Total No. of Questions :5]

P1784

SEAT No. :

[Total No. of Pages :3

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M.Sc.

COMPUTER SCIENCE

CS-101: Principles of Programming Languages

(2008 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicates full marks.*

Q1) Attempt all of the following: **[8×2=16]**

    a)   What is bootstrapping?

    b)   "C - Language does not support array operations". Justify.

    c)   What is JIT compiler?

    d)   What are bound & free variables in prolog?

    e)   What is disjoint task?

    f)   Compare object life time and binding life time.

    g)   define static link & dynamic link.

    h)   Differentiate between predicate NULL and ENDP.

Q2) Attempt any four of the following: **[4×4=16]**

    a)   Explain with suitable example parameter passing modes.

   b)   What is dangling pointer? What are solutions to the dangling pointer problem?

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c) What is garbage? What are different approaches to garbage collection?

d) Explain the concept of macros in 'C'.

e) What is boxing & unboxing? Give suitable example with java code.

Q3) Attempt any four of the following: **[4×4=16]**

a) What is difference between enumeration controlled loop and logically controlled loop?

b) What is Monitor? State its advantages over semaphores.

c) Explain how programming languages are classified.

d) Give the implementation for the following shared multiple inheritance.
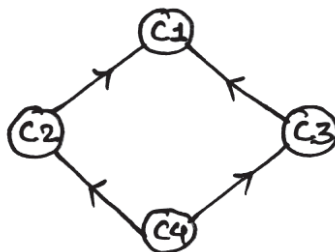
e) What is object closure? Explain with suitable example in C++.

Q4) Attempt any four of the following: **[4×4=16]**

a) What is coroutine? What is quasi-concurrency?

b) Define a recursive function in LISP to return last element of the list.

c) What is abstraction? What are benefits of abstraction provided by modules and module types?

d) What is multiway assignement? Give its advantages.

e) Explain why ordering within an expression is important.

Q5) Attempt any four of the following: [4×4=16]

a) Write a prolog program to find factorial of a given number.

b) Define Lisp function pal to check whether given list is palindrome or not.

c) Find output of:

   i)   (first (rest (first ; ((ab) ((d)))))

   ii) (append' (a b)' ( ))

   iii) (cons' (a b)' ( ))

   iv) (cadadr' ((p q) (r s) (t u)))

d) Write a lisp function for finding intersection of two lists.

e) Write a prolag program which uses red cut.

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M.Sc.

COMPUTER SCIENCE

CS - 102 : Object Oriented Software Engineering.

(2008 Pattern) (Old Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following: **[8×2=16]**

   a)   Define Link attribute.

   b)   What are three kinds of building blocks of UML?

   c)   Give two standard stereotypes that apply to components?

   d)   What is association and state its role.

   e)   What do you mean by recursive aggregation?

   f)   What are abstract classes?

   g)   What is meant by tagged values?

   h)   Differentiate between generalization and aggregation.

Q2) Attempt any four of the following.   **[4×4=16]**

   a)   Write a note on Inception and requirement understanding.

   b)   What is importance of system Design?

   c)   Explain grouping elements of UML.

   d)   Write a short note on white box testing.

   e)   Explain the component of sequence diagram.

Q3) Attempt any four of the following. [4×8=32]

 a) Consider on " Online money transfer system", which allows customer to perform various transactions. Discuss different scenario and draw sequence diagram.

 b) Prepare a class diagram for Hospital management system. Consider at least three classes. Define appropriate relationship, association with multiplicity

 c) Draw use case diagram for online Railway reservation.

 d) Draw activity diagram for University Examination form filling.

 e) Draw state chart diagram for automated vending machine for tea/coffee. select option coffee/ Tea/ milk and get appropriate amount of coffee/tea/milk.

Q4) Attempt any four of the following. [4×4=16]

 a) Write a note on Object oriented Analysis.

 b) Give any five activities and artifact considered in inception.

 c) Explain the process of forward engineering for the use case diagram.

 d) What is an agile process?

 e) Define U.M.L Explain the advantages of U.M.L.

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M.Sc

COMPUTER SCIENCE

CS - 103 : Distributed Databases Concepts

(2008 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data if necessary.*

Q1) Attempt any eight from the following.   **[8×2=16]**

a)   Give any two complicating factors in design of DDBMS.

b)   Explain what is unilingual architecture.

c)   Write short note on distributed catlog management.

d)   What are the query processing objective.

e)   Explain the term.

   i)   Type incorrect query.

   ii)   Semantically incorrect query.

f)   Define

   i)   Linear join tree

   ii)   Bushy join tree

g)   List any four types of failures that can occure in distributed databases.

h)   What is nested transaction?

i)   Discuss the classification criteria of concurrency control approaches.

j)   What are the layers of query processing?

Q2) Attempt any four from the following.   **[4×4=16]**

a)   Explain steps of query processor by specifying input and output of each step.

b)   Providing transparency is necessary in DDBMS. Comment.

c)   Autonomy refers to distribution of control, not data. Comment.

d)   Compare and contrast between following two architectures of DDBMS.

   i)   Client - server

   ii)   Peer - to - peer

e)   Replication of data in distributed databases reduces reliability, justify true or false.

Q3) Attempt any four from the following.   **[4×4=16]**

a)   Consider the following database :

   PROJ (pno, pname, budget, location) and

   ASG (pno, eno, duration, responsibility)

   Consider, set of simple predicates

   P = {budget ≤ 100000,

   budget >100000}

   Perform horizontal fragmentation of PROJ based on set *p*, Using this fragmentation of PROJ,

   Further perform derived horizontal fragmentation of ASG.

b)   Given database

   EMP (<u>eno</u>, ename, title) and

   ASG (<u>eno</u>, <u>pno</u>, dur, resp)

   Supose EMP relation is horizontally Fragmented as

   EMP_1 = 6 eno ≤ "e_3" (EMP)

   EMP_2 = 6 eno > "e_3" (EMP)

Supose ASG relation is horizontally fragmented as

$$ASG_1 = 6 \ eno \leq \text{“}e_3\text{”} \ (ASG)$$

$$ASG_2 = 6 \ \text{“}e_3\text{”} < eno \leq \text{“}e_5\text{”} \ (ASG)$$

$$ASG_3 = 6 \ eno > \text{“}e_5\text{”} \ (ASG)$$

Transfer following query to reduced query on fragments and determine whether it is better than generic query

SELECT ename, title, resp, pno
FROM ASG, EMP

WHERE ASG. eno = EMP. eno and pno = " $p \ l$ " ;

c) Consider following query :

SELECT patient - name

FROM patient P. disease D. patient - disease PD

WHERE P. sno = PD. sno

and PD. dno = D. dno

and dname = "DENGUE"

and P. age < 55

Optimize above query using centralized INGRES query optimization algorithm.

d) Consider query that refers to join of relation.

PROJ (pno, pname, bud, 10c) &

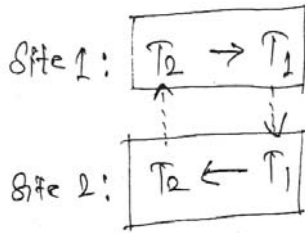ASG (pno, eno, dur, resp) on attribute

pno.

Assume that PROJ & ASG reside at two different sites, and index is on pno.

Consider size (PROJ) = 200 and size (ASG) = 400. Write down all possible execution strategy along with cost incurred. If distributed system R algorithm (R*) is implemented. Which is best strategy amongst all and why?

e) Consider the following distributed wait - for - Graph

Detect Deadlock using distributed deadlock detection algorithm.

Q4) Attempt any four from the following. **[4×4=16]**

a) Consider the following relation

EMP (eno, ename, addr, age, dno)

DEPT (dno, dname, bud)

EMP relation is partitioned horizontally as

$EMP_1 = 6\ age < 25\ (EMP)$

$EMP_2 = 6_{25} < age < 50\ (EMP)$

$EMP_3 = 6\ age >= 50\ (EMP)$

DEPT relation is partitioned horizontally as

$DEPT_1 = 6\ bud < 3,00,000\ (DEPT)$

$DEPT_2 = 6\ bud >= 3,00,000\ (DEPT)$

i) Draw join graph of EMP ⋈ DEPT

ii) Is the graph simple or partitioned?

b) There are two relations in DDBMS.

EMP (eno, enm, age, sal, desg, dno)

DEPT (dno, dnm, bud)
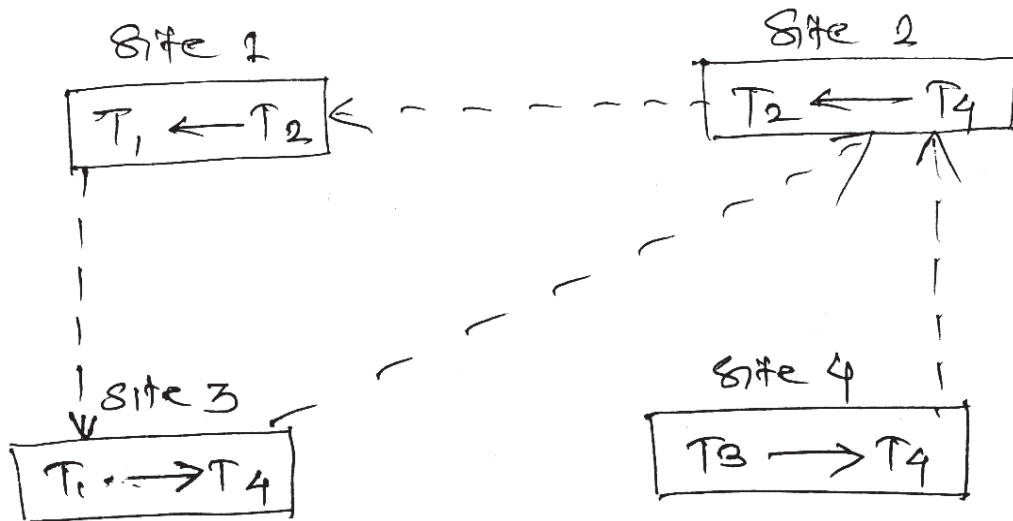
Size (EMP) = 10,000 taples

Size (DEPT) = 500 taples

EMP is stored at site S_1

DEPT is stored at site S_2

Query executed at site S_3

"Find out names of managers of those departments which have budget i.e bud > 7,00,000.

c) Consider following DWFG.

Check if deadlock exist in system. If so find out the sites involved in deadlock.

d) GNe schedule of two complete transaction which is not allowed by strict 2 PL, but is allowed by basic 2PL.

e) In 3PC, when new coordinator is selected due to failure of original coordinator how it handles the termination protocol?

Q5) Attempt any four from the following.   **[4×4=16]**

a) Write note on : Work flow.

b) Explain each rule of fragmentation correctness in detail.

c) Explain optimistic concurrency control protocol.

d) Explain centralized 2PC protocol in distributed environment.

e) Write a short note on "False deadlocks".

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M.Sc.

COMPUTER SCIENCE

CS-104: Design & Analysis of Algorithms

(2008 Pattern) (Semester-I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   *Figures to the right indicate full marks.*

    2)   *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt any Eight from the following: **[8×2=16]**

    a)   Give control abstraction for divide and conquer strategy.

    b)   Find n_0 such that for all $n > n_0$ the following is true $3\log_2 n < 4n < n^2$.

    c)   What is satisfiability problem? State cook's theorem.

    d)   Huffman code is fixed length code? Justify.

    e)   Define principle of optimality? State one essential difference between greedy method and dynamic programming?

    f)   Define Horner's rule.

    g)   What is Tree edge and Forward edge. Give one example.

    h)   Define state space tree and problem state.

    i)   Why least cost search method is preferred over LIFO and FIFO Branch Bound method?

   j)   What is the recurrence relation for Quick sort for the time T(h).

Q2) Attempt any four of the following.   **[4×4=16]**

    a)   Show how merge sort algorithm sorts the following sequences of keys. 43, 22, 18, 11, 181, 140, 13, 50

    b)   Let A[1..n] be an array of integers, integers can be duplicated. Write an efficient algorithm to find occurences of given integer in an array A. Find its time complexity.

c) Obtain optimal solution for the following job scheduling with deadlines using greedy method. p = (20, 15, 10, 5, 1) d = (2, 2, 1, 3, 3).

d) Illustrate the strongly connected components algorithm on the following graph (start vertex c)
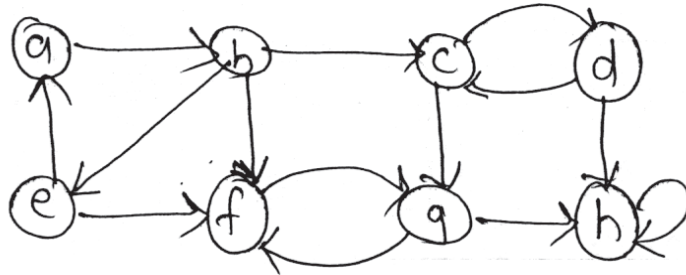
e) Apply Floyd Warshall algorithm to find lengths of shortest paths from vertex u to vertex v, $\forall u, v \in v(G)$, where adjacency matrix of G is,

$$W = \begin{bmatrix} 0 & 4 & 11 \\ 6 & 0 & 2 \\ 3 & \infty & 0 \end{bmatrix}.$$

**Q3)** Attempt any four of the following: **[4×4=16]**

a) Explain P-class, NP-class, NP-hard & NP-complete with example.

b) Define asymptotic notation? What are types of asymptotic notation? Explain any one with example.

c) Draw the portion of state space tree generated by LCBB for the knapsack problem instance by w = (4, 6, 3, 4, 2) p = (10, 15, 6, 8, 4) m = 12.

d) Write a recursive algorithm for Towers of Hanoi. Give example and also explain its computing time in terms of recurrence relation.

e) Find all Hamiltonian cycles for the following graph.
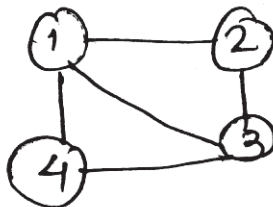
Q4) Attempt any two of the following: **[2×8=16]**

a) What is backtracking? Give the bounding function for the given set of weight W = {5, 7, 10, 12, 15, 17} & m = 22. Draw the state space tree using variable type size & find all possible subsets that give sum of all elements as 22.

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b) Define BFS and DFS? Illustrate it on the following graph.
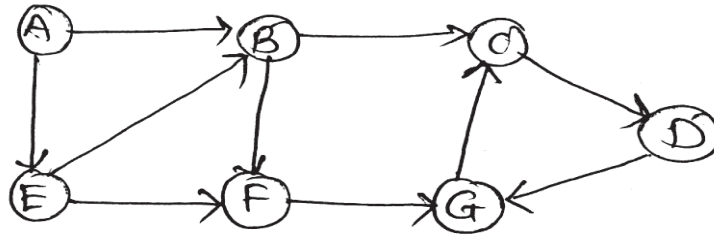
c) Explain string editing problem. A string X can be transformed into a string Y by applying a sequence of edit operations such as insert, delete & change with associated cost 1, 1 & 2 respectively. Give the recurrence relation for the value of the optimal solution when the problem is to be solved using Dynamic programming for X = {b, b, a, b, a} & Y = {a, b, a, a}.
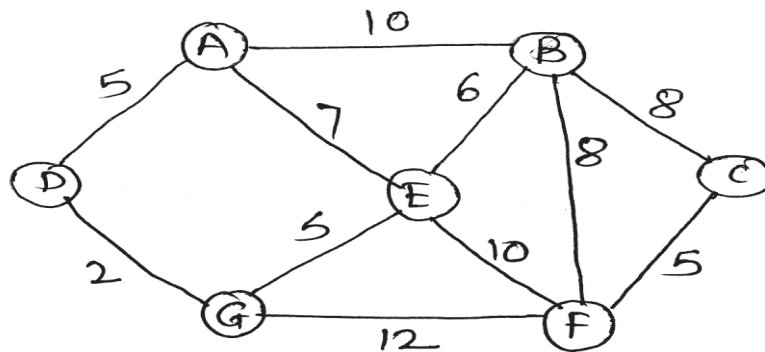
Q5) Attempt any two of the following: [2×8=16]

a) Obtain the reduced cost matrix for the TSP instance given by the cost matrix

$$\begin{bmatrix} \infty & 10 & 12 & 9 & 5 \\ 7 & \infty & 6 & 4 & 3 \\ 8 & 4 & \infty & 4 & 8 \\ 11 & 10 & 5 & \infty & 5 \\ 5 & 4 & 9 & 6 & \infty \end{bmatrix}$$

b) Apply Prim's and Kruskal algorithm to obtain minimum spanning tree for the following graph.

c) Explain Strassen's matrix multiplication. Derive the time complexity required by Strassen's matrix multiplication. Compute the matrix product of following matrices giving each computational step.

$$A = \begin{bmatrix} 4 & 3 \\ 5 & 6 \end{bmatrix} \quad B = \begin{bmatrix} 3 & -2 \\ -4 & 2 \end{bmatrix}$$

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M.Sc.

COMPUTER SCIENCE

CS-201: Advanced Networking Concepts

(2008 Pattern) (Semester-II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Neat diagrams must be drawn wherever necessary.

    3)   Figures to the right indicates full marks.

Q1) Attempt all of the following: **[8×2=16]**

    a)   Why application would use UDP instead of TCP?

    b)   Explain the purpose of sequence number & Acknowledge number in TCP.

    c)   Describe any four socket system calls.

    d)   Define bursty data with example.

    e)   Explain features of Service Model.

    f)   Explain all types of BGP message.

    g)   What is maximum size of TCP header? What is minimum size of TCP header.

    h)   Define primary server & secondary server.

Q2) Attempt any four of the following.   **[4×4=16]**

    a)   What is an ethernet? Explain it.

    b)   How Remote login is perform using TELNET.

    c)   State the different design goals of ATM.

    d)   Explain three way handshake method used for connection termination in TCP.

    e)   Describe various multicost applications.

Q3) Attempt any four of the following: **[4×4=16]**

   a) Explain access method used in wireless LAN.

   b) Explain the strategies & actions in crash recovery.

   c) Explain open loop & closed loop congestion control.

   d) Given two prime numbers p = 7 and q = 17. Find out N, E & D in RSA encryption process.

   e) Explain address resolution protocol.

Q4) Attempt any four of the following: **[4×4=16]**

   a) Explain the services offered by TCP to the processes at the application layer.

   b) State the advantages of IPv$_6$ that are over IPv$_4$.

   c) Explain RTCP.

   d) Describe various file transfer commands used by FTP.

   e) Explain SNMP.

Q5) Attempt any four of the following: **[4×4=16]**

   a) State & explain in brief different error reporting messages in ICMPv$_6$.

   b) Write note on HTTP.

   c) Explain Diffie - Hellman Protocol.

   d) Explain Silly window syndrome created by Sendor.

   e) Describe IPv$_4$ header with neat diagram.

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M.Sc.

COMPUTER SCIENCE

CS - 202 : Unix Internals

(2008 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

   1) Neat diagrams must be drawn wherever necessary.

   2)   figures to the right indicate full marks.

   3) All questions carry equal marks.

   4) All questions are compulsory.

Q1) Attempt **all** of the following.   **[8 × 2 = 16]**

   a)   What are the fields present in disk inode?

   b)   The offset within the file at which a process wants to read is 1234567. Find out block number and offset within block using bmap algorithm.

   c)   What are the contents of mount table?

   d)   How pipe files differ from regular files?

   e)   Explain the system calls to change the owner of a file and to change the current directory of a process.

   f)   How many and which are pointers are present in the buffer header of buffer cache?

   g)   Explain the syntax of wait() system call along with its parameter and return value.

   h)   What is the use of nice() system call.

Q2) With proper justification state whether the following statements are true or false. (Any four)   **[4 × 4 = 16]**

   a)   If a process is executing in user mode and if a signal arrives, kernel cannot handle it immediately.

   b)   Kernel saves the context of the process when the execution mode of the process changes from user to kernel.

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c) A process cannot open a file for reading as well as for writing simultaneously.

d) All the blocks on the file system, which are free, must be present on the free block list.

e) Kernel needs to create a copy of page before updating it if "Copy on Write" bit is set for the page.

Q3) Attempt any four of the following.   **[4 × 4 = 16]**

a) Explain the system calls related with time.

b) What is context switching? Under which situations kernel saves the context of a process?

c) Explain in brief the two scenarios, which can occur while writing to a pipe file.

d) Explain with proper diagrams how the list of free inodes, in the super block, is maintained.

e) Which different page faults can occur in demand paging? Explain how kernel handles the page fault (any one).

Q4) Solve any four of the following   **[4 × 4 = 16]**

a) Trace the execution of the following program

```
#include <signal.h>
main()
{    int i;
     setpgrp();
     for (i=0;i<10;i++)
     {         if (fork() = = 0)
               {         setpgrp();
                         pause();
               }
     }
     kill(0, SIGINT);
}
```

b) Write a C program in which parent and child share a pipe for data transfer.

c) There are 3 processes currently active in the system with base priority of 60. Show how the priorities of the processes will change and how they will be scheduled during fist 5 seconds of execution. Assume all the processes start their execution at the same time and clock ticks 60 times in a second. Time slot allotted for process execution is of 1 second.

d) Show how various data structures are updated by file subsystem, when the following code is executed

Process A

F11 = open("sample.dat", O_RDONLY);

F12 = open("myprog.c", O_WRONLY);

F13 = dup(f11);

F14 = open("sample.dat", O_WRONLY);

Process B

f21 = open("myprog.c", O_WRONLY);

f22 = open("trial.txt", O_RDONLY);

f23 = dup(f22);

f24 = dup(21);

e) Write a C program in which a parent process forks and creates a child process. Child when scheduled, executes a new program "myprog". Parent, after creating child process, displays a message "Child process is created" and exits.

Q5) Attempt any four of the following.   **[4 × 4 = 16]**

a) What are different types of the signals that a process can send to another process?

b) Which user ids are stored in process table slot and u-area of a process? What is their significance?

c) Explain the structure of buffer cache and list the five scenarios, which arise during allocation of buffer to the process.

d) What are different scenarios under which kernel needs to swap out a process?

e) Which are different data structures that are used by kernel to manage the process subsystem?

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M.Sc. - I

COMPUTER SCIENCE

CS-203 : Software Architecture

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

1) *All questions are compulsory.*

2) *All questions carry equal marks.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Assume suitable data, if necessary.*

Q1) Attempt the following :

[8 × 2 = 16]

a) What is "Pure Fabrication" GRASP.

b) In short, Explain sitemesh framework.

c) Define component.

d) List out the applicability of Abstract factory Design pattern.

e) Give organization of Design pattern catalog.

f) What do you mean by unified process.

g) What are type of responsibilities.

h) Explain term Module.

Q2) Attempt the following: (Any Four) [4 × 4 = 16]

a) Discuss Event Based and object oriented organization Architectural style.

b) Explain layered system Architectural style.

c) What is heterogenous Architectures.

d) Discuss module Architectural structure.

e) Write short note on pipe and filter Architectural style.

Q3) Attempt the following: (Any 4) [4 × 4 = 16]

a) What are different characteristics of framework.

b) "Architecture manifests the earliest set of design decisions". Justify.

c) Write short note on Cohesion.

d) Explain applicability and consequences of single ton Design Pattern.

e) What are participants of Facade Design Pattern?

Q4) Attempt the following: (Any 4) [4 × 4 = 16]

a) Give structure of observer design pattern with example.

b) What are the scopes of resources in struts framework?

c) What are the duties performed by MVC. Controller in a web fire application?

d) Draw a neat diagram of struts framework?

e) What are the duties performed by MVC model and MVC view in a web tier application.

Q5) Attempt any four of the following: **[4 × 4 = 16]**

    a)   Explain the concept of container in struts framework.

    b)   Differentiate code reuse Vs component reuse.

    c)   An online banking application form contains information such as Account No, Name, Date of Birth, email Address & Mobile No., Mobile No. is optional field. Apply validation framework for the above application.

    d)   What are the different approaches fro component based development.

    e)   Write short note on Maverick framework.

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Total No. of Questions :5]

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SEAT No. :

[Total No. of Pages :3

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M.Sc.

COMPUTER SCIENCE

CS-23-301: Software Metrics & Project Management

(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

1)   All questions are compulsory.

2)   All questions carry equal marks.

3)   Figures to the right side indicate full marks.

Q1) Attempt the following:

[8×2=16]

a)   Define NPV and ROI.

b)   List the tools used for Quality Assurance.

c)   Define CPI and SPI.

d)   List the contents of Project Charter.

e)   List the qualities required for Project Manager.

f)   Define Cost Estimates.

g)   Define Faults and Failures.

h)   Define Productivity.

Q2) Attempt any four of the following:

[4×4=16]

a)   Write a Note on organizational structure in Project Management.

b)   Explain Performance Reporting in communication Management.

c) Define cost estimates and explain its types.

d) Define Quality and explain outcome of quality process in quality management.

e) Write a note on GQM.

Q3) Attempt any four of the following: **[4×4=16]**

a) Write a note on Work Breakdown Structure.

b) Explain Tools and techniques used for planning purchase and acquisition.

c) Explain any four basic modes for handling conflict in communication management.

d) What are the different methods for selecting projects in Project management?

e) Define Resource Leveling and Resource Loading.

Q4) Attempt any four of the following: **[4×4=16]**

a) Define Risk Identification and Explain Risk Categories.

b) Write a note on Project Integraion Management.

c) By what attributes software size can be described in software metrics.

d) What is critical path and find critical path for following.
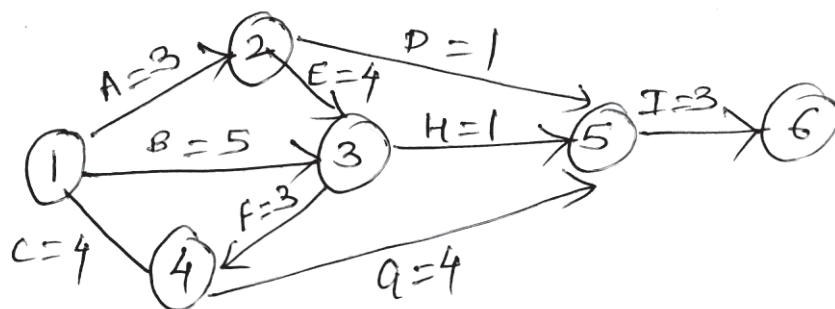
e) Write a note on Metric Plan.

Q5) Attempt any four of the following: [4×4=16]

    a) Write steps involved in planning of data collections.

    b) Write a note on:

        i) Gantt Chart

        ii) PERT

    c) As a team size increases, communication becomes complex justify.

    d) Write a note on Six Sigma.

    e) Explain phases of Project life cycle with diagram.

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M.Sc.

COMPUTER SCIENCE

CS - 23- 302 : Mobile Computing

(2008 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   *Neat diagrams must be drawn wherever necessary.*

    2)   *Figures to the right indicate full marks.*

    3)   *All questions carry equal marks.*

    4)   *All questions are compulsory.*

Q1) Attempt all of the following: **[8×2=16]**

    a)   What is RTT problem in GSM? How can it be resolved?

    b)   What are hard handover and soft handover?

    c)   State any two advantages of I-TCP.

    d)   What is near and Far terminal problem?

    e)   What is cell breathing in cellular system?

    f)   What is COA? State its two types.

    g)   What is uplink and downlink?

    h)   How can MACA still Fail in case of hidden / Exposed terminals.

Q2) Attempt any four of the following.   **[4×4=16]**

    a)   Explain architecture of MMS.

    b)   Which additional Features are offered by WSP/B adapted to web browsing?

    c)   Explain packet Reservation Multiple Access (PRMA) scheme.

    d)   Explain the roles of various entities in mobile IP.

    e)   What are the different types of commands supported by J2ME?

Q3) Attempt any four of the following. **[4×4=16]**

    a) Why are special protocols for the support of micro- mobility on the network layer needed?

    b) Explain GPRS architecture.

    c) What are advantages and disadvantages of small cell size in cellular system?

    d) Write a short note on Snooping TCP.

    e) What is the need of mobile ad - hoc network?

Q4) Attempt any four of the following. **[4×4=16]**

    a) What are improvements needed for TCP in 2.5 G/3G networks?

    b) What are various components and interfaces of the WAP architecture.

    c) How agent discovery in mobile IP is performed?

    d) What are important features of windows CE and symbian operating Systems?

    e) Write a short note on various types of services defined in GSM.

Q5) Attempt any four of the following. **[4×4=16]**

    a) Compare 'text field' control with 'text box' control.

    b) What are fundamental differences between wired networks and ad-hoc wireless networks related to routing?

    c) Explain DSSS and FHSS techniques of spreading the spectrum, in detail.

    d) Explain the following terms in GSM architecture

        i) HLR

        ii) VLR

        iii) EIR

        iv) IMEI

    e) What are different classes of wireless transaction protocol (WTP)

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[5233]-33

M.Sc.

COMPUTER SCIENCE

CS 23-303 : Information Systems Security

(2008 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1)   All questions are compulsory.

2)   All questions carry equal marks.

3)   Neat diagrams must be drawn wherever necessary.

Q1) Attempt all of the following.   **[8×2=16]**

   a)   Define.

      i)   Fabrication

      ii) Interruption

   b)   What is self signed certificate?

   c)   Explain the process of key wrapping.

   d)   Write any two objectives of designing Blowfish algorithm.

   e)   What are MIME headers in an e-mail message?

   f)   Explain Expansion permutater step of DES algorithm.

   g)   What are the problems with passwords?

   h)   What is address spoofing?

Q2) Attempt any four of the following.   **[4×4=16]**

   a)   Explain one time initialization process of AES algorithm.

   b)   How does certificate based authentication works?

   c)   Explain in detail Handshake protocol of SSL.

   d)   Discuss working of Kerberos protocol.

   e)   Consider the plain text "ABCDEFGHIJKL" and one time password "QOPTSRWVUZYX". Using vernam cipher construct cipher text.

Q3) Attempt any four of the following :   **[4×4=16]**

    a)   Explain cipher feedback (CFB) mode of an algorithm.

    b)   Why digital certification revocation is needed? How online certificate revocation status check is done?

    c)   Explain SET process in detail.

    d)   Explain Biometric authentication process.

    e)   Consider the plain text "EXAM SECTION" and keyword " JACK AND JILL". Using playfair cipher construct cipher text.

Q4) Attempt any four of the following :   **[4×4=16]**

    a)   Compare MD-5 and SHA-1 algorithms.

    b)   How does the CA signs the digital certificate?

    c)   Which security features are supported by PGP? Also explain steps of PGP.

    d)   Explain AH and ESP protocol.

    e)   Consider $n = 11$, $g = 7$, $x = 3$ and $y = 6$. Use Define Hellman Algorithm and find K_1 and K_2.

Q5) Attempt any four of the following :   **[4×4=16]**

    a)   Explain key generation process of each round of IDEA.

    b)   What are different variations of DES algorithm?

    c)   Explain working of time stamping protocol (TSP).

    d)   How firewall perform network address translation?

    e)   Explain any four security principles.

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[5233]-102

M.Sc. - I
COMPUTER SCIENCE
CS - 102 : Advanced Networking
(2011 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:
   1)   *All questions are compulsory.*
   2)   *Neat diagrams must be drawn wherever necessary.*
   3)   *Figures to the right indicates full marks.*

Q1) Attempt any eight of the following: **[8×2=16]**

   a)   What is flow label field in IPv6 datagram?

   b)   In a datagram value of HLEN is 5. The value of total length is 200, What is the number of the first byte and last byte if offset value is 100.

   c)   What is role of garbage collection timer in RIP?

   d)   State difference between strict - source route option and loose-source route option.

   e)   State and define types of multiplexing in transport layer?

   f)   Define streaming stored audio video.

   g)   What is tunneling?

   h)   Explain Bluetooth in brief.

   i)   What is kerberos?

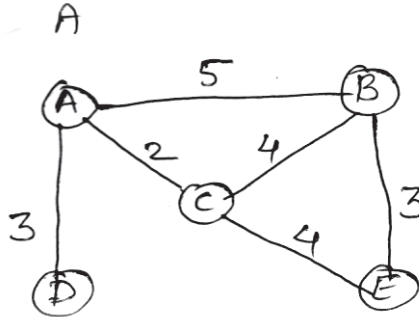**Q2)** Attempt any four of the followings.   **[4×4=16]**

   a)   Explain frame format of IPv4.

   b)   Explain any two types of method proposed for connection release in transport layer.

   c)   Apply Rail fence cipher technique on plain text "Come Home Tomorrow".

   d)   Explain different types of autonomous system in BGP.

   e)   Explain RTCP.

Q3) Attempt any four of the following.   **[4×4=16]**

a) Explain architecture of IEEE 802.11.

b) Explain key transformation and expansion permutation process in DES?

c) Create shortest path tree by using Dijkstra's algorithm for node A.

d) Explain active and passive attack.

e) Explain Nagle's algorithm

Q4) Attempt any four of the following.   **[4×4=16]**

a) Discuss the key steps used in creations of a digital certificate.

b) Why sliding window protocol is used in TCP?

c) Given two prime no p=7 & Q=17. Find out N, E and D in an RSA encryption process.

d) Discuss design goals of ATM?

e) Discuss different commands used in SMTP to send message from client ot server.

Q5) Attempt any four of the following.   **[4×4=16]**

a) Contrast error reporting messages in IcmPv6. With error reporting message in IcmPv4.

b) How dynamically buffer management is done in transport layer.

c) Describe how TCP is encapsulated in an IP datagram.

d) State Email security protocols. Explain any one.

e) Explain SIP Message types.

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[5233]-201

M.Sc.

COMPUTER SCIENCE

CS-201 : Digital Image Processing

(2011 Pattern) (Semester-II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   Question 1 is compulsory.

    2)   Attempt any four from the remaining.

    3)   Draw neat diagrams wherever necessary.

    4)   Figures to the right indicate full marks.

Q1) Attempt all: **[8×2=16]**

    a)   What is spatial filtering?

    b)   Define Image sampling?

    c)   Define reflection and translation operations on a set 'B'.

    d)   What is blind spot?

    e)   Find the convolution of following 1-D images {-1, 4, 2, 3} and {0, 1, 2, 3}.

    f)   Mention two ranges of EM - spectrum used for imaging. Give one application each.

    g)   What do you mean by normalization with respect to starting points.

    h)   Mention the two segmentation approaches.

Q2) a)   Explain the role of different components of a general purpose digital image processing system.   **[8]**

    b)   Write a short note on shape numbers.   **[4]**

    c)   Explain the concept of unsharp masking with help of appropriate diagrams.   **[4]**
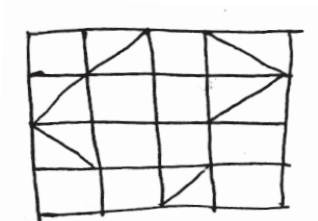
Q3) a) Use the following table to find the transformation function that is obtained with histogram equalization. **[8]**

r_k	n_k
$r_0 = 0$	81
$r_1 = 1$	122
$r_2 = 2$	245
$r_3 = 3$	329
$r_4 = 4$	656
$r_5 = 5$	850
$r_6 = 6$	1023
$r_7 = 7$	790

b) Give a mask to detect horizontal line in an image. Explain its working. **[4]**

c) Write 8 - dimentional chain code for representing following boundary start from top left point. **[4]**

Q4) a) Give three edge models. When and how do we use zero detection? **[8]**

b) What is adaptive thresholding? Where it is used? **[4]**

c) Write a short note on boundary approximation using 'mpp'. **[4]**

Q5) a) Following is a 1-D intensity profile of an image calculate and plot first and second order derivatives of it. Explain the nature and use of each derivative. **[8]**

10	10	10	10	9	8	7	6	5	5	5	5	5	12	5	5	5	8	8	8	8	8	8	8

b) Give any two arithmetic operations used in digital image processing with one application of each. **[4]**

c) Write a short note on low pass filter for image processing. **[4]**

Q6) a) Explain the role of image sampling and quantization in forming a digital image. **[8]**

b) Explain zooming and shrinking in digital Images. How does it take place? **[4]**

c) One dimensional image strip represented by { 1 2 5 9 4 3} is to be convolved with a filter Kernel given by {-1 0 1}. Give the step-by-step procedure of finding the answer. **[4]**

Q7) a) Explain the basics of filtering in the frequency domain. **[8]**

b) Explain and state the use of wiener filtering. **[4]**

c) Define 'erosion' and explain it using suitable diagrams. **[4]**

Q8) a) Explain local processing for edge linking. **[8]**

b) The equation for high pass filter is given below. Write the equation for the corresponding low pass filter. **[4]**

$$H(u, v) = 1 - e^{-D^2}(u,v) / 2D_0^2$$

Explain the variables used.

c) What is 'Bridging Gap'? How is it achieved with the help of Dilation?**[4]**

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SEAT No. :

[Total No. of Pages :5

[5233] - 202

M.Sc.

COMPUTER SCIENCE

CS - 202 : Advanced Operating Systems

(2011 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

1) *Figures to the right indicate full marks.*

2) *All questions carry equal marks.*

3) *Assume suitable data, if necessary.*

4) *All questions are compulsory.*

Q1) Attempt all of the following: **[8 × 2 = 16]**

a) Explain the syntax of open ( ) system call.

b) Explain mincore ( ) function.

c) Explain any two thread functions.

d) How file sharing is done in UNIX operating system.

e) Write an equivalent of kill (get pid ( ), sig).

f) What do you mean by Daemon.

g) State the use of lseek ( ) system call.

h) Write basic types of user mode process in windows.

Q2) State whether True/False and Justify.(Attempt any eight) **[8 × 2 = 16]**

a) A file descriptor is a negative integer.

b) Each process group can have multiple process group leaders.

c) Open ( ) system call takes three arguments.

d) Sig 1 and Sig 2 are user defined signals.

e) In windows one can find the address of the TEB with the kernel debugger / thread command.

P.T.O.

f) The number of context layer is bounded by the number of interrupt levels supported by the machine.

g) Two signals SIGCLD and SIGCHLD has different semantics.

h) Symbolic link incur more overheads than hard links.

i) In LINUX, files are usually accessed via file names.

Q3) Attempt any four of the following. **[4 × 4 = 16]**

a) Explain the processor affinity.

b) Draw a neat labelled diagram of process state transitions.

c) Write a note on Demand Paging.

d) Describe the different states of thread.

e) Explain in detail - context of a process.

Q4) Explain the behaviour of following 'C' programs: (any four) **[4 × 4 = 16]**

a) #include <signal.h>

main( )

{

    extern catcher ( );

    signal (SIGINT, catcher);

    kill (0, SIGINT);

}

catcher ( )

{

}

b)
```
main ( )
{
int fd;
char buf [1024];
fd = create ("junk", 0666);
1seek (fd, 20001, 2);
write (fd, "hello", 5);
close (fd);
sd = open ("junk" D-RDONLY);
read (fd, buf, 1024);
read (fd, buf, 1024);
read (fd, buf, 1024);
}
```

c)
```
#include <stdio.h>
#include <stdlib.h>
void out(void)
{
   print f ("atexit ( ) succeeded");
}
int main (void)
{
if (at exit (out))
fprintf (stderr, "atexit ( ) failed");
}
```

d)
```
main ( )
{
int status;
if (fork ( ) = = 0)
execl ("/bin/date", "date", 0);
wait (status);
}
```

e)
```
main (arg c, arg v)
int argc; char * argv[ ];
{
int fd, skval;
char c;
if (argc! = 2);
exit ( );
fd = open (argv [1], O_RDONLY);
if (fd = = –1)
exit ( );
while ((skval = read (fd, &c, 1)) = = 1)
{
  print f ("char %c/n", c);
  skval = 1seek (fd, 1023L, 1);
  print f ("New seek val = % d\n", skval);
}
```

Q5) Write a "C" program for the following: (Any Four)   [4 × 4 = 16]

   a)   Write a program to demonstrate race condition in catching signals.

   b)   Write a program to print the type of file for each command line argument.

   c)   Write a program to demonstrate sharing of file access between parent and child.

   d)   Write a program to print size of file.

   e)   Write a program to catch death of child signal.

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[5233] - 203

M.Sc.

COMPUTER SCIENCE

CS-203 : Data Mining and Data Warehousing

(2011 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Draw neat diagrams wherever necessary.

    3)   Figures to the right indicate full marks.

Q1) Attempt any eight of the following :   **[8 × 2 = 16]**

    a)   When to apply Chi-square test.

    b)   Define association rule.

    c)   List various components of data warehouse.

    d)   What is hub?

    e)   What is meant by pattern?

    f)   What is Role of data mining in Financial and Banking area?

    g)   Define RECALL.

    h)   What is Precision?

    i)   What are visualization technique?

    j)   What is clustering?

Q2) Attempt any four of the following: [4 × 4 = 16]

    a) Explain data mining metrices.

    b) Describe Rattle in short.

    c) What are the two basic information retrieval methods? Discuss them in details.

    d) Explain steps involved in knowledge Discovery.

    e) What is WEKA? What are the advantages of WEKA.

Q3) Attempt any two of the following: [2 × 8 = 16]

    a) Consider the following transaction table and generate the candidate itemsets and frequent itemsets, where the minimum support count is 2.

TID	list of items
T100	I_1, I_2, I_5
T200	I_2, I_4
T300	I_2, I_3
T400	I_1, I_2, I_4
T500	I_1, I_3
T600	I_2, I_3
T700	I_2, I_3
T800	I_1, I_2, I_3, I_5
T900	I_1, I_2, I_3

    Apply Apriori Algorithm to find the candidate itemset and frequent item set.

b) Discuss SVM algorithm.

c) Suppose that a data warehouse of match consist of four dimensions date, spectator, location and game and the two measures count and charge, where charge is the fare that a spectator pays when watching a game on a given date, spectator may be students, adults or seniors with each category having its own charge rate. Draw a state schema diagram for the data warehouse.

Q4) Attempt any four of the following: **[4 × 4 = 16]**

a) Discuss following terms-

   i) Active learning.

   ii) Reinforcement learning.

b) Differentiate between OLTP and OLAP.

c) What are the different panel in explorer interface of weka.

d) Write a short note on overfitting issue in decision tree.

e) Write short notes on -

   i) Parameter learning.

   ii) Structure learning.

Q5) Attempt any four of the following: **[4 × 4 = 16]**

a) What are Applications of frequent item set?

b) Write a short note on KDD.

c) Differentiate between agglomerative and divisive clustering methods.

d) What are the issues to be considered during data integration?

e) Write a short note on maximum likelihood.

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[5233] - 301

M.Sc.

COMPUTER SCIENCE

CS-301: Software Metrics & Project Management

(2011 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

1)   All questions are compulsory.

2)   All questions carry equal marks.

3)   Figures to the right indicate full marks.

Q1) Attempt the following: **[8×2=16]**

a)   State tools & techniques used in quality assurance.

b)   Define project management.

c)   State major processes involved in Human Resource Management.

d)   Define MTBF (Mean Time Between Failures).

e)   Define Activity on Arrow & its used in project management.

f)   What is a staffing management plan.

g)   Explain Delphi Technique.

h)   State differences between efficiency & effectiveness in a project.

Q2) Attempt any four of the following: **[4×4=16]**

a)   Explain tools & techniques used for managing project Team.

b)   Explain types of contracts used in procurement management.

c)   Explain where metrics plan is used and when it is used in software measurement.

d)   Explain project life cycle with diagram.

e)   Explain types of dependencies or relationships between activities in project time management.

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Q3) Attempt any four of the following: [4×4=16]

a) Write a short note on GQM.

b) Explain Maslow's Hierarchy of Needs in project Human Resource Management.

c) Explain basic response strategies for Negative Risks.

d) Write a note on Six Sigma technique.

e) Write steps involve in planning of data collection.

Q4) Attempt any four of the following: [4×4=16]

a) What is Resource Loading and Resource Leveling.

b) Write a note on WBS? How it is useful for project.

c) Write a short note on Triple constraint.

d) Explain project charter & its contents.

e) Explain in brief levels of process maturity.

Q5) Attempt any four of the following: [4×4=16]

a) Explain internal & external attributes related with process, product & Resources.

b) What is software reliability? How it can be measure.

c) Explain any four modes for handling conflicts in communication management.

d) Explain scope management in detail.

e) Explain any four major cost categories in cost of quality.

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[5233]-302

M.Sc.

COMPUTER SCIENCE

Cs - 302 : Mobile Computing

(2011 Pattern) (New) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Figures to the right indicates full marks.*

Q1) Attempt all of the following: **[8×2=16]**

a)   What is the use of mm4 transfer protocol?

b)   List the various applications of mobile communication.

c)   Define intersymbol interference.

d)   Write any two differences between SDMA & CDMA.

e)   List the all bearer services of GSM.

f)   Why SGSN and GGSN are required in GPRS architecture?

g)   Which are the services provided by HA to MN?

h)   How WTP class 1 service differ from class 0?

Q2) Attempt any four of the followings.   **[4×4=16]**

a)   Explain the advantages & disadvantages of spread spectrum.

b)   Why CSMAICD fail in wireless network?

c)   Explain the WAP 1.X architecture.

d)   Explain J2 ME architecture.

e)   Explain how tunneling works for mobile IP using IP in IP & generic routing encapsulation. Discuss the advantages & disadvantages of these methods.

Q3) Attempt any four of the following. **[4×4=16]**

    a) Name the main elements of the GSM system architecture? Also describe their functions.

    b) List & explain the task of RNC in UMTs.

    c) Explain how wireless transport layer established a secure session.

    d) Explain the GSM protocol architecture for signaling.

    e) List the features of Android.

Q4) Attempt any four of the following. **[4×4=16]**

    a) How does dynamic source routing handle routing?

    b) Explain the mobile originated sms procedure.

    c) Explain the features of wsp/B adapted to web browsing.

    d) Draw & explain the UTRAN architecture.

    e) Why & when are different signaling channels needed? What are their differences?

Q5) Attempt any four of the following. **[4×4=16]**

    a) Discuss the various entities & terminology used in mobile IP.

    b) Explain Hawaii micro mobility protocol with its advantages & disadvantages.

    c) Draw & explain GPRS plane protocol model.

    d) How & why does I-TCP isolate problems on the wireless link? What are the main advantages of this solution?

    e) What is the reaction of standard TCP in case of packet loss? Why is it quite of ten problematic in the case of wireless network & mobility?

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[5233] - 303

M.Sc.

COMPUTER SCIENCE

CS - 303 : Soft Computing

(2011 - Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Wherever required draw neat labeled diagram.*

3) *Figures to the right indicate full marks.*

4) *Use of simple calculator is allowed.*

Q1) Attempt all of the following: **[8 × 2 = 16]**

a) Based on linguistic rules give any two common methods of deductive inference for fuzzy system.

b) Define fuzzy set.

c) What is BNN and ANN? Give any two differences.

d) Give any two applications of Genetic Algorithm.

e) State any two components of Neural Network.

f) Define artificial neuron.

g) Give four modes of approximate reasoning.

h) Define core membership function.

Q2) Attempt any FOUR of the following: **[4 × 4 = 16]**

a) Explain Neural Network Architecture.

b)   Explain four properties of Genetic Algorithm.

c)   What is defuzzification? Explain any two methods of defuzzification.

d)   Write a note on resources of MATLAB in fuzzy inference system.

e)   Differentiate supervised and unsupervised learning.

Q3) Attempt any FOUR of the following :   **[4 × 4 = 16]**

a)   Let $A = \left\{ \dfrac{0.9}{1} + \dfrac{0.4}{2} + \dfrac{0}{3} \right\}$ be a fuzzy set. Given fuzzy relation is

$$R = \begin{bmatrix} 1 & 0.8 & 0.1 \\ 0.8 & 0.6 & 0.3 \\ 0.6 & 0.3 & 0.1 \end{bmatrix}$$ find A o R (max min composition).

b)   Consider two fuzzy sets,

$$A = \left\{ \dfrac{0.3}{x_1} + \dfrac{0.7}{x_2} + \dfrac{0.5}{x_3} \right\}, \quad B = \left\{ \dfrac{0.8}{x_1} + \dfrac{0}{x_2} + \dfrac{0.4}{x_3} \right\}$$

Find difference of two fuzzy sets. Also apply De Morgan's law on these sets.

c)   Consider following fuzzy relation matrix 'R' and determine λ - cut relation for the followign λ - values on λ_1, $\lambda_{0.5}$, $\lambda_{0.8}$ and $\lambda_{0.3}$

$$R = \begin{bmatrix} 1 & 0.8 & 0 & 0.2 & 0.5 \\ 0.8 & 1 & 0.5 & 0 & 0.2 \\ 0 & 0.5 & 1 & 0.6 & 0 \\ 0.2 & 0 & 0.6 & 1 & 0.5 \\ 0.5 & 0.2 & 0 & 0.5 & 1 \end{bmatrix}$$

d)   Given the following fuzzy sets.

$$A = \text{small} = \left\{ \dfrac{1}{1} + \dfrac{0.8}{2} + \dfrac{0.6}{3} + \dfrac{0.4}{4} + \dfrac{0.2}{5} \right\}$$

$$B = \text{large} = \left\{ \frac{0.2}{1} + \frac{0.4}{2} + \frac{0.6}{3} + \frac{0.8}{4} + \frac{1}{5} \right\}$$

Find membership function for,

A slighty small and B very large.

e) Perform following operations on intervals

   i)   [3, 2] + [4, 3]

   ii) [2, 1] × [1, 3]

   iii) [4, 6] ÷ [1, 2]

   iv) [3, 5] − [4, 5]

Q4) Attempt any two of the following: **[2 × 8 = 16]**

   a) Explain in detail fuzzy propositions.

   b) Brief note on operational summary of BP algorithm.

   c) Define linear separability. Also show that the boolean funciton AND is linearly separable.

Q5) Attempt any two of the following: **[8 × 2 = 16]**

   a) What is fuzzy equivalence relation? Also describe its properties.

   b) Explain the basic genetic algorithm maximize $f(x) = x^2$ over {0, 1, 2, ...3} with initial x values of (13, 24, 8, 19).

   c) How fuzzy logic is used and hour it is applied in how appliances.

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