[4937] - 101

M.Sc. - II

COMPUTER SCIENCE

CS - 101 : Principles of Programming Languages

(Semester - I) (2008 and 2011 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

2) *All Questions are compulsory.*

3) *All Questions carry equal marks.*

4) *Assume Suitable data, if necessary.*

Q1) Attempt ALL of the following:

[8×2=16]

a) What is a JIT compiler?

b) What is the difference between cut and fail predicate?

c) What is the difference between predicate NULL & ENDP?

d) What is Object life time, Binding Life time?

e) What do you mean by applicative order evaluation?

f) What type of method binding is supported by default in C++ and Java?

g) What is a task? What is the purpose of ready queue?

h) What is the use of static link and dynamic link?

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

a) Explain the distinction between interpretation and compilation. What are the advantages and disadvantages of the two approaches?

b) Explain different times at which binding decisions can be made.

c) What is dangling pointer? Give sequence of operations that creates a dangling pointer in any languages.

d) Write a C/C++ function that declares an array statically, on the stack, and on the heap.

e) Describe the difference between static and dynamic scope.

Q3) Attempt Any Four of the following: **[4×4=16]**

a) Describe the lazy and eager approaches to reclaiming garbage.

b) Explain the two methods of implementing blocks.

c) Explain with suitable example parameter passing modes.

d) Generate target code for the following Boolean expression which uses short circuit evaluation. If ((A > B) or (C > D)) AND $(E \neq F)$ then then_clause else else_clause.

e) What is descriptor? Give descriptor for static string, limited dynamic string and dynamic string.

Q4) Attempt Any Four of the following: **[4×4=16]**

    a)   Explain SIMD and MIMD multiprocessor architecture in detail.

    b)   Explain with example fully qualified and elliptical references to fields in records.

    c)   Explain the visibility rules in C++.

    d)   Describe three common uses of the goto statement and show how to avoid them using structured control flow alternative.

    e)   Give implementation of virtual methods for the following:

```
class foo
{
    int a;
    double b;
    char c;
    public :  Virtual void x(--) {---}
              Virtual void y(--) {---}
              Virtual void z(--) {---}
              Virtual void m ( );
}F;
```

Q5) Attempt Any Four of the following: **[4×4=16]**

    a)   Write a LISP function to keep first 'n' elements of a given list.

    b)   Write a LISP function to find the maximum element from a list.

    c)   Consider the following sentences: "Marcus was a man. Marcus was a pompeian. All pompeians were roman. Caeser was a ruler. All romans hated all rulers. Marcus tried to assassinate caeser". Write a Prolog program to prove that marcus hate caeser and show how it will be proved by your program.

    d)   Write a Prolog program which uses red cut.

    e)   Write a tail recursive Prolog program to find factorial of given number.

ଓଷ୍ଟ୍ରୋଷ୍ଟ୍ରୋ

[4937] - 101

[4937] - 102

M.Sc.

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

   3)   ***Draw neat diagrams where necessary.***

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

   a)   The HLEN value of an IP datagram is 0111 is binary. How many bytes of oplions are present?

   b)   What is the difference between substitution and transposition cipher?

   c)   State the SET parteapants.

   d)   What is the advantage of CBC over ECB mode?

   e)   What is anonymous electronic money?

   f)   State the difference between RTP and RTCP.

   g)   A TCP client is programmed as Retransmit in so and serves is programmed as Ack First then write. Will there be a packet loss? In which care?

   h)   What is DNS spoofing?

P.T.O.

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

   a)   Explain silly window syndrome and its solution.

   b)   Compare distance vector and link state routing.

   c)   Explain double spending problem in electronic money. How is it solved?

   d)   Apply playfair cipher to text "attack tomorrow" using keyword CIPMER.

   e)   Consider IP datagram having bytes 0 – 2999. It is fragmented into two
        equal datagrams. Show :

        i)   Total length field

        ii)   Flags

        iii) Identification

        iv)   Fragmentation offset.

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

   a)   Explain IPv4 to IPvb transition.

   b)   Explain the steps in obtaining digetal certificate.

   c)   Explain different types of firewalls.

   d)   Arouter running RIP has 20 entries in its table. How many periodic and
        expiration timers are needed? If 5 routes are invalid, how many garbage
        collection timers are needed?

   e)   Explain types of attacks.

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

   a)   Apply RSA algorithm to generate keys. Use p = 7 and q = 11.

   b)   Write a note on TCP window management.

   c)   Explain count to infinity problem and solutions.

   d)   Explain any one email security protocol.

   e)   Compare ICMPv4 and ICMPv6.

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

   a)   Explain services provided by UDP and TCP.

   b)   Explain how public & private key cryptography can be used together.

   c)   Mention the steps in SET protocol.

   d)   Explain the various rounds of DES.

   e)   Explain AH and ESP protocols in IPSec.

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

SEAT No. :

[Total No. of Pages :5

[4937] - 103

M.Sc.

COMPUTER SCIENCE

CS - 103 : Distributed Database Concepts

(Semester - I) (2008 and 2011 Pattern)

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

Instructions to the candidates:

   1) Neat diagrams must be drawn wherever necessary.

   2) Figures to the right side inidcate full marks.

   3) Assume suitable data if necessary.

Q1) Answer the following: (Any 8)   **[8×2=16]**

   a)   "Distributed data processing uses divide and conguer method". State True / False and Justify.

   b)   What are the three characteristics on which DOBMS architectural models are based?

   c)   What is minterm predicate? Give example.

   d)   What are the layers of query processing?

   e)   Consider the following relation

      EMP (eno, ename, title)

      Proj (pno, pname, budget, location)

      Asg (eno, pno, resp, dur)

      Given the query graph for the following query.

      Select ename, pname from Emp, Asg, Proj

      where dur > 12 and

      Emp. eno = Asg. eno

f) Define : Linear tree and Bushy tree.

g) Differentiate between join and semi join.

h) What happens if proper isolation of transaction is not maintained?

i) What is lock point? Explian the categories according to

j) What different types of failures can occur in distributed database.

Q2) Answer the following:(any four)   **[4×4=16]**

a) What are different levels at which transparency should be provided in distributed DBMS?

b) Explain the "MDBS with GCS" architectural model in detail.

c) Explain the correctness rule for vertical fragmentation.

d) Explain layers of query processing.

e) State the different steps in query decomposition.

Q3) Solve the following:(any four)   **[4×4=16]**

a) Let $Q = \{ q_1, q_2, q_3, q_4\}$ be a set of queries $A = \{A_1, A_2, A_3, A_4\}$ be the set of attributes and $S = \{S_1, S_2, S_3\}$ be set of sites. The matrices are given below. Describe the attribute usage values and application access frequencies. Assume that $ref_i (q_k) = 1 \forall q_k \ \& S_i$ and A_1 is key attribute. Use the bond energy and vertical partitioning algorithm to obtain a vertical fragmentation of the set of attributes in A.

	A_1	A_2	A_3	A_4
q_1	1	0	1	0
q_2	0	1	1	0
q_3	0	1	0	1
q_4	0	0	1	1

	S_1	S_2	S_3
q_1	15	20	10
q_2	5	0	0
q_3	25	25	25
q_4	3	0	0

b) Draw an operator tree for the following

Select EMP. Ename

From EMP, DEPT

Where EMP. Sex = "male"

AND EMP. Age > 45 and DEPT. Budget > 2,00,000

AND EMP. Dno = DEPT. Dno;

The department relation is fragmented using horizontal fragmentation
DEPT 1 = $\sigma_{budget < 2,00,000}$ (DEPT)

DEPT 2 = $\sigma_{budget >= 2,00,000}$ (DEPT)

EMP relation is fragmented using derived horizontal fragmentation as

EMP1 = EMP $\bowtie$ DEPT1

EMP2 = EMP $\bowtie$ DEPT2

Convert generic tree to operator tree and reduce it.

c) Explain system R algorithm with suitable example.

d) Consider a data X. Let RTM (X) = 21 and WTM(X) = 20. Let the pair $(P_i(X),Ts)$ denotes a prewrite request to transaction Ti on the item X with timestamp Ts. Indicate the behaviour of the timestamp method with 2-phase commitment if the following sequence of requests is recieved.

$(P_1 (X), 22)$, $(P_2 (X), 26)$, $(R_3 (X), 19)$, $(R_4 (X), 23)$, $(W_1 (X), 22)$, $(R_5 (X), 24)$, $(P_6 (X), 18)$, $(R_7 (X), 37)$, $(W_2 (X), 26)$.

e) Consider the DWFG given below. Detect the deadlock if any, using the deadlock detection algorithm.
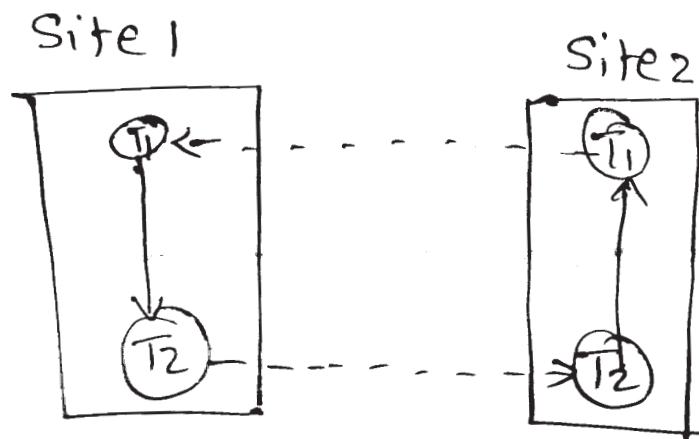
Q4) Attempt the following: (Any 4)　　　　　　　　　　　　　　　**[4×4=16]**

a) Simplify the following query and optimized it into optimized operator tree using restructuring algorithm.

Select Ename

From Proj, ASG, EMP

Where $ASG \cdot ENo = EMP \cdot ENo$

AND $ASG \cdot PNo = Proj \cdot PNo$

AND ENAME ≠ "Sominath"

AND Proj · PNAME = "Instrumentation"

AND (DUR = 12 OR DUR = 24)

b) Let object X and Y be stored at site 1 and object 2 and W be stored at site 2. Determine for each of the following execution, whether the execution is serializable or not.

i)　　S1 : $R_i (X)$, $R_j (X)$, $W_j (Y)$, $W_i (X)$

　　　S2 : $R_i (W)$, $R_j (Z)$, $W_j (W)$, $W_i (W)$

ii)　　S1 : $R_i (X)$, $R_j (X)$, $W_j(Y)$, $W_i(Y)$

　　　S2 : $W_i(Z)$

c) Explain in - place update recovery.

d) Explain locking based concurrency control.

e) What are distribution design issues.

Q5) Answer the following: (Any 4)   [4×4=16]

    a)   Discuss the properties of transaction.

    b)   Differentiate between basic and conservative timestamp mechanism.

    c)   Discuss the various features of 2PC Protocol used for distributed recovery.

    d)   Explain the query optimization techniques.

    e)   Explain semijoin based algorithm.

CRROCRRO

P2341

[4937] - 104

M.Sc.

COMPUTER SCIENCE

CS - 104 : Design Analysis of Algorithm

(Semester - I) (2008 and 2011 Pattern)

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

Instructions to the candidates:

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

   2)   *All questions are compulsary.*

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

Q1) Answer any Eight From the following: **[8×2=16]**

   a)   Define Big O notation. Is $2^{n+1} = O(2^n)$.

   b)   Merge sort is in place algorithm. Justify.

   c)   What is stable sorting algorithm? List any two sorting algorithm that are stable.

   d)   Define spanning tree.

   e)   Justify the partial solution obtained during Kruskal's algorithm are also trees.

   f)   Define bridge and articulation point.

   g)   What is 8 queen's problem & How many tuples will be in solution space using explicit and implicit constraints.

   h)   Array sorting in NP - class problem. Justify.

   i)   What is algebraic transformation?

   j)   Why Least cost search method is preferred over LIFO and FIFO branch Bound Method.

P.T.O.

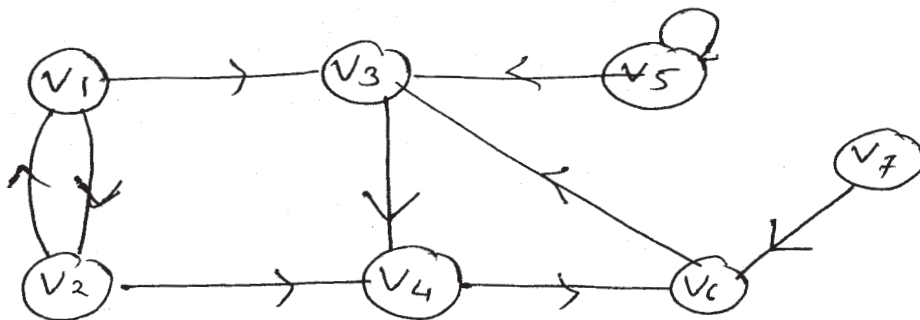*Q2)* Answer any four from the following: [4×4=16]

a) Explain Strassen's matrix multiplication. Derive the time complexity required by Strassen's matrix multiplication.

b) Order the following function in ascending order of the growth rate $\log_2 n$, n, $n\log_2 n$, n^2, n^3, 2^n.

c) Consider the following instance for job sequencing with deadlines where n = 7,

$(p_1, p_2......, p_7) = (3, 5, 20, 18, 1, 6, 30)$

$(d_1, d_2......, d_7) = (1, 2, 4, 3, 2, 1, 2)$

Give solution obtained using greedy method that uses set representations.

d) Find the optimal solution for the following for the 0/1 knapsack problem by jump and point method. n = 3, m = 6, w = (2, 3, 4), p = (1, 2, 5).

e) Find the **DFS** spanning tree for the following diagraph. Also list the tree edges a cross edges of the graph. [start vertex v_1].

Q3) Answer any four from the following: **[4×4=16]**

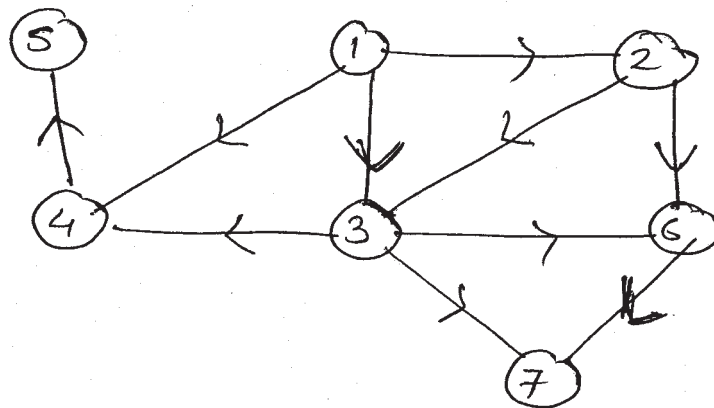a) What is Hamiltonian cycle? Find all the Hamiltonian cycle for the following graph.
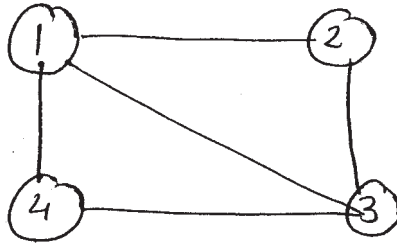
b) Give LCBB Formulation of 0/1 knapsack problem. Draw the SST generated by LCBB for the following knapsack instance Let $N = 5$, $M = 12$.

$(p_1, p_2, ...p_5) = (10, 6, 15, 4, 8)$

$(w_1, w_2, w_5) = (4, 3, 6, 4, 2)$

c) Find the topological sort of the following graph? What is its time complexity.

d) Find P - class, Np - class, NP - hard and NP - complete with example.

e) Define Asymptotic notation? What are types of Asymptotic notation? Explain any one with example.

Q4) Answer any Two from the following: [2×8=16]

    a)   Find the minimum spanning tree for the following graph using kruskal's and prims algorithm.
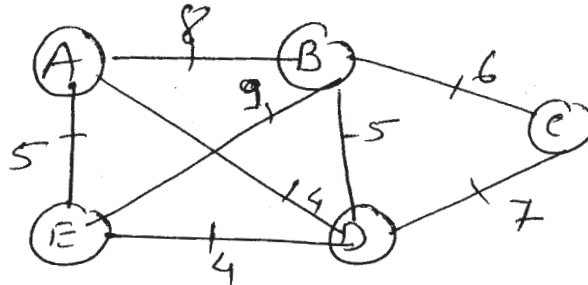

    b)   Write an algorithm to sort 'n' elements using merge sort algorithm in ascending order. Discusses the best case and worst case time complexity. of it.

    c)   What is chain matrix multiplication problem? Give the recurrence relation for the value of optimal solution. When the problem is to be solved uisng dynamic programming for the chain 20×5, 5×10, 10×10, 10×5 give the matrix of optimal values computed in bottom up manner.

Q5) Answer any Two from the following: [2×8=16]

    a)   What is strongly connected components of a directed graph. Write algorithm for finding strongly connected graph? Find strongly connected components of following graph G using the algorithm.

        [Start vertex C].
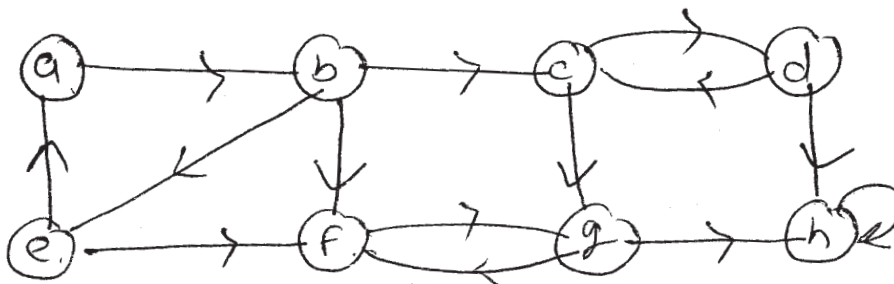
b) What is the backtracking? Give the bounding function for the given set of weights w = {5, 7, 10, 12, 15, 17} and m = 22. Draw the state space tree (SST) using variabe typle size and find all possible subsets that give sum of all elements as 22.

c) What is Branch and Bound method? How it differs from Backtracking strategy? Consider the travelling salesman instance defined by the following cost matrix. Obtain reduce cost matrix which node will be next selected in LCBB method.

$$\begin{bmatrix} \infty & 20 & 30 & 10 \\ 15 & \infty & 16 & 4 \\ 3 & 5 & \infty & 2 \\ 19 & 6 & 18 & \infty \end{bmatrix}$$

ಲ೮ಲ೮

Total No. of Questions :8]

P2342

SEAT No. :

[Total No. of Pages :4

[4937] - 201

M.Sc. (Computer Science)
CS - 201 : DIGITAL IMAGE PROCESSING
(Semester - II) (2011 Pattern) (New)

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

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Attempt Any four from the remaining.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*
5) *Figures to the right indicate full marks.*
6) *All questions carry equal marks.*

Q1) Attempt ALL: **[8×2=16]**

a) What do you mean by intensity or gray level of the image?

b) When you enter a dark theater on a bright sunny day, it takes an appreciable interval of time before you can see well enough to find an empty seat. Which of the visual processes play an important role in this situation?

c) What do you mean by gamma correction?

d) Write 2 - D continuous Fourier Transform pair.

e) What are the principal sources of noise in digital images?

f) Write 2 properties of opening operation.

g) Write 2 approaches used for segmentation.

h) What is Freeman chain code?

P.T.O.

Q2) a) Consider the two image subsets, S_1 and S_2 shown in the following figure. For $V = \{1\}$, determine whether these two subsets are

    i)   4 - adjacent

    ii)   8 - adjacent, or

    iii) m - adjacent

	S_1				S_2				
0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	1	0	0	1
1	0	0	1	0	1	1	0	0	0
0	0	1	1	1	0	0	0	0	0
0	0	1	1	1	0	0	1	1	1

b) Write various applications of digital image processing.

c) Obtain a single intensity transformation function for spreading the intensities of an image so that the lowest intensity is 0 & the highest is L - 1. **[8+4+4=16]**

Q3) a) Consider the following 1 - D sequences:

    i)   f = {2 1 1 1}

    ii)   g = { 0 –1 0 1}

    Check whether f and g are even or odd.

b) Give the condition (s) under which the D4 distance between two points p and q is equal to the shortest 4 - path between these points.

c) Give PDF for uniform noise and Impulse noise.

[8+4+4=16]

Q4) a) Given a 3 - bit image of size 64×64 pixels having intensity distribution as shown in the table given below. Apply histogram equalization technique to build output (processed) image.

$r_k = (0......7)$

$h_k = (790, 1023, 850, 656, 329, 245, 122, 81)$.

b) Obtain equations for bandpass filters.

c) Explain how Boundary (Border) following algorithm works.

[8+4+4=16]

Q5) a) Explain various properties of 2- D discrete Fourier transform.

b) Write steps for unsharp masking and highboost filtering in spatial domain.

c) Explain structural approaches for texture description.

[8+4+4=16]

Q6) a) Give step-by-step procedure for obtaining $g(x, y)$ using laplacian in frequency domain on the input image $f(x, y)$.

b) Which intensity transformation function should be used to enhance too dark image? Too faint (dull) image?

c) Which derivative is more sensitive to noise? Give fundamental steps for edge detection.

[8+4+4=16]

Q7) a) Prove the following:

i) $(A \ominus B)^c = A^c \oplus \hat{B}$

ii) $(A \oplus B)^c = A \ominus \hat{B}$

b) What is 2 - D Impulse and its sifting property?

c) Which filters are best suitable for the removal of salt - and - pepper noise? Justify.

[8+4+4=16]

Q8) a) Explain the working of following filters. [8+4+4=16]

      i) Adaptive median filter.

      ii) Adaptive, local noise reduction filter.

   b) Explain morphological reconstruction by dilation and by erosion with the help of suitable diagram.

   c) Give the following filter masks.

      i) Roberts cross - gradient operators.

      ii) Prewitt masks.

      iii) Sobel masks.

<p style="text-align:center">೫ೞೞ೫ೞ</p>

Total No. of Questions : 5]

P2343

SEAT No. :

[Total No. of Pages : 7

[4937]-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 Directory of Unix File System.

b) Write a note on sharing and copy-on-write.

c) What is the functionality of DLLS?

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

e) State the role of process table and u area.

f) Discuss the role of hardware abstraction layer and windows executive.

g) Explain the syntax of sig2str( ) and sig2sig( ) functions.

h) Give the structure of the executive thread block.

Q2) State whether True/False and Justify (Attempt <u>any Eight</u>)   **[8 × 2 =16]**

a) The kernel performs various primitive operations on behalf of user processes.

b) The memory manager maps the virtual addresses onto physical addresses.

c) Priority class is not a part of create process.

P.T.O.

d) A file descriptor is a negative integer.

e) Returning an integer value from the main function is equivalent to calling exit with the same value.

f) When system service gets called, user application switches from kernel mode to user mode.

g) Pending I/O request is part of executive thread block.

h) Two signals SIGCLD and SIGCHLD has different semantics.

i) Buddy memory allocation scheme suffers from internal and external fragmentation.

j) The strsignal ( ) is better than psignal ( ).

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

a) Explain the structure of kernel thread block.

b) Discuss the architecture of Unix.

c) List out different steps required during dispatching of thread.

d) Write a note on malloc, calloc, realloc and free system calls.

e) Discuss any four states of thread.

Q4) Explain the behavior of following "C" programs: (any Four) **[4 × 4 =16]**

a) # include < stdlib.h>

include < stdio.h>

include < unistd.h>

include < signal.h>

Static void sigint _ handler (int signo)

```c
        {
                printf("caught SIGINT");

                exit (EXIT_SUCCESS);

        }

        int main (void)

        {

                if (signal (SIGINT, sigint_handler) = = SIG_ERR)

                {

                        fprintf(stderr, "cannot handle SIGINT");

                        exit (EXIT_FAILURE);

                }

                for ( ; ; )

                        pause ( );

                return 0;

        }
```

b)
```c
        # include < stdio.h>

        # include <fcntl.h>

        # include < sys/stat.h>

        int get_inode (int fd)

        {

                struct stat buf;

                int ret;

                ret = fstat (fd, &buf);
```

```c
        if(ret <0)

        {

                perror ("fstat");

                return (-1);

        }

        return buf. st_ino;

    }

    int main (int argc, char *argv[ ] )

    {

        int fd, inode;

        if (argc < 2)

        {

                fprintf(stderr, "usage: %s <file>", argv [0]);

                return 1;

        }

        fd = open (argv[1], 0_RDONLY);

        if (fd <0)

        {

                perror ("open");

                return 1;

        }

        inode = get_inode (fd);

        printf("%d", inode);

        return 0;

    }
```

c)
```
# include < stdlib.h>

int main ( )

{

    int *x, *y;

    x = malloc (50 *sizeof (int));

    if (! x)

    {

        perror ("malloc");

        return – 1;

    }

    y = calloc (50, size of (int));

    if (! y)

    {

        perror ("calloc");

        return –1;

    }

}
```

d)
```
# include < stdio.h>

# include < stdlib.h>

void out (void)

{

    printf("atexit ( ) succeeded");

}
```

```c
int main (void)
{
    if (atexit (out))
        fprintf(stderr, "atexit( ) failed");
}
```

e)
```c
# include < stdio.h>
#  include <signal.h>
int main (void)
{
    int ret;
    ret = kill (1722, SIGHUP);
    if (ret)
        perror ("kill");
    ret = kill(1722, 0);
    if (ret)
        printf("Lack of permissions");
    else
        printf("permissions are available");
}
```

f)
```c
# include<stdio.h>
# include < unistd.h>
int main (void)
{
```

```
int ret, val;

val = nice (0);

val = 10 – val;

errno = 0;

ret = nice (val);

if (ret = = –1 && errno ! = 0)

    perror("nice);

else

    printf("nice value = %d", ret);

}
```

Q5) Write a"C" program for the following: (any four)   **[4 × 4 =16]**

a) Write a program which handles all possible keyboard signals. (ctrl + C, ctrl + Z etc.).

b) Write a program to print its process ID, parent process ID and group ID.

c) Write a program to print size of file.

d) Write a program that will fork a separate process.

e) Write a program to show the use of mmap( ).

f) Write a program which will call sleep (60) in an infinite loop. Every five times through the loop fetch the current time of day and print the tm-sec field.

✦ ✦ ✦

[4937] - 203

M.Sc.

COMPUTER SCIENCE

CS - 203 : Data Mining & Data Warehousing

(Semester - II) (2011 Pattern)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

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

    a)   Discuss whether the following is a data mining task. "Determine if airport passengers are potential terrorists or criminals."

    b)   What is Data Mart?

    c)   What are ouliers?

    d)   What do you mean by machine learning?

    e)   Give an example of clustering.

    f)   What is bootstrap?

    g)   What are social implications of data mining?

    h)   What is k- means clustering?

    i)   What is crawler?

    j)   Which are the major approaches to text mining?

Q2) Answer <u>any four</u> of the following: **[4×4=16]**

a) List & describe the five primitives for specifying a data mining task.

b) Differentiate between OLTP & OLAP.

c) Explain the strategies for data reduction.

d) How can we improve the efficiency of Apriori - based mining?

e) Explain the architecture of a data warehouse.

f) Explain the method for finding frequent itemsets using cnadidate generation.

Q3) Answer <u>any two</u> of the following: **[2×8=16]**

a) The following table contains training data fromemployee database where count represents the number of data tuples having the values for department, status, age & salary given in that row. Let status be the class level attribute. Given a data tuple having the values, "systems," "26 .. 30", and "46 - 50 k" for the attributes departments age and salary, compute a naïve Bayesian classification of the status.

Dapartment	Status	Age	Salary	Count
Sales	Senior	31.. 35	46k .. 50k	20
Sales	Junior	26 .. 30	26k .. 30k	20
Sales	Junior	31 .. 35	31k .. 35k	30
Systems	Junior	21 .. 25	46k .. 50k	10
Systems	Senior	31 .. 35	66k .. 70k	7
Systems	Junior	26 .. 30	46k .. 50k	5
Systems	Senior	41 .. 45	66k .. 70k	6
Marketing	Senior	36 .. 40	46k .. 50k	12
Marketing	Junior	31 .. 35	41k .. 45k	5
Secretary	Senior	46 .. 50	36k .. 40k	5
Secretary	Junior	26 .. 30	26k .. 30k	6

b) Generate frequent large item sets for the following set of transactions with minimum support = 2.

Transaction ID	Items
t_1	Bread, jelly, Peanut Butter
t_2	Bread, Peanut Butter
t_3	Bread, Milk, Peanut Butter
t_4	Beer, Bread
t_5	Beer, Milk

c) The following table shows the midterm & Final exam marks obtained for students in a database. Use the method of least squares to find an equation for the prediction of a students final exam marks on the student's midterm marks in the course. Predict the final exam marks of a student who received 86 marks in the midterm exam.

Midterm exam	Final exam	Midterm exam	Final exam
72	84	83	79
74	78	88	74
59	49	81	77
33	52	86	75
50	63	65	77
94	90	81	90

Q4) Answer <u>any four</u> of the following: **[4×4=16]**

    a) How can we measure predictor accuracy?

    b) Explain the requirements of clustering in data mining.

    c) Compare classification & Prediction Methods.

    d) Explain web content mining.

    e) What is Information retrieval? (IR)? What are the methods for IR?

    f) What are similarity measures?

Q5) Answer <u>any four</u> of the following: **[4×4=16]**

    a) Explain the different OLAP operations supported by OLAP tools.

    b) Explain decision tree (DT) model.

    c) Explain star schema with an example.

    d) Explain the warehouse design process.

    e) Construct a FP - Tree for the following data.

TID	Item - IDs
T_{100}	I_1, I_2, I_5
T_{200}	I_2, I_4
T_{300}	I_2, I_3
T_{400}	I_1, I_2, I_4
T_{500}	I_1, I_3
T_{600}	I_2, I_3
T_{700}	I_1, I_3
T_{800}	I_1, I_2, I_3, I_5
T_{900}	I_1, I_2, I_3

ಚಿಲ್ಲಚಿಲ್ಲ

[4937]-301

M.Sc.

COMPUTER SCIENCE

CS - 301 : Software Metrics and 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 all of the following questions:　　　　　　　　**[8 × 2 = 16]**

　a)　Define:

　　　i)　NPV

　　　ii)　ROI

　b)　Distinguish between software reliability and hardware reliability.

　c)　Define:

　　　i)　Fault

　　　ii)　Bug

　d)　What do you mean by project management?

　e)　Project Integration management is not the same thing as the software integration management comment.

　f)　What are the roles and responsibilities that the metrics plan should have?

　g)　Define:

　　　i)　Risk event

　　　ii)　Risk symptom.

　h)　Give the types of dependencies between activities.

P.T.O.

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

    a)   What are the three main outputs of quality control process?

    b)   What are the main types if contract if you decide to outsource?

    c)   Explain McCall's software Quality Model.

    d)   What is CMM? Explain all the phases in CMM model?

    e)   Explain any 4 suggestions used for improving project communication management.

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

    a)   What are the qualities required for a project manager?

    b)   Which factors affects the quality of I.T. projects?

    c)   Explain any 4 elements of project plan.

    d)   Explain the internal attribute structure in detail.

    e)   Explain the why and what of metrics plan.

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

    a)   How does team structure affects productivity?

    b)   Write a short note of an GQM framework.

    c)   Design the work breakdown structure for library management system.

    d)   Explain the cost estimation tools and techniques.

    e)   What are the outputs of the project risk response development?

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

a) What are the main processes involved in project human resource management?

b) Explain the overall change control process.

c) Write a short note on scope statement.

d) Explain the tools and techniques used for schedule development process.

e) Explain in brief reliability growth problem.

✦ ✦ ✦

M.Sc.
COMPUTER SCIENCE
CS - 302 : Mobile Computing
(2011 Pattern) (Semester - III)

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 indicate full marks.*

Q1) Attempt <u>All</u> of the following   **[16]**

 a) Define user mobility & device portability.

 b) Give the disadvantages of spread spectrum.

 c) List the problems related with reverse funneling.

 d) Write any two advantages of snooping TCP.

 e) Explain hidden & exposed terminals.

 f) Explain the use of broadcast control channel.

 g) List four J2ME profiles.

 h) Give the name of any four mobile communication protocols.

Q2) Attempt <u>any four</u> of the following: **[16]**

 a) What are the advantages & disadvantages of CDMA?

 b) Explain different types of handover used in UMTS.

 c) Which are the components of GPRS & what is their purpose?

 d) Discuss the various applications of mobile computing.

 e) How wireless transport layer establishes a secure session?

Q3) Attempt <u>any four</u> of the following: **[16]**

    a)   Explain Features of Android.

    b)   Explain the function of each layer in WAP Architecture.

    c)   List & explain various mobile services of GSM?

    d)   Explain FDMA in detail.

    e)   Explain Dynamic source Routing.

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

    a)   Explain any one method used for congestion control in mobile transport layer.

    b)   Write a short note on reverse tunneling.

    c)   What advantages does the use of IPV6 offer for mobility?

    d)   What are the advantages & disadvantages of cellular systems?

    e)   Explain lifecycle of MIDlet.

Q5) Attempt <u>any four</u> of the following: **16]**

    a)   What is MMS? How it is different from short message service? Describe MMS Architecture.

    b)   Describe FHSS with neat diagram.

    c)   Write note on Indirect TCP.

    d)   Describe funneling & encapsulation.

    e)   What is code Division multiplexing? Explain.

[4937]-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)   *Neat diagrams must be drawn wherever necessary.*

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

    4)   *All questions carry equal marks.*

    5)   *Use of electronic pocket calculator is allowed.*

Q1) Attempt all   **[8 × 2 = 16]**

    a)   State any two limitations of genetic algorithms.

    b)   Define: Convex Fuzzy set.

    c)   Find $\underset{\sim}{A} \cap \underset{\sim}{\bar{B}}$ for the following two fuzzy sets

$$\underset{\sim}{A} = \left\{ \frac{0}{0} + \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.6}{3} + \frac{0.9}{4} + \frac{1}{5} \right\}$$

$$\underset{\sim}{B} = \left\{ \frac{0}{0} + \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.3}{3} + \frac{0.4}{4} + \frac{0.7}{5} \right\}$$

    d)   What is batch mode training?

    e)   Define the linguistic hedge slightly for the linguistic atom : α.

    f)   State any two selection methods used in GA.

    g)   Give the equation of the sigmoidal signal function.

    h)   What is the purpose of using a positive bias in a neural network?

Q2) Attempt any four [4 × 4 = 16]

a) What is defuzzification? Describe in brief the center of sums and center of largest area methods of defuzzification with the help of proper diagrams.

b) Define sub-normal fuzzy set. Explain any three features of the membership function with the help of diagram.

c) What is "crossover" in GA? Explain with the help of examples any two crossover techniques.

d) What is a boolean function? Write a short note on space of boolean functions.

e) What is associative recall? Explain the concept of crosstalk and pattern completion property.

Q3) Attempt any four [4 × 4 = 16]

a) Using the inference approach obtain the membership values for the triangular shapes $(I$ and $T)$ for a triangle with angles 40°, 60° and 80°.

b) Consider the following two fuzzy sets.

$$A = \left\{ \frac{0}{0.2} + \frac{0.8}{0.4} + \frac{1}{0.6} \right\}$$

$$B = \left\{ \frac{0.9}{0.2} + \frac{0.7}{0.4} + \frac{0.3}{0.6} \right\}$$

Express the following α - cut sets using Zadeh's notation.

$$(A \cup B)_{0.6}, \quad (A \cup \bar{A})_{0.7}, \quad (B \cap \bar{B})_{0.3}, \quad (B)_{0.2}$$

c) Consider the following two fuzzy sets defined on the universe $U_1 = U_2 = \{2, 3, 4, 5\}$.

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

$$2 = \left\{ \frac{1}{2} + \frac{0.6}{3} \right\}$$

Using Zadeh's extension principle determine the membership values for the algebraic product : 4×2 and sum $2 + 2$.

d) Consider the following fuzzy sets.

$$P = \left\{ \frac{0}{100} + \frac{0.1}{200} + \frac{0.3}{300} \right\}$$

$$Q = \left\{ \frac{0.5}{y_1} + \frac{0.57}{y_2} + \frac{0.6}{y_3} \right\}$$

$$T = \left\{ \frac{0.8}{z_1} + \frac{0.9}{z_2} + \frac{1.0}{z_3} \right\}$$

Perform the operations - $R = P \times Q$, $S = Q \times T$ and $I = R \circ S$ on the fuzzy sets.

e) Given the following two fuzzy sets:

$$old = \left\{ \frac{0.6}{50} + \frac{0.8}{60} + \frac{0.9}{70} + \frac{1}{80} \right\}$$

$$young = \left\{ \frac{0.3}{60} + \frac{0.2}{70} + \frac{0}{80} \right\}$$

Find membership functions for:

i) Very old and not young

ii) Very very young

Q4) Attempt any two   **[2 × 8 = 16]**

a) Explain how α - LMS reduces the linear error at the output of a neuron. What is the difference between α - LMS and μ - LMS.

b) With the help of proper diagrams, describe any four neuron signal functions.

c) What is a fuzzy equivalence relation? Describe its properties.

Q5) Attempt any two **[2 × 8 = 16]**

a) The truth table for ANDNOT function is given below: Find the weights using perceptron network for ANDNOT function when all inputs are presented only one time (1 epoch only). Use bipolar inputs and target, assume initial weights as 0 and $\eta = 1$ and $\theta = 0$.

x_1	x_2	t(target)
1	1	−1
1	−1	1
−1	1	−1
−1	−1	−1

Use the following activation function.

$$\delta_j(x_j) = \begin{cases} 1 & \text{if } x_j > 0 \\ 0 & \text{if } -0 \le x_j \le 0 \\ -1 & \text{if } x_j < -0 \end{cases}$$

b) Let X = {4, 5, 6, 7, 8} and Y = {p, q, r, s, t} be the universe of discourse. Consider the following three fuzzy sets defined on the above universe. $\underset{\sim}{A}$ defined on universe on X, $\underset{\sim}{B}, \underset{\sim}{C}$ on Y.

$$A = \left\{ \frac{0.4}{4} + \frac{0.5}{5} + \frac{0.7}{6} + \frac{1}{7} + \frac{0.8}{8} \right\}$$

$$B = \left\{ \frac{0.4}{p} + \frac{1}{q} + \frac{0.7}{r} + \frac{0.1}{s} + \frac{0}{t} \right\}$$

$$C = \left\{ \frac{0.5}{p} + \frac{0.6}{q} + \frac{1}{r} + \frac{0.6}{s} + \frac{0.2}{t} \right\}$$

Determine the implication relations:

i)   if X is in $\underset{\sim}{A}$ then Y is in $\underset{\sim}{B}$.

ii) if X is in $\underset{\sim}{A}$ then Y is in $\underset{\sim}{B}$ else Y is in $\underset{\sim}{C}$.

c)   Maximize the following function where x is permitted to vary between 0 and 31 with initial population randomly selected is (11, 29, 8 ,17). Show one crossover operation and one mutation operation. Use the Roulette wheel selection method to select individuals that will participate in the crossover.

Function : $f(x) = x^2$.

✦   ✦   ✦