M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper -I : Data Structures

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 is compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   a)   What are the disadvantages of linear queues?

     b)   How are Collision handled in linear probing?

     c)   Define minimal spanning tree.

     d)   When is Radix sort termed LSD first sort?

     e)   What is the general principle behind external sorting?

Unit - I

2)   a)   How are priority queues implemented using a single queue? Explain.

     b)   State all possible applications of priority queues.

OR

3)   a)   Show that the maximum number of nodes in a binary tree of height h is $2^h - 1$.

     b)   Construct a binary search tree T for the following set S of elements in the order given below :
         S={INDIGO, GREEN, CYAN, YELLOW, RED, ORANGE, VIOLET}.

Unit – II

4)   a)   What is Hashing? List out the possible applications of it.

     b)   Discuss Quick sort. What is its time complexity?

OR

5) a) Test he stability of Heap sort on the list L={7^1, 7^2, 7^3}.

b) What is the principle behind Shell sort? Give an example.

Unit – III

6) a) Define external sorting. List out all the possible sorting techniques.

b) What is the principle behind external sorting? Explain with an example.

OR

7) a) What is a 2-way Merge? Give an example.

b) Discuss the advantages and disadvantages of Merge sort.

Unit – IV

8) Explain the following :

a) BFS and

b) DFS.

OR

9) Discuss the search techniques for minimal spanning tree. Choose your own example and explain it.

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<div align="right">**(DMTCS 02)**</div>

M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - II : Discrete Mathematical Structures

Time : 3 Hours   **Maximum Marks : 75**

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Answer Question No. 1 compulsory   ***(15)***

Answer any ONE question from each unit   ***(4 x 15 = 60)***

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1) a) What is a Logic?

    b) Why we need the set of connectives in Logic?

    c) Indicate the Truth value of the proposition : If 3+4 = 7, then 5+3 = 8.

    d) What is a consistency?

    e) What are the basic principles of counting?

    f) Define Euler path.

    g) Define homomorphism.

    h) What do mean by graph coloring?

    i) Define induced graph.

    j) State the operations on relations.

    k) What is a minimal spanning tree?

    l) List all the properties of lattice.

    m) What is a 2-chromatic number?

n) Is there any difference between four color problem and theorem?

o) Define planar graph.

Unit - I

2) a) Obtain the equivalent PDNF for the proposition~$(P \lor Q) \leftrightarrow (P \land Q)$.

b) Show that R$\lor$S follows logically from the premises

C $\lor$ D, (C $\lor$ D)) $\rightarrow$ ~H,~H$\rightarrow$(A$\land$~B) and (A$\land$~B) $\rightarrow$R $\lor$ S.

OR

3) a) Obtain the PCNF of ~$(P \lor Q) \rightarrow (P \rightarrow \sim Q)$.

b) Using automatic theorem proving, show that $(P \lor Q) \land (Q \rightarrow R) \land (P \rightarrow M) \leftrightarrow (R \lor M)$.

Unit – II

4) a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and the other 3 will have 5 books each.

b) Using Multinomial theorem, expand $(2x - 3y + 4z)$ 3.

OR

5) a) Determine the number of integers between 1 and 10,000,000 have the sum of digits equal to 18.

b) Determine the number of ways possible to wear 5 rings on 4 fingers.

Unit – III

6) a) Solve the recurrence relation an-7an-1 + 12an-2=0 for n$\square$ 2, a0=1 and a1=2. of two integers.

b) Solve the recurrence relation of Fibonacci series.

OR

7) a) Find a general expression for a solution to the recurrence relation

an – 5an-1 + 6an-2 = n(n-1) for n $\geq$ 2.

b) Solve the recurrence relation an – 7an-1 + 10an-2 = 0 for $n \geq 2$.

8) a) What is circuit rank? Give an example.

b) Find the Chromatic Number of the following graphs

    i) Complete Graph Kn

    ii) Complete Bi-Partite graph (Km,n)

    iii) Cycle graphs (Cn)

    iv) Null graph (Nn).

<div align="center">OR</div>

9) Explain and Illustrate various ways for representation of graphs.

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M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - III : Computer Architecture And Organization

Time : 3 Hours   **Maximum Marks : 75**

__Answer question No. 1 is compulsory__   *(15)*

__Answer ONE question from each unit__   *(4 x 15 = 60)*

1) a) How many flip-flops will be complemented in a 10 bit binary counter to reach the next count after 1001100111 and 0011111111?

    b) Represent the number $(+46.5)_{10}$ as a floating point number with 24 bits. The normalized fraction mantissa has 16-bits and exponent has 8-bits.

    c) Draw the logic symbol for three state buffer.

    d) What is register transfer language?

    e) Mention the basic computer instruction formats.

    f) Define a program interrupt.

    g) Convert the following arithmetic expression from infix to reverse polish notation. A+B*[C*D+E*(F+G)].

    h) What are the basic differences between a branch instructions and call subroutine instructions?

    i) What are resources conflicts and data conflicts in pipelining technique?

    j) List the applications of vector processing.

    k) Define control word and control memory.

l)   What are tightly coupled and loosely coupled multiprocessors?

m)   What is cache coherence protocol?

n)   Define virtual memory.

o)   What is set-associative cache mapping?

Unit - I

2)   Explain the shift micro operations with an examples.

OR

3)   Describe the memory reference instructions briefly.

Unit – II

4)   Explain briefly about data manipulation instructions.

OR

5)   a)   Explain the matrix multiplication in vector processing.

b)   Describe delayed load and delayed branch in RISC pipeline.

Unit – III

6)   a)   What is the difference between a microprocessor and micro program? Is it possible to design a microprocessor without a micro program? Are all micro programmed computers are also microprocessors?

b)   Explain the differences between hardwired control and micro programmed control? Is it possible to have a hardwired control associated with a control memory?

OR

7)   a)   Explain the concept of address sequencing in micro programmed control unit.

b)   With a neat sketch explain the micro programmed control organization.

8) What is a DMA write a short note on DMA controller?

OR

9) Write a short note on :

a) SRAM

b) DRAM

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M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - IV : Operating Systems

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 is compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   a)   What is an interrupt? List several events that can cause an interrupt in the CRA-1.

b)   Why a little language is use full?

c)   What is busy waiting? What is the alternative?

d)   What is the difference between powers of allocation and buddy system?

e)   Why is DMA useful?

f)   What are the disadvantages of virtual hardware?

g)   What is a process?

h)   Give an example of pipe buffer.

i)   Define software design process.

j)   What do you mean by semaphore? Give an example.

k)   What is indirection? Give entity and line of indirection.

l)   What is a file?

m)   What is internal fragmentation?

n) State scheduling algorithms.

o) Define an object? Give an example.

Unit - I

2) a) Explain the difference between sharing a resource and multiplexing a resource.

b) Explain the system calls that are used in process communication.

OR

3) a) What is a design problem? Explain the design problems that occurs while designing a system.

b) Explain the contents of design technique standard format.

Unit - II

4) a) Compare a multi-processor with a multi computer.

b) Explain how a shell pipeline uses the producer consumer IPC pattern.

OR

5) a) Explain the following scheduling methods with example.

i) FCFS

ii) Round Robin

b) What are the three general strategies for adding a new facility to a system?

Unit - III

6) a) Compare paging and segmentation.

b) Explain optimal page replacement algorithm with example.

OR

7) a) What is the "Law of dimishing returns"?

b) What is the difference between internal fragmentation and external fragmentation?

Unit - IV

8) a) Explain in detail about disk devices.

     b) Explain SSTF disk scheduling algorithm with an example.

<p align="center">OR</p>

9) a) What are the duties of logical and physical file systems?

     b) Describe the boot process for an operating system.

     c) What makes caching work?

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(DMTCS 05)

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - V : Automata Theory and Formal Languages

Time : 3 Hours   **Maximum Marks : 75**

__Answer question No. 1 compulsory__   *(15)*

__Answer any ONE question from each unit__   *(4 x 15 = 60)*

1)   a)   What is concatenation?

      b)   Define NFA.

      c)   Define Kleen's closure.

      d)   Express $\delta(q, xy)$ in terms of x and y.

      e)   List out all types of CFG.

      f)   Draw the diagram for the union of two recursive languages is recursive.

      g)   State Church's Hypothesis.

      h)   Explain the different moves in a TM.

      i)   State two properties of CFLs.

      j)   What is an unambiguous grammer?

      k)   Define Regular Set.

      l)   What is the significance of Pumping lemma?

      m)   List all the applications of TM.

      n)   Is there any difference between Moore and Mealy machine?

      o)   What is the role of RE in FA.

UNIT - I

2) a) Design a DFA M that accepts the language L(M) = {w/w ε {0,1}*} and w does not contain three consecutive 0's.

   b) Prove that any transition function δ and for any two input strings x and y

   $$\delta(x, y) = \delta(\delta(q,x),y).$$

   OR

3) a) Explain the construction of Minimum Automation with an example.

   b) Construct a DFA with reduced states equivalent to the regular expression 10 + (0+11)0*1.

UNIT – II

4) a) Define context free grammar with an example.

   b) Show that the language $L(G) = \{ww^R/w\varepsilon\{a,b\}*\}$ is context free but not regular.

   OR

5) a) Define Parse Tree. Let G = ({S,A},{a,b},P,S) where P consists of

   S→aAS|a|SS

   A→SbA|ba

   Construct the derivation tree for it

   b) Find the PDA with only one state that accepts the language $\{a^m b^n :n>m\}$.

UNIT – III

6) a) Write the differences between TM and PDA.

   b) Design a TM that computes a function f(m,n) = m + n, that is addition of two integers.

   OR

7) Explain Computable functions with suitable examples.

UNIT – IV

8) a) Write a short note on Chomsky Hierarchy of languages.

   b) Discuss Linear Bounded Automata.

   OR

9) Discuss undecidability of Post's Correspondence Problem.

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(DMTCS 06)

M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - VI : Database Management Systems

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   a)   List out the characteristics of DBMS.

     b)   Who is known as end user?

     c)   What is a client module?

     d)   What do you mean by schema?

     e)   State all types of entity.

     f)   What is the basic difference between subclass and superclass?

     g)   What is a relation?

     h)   Name some storage devices.

     i)   Define Hashing.

     j)   What do you mean by entity?

     k)   Define Tuning.

     l)   List all primary file organizations.

     m)   What is the significance of quarrying in DBMS?

     n)   How many normal forms are there?

     o)   Why meta data is required in DBMS?

Unit - I

2)   a)   Explain all actors in the schema.

       b)   Discuss the main characteristics of the data base approach and how it differs from traditional file system?

<p align="center">OR</p>

3)   Discuss the main categories of data models.

Unit – II

4)   a)   How many join orders are there for a query that joins 10 relations? Discuss.

       b)   List out the differences between pipelining and materialization.

<p align="center">OR</p>

5)   Discuss the merits and demerits of providing secondary indexes and primary indexes.

Unit – III

6)   a)   What do you understand by attribute closure>Give an example.

       b)   What is the minimal normal form that a relation must satisfy? And why?

<p align="center">OR</p>

7)   a)   How do template dependencies differ from the other types of dependencies? Discuss.

       b)   Define fourth normal form. When is it violated? Why it is useful?

Unit – IV

8)   List the phases of database design and implementation for large database.

<p align="center">OR</p>

9)   a)   Discuss the types of problems encountered during Tuning.

       b)   What are the operations that need to be noted by the recovery system.

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M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - VII : Software Engineering

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 is compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   a)   What is a product? Give an example.

      b)   What is an user interface design?

      c)   Define web engineering.

      d)   How many software testing techniques are there? List them.

      e)   What is a software life cycle?

Unit - I

2)   a)   Define software process. Give an example.

      b)   Explain software quality assurance.

OR

3)   Discuss system engineering in detail.

Unit – II

4)   a)   State and explain various analysis concepts and principles.

      b)   Discuss why user interface design plays an important role in software engineering and discuss.

OR

5)   Discuss the design concepts and principles.

Unit – III

6) a) What is a software metric? Give an example.

b) Discuss technical metrics for software.

OR

7) What are the testing strategies in conventional software? Explain them in detail.

Unit – IV

8) What is clear room software? Discuss with an example.

OR

9) a) Discuss client/server software engineering.

b) Write short notes on Re engineering.

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M. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of First Year)

COMPUTER SCIENCE

Paper - VIII : E-Commerce

Time : 3 Hours   **Maximum Marks : 75**

Answer any five of the following

All questions carry equal marks

1)   a)   Concept of e-commerce.

      b)   Online e-cash.

      c)   Security Teams.

      d)   E-mail

      e)   Extra net

      f)   EP

2)   What are the opportunities of e-commerce.

3)   State secure e-payment protocols.

4)   Elucidate the requirements of internet monetary payment.

5)   Give an account intruder approaches to security.

6)   Explain different methods security.

7)   Discuss the internet applications for e-commence.

8)   Elucidate the issues in advertising on internet

9)   Describe different kinds of antivirus available for internet.

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