properties.
- 6 (a) Discuss the role of parameters and results in CORBA IDL with example.
(b) Discuss the examples of client and server programs in CORBA by supporting any language.
- 7 Write short notes on:
(a) Hierarchical two phase commit protocol.
(b) Flat two phase commit protocol.
- 8 Explain threats from mobile code. Discuss briefly information leakage.

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3

III B. Tech II Semester (R09) Regular Examinations, April/May 2012

DISTRIBUTED SYSTEMS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) How the hardware components are shared in a distributed system?
(b) How the software components are shared in a distributed system?
- 2 Explain in detail java RMI.
- 3 Explain the overlay caste study Tapestry.
- 4 Explain Berkeley algorithm for internal synchronization of clocks.
- 5 (a) Explain synchronization with and without transactions.
(b) Describe how a non-recoverable situation could arise if write locks are released after the last operation of a transaction but before its commitment.
- 6 (a) Discuss methods and attributes in CORBA IDL with example.
(b) Briefly give a description of IDL constructed types.
- 7 (a) Discuss types of phases in two phase commit protocol.
(b) Sketch the diagram and explain how coordinator and participant can be communicated in two phase commit protocol.
- 8 (a) Discuss worst case assumptions and supporting guidelines for security.
(b) What is cryptography? List out and explain its advantages.

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4

III B. Tech II Semester (R09) Regular Examinations, April/May 2012

DISTRIBUTED SYSTEMS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What is software architecture?
(b) What is middle ware? What are the limitations of middle ware?
- 2 Explain how remote resources are accessed in UNIX/LINUX.
- 3 (a) Peer to peer systems software is responsible for maintaining the integrity and authenticity of data. Explain.
(b) How the routing layer provides the mechanism for placing and retrieving the relevant distributed knowledge?
- 4 What is the importance of time in a distributed system?
- 5 (a) What are the advantages and disadvantages of timeouts? Briefly describe the upgrade locks in CORBA.
(b) List out and explain the uses of locks in strict two phase locking.
- 6 (a) Explain timeline operations in a distributed shared memory system. Discuss the requirements of release consistency memory.
(b) How locks can be used in a release consistency memory? Explain with example.
- 7 (a) Describe flat and nested distributed transactions with example.
(b) Explain briefly the role and responsibilities of a coordinator in a distributed transaction.
- 8 Describe the syntax of services for client and server sessions using Kerberos.

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1

III B. Tech II Semester (R09) Regular Examinations, April/May 2012

ARTIFICIAL INTELLIGENCE
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain the following:
 - (a) Referential transparency.
 - (b) Semantic networks.
- 2
 - (a) Write the differences between supervised and unsupervised learning.
 - (b) Explain computational learning theory.
- 3
 - (a) Explain mathematical model of a neuron.
 - (b) Explain fuzzy rules and fuzzy profiles.
- 4 State and prove Bayes' theorem.
- 5 What is a production system? What does it consist of? Explain different categories of it and also its role in AI.
- 6
 - (a) Discuss the representation of a node in search tree.
 - (b) Compare uninformed search with informed search.
- 7 How does a DPLL and WALKSAT algorithm perform in practice? Explain.
- 8 Discuss the limitations of propositional logic and explain how first order logic overcomes these with its features.

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III B. Tech II (R09) Semester Regular Examinations, April/May 2012

ARTIFICIAL INTELLIGENCE
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain briefly about truth maintenance systems.
(b) What are the advantages of truth maintenance systems?
- 2 (a) Explain mathematical model of a neuron.
(b) Explain sugeno style of fuzzy inference processing.
- 3 Explain the following random variables:
(a) Boolean.
(b) Discrete.
(c) Continuous.
- 4 (a) Explain decision trees as performance elements.
(b) Explain the ensemble method boosting with example.
- 5 (a) What is an artificial intelligence technique? Explain.
(b) Discuss production system and its characteristics.
- 6 Discuss map coloring problem as the simplest kind of CSP. Explain the problem solving process.
- 7 (a) Write about a generic knowledge agent.
(b) Give a truth-table enumeration algorithm for deciding propositional entailment.
- 8 How to reduce first order inference to propositional inference? Explain the process with examples.

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III B. Tech II (R09) Semester Regular Examinations, April/May 2012

ARTIFICIAL INTELLIGENCE
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain joint probability distribution with examples.
- 2 Write short notes on mental events and mental objects in knowledge representation.
- 3 Explain the following:
 - (a) α - cut threshold.
 - (b) Fuzzy set operations.
 - (c) Depiction of a fuzzy set.
- 4 Explain Tic-Tac-Toe problem and discuss at least two solutions using AI techniques with suitable data structures and algorithms.
- 5
 - (a) Suppose we generate a training set from a decision tree and then apply decision tree learning to that training set. Is it the case that the learning algorithm will eventually return the correct tree as the training set size goes to infinity why or why not?
 - (b) Explain decision tree induction with example.
- 6 Derive a genetic algorithm approach to the traveling salesperson problem.
- 7
 - (a) Discuss theorem provers as assistants.
 - (b) Illustrate the lifting lemma.
 - (c) Write about Herbrand's theorem.
- 8
 - (a) Discuss resolution algorithm for propositional logic.
 - (b) Explain the semantics of propositional logic.

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III B. Tech II (R09) Semester Regular Examinations, April/May 2012

ARTIFICIAL INTELLIGENCE
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain fuzzy sets with examples.
(b) Explain fuzzification.
- 2 (a) The version space contains all hypothesis consistent with the examples. Explain.
(b) Explain relevance-based learning.
- 3 What is upper ontology? What is the use of upper ontology? Explain in brief.
- 4 Explain probabilistic inference using full joint distributions.
- 5 What is 8-puzzle problem? Describe it formally and analyze its characteristics.
- 6 Compare various search strategies under uninformed search in terms of the four evaluation criteria.
- 7 (a) What do you mean by semidecidability?
(b) Comment on completeness of first order logic.
(c) What is meant by conjunctive normal form?
- 8 List and explain the inference rules for propositional logic.
