[4039] - 101

P938

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS - 101 : Principles of Programming Languages
(New 2011 Pattern)

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)   *Figures to the right indicate full marks.*
   5)   *Assume suitable data, if necessary.*

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

   a)   Under which two circumstances, bootstrapping is necessary?

   b)   What does the following LISP function return if called with (dogwalk' (pole cat))?

   (defun dogwalk (L)
         (COND
               ((END P L) ' ( ))
          ((EQ (FIRST L)) ' cat) ' (chase- forever))
   (T (CONS ' jump (dogwalk (REST L))))))

   c)   Why prolog variables are typeless?

   d)   Why doesn't a C program need to create a subroutine closure when it passes a function as an argument?

   e)   Justify True / False: "Short - circuit evaluation can save time".

   f)   Show IEEE Floating - point standard 754 format for single - and double - precision representation.

   g)   Consider the following pseudocode program fragment:

   Subroutine swap (a, b)

   begin

         t : = a;   a : = b;   b : = t;

   end

   Suppose that the programming language adopts the reference model for variables (similar to Java) and thus the parameters are passed by sharing. What is the result of calling swap (x, y) on variables x and y?

P.T.O.

h) Why won't C++ allow you to apply a dynamic_cast operator to an object of a class that has no virtual functions?

i) Consider the following C++ declaration:

const int n = 10; int a [n];

Do you think these declarations will work in C? in C++? Justify.

j) Define i) Cooperation synchronization

ii) Competition synchronization

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

a) Explain the term "C++ compilers attempts to understand their source; C++ preprocessors do not". With the help of C++ code.

b) Write a C/C++ function that declares an array statically, on the stack, and on the heap. Which one is likely to be more efficient?

c) Which feature (s) of Java is/are used in the following code? Show how each variable is represented in memory.

int i = 3, j;

Integer I = new Integer (5);

Integer J; J = i; j = I;

d) Write C/C++ code to generate dangling reference on heap and dangling reference on stack.

e) Suppose that class D is inherited from classes A, B, and C, none of which share a common ancestor. Show how data members and vtables of D might be laid out in memory. Show how to convert the reference to a D object into a reference to an A, B, or C object.

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

a) Define task. List three characteristics of tasks which distinguish them from subprogram?

b) What is tail recursion? Apply tail recursion optimization on the following function:

```
int   collatz (int n, int  k) {
if (n == 1)   return k;
if (n% 2)
        return collatz (3 * n + 1, k + 1);
return   collatz (n/2, k) + 1;
}
```

c) What is a descriptor? Give descriptors for static string and limited dynamic string and dynamic string.

d) Write a pseudocode which generate different results for each of the parameter - passing techniques i.e. call by name, by reference, by value-result, and by name.

e) Consider the following Java code:

interface pingable { public void ping ( );}

class counter implements pingable {

    int count = 0;

    Public void ping ( ) { + + count;}

    Public int val ( ) { return count; }

}

Public class ping {

    Public static void main (string args [ ])

    {   Counter c = new Counter ( );

        c.ping ( ); c.ping ( );

        int v = c. val ( );

        System.out .print ln (v);

    }

Assume that this is to be compiled to native code on a machine with 4 - byte addresses. Draw a picture of the layout in memory for counter object. Show all virtual function tables.

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

a) Explain discriminated and free unions with the help of suitable diagram.

b) Explain the significance of the 'this' in C++? Write C++ code which demonstrates the use of it.

c) Consider the following diagram depicting subroutine nesting levels.
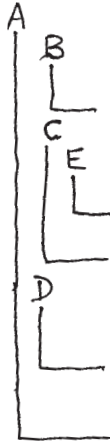
Draw static and dynamic chain. Assume the calling sequence is A, A, C, D, B, C, E, B.

d) Explain SIMD and MIMD multiprocessor architectures in detail.

e) Assume that the language uses dynamic scoping. What does the following program print if the language uses deep binding? Explain your answers.

x ; integer

procedure set_x (n : integer)

———————— x : = n + 1

procedure print_x

———————— write - integer (x)

procedure foo (S, P : function; n : integer)

———————— x : integer : = 6

———————— if n in { 1, 3} set_x (n)

———————— else   S(n)

———————— if n in {1, 2} print_x

———————— else   P

Set_x (o); foo (set_x, print_x, 1) ; print_x

Set_x (o); foo (set_x, print_x, 2) ; print_x

Set_x (o); foo (set_x, print_x, 3) ; print_x

Set_x (o); foo (set_x, print_x, 4) ; print_x

Q5) Attempt any four: [4 × 4 = 16]

a) Consider the following sentences : Ahmed likes swimming and he want to visit all middle east seas except the dead - sea. Write a prolog program such that goal visit (dead - sea) will return false / No, whereas, goal visit (x) will return all other seas (except dead - sea). Assume that middle east has red-sea, blue-sea, dead-sea, and arab-sea. Use of cut and fail is must.

b) Write a tail recursive prolog program to print numbers from n to 1.

c) Consider the following sentences:

Mammals have 4 legs and no arms, or 2 arms and 2 legs. A cow is a mammal. A cow has no arms. Write a prolog prolog to represent these sentences. Can we prove that cow has 4 legs? Why or Why not?

d) Write a recursive LISP function which takes two sorted numeric lists as argument and returns a list which is also in sorted order. e. g.

(Merge ' (1   2   5)   ' (3   7)) returns (1   2   3   5   7).

e) Define a recursive LISP function to find intersection of two lists perceived as sets and taken as arguments.

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P939

[4039] - 102

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

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

    a)   What is a flow label ? State its significance.

    b)   What is a switching fabric? State any two switching fabrics.

    c)   State & define types of multiplexing in the transport layer.

    d)   What is Voice over IP? State two protocols used to handle it.

    e)   Define plain text & cipher text.

    f)   What is a virus? State the phases of a virus lifetime.

    g)   What is a key wrapping? How it is useful?

    h)   State any four key participants of SET.

    i)   State how SHTTP is different from SLL.

    j)   What is kerberos? State the parties involved in it.

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

    a)   What is a Frame Relay? Discuss its advantages.

    b)   Explain the buffering mechanism in the transport layer.

    c)   What is Electronic Money? Explain its types.

d) Calculate the checksum at sender for an IPV4 packet header without option. (section size = 16 bits)

IPV4 packet header is :

4	10	0	32	
	1		0	0
4		17		0
10.12.10.6				
12.10.8.4				

e) Design a Caesar cipher scheme to codify the messages by replacing each alphabet with an alphabet two places down the line. Obtain the cipher text for the given plain text: <u>ADVANCED</u> <u>NETWORKING</u>.

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

a) Suppose a TCP connection is transferring a file of 8000 bytes. The first byte numbered 20,001. What are the sequence numbers for each segment if data is sent in segments, each carring 2000 bytes.

b) Consider the routing table for router R1.

Routing table for router R1:

Mask	Network Address	Next - Hop	Interface
/26	180.70.165.192	–	m_2
/25	180.70.65.128	–	m_0
/24	201.4.22.0	–	m_3
/22	201.4.16.0	–	m_1
Default	Default	180.70.65.200	m_2

i) Show the forwarding process if a packet arrives at R1 with destination address 201.4.22.40.

ii) Show the forwarding process if a packet arrives at R1 with destination address 20.24.30.75.

c) Consider the given algorithm for : a^b mod n

Start

    C = 1

    for i : = 1 to b

        Calculate C = (C × a) mod n

    next i

end

Using this algorithm find a message digest for the result 9^4 mod 117

d) Explain any four advantages of IP security.

e) Write a short note on ICMPV4 package.

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

a) What is the purpose of RTCP? Discuss its messages.

b) Define a routing protocol. Explain the types of routing with their respective routing protocols & implementations.

c) Write a short note on "Attacks : A Technical View".

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

e) What is the significance of the TSP? Explain its working.

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

a) Explain three protocol scenarios for connection establishment using three-way handshake.

b) Explain the structure of a router.

c) Explain how does certificate-based authentication work.

d) State Email security protocols. Explain any one.

e) What is DES? Explain the broad level steps in DES.

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[4039] - 103

M.Sc. (Sem. - I)

COMPUTER SCIENCE - I

CS - 103 : Distributed Databases Concepts

(New 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.*

3) *All questions carry equal marks.*

Q1) Answer in short (any 8): [**8 × 2 = 16**]

a) Write any two reasons of why to distribute the data.

b) Explain what is unilingual and multilingual architecture.

c) Top-down design approach is suitable when a distributed database system is being designed from scratch. Comment.

d) Static optimization reduces the possibility of bad optimization choice. Comment.

e) Explain the terms

   i) Type incorrect query

   ii) Semantically incorrect query.

f) What are the methods supported by R* algorithm for intersite data transfer?

g) What are the restrictions applied to reduce the size of search space?

h) What is nested transaction?

i) Pessimistic concurrency control algorithms synchronize the execution of transactions early during their execution life cycle. Comment.

j) Explain the problem of network partitioning in distributed environment.

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

a) Why concurrency control becomes more complicated in DDBMS as compared to RDBMS?

b) Compare and contrast between client - server and peer - to - peer architecture of DDBMS.

c) Explain the problem of allocation of fragments.

d) List out all the characteristics of query processor and explain any one in detail.

e) Explain each step of query processor by specifying input and output of each of the step.

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

a) Let $Q = \{q_1, q_2, q_3\}$ be the set of queries, $A = \{A_1, A_2, A_3, A_4\}$ be the set of attributes and $S = \{S_1, S_2\}$ be the set of sites. The matrix a, given below, describes the attribute usage values and matrix b gives application access frequencies. Assume that $ref_i(q_k) = 1$ for all q_k and s_i and A_3 is the key attribute. Apply clustering algorithm and partitioning algorithm (if required) and obtain vertical partitions of the relation.

$$
\begin{array}{c}
 \\
q_1 \\
q_2 \\
q_3
\end{array}
\begin{array}{cccc}
A_1 & A_2 & A_3 & A_4 \\
\left[\begin{array}{cccc}
1 & 1 & 1 & 0 \\
0 & 1 & 1 & 0 \\
0 & 0 & 1 & 1
\end{array}\right]
\end{array}
\qquad
\begin{array}{c}
 \\
q_1 \\
q_2 \\
q_3
\end{array}
\begin{array}{cc}
S_1 & S_2 \\
\left[\begin{array}{cc}
5 & 20 \\
25 & 8 \\
30 & 6
\end{array}\right]
\end{array}
$$

(a)   (b)

b) Draw an operator tree for the following query.

    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 DEPT relation is fragmented horizontally as

    DEPT1   = $\sigma_{budget\ <\ 2,00,000}(DEPT)$

    DEPT2   = $\sigma_{budget\ >\ =\ 2,00,000}(DEPT)$

EMP relation is fragmented using derived horizontal fragmentation as

$$EMP1 = EMP \ltimes DEPT1$$

$$EMP2 = EMP \ltimes DEPT2$$

convert operator tree to generic tree and then reduce it.

c) The database contains following three relations

Student (R-no, Name, Class, Date - of - birth)

Teacher (T-no, T-name, Qual)

Stud - teac (R-no, T-no, Subject)

The query is to find out names of the students who are learning subject "Distributed Databases" and names of teachers teaching to them. The following indices are available

    – Student has an index on R-no

    – Teacher has an index on T-no

    – Stud - teac has an index on Subject

Apply system R algorithm to find out access methods & join orders.

d) Consider the join graph in the following diagram

The fragmentation of the three relations is done and following table shows the number of tuples of each of the relation stored at three different sites S_1, S_2 & S_3

	S_1	S_2	S_3
Student	500	600	800
Teacher	–	100	–
S - t	2000	1000	–

Size (student $\bowtie$ S - t) = 3000

Size (Teacher $\bowtie$ S - t) = 5000

Apply algorithm of distributed INGRES for broad cast network so that communication time is minimized.

e) Consider data items x & y with the following read and write time stamps.

RTS $(x) = 10$ WTS $(x) = 10$

RTS $(y) = 12$ WTS $(y) = 8$

If the following sequence of requests is received what will be the behaviour of Basic Time Stamp Ordering algorithm?

$< R (x), 12 >,$ $< W (x), 12 >,$ $< R (x), 15 >,$ $< W (x), 13 >,$

$< R (y), 16 >,$ $< W (x), 11 >,$ $< W (x), 15 >,$ $< W (y), 15 >$

The request is of the form < operation, time stamp of transaction which has requested the operation >

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

a) Consider the following relations

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

DEPT   (dno, dname, budget)

EMP relation is partitioned horizontally as

$$EMP1 \quad = \quad \sigma_{age \, < \, 25} \, (EMP)$$

$$EMP2 \quad = \quad \sigma_{25 \, < \, age \, < \, 40} \, (EMP)$$

$$EMP3 \quad = \quad \sigma_{age \, > \, = \, 40} \, (EMP)$$

DEPT relation is also partitioned horizontally as

$$DEPT1 \quad = \quad \sigma_{budget \, < \, 2,00,000}(DEPT)$$

$$DEPT2 \quad = \quad \sigma_{budget \, > \, = \, 2,00,000}(DEPT)$$

Draw a join graph of EMP ⋈ DEPT. Is the graph simple or partitioned? If it is partitioned modify the fragments of EMP and DEPT so that the join graph of EMP⋈DEPT will be simple.

b) There are two relations is DDBMS

EMP   (eno, ename, age, salary, designation, dno)

DEPT (dno, dname, budget)

Size (EMP) = 10000 tuples   Size (DEPT) = 500 tuples

EMP is stored at site S1, DEPT is stored at site S2. The query is executed at site S3.

"Find out names of managers of those departments which have budgets > 5,00,000".

Show at least 2-ways of evaluation of queries . Assume that there are 100 departments satisfying the condition, tuple access time is 1 unit, tuple transmission time is 5 units. Find out cost of evaluation (in terms of time) of query in both the alternatives.

c) Consider the following DWFG.
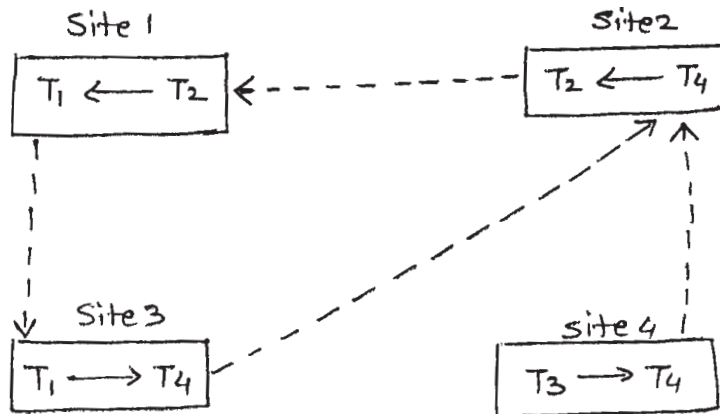
Check if deadlock exists in system. If so, find out the sites involved in deadlock.

d) Give a schedule of two complete transactions which is not allowed by strict 2PL but is allowed by basic 2PL.

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

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

a) With an example explain how reduction of query with horizontal fragmentation is achieved.

b) Write note on : Work flows.

c) Explain optimistic concurrency control protocol.

d) Explain centralized 2PC protocol in distributed environment.

e) What are the correctness rules of fragmentation? Explain each one in detail.

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P941

[4039] - 104

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS - 104 : Design and Analysis of Algorithms
(New 2011 Pattern)

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 any eight from the following: **[8 × 2 = 16]**

    a)   What do you mean by in - place sorting algorithm? Give example of in-place sorting algorithm which is also stable.

    b)   Justify that partial solution obtained during Kruskal's algorithm are also trees.

    c)   Problems solved by dynamic programming required polynomial time. Justify.

    d)   What are the limitations of Merge-Sort?

    e)   Why Least cost search method is preferred over LIFO and FIFO Branch Bound Method?

    f)   What is 8 queen's problem? How many tuples will be in solution space using explict and implict constraints?

    g)   What is alebraic transformation?

    h)   Define Np-Hard and Np-Complete class of problems.

    i)   What are the edges present in DFS spanning tree of undirected graph? Define them.

    j)   What is Towers of Hanoi Problem? Give its computing time in terms of recurrence relation.

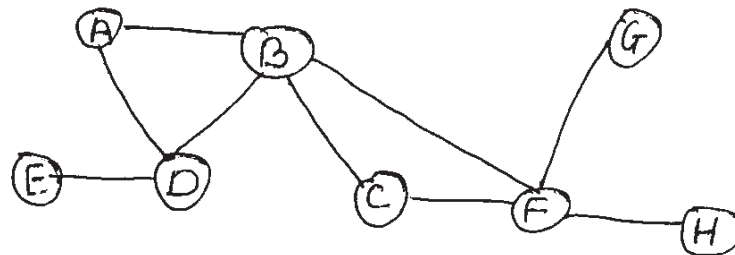*Q2)* Attempt <u>any four</u> of the following: **[4 × 4 = 16]**

a) If S is a set of n elements, the powerset of S is set of all possible subset of S. Write recursive algorithm to compute powerset of S.

b) Why quick sort is also called as partition and exchang sort? Determine running time of quick sort for

   i) sorted input

   ii) reverse ordered input

   iii) random input

c) Consider the following instance for job scheduling with deadlines problem where n = 5

$$(p_1, p_2, p_3, p_4, p_5) = (20, 15, 10, 5, 1)$$

$$(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$$

Give solution obtained using fast greedy method that uses set representation.

d) Find the minimum cost of computing product of chain of matrices having dimension $15 \times 5,\ 5 \times 10, 10 \times 20, 20 \times 25$ using dynamic programming.

e) Explain Breadth First Traversal method for a graph. Give the order of vertices visited during BFS for the following graph : (start at vertex A).

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

a) Discuss different asympotic noations in analysis of algorithm and what properties are satisfied by these notations?

b) Write non deterministic algorithm to sort set of n positive integers.

c) Given set S of weights as {5, 10, 12, 13, 15, 18} n = 6, m = 30. Apply backtracking algorithm to find all possible subsets of S that give sum of elements to 30.

d) 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

e) Write an algorithm to find fast fourior transform using divide and conquer strategy.

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

a) Write control of abstraction for divide conquer strategy. Devise an algorithm to find X^n using divide and conquer method and discuss its time complexity.

b) What is longest common subsequence problem? Show that it satisfies optimal substructure property. Determine length of longest common subsequence of

X = < 1, 0, 0, 1, 0, 1, 0, 1 >

Y = < 0, 1, 0, 1, 1, 0, 1, 1, 0 >

c) What is knapsack problem? Justify that all optimal solutions will fill the knapsack exactly. Find optimal solution to knapsack instance using greedy method.
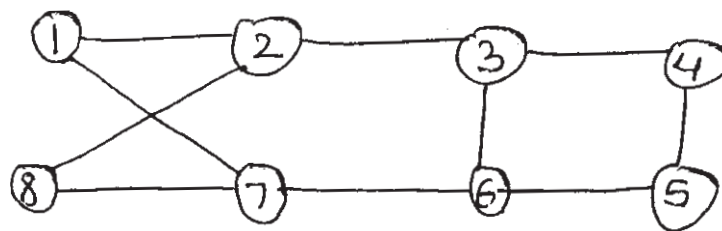
n = 7 m = 15

$(p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (10, 5, 15, 7, 6, 18, 3)$

$(w_1, w_2, w_3, w_4, w_5, w_6, w_7) = (2, 3, 5, 7, 1, 4, 1)$

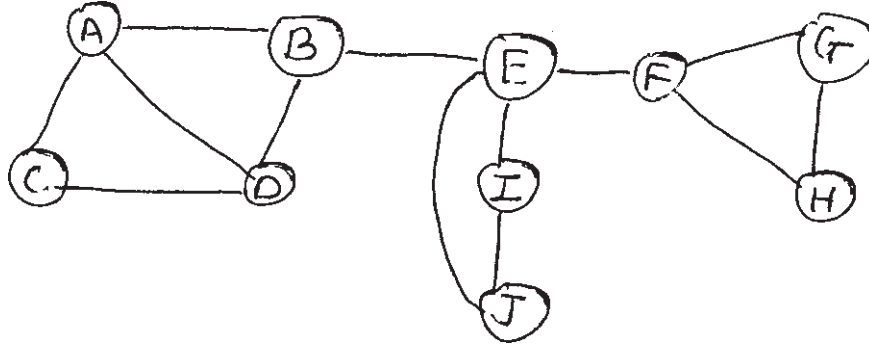**Q5)** Attempt <u>any two</u> of the following: **[2 × 8 = 16]**

a) Explain backtracking strategy in detail. What is Hamiltonian cycle? Find Hamiltonian cycle for the following graph:

b) Define the terms: Articulation point, bridge and biconnected components of Graph.

Find the Articulation point, bridge edge and biconnected components for the following graph:

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 reduced cost matrix which node will be next selected in LCBB method?

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

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P942

[4039] - 11

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS 11 - 101 : Principles of Programming Languages
(Old Course) (2008 Pattern)

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)   *Figures to the right indicate full marks.*

    5)   *Assume suitable data, if necessary.*

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

    a)   What is coercion? Give example for the same in 'C'.

    b)   What are dataflow languages? List any 2 languages supporting the paradigm.

    c)   What do you mean by Bound and Free variables in Prolog?

    d)   What are first class and second class values?

    e)   Give any two language mechanisms used to specify ordering.

    f)   Define   i)   Vector   ii)   Slice

    g)   List the two crucial issues related to concurrency.

    h)   What is initialization and finalization?

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

    a)   Find and justify the output of the following code for static and dynamic scope.

```
——— n : integer           ---   global declaration
—— procedure first
————— n : = 3
——— procedure second
——— n : integer           ---   local declaration
——— first ( )
——— n : = 5
—— if read - integer ( ) > 0
———— second ( )
—— else
——— first ( )
———write - integer (n)
```

P.T.O.

b) What is binding? What is binding time? Explain load time and link time bindings.

c) Explain cache coherence problem.

d) Differentiate between subroutines and coroutines.

e) What is a subroutine closure? What is it used for? How is it implemented?

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

a) What is a nondeterministic construct? How guarded commands support nonderterminacy?

b) Explain concept of structural equivalence and name equivalence with suitable examples.

c) Type two-chars = packed array [1 - - 2] of char;

    i)   Type element = record

            name = two - chars;

            automic - number = integer;

            automic - weight = real;

            metallic = Boolean

    end;

    ii)   Type element = packed record

            name = two - chars;

            automic - number = integer;

            automic - weight = real;

            metallic = Boolean

    end.

using the above specifications, give memory layout for

i) and ii) on a 32 - bit machine.

d) Discuss contiguous array allocation Vs. row pointers in C, with suitable example.

e) What are enumeration controlled and logically controlled loops? What type of loop is 'C' for loop?

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

a) Explain the programming language spectrum.

b) Explain any four thread creation syntax.

c) What are semaphores? How semaphore is used for providing synchronization in producer consumer problem.

d) What is v table? How it is used for implementation of virtual methods? (Explain with suitable example).

e) What is data abstraction? Name three important benefits of data abstraction.

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

a) Write a Lisp function to find GCD of given two numbers.

b) Write a Lisp function to find whether a given symbol is member of a given list.

eg. (member_of (a '(a   b   c   d))

o/p $\Rightarrow$ True.

c) "John likes all easy courses. All courses from science faculty are hard. B.Sc. is a course from science faculty. All courses from Arts faculty are easy. B.A. is a course from Arts faculty. Music-Hons. is a course from Arts faculty".

From the facts given above, write a prolog program to prove that John likes B.A. and music - Hons, courses.

d) Write a prolog program (using recursion) for finding the nth term of fibonacci series.

e) Explain concept of dynamic databases from prolog.

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[4039] - 12

P943

M.Sc. (Sem. - I)

COMPUTER SCIENCE

CS-11 - 102 : Object Oriented Software Engineering

(2008 Pattern)

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)   Assume suitable data, if necessary.

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

   a)   State difference between link and association.

   b)   Explain concurrent tasks.

   c)   Differentiate between generalization and aggregation.

   d)   What is qualifier? Explain with suitable examples.

   e)   What is object orientation.

   f)   What are abstract classes.

   g)   Define the following terms:-

       i)   Forking

       ii)   Joining

   h)   Explain elaboration concept in short.

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

   a)   Write a note on Inception & requirement understanding.

   b)   Describe the components of sequence diagram.

   c)   Write a note on object oriented strategies.

   d)   Write a note on object oriented analysis.

   e)   Explain Coad and Yourdon Method.

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

   a) Consider an automatic water level system which is used for controlling the water flow. Identify the different states and draw a state transition diagram.

   b) Draw a class diagram for "Hospital Management System".

   c) Draw component and deployment diagram for "University Examination System".

   d) Draw activity and state diagram for the process of creating a document.

   e) Draw a collaboration diagram for "Loan Banking System".

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

   a) Explain generalization by giving suitable example.

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

   c) Write a note on Jacobson Method.

   d) Consider the case, where Mr. X gives a telephonic call to Mr. Y Discuss the different scenarios and draw the sequence diagram for the same.

   e) Draw a collaboration for Railway Reservation System. The passenger is required to fill a reservation from giving details of his journey. The counter clerk ensures whether the place is available and prepares a booking statement.

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P944

[4039] - 13

M.Sc. (Sem. - I)

COMPUTER SCIENCE

CS 11 - 103 : Advanced Database Concepts/Distributed Database

(Old Course) (2008 Pattern)

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 are compulsory.*
4) *Make necessary assumptions.*

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

a) Define a Distributed Database.

b) Define the concept of semiautonomous systems, as a reference architecture for a DDB.

c) Define the disjointness rule of correctness for a derived fragmentation.

d) State, what do you mean by semantu analysis of a query, with an eg.

e) Define the following

   i) A disjunctive normal form (DNF) of a query qualification.

   ii) A conjunctive normal form (CNF) of a query qualification.

f) Consider the following hybrid fragmentation of a relation player (pno, pname, page).

$$p_1 = \sigma_{pno \leq 12}(player)$$
$$p_2 = \sigma_{pno > 12}(player)$$
$$p_3 = \Pi_{pno,\ page}(p2)$$
$$p_4 = \Pi_{pno,\ pname}(p2)$$

Define a localization program. State the localization program for the above relation, player.

g) Define the selectivity factor for a semijoin between two relations R and S. ie $R \ltimes_A S$.

h) "A non-blocking commit protocol, improves the response time performance of transactions". State True/false. Justify your answer.

Q2) Attempt any four: [4 × 5 = 20]

a) Comment on the following:

"A ddbms helps for intra query and inter query parallelism".

b) Comment on the following

"The multilingual approach of implementing a MDBS architecture, makes querying easier from a user perspective".

c) Comment on the following

"Allocation of a fragment to a site cannot be done in isolation (ie without considering the other related fragments).

d) Define the following terms. Give 2 examples of each type.

   i)   Pessimistic concurrency control algorithms.

   ii) optimistic concurrency control algorithms.

e) Write a short note on "voting based termination protocols".

Q3) Attempt any four: [4 × 6 = 24]

a) Given the following fragmentation of relation supplier (supno, supname, code, city) which splits the relation in Internal and External suppliers:

   Internal : $\sigma_{code = "Internal"}$ (supplier)

   External : $\sigma_{code = "External"}$ (supplier)

   i)   Determine a derived horizontal fragmentation for relation parts (partno, partname, supno, price), with supno being a foreign key in parts referencing supplier. supno.

   ii) Comment on the correctness of your solution by describing why the correctness rules are met.

   iii) Draw the join graph and decide on the goodness of the obtained fragmentation.

b) Consider the following fragmentation

   (Internal and external suppliers) of relation

   Supplier (supno, supname, code, city)

   Supplier 1 : $\sigma_{code = "Internal"}$ (supplier)

   Supplier 2 : $\sigma_{code = "External"}$ (supplier)

   and the following fragmentation of relation

   Parts (partno, partname, supno, price)

First step (vertical fragmentation)

$$\text{Parts}_1 = \Pi_{\text{partno, partname}} (\text{parts})$$

$$\text{Parts}_2 = \Pi_{\text{partno, supno, price}} (\text{parts})$$

Second step (Horizontal fragmentation)

$$\text{Parts}_{2.1} = \sigma_{\text{Price} \le 10} (\text{parts } 2)$$

$$\text{Parts}_{2.2} = \sigma_{\text{Price} > 10} (\text{parts } 2)$$

Third step (derived Horizontal fragmentation)

$$\text{Parts}_{2.2.1} = \text{Parts}_{2.2} \, \infty \, \text{supplier}_1$$

$$\text{Parts}_{2.2.2} = \text{Parts}_{2.2} \, \infty \, \text{supplier}_2$$

In summary, given fragments supplier_1, supplier_2, parts_1, $\text{parts}_{2.1}$, $\text{parts}_{2.2.1}$ and $\text{parts}_{2.2.2}$ and the query:

$$\Pi_{\text{partname, supname}} (\sigma_{\text{price} < 5} (\sigma_{\text{code = 'internal'}} (\text{parts} \, \infty \, \text{supplier})))$$

Draw & optimize the query tree. In each step, indicate which transformation rules are used, to optimize the query tree further & why they are used.

c) Consider the following DWFG
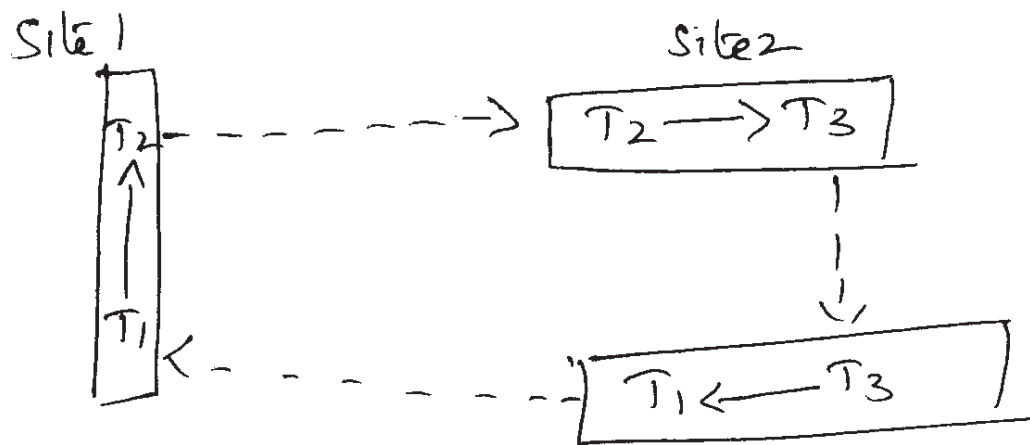
Detect a deadlock, if it exists, using the distributed deadlock detection algorithm.

d) Let objects x & y be stored at site 1, and objects z and w be stored at site 2. Determine, for each of the following executions, whether the execution is serializable or not. If serializable, determine all possible total orders of transactions.

Execution 1 :

$$S_1 : R_i(x)\ R_j(x)\ W_j(y)\ W_i(x)$$
$$S_2 : R_i(w)\ R_j(z)\ W_j(w)\ W_i(w)$$

Execution 2 :

$$S_1 : R_i(x)\ R_j(x)\ W_j(y)\ W_i(y)$$
$$S_2 : W_i(z)$$

Execution 3 :

$$S_1 : R_i(x)\ R_j(x)\ W_i(x)\ W_j(y)$$
$$S_2 : R_i(z)\ R_j(z)\ W_j(z)\ W_i(w)$$

e) Consider the following query

Select playername, gamename, hobby from player p, game g, gameplayer gp, playerhobby ph

where p.pno = gp.pno and g.gno = gp.gno and p.pno = ph.pno and

(g . gamename = "cricket or ph . hobby = "stamp collection")

   i)   Convert the above query qualification (the selection predicate) into DNF (disjunctive normal form)

   ii) Draw the query graph for the above query.

   iii) Extract the join graph from the query graph of (ii) and show it as a linear join tree and a bushy join tree

Q4) Attempt any four :   [4 × 5 = 20]

   a) Write a short note on "Dead lock detection methods in a Distributed database system".

   b) Comment on the following

      "Independency recovery protocols help in reducing the number of messages that need to be exchanged during a recovery process".

   c) Write a short note on " Promises of a DDBMS".

   d) Write a short note on the Bottom-up approach of designing a distributed database.

   e) Write a short note on

      "Lazy replication protocols" for commitment.

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[4039] - 14

P945

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS-11 - 104 : Design and Analysis of Algorithms
(2008 Pattern)

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

Instructions to the candidates:
    1)   *All questions are compulsory.*
    2)   *Neat diagrams must be drawn whenever necessary.*
    3)   *Figures to the right indicate full marks.*
    4)   *Assume suitable data, if necessary.*

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

    a)   Define Ω notation. Is $3n + 2 = \Omega(n)$. Justify.

    b)   What is difference between Dynamic programming method and Divide and conquer method.

    c)   What do you mean by minimum spanning tree?

    d)   Define Dynamic trees and static trees.

    e)   Define Hamiltonian cycle.

    f)   Give any two examples of NP - complete problems.

    g)   Differentiate between subset paradigm and ordering paradigm of greedy method.

    h)   What do you mean by branch and bound?

Q2)   Attempt <u>any four</u> of the following: **[4 × 5 = 20]**

    a)   Let A[l..n] be a sorted array of distinct integers, some of which may be negative. Give an efficient algorithm that can find an index i such that $1 <= i <= n$ and $A[i] \neq i$, provided such an index exists. What is its time complexity?

    b)   Let A[l..n] be an array of integers. Write an efficient algorithm to count occurences of given integer using Divide and Conquer strategy. What is its time complexity.

c) Consider the following instance for job scheduling with deadlines problem,

n = 7, $(P_1, P_2, \ldots\ldots\ldots\ldots P_7) = (13, 12, 7, 18, 6, 14, 20)$

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

Give the solution obtained using Greedy method.

d) What is string editing problem? Give the recurrence relation for the value of the optimal solution when the problem is to be solved using dynamic programming.

e) Apply Dijkstra's algorithm on following graph.

Start vertex = B.
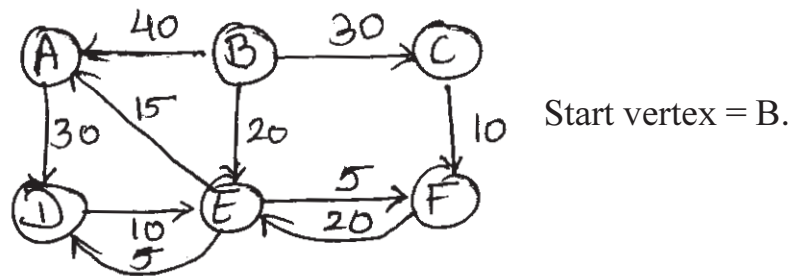
Q3) Attempt <u>any four</u> of the following: **[4 × 5 = 20]**

a) Write algorithms for binary search and ternary search. State its time complexity.

b) What do you mean by prefix code? What is an optimal Huffman code for the following set of frequencies.

a	b	c	d	e	f	g	h
35	10	7	9	15	6	2	25

c) What is the best way to multiply a chain of matrices with dimensions that are 15 × 3, 3 × 10, 10 × 2, 2 × 30 and 30 × 5 using dynamic programming method.

d) Find all possible solutions when the following graph is coloured with exactly 3 colours.
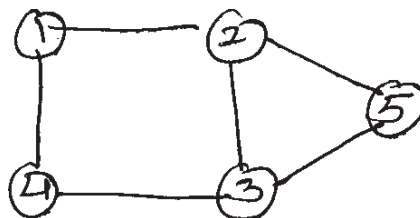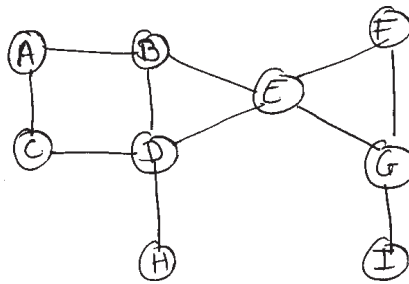

e) What is satisfiability problem? Give a nondeterministic algorithm for satisfiability problem.

Q4) Attempt <u>any four</u> of the following: [4 × 6 = 24]

a) Give BFS and DFS for the following graph. Show all steps.

Starting node is A. and neighbours are examined in reverse alphabetical order.

b) Explain Travelling Salesman Problem. Solve the following TSP instance using Dynamic programming method.

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$
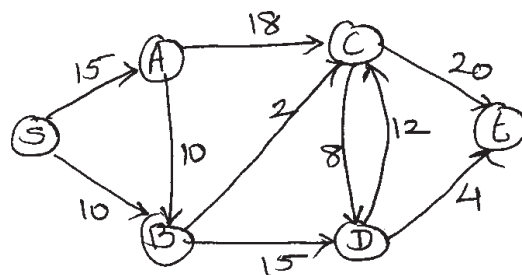
c) Describe LCBB method. Apply it to solve following instance of 0/1 knapsack problem.

m = 15, n = 4 (P_1, P_2, P_3, P_4) = (10, 10, 12, 18)

$(w_1, w_2, w_3, w_4,)$ = (2, 4, 6, 9).

d) Explain 8 Queen's Problem. Give the algorithm to solve 8 queen's problem using back tracking method. What is its time complexity?

e) What is flow network? Find out the maximum flow from the following network, where s is source and t is sink.

f) Give the recurrence relation for the value of the optimal solution when longest common subsequence problem is to be solved using dynamic programming method. Give the matrix of the values computed while determining LCS of following strings.

X = abaabbab   Y = bababa

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[4039] - 21

P946

M.Sc. - I (Sem. - II)
COMPUTER SCIENCE
CS - 201 : Advanced Networking Concepts
(2008 Pattern)

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

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Neat diagram must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

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

a) What is hidden terminal problem faced in wireless LAN.

b) Which fields of the IP header change from router to router?

c) Define Marshaling.

d) What is use of 'end of option', option in IP datagram?

e) Define the role of relay agent in BOOTP.

f) Why database description packet is needed in OSPF?

g) Define domain name & label.

h) State the commands used to define the port number for the data connection on client site.

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

a) A user want to move a file named File 1 from /usr/usrs/ report directory to /usr/usrs/ letters directory. The host is called "Magraw.com". Show all possible commands & responses.

b) Discuss the need & architecture of ATM network.

c) Compare the headers of IPv4 & IPv6 datagrams.

d) Explain how TCP controls the congestion.

e) Explain the socket interface for connectionless concurrent server.

P.T.O.

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

a) Explain how silly window syndrome degrade TCP performance.

b) Discuss dynamic address allocation of DHCP.

c) How many types of records are used in DNS? Explain any one in detail.

d) Discuss the different approaches used in multicast routing to reduce its complexity.

e) Explain with example the process of IPv4 fragmentation.

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

a) Discuss all scenarious for connection release in transport layer.

b) Explain the characters used in TELNET by client to control the remote server.

c) Explain the various techniques used in point-to-point WAN to establish connection between two devices.

d) Compare & contrast distance vector routing with link state routing.

e) Show with a example of downloading of email by using POP3.

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

a) Explain the need, functions of structure of management information protocol.

b) Give the difference between Transport layer & Data link layer.

c) Why real time transport control protocol is needed? Explain all its message types.

d) Silly window syndrome & clark's solution are complementary with each other. Justify.

e) Explain H.323 architecture & its protocols.

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[4039] - 22

P947

M.Sc. (Sem. - II)

COMPUTER SCIENCE

CS - 202 : Unix Internals

(2008 Pattern) (New Course)

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) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

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

a) What is global interrupt stack?

b) Is it necessary to maintain incore inode? What would happen if it is not maintained?

c) Consider following program segment

   fd = open ("file 123. txt", ORDONLY);

   close (0);

   fdl = dup (fd);

   What will be the values of fd and fdl?

d) Explain the difference between system calls for device and regular file.

e) Describe the term "cause of sleep".

f) List the states, in which the page that caused the fault can be occur.

g) Suppose the 'u area' contains the segment tables and page tables for a process. How can the Kernel swap the 'u area' out?

h) "Inode locking and unlocking mechanism is depends on system call and not on closing the file". Comment.

Q2) State whether the following statements are true or false. Justify your answer (any four): **[4 × 4 = 16]**

a) The Kernel never invokes the grow region to increase the size of shared region.

b) The Kernel allows the mount to succeed if the inode reference count is greater than one.

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

d) A process that opens the named pipe for the reading will sleep until another process opens the named pipe for writing.

e) Zombie processes & processes locked in memory do not get swapped out.

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

a) How the Kernel maintains the table of content in inode using direct and indirect blocks? Convert file offset 1,30,000 into physical block number and offset into block using b map. Assume block size of 1024 bytes.

b) In which cases Kernel removes the entries for sticky-bit text regions.

c) Why processes freeing an inode checks whether the super block is locked? What would happen if it is not locked?

d) Explain wakup algorithm in detail.

e) Discuss the following cases with example

   i) Process sleeping at not interruptible priority & return zero.

   ii) Process sleeping at not interruptible priority and do not long jump.

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

a) Write a C program which acts as a server in the UNIX system domain using sockets.

b) Write a C program which polls a terminal.

c) Design a scheme that reduces number of directory searches for file names by caching.

d) Explain the behaviour of the following program.

```
main ( )
{    char * endpt;
     char * sbrk( );
     int brk ( );
     entpt = sbrk (0);
     printf("endpt = %ud after sbrk\n", (int) endpt);
     While (endpt - -)
     {  if (brk (endpt) = = –1)
          {    printf("brk of %ud failed\n", endpt);
               exit ( );
          }
     }
}
```

e) How Kernel behave if we execute following program? Why?

```
# include <signal.h>
main (argc, argv)
int argc; char * argv[ ];
{   int i, val, code;
      if (argc > = 1)
          signal (SIGCLD, SIG_IGN);
      for (i = 0; i < 20; i ++)
          if ( fork ( ) = = 0)
          { printf ("child process % x\n", getpid ( ));
               exit (i);
          }
      Val = wait ( & code);
      printf ("wait val %X code %X," val, code);
}
```

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

a) Use of ptrace for process tracing is primitive and suffers several drawbacks. How? Explain in detail.

b) What happens when process execute unlink system call?

c) Draw neat labeled diagram for Kernel to driver interface.

d) Process table contains fields that need to be accessible only to the running process. Why?

e) What should a fault handler do if the system runs out of pages?

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P948

[4039] - 23

M.Sc. (Sem. - II)

COMPUTER SCIENCE

CS - 203 : Software Architecture

(2008 Pattern)

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) Assume suitable data if necessary.

    5) All questions are compulsory.

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

    a) What do you mean by unified process?

    b) "Architecture is the vehicle for stake holders communication". Justify.

    c) State the questions to be answer for selecting specific Architectural style.

    d) Give elements of Design pattern.

    e) "Abstract Factory defines an interface for creating an object, but let subclasses decide which class to instantiate". Justify.

    f) Which are the doing responsibilities in GRASP?

    g) Define - Framework.

    h) Explain the concept of component.

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

    a) In detail, explain Iterative Development Life Cycle.

    b) Discuss Module Architectural structure.

    c) "Layered system Architectural style supports design based on increasing level of abstractions". Justify.

    d) Write a short note on Event Based Implicit Invocation Architectural style.

    e) What are the categories of pattern?

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

a) Explain applicability and implementation of factory method Design pattern.

b) "Decorator Design Pattern attach additional responsibilities statically". Justify.

c) Give structure and participants of Iterator Design pattern.

d) Credit card company want to send bills to its customer for monthly transaction. A bill generator module should allow user to generate different types of bills for silver card, gold card, and platinum card. Selection of type of bill is based on card type and month.

A new bill is generated by creating it. Bill generator module make necessary additions and probably print or email it.

Select most appropriate Design pattern to address the problem and how it is applied. Give an appropriate class diagram containing relevant classes to illustrate use of the design pattern.

e) with the help of suitable example, explain Information Expert GRASP.

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

a) Which are the degrees of functional cohesion in GRASP.

b) "Using Protected variations GRASP, new implementations can be introduced without affecting clients". Justify.

c) What are the duties performed by MVC model and MVC view in a web Tier Application.

d) State characteristics of framework.

e) Why we need validator framework.

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

a) What are the advantages of components?

b) "Objects within a page scope are visible to all clients". Justify.

c) Write a short note on Expresso Framework.

d) A struts application is to be designed for registration to a social networking website. A registration page contains three fields email-id, password, and confirm password. Successful registration requires two passwords to match and valid email address. If registration is successful, home page is displayed else failure page is displayed.

   Give the struts components one need to create to design this application.

e) A host of National seminar is inviting online registrations from the participants from academic field. Registration form contains name, college name, designation, experience, qualification, Mobile no, Email id etc.

   Give the basic validators that can be used with above registration form.

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P949

[4039] - 31

M.Sc. (Sem. - III)

COMPUTER SCIENCE

CS 21 - 301 : Software Metrics & Project Management

(2008 Pattern)

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)   Define sunk cost & Internal rate of return.

    b)   What is GQM? State its importance.

    c)   Define complexity. State two measures of problem complexity.

    d)   State the importance of Delphi method in project management.

    e)   State the purpose of SOW.

    f)   State any two tools used for quality assurance.

    g)   Define AOA? State its use in project management.

    h)   What is project charter?

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

    a)   What is project? Explain the attributes of the project.

    b)   What is CCB? Explain change control system role in project management.

    c)   Explain different approaches to developed WBS.

    d)   What is PDM? Explain four types of relationship between activities used in PDM.

    e)   Write a note on cost estimation tools and techniques.

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

a) How could you use resource loading and resource leveling to ensure that a project runs smoothly.

b) Suppose you decided to become an independent information technology consultant. What type of contract would you prefer for your services? Why?

c) Explain fine modes for handling conflicts in communication management.

d) The sole purpose of risk control is to avoid risk. Justify.

e) Write a note on quality control.

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

a) Explain the process involve in scope management.

b) Project manager tries to reduce high staff turnover. Justify.

c) Explain in brief: levels of process maturity.

d) Explain key process areas in CMM & their goals.

e) What is measurement? What is metric. State the importance of measurement.

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

a) What is software and hardware reliability?

b) Number of people working on a software project & overall productivity is not linear - comment.

c) Write steps involve in planning of data collection.

d) Distinguish between internal and external attributes. State internal and external attributes related with processes, products & resources.

e) Write a note on metric plan.

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[4039] - 32

P950

M.Sc. (Sem. - III)
COMPUTER SCIENCE
CS - 302 : Mobile Computing
(2008 Pattern)

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) What are the main drawbacks of spread spectrum technology?

b) Which of the MAC schemes can give hard guarantees related to the bandwidth and access delay?

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

d) What are the functions of Gateway GSN in GPRS?

e) What are the different command types available in J2ME?

f) What is the purpose of destroy APP() function in J2ME?

g) What is fast retransmit / fast recovery in mobile transport layer?

h) What is the purpose of Record Enumeration in J2ME?

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

a) Explain windows CE operating system.

b) Explain logical model of Wireless Application Environment.

c) What is the purpose of following optimizations for TCP?
   i) Indirect - TCP
   ii) Snooping TCP
   iii) Transmission/Timeout Freezing
   iv) Selective Retransmission

d) Why is routing in multihop ad-hoc network is complicated?

e) What are the advantages of MACA scheme? How can MACA still fail in case of hidden/exposed terminals?

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

a) What information following entities in GSM can hold?

    i)   Mobile station   ii)   HLR

    iii) EIR   iv) VLR

b) "J2ME is not similar to J2SE". Discuss.

c) What is "Inefficient Triangular Routing Behavior"? How to solve this problem in mobile IP?

d) Explain cellular IP with its advantages and disadvantages.

e) Explain cell Broadcast Service with its advantages.

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

a) Explain WAP architecture.

b) What are the requirements from mobile IP?

c) Explain WAP push architecture.

d) How GPRS implements different Quality of Services?

e) What are the constraints we can set for Text Box in J2ME?

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

a) Compare Frequency Hopping with Direct Sequence Spread Spectrum.

b) Name the elements used in mobile IP with their functionality.

c) Why CSMA/CD fails in wireless network?

d) What is the purpose of mobile TCP? How it works? What are its advantages and disadvantages?

e) Compare proactive protocols and Reactive protocols used in mobile Ad-hoc network.

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[4039] - 33

P951

M.Sc. (Sem. - III)

COMPUTER SCIENCE

CS-23 - 303 : Information Systems Security

(2008 Pattern)

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) Why passive attacks are difficult to detect?

   b) By applying Rail Fence technique convert the plain text "To develop attitude & interest along with necessary knowledge".

   c) In MD 5 if length of the message is 5120 bits, how many bits are required for padding.

   d) What is stegnography?

   e) Discuss the triple DES with two keys.

   f) Explain the model of network security.

   g) What is Honey pot?

   h) State script based approach to achieve SSO.

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

   a) Apply play fair cipher on plain text "University of Pune" & Use keyword as "systems".

   b) How DSA is used for digital signatures?

   c) Discuss the relationship of strength of cryptographic key with key size.

   d) Explain the working of MD 5.

   e) Why digital certificate revocation is needed? How offline certificate revocation status check is done?

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

a) Explain the working of kerberos.

b) Explain the process of SET protocol to protect credit card transaction on the Internet.

c) When is Demilitarized zone required? How is it implemented?

d) Explain the method by which we can avoid replay attack in user authentication.

e) Why Internet work security is called facinating & complex?

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

a) Explain the different steps used in one time initialization process of AES.

b) How IPsec does key management?

c) Explain the working of 3–D secure protocol.

d) What are the typical contents of a digital certificate.

e) Given two prime numbers P = 17 & Q = 13. Find out N, E, & D in an RSA encryption process.

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

a) Discuss the functionality & need of S/MIME.

b) Explain the working & disadvantages of HMAC.

c) Discuss the subkeys generation process of Blowfish algorithm.

d) Explain the concept of key rings is PGP.

e) Explain the different steps used for every round of IDEA.

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