P862   **[3633]-101**

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS-II-101 : Principles of Programming Languages
(New & Old Course)

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.*
 5) *All questions carry equal marks.*

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

 a) What distinguishes declarative languages from imperative languages?

 b) Explain in brief, the notion of definite assignment in Java.

 c) Name two important programming languages that are strongly but dynamically typed.

 d) Explain the behavior of the following:
    (code fragment;
        int k=20; printf("%d%d%d%d", k, k++, ++k, k);

 e) Why Java does not support friend functions?

 f) What are single assignment variables? In what languages do they appear?

 g) Consider the following:
        batsman(irfan).
        batsman(gambhir).
        batsman(kapil).
        batsman(dravid).
        bowler(ishant).
        bowler(dravid).
        bowler(mishra).
        bowler(gambhir).
        allrounder(X):- batsman(X),
                         bowler(X).
    What will be the output of :
    Goal: allrounder(Y)↵

h)   Consider the following:
     (DEFVAR WILDA '((LEOPARD 18)
                        (DEER 90)
                        (FOX 10)
                        (LION 25)))
     Evaluate the following:
     (COND ((EQ 'LEOPARD (CAAR WILDA))
             (CADAR WILDA))
             (T (CDR WILDA)))

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

   a)   Consider the following Pseudocode:
        —Procedure main
        ——procedure A(I; integer; procedure P);
        ———procedure B; begin print(I); end;
        ——begin (*A*)
                if I > 2   P
             else if I > 1   A(3, B);
             else A(2, C);
             end; (*A*)
        ———procedure C; begin end;
        —begin (*main*) A(1, C); end.

        Assume that the language uses static scoping.

        What does the program print under deep binding? Under shallow binding?

   b)   Explain different status, a value can have in programming languages.

   c)   Explain different types of data objects with regard to object lifetimes. Give an example of each.

   d)   Apply tail recursion optimization for the following function:
        int foo(int n) { if (!n) return 1;
        if (! (n%2)) return 2*foo(n/2); return foo(n−1);
        }

   e)   Give 3 examples of r-values that cannot be *l*-values. Are there any *l*-values that cannot be r-values? Explain.

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

a)   The time at which the shape of an array is bound has a major impact on how the storage for the array is managed. At least five cases arise. Explain all of them.

b)   Will the following code work in C ? Justify.
         int k="Strange"; print f("%d %s", k, k);

c)   Explain nonconverting type casts in C++.

d)   Give a single program fragment that produces different results under call-by-value, call-by-reference, call-by-value-result, and call-by-name.

e)   Show stack-layout for the call f(91);
         fun f(x)= if x > 100 return x−10
         else return f(f(x + 11));

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

a)   Give an example of a feature in C++ that promotes each of the following OO design principles: code reuse, type safety, abstraction, and encapsulation. Give another example that violates each of these.

b)   Compare Java final methods with C++ nonvirtual methods.

c)   What are the tradeoffs between language based and library-based implementations of concurrency?

d)   Explain how escape analysis could be used to reduce the cost of certain synchronized statements and methods in Java.

e)   Explain C++ Compilation process with the help of suitable diagram.

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

a)   Consider the following statements: "John is a man. Mary is a woman. Tom is man. Rani is a woman. All women who lives in city are called CityFemales. Mary lives in city. All men like Wine. Rani lives in city. Mary likes wine. John loves all CityFemales who likes wine."

   Write a Prolog program to answer the question whom does John loves? and to prove that Rani is a CityFemale. Show how it will be answered by your program?

b) Under what conditions for p, q, r, s are the following Prolog rules satisfied:

i) x:- p, q.
    x:- r, !, s.
    x:- fail.

ii) x:- p, !, q.
    x:- r, s.
    x:- fail.

c) Give at least four conceptual differences between C and Prolog.

d) Define a recursive function in LISP named PALIND which takes one list as an argument and returns true if the list is Palindrome.
e.g. (PALIND '(M A D A M)) returns True.

e) Define a recursive function in LISP named INTERCHANGE which takes one list as an argument and interchanges the values in a list.
e.g. (INTERCHANGE '(1 2 3 4 5)) returns (2 1 3 4 5) as an output.

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P863   **[3633]-102**

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CS-102 : Object Oriented Software Engineering
(2005 Pattern (Old) & 2008 Pattern (New))

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)　How to define operation in an object model?

　　b)　What do you mean by polymorphism?

　　c)　The UML is a language for software development - comment.

　　d)　Explain behavioral things of UML.

　　e)　State difference between link and association.

　　f)　What is architecturally significant in Elaboration?

　　g)　Explain concurrent tasks.

　　h)　Explain Bottom up integration testing.

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

　　a)　What are different types of relationships supported in UML?

　　b)　Explain Elements of an object model.

　　c)　Discuss the components of sequence diagram.

　　d)　How are iterative development and unified process related?

　　e)　Explain Coad and Yourdon method.

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

   a) A system is to be designed for ATM Banking. A bank can have multiple customers. All the customers are issued the ATM cards. The ATM accepts the card and reads card number and password. It verifies the card number and password. It asks the user to select the kind of transaction. The user can deposit or withdraw the amount. If withdraw, it verifies whether amount is with in limit. It dispenses cash and asks whether to continue. It also asks whether you want the transaction to be printed. The card is ejected. Consider different aspects and draw use case diagram, sequence diagram using UML techniques.

   b) Draw component and deployment diagram for token-ring network that consists of three MSAUS.

   c) A DVD player has ON/OFF, Stop/eject, play, rewind and fast forward buttons, first two buttons allow toggling between the two states. Draw the state diagram.

   d) Draw class diagram for the chain of Responsibility in a web page that opens in IE.

   e) Prepare object diagram showing at least 7 relationship among the following object classes. Include associations, aggregation and generalization, show multiplicity. You may add additional attributes if necessary.

      Play ground, school, principal, classroom, student, book, teacher, school board, computer, desk, chair, door.

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

   a) Explain inter class test case design.

   b) Discuss the task management component.

   c) Write note on Artifacts in Inspection.

   d) Draw an activity diagram for the business process of meeting a new client.

   e) Draw a collaboration diagram for the GUI.

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P864   **[3633]-103**

M.Sc. (Sem. - I)
COMPUTER SCIENCE
CSII-103 : Distributed Database Concepts
(2005 Pattern Old & 2008 Pattern New)

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.*

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

a) State the contents that are defined for update statements, in the work load of a DBMS.

b) State the 3 dimensions based on which the architectural models for a DDB, is defined.

c) Define the following terms:
   i) Network transparency.
   ii) Replication transparency.

d) Consider the following relations and a set of queries, defined on them, as follows:

   Student($\underline{Rno}$, Sname, age, address)
   Project ($\underline{Pno}$, pname, duration, type)
   St-proj ($\underline{Rno, pno}$, grade)

   The set of queries Q is as follows:
   Q={q_1, q_2, q_3} where each q_i is given as follows:
   q_1 : select grade from st-proj
   　　　　order by pno;
   q_2 : select sname from
   　　　student, st-proj where
   　　　student.Rno = st-proj.Rno and
   　　　grade='A';
   q_3 : select sname from student s,
   　　　st-proj sp, project p where
   s.Rno=sp.Rno and sp.pno=p.pno and pname="A web tool";
   Create the attribute usage matrix, with respect to the above relations and the set Q.

                                                              P.T.O.

e) State the different steps of query processing in a DDBMS.

f) State the different alternatives for implementing a lock manager component, in a DDBMS.

g) Define the semi-join strategy of executing a join between two relations R and S.

h) Define the concept of serializability in a DDBMS.

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

a) Write a short note on the Query optimization process, with special emphasis on the search space generation and the search strategies used.

b) Write a short note on the components of a DDBMS.

c) Describe any five architectural alternatives, for a DDB.

d) Write a short note on the "MDBS without a GCS" architecture.

e) Discuss on the criterias, based on which the correctness of a derived fragmentation is decided.

Q3) Attempt any <u>four</u>: **[4 × 6 = 24]**

a) Consider the following query:

  select person-name from

  person p, diseases d, person-disease pd

  where p.ssno=pd.ssno and

    pd.dno=d.dno and

    disname='Swine flu' and p.age < 45;

Optimize the above query, using the Ingres query optimization algorithm for centralized query optimization.

b) Consider the following relations:

  emp(eno, ename, age, dno)

  proj(pno, pname, budget)

  emp-proj(<u>eno</u>, <u>pno</u>, duration, resp)

The above relations are part of a DDB, that is put across sites 1, 2, 3, 4.

Consider the following query set Q={q_1, q_2, q_3}, where each q_i is defined as below:

q_1 : Select pname from project where

budget=1,00,000;

q_2 : Select ename from emp, emp-proj where

emp.eno=emp-proj.eno

group by emp-proj.pno having count(*) > 10;

q_3 : Select pname from project p, emp-proj ep where p.pno=ep.pno

and budget < 10,000;

The access frequency matrix is given as follows:

	S_1	S_2	S_3	S_4
q_1	10	0	10	20
q_2	0	0	10	10
q_3	10	0	0	10

Construct the attribute usage matrix, use (q_i, A_j) with respect to the attributes defined in the above relations. Also construct the attribute affinity matrix consisting of all the attributes of the above relations.

c) Simplify the following query and transform it into an optimized operator tree, using the restructuring algorithm.

Select iname, Inv-no from item I, Invoice In, It-inv itn where In.amt > 5000 and itn.itno=I.itno and (I.iname='grocery' OR itn.Qty=100) and itn.Inv−no=In.Inv−no;

d) Simplify the following queries expressed in SQL, using idempotency Rules.

i) Select mname from movie

where budget < 10,000 and not (budget < 10,000 or myear=2004) and (mno # 5 and myear=1996);

ii) Select name from person

where (not(city='Pune') and

(city='Mumbai') OR (age > 20) and

not (age > 20)) or name='Joshi';

e) Consider the following DWFG given below:
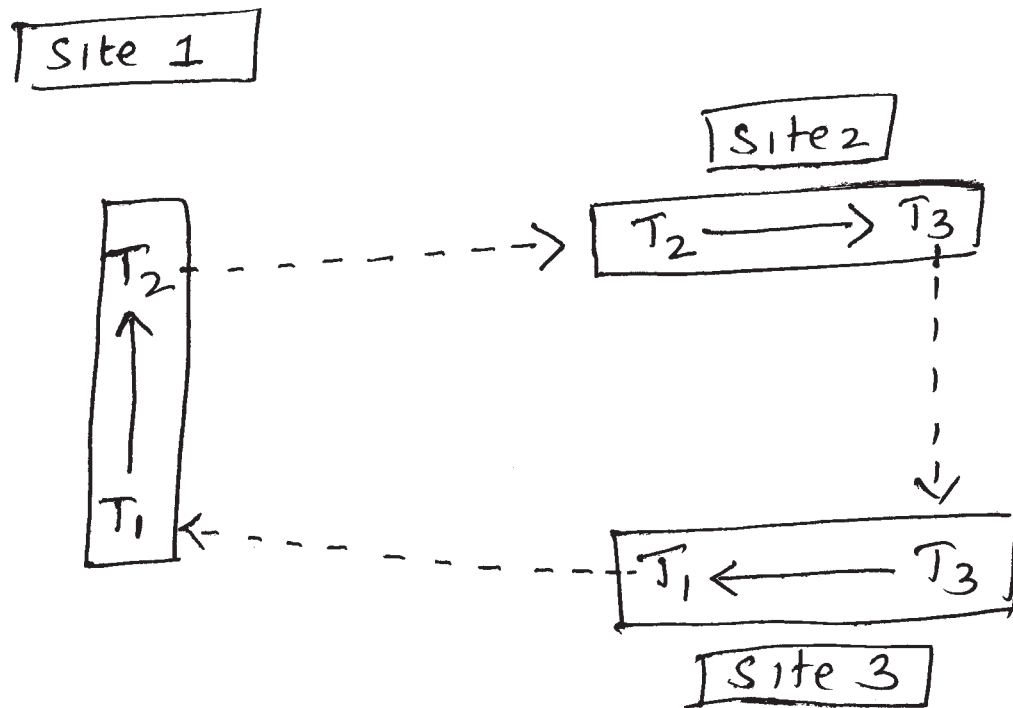
Detect the deadlock using the distributed deadlock detection algorithm.

Q4) Attempt any <u>four</u>:   **[4 × 5 = 20]**

a) Write a short note on "The behaviour of 2PC in case of site failures".

b) "A site participating in a DDBMS is always a fully autonomous DBMS". Comment.

c) Write a short note on 'Detection of false deadlocks' in a DDBMS.

d) Discuss on the drawbacks of 2PC protocol, with special emphasis on blocking and reduction of message passing between coordinator and participant.

e) What is a workflow? Explain the different types of workflows.

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P865   **[3633]-104**

M.Sc. (Computer Science)
CSII-104 : DESIGN & ANALYSIS OF ALGORITHMS
(Sem. - I) (Old & New Course)

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: [8 × 2 = 16]

a) Insertion sort can be expressed as a recursive procedure as follows. In order to sort A[1…n], we recursively sort A[1…n–1] and then insert A[n] into the sorted array A[1…n–1]. Write a recurrence for the running time of this recursive version of insertion sort.

b) Give control abstraction for Divide-and-Conquer Strategy.

c) Differentiate between subset paradigm and ordering paradigm of greedy strategy.

d) Which is a more efficient way to determine the optimal number of multiplications in a matrix-chain multiplication problem: enumerating all the ways of parenthesizing the product and computing the number of multiplications for each, or running RECURSIVE-MATRIX-CHAIN? Justify.

e) Define live node and dead node.

f) What do you mean by branch-and-bound? Give an example of an application where this technique might be useful.

g) How can the number of strongly connected components of a graph change if a new edge is added?

h) Show commonly believed relationship among P, NP, NP-complete and NP-hard problems with the help of suitable diagram.

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

   a)   Which of the following sorting algorithms are stable: insertion sort, merge sort, heap sort, and quick sort? Give a simple scheme that makes any sorting algorithm stable. How much additional space does your scheme entail?

   b)   Obtain optimal solution for the following job scheduling with deadlines using greedy method.

       p = (5, 10, 15, 1, 20), d = (3, 1, 2, 3, 2)

   c)   What is the best way to multiply a chain of matrices with dimensions that are 13×5, 5×89, 89×3, and 3×34 using dynamic programming?

   d)   Show that the running time of QUICKSORT is $O(n^2)$ when the array A contains distinct elements and is sorted in decreasing order.

   e)   What is m-colorability graph problem? Give the formulation for explicit and implicit constraints in case of m-colorability graph problem with n nodes.
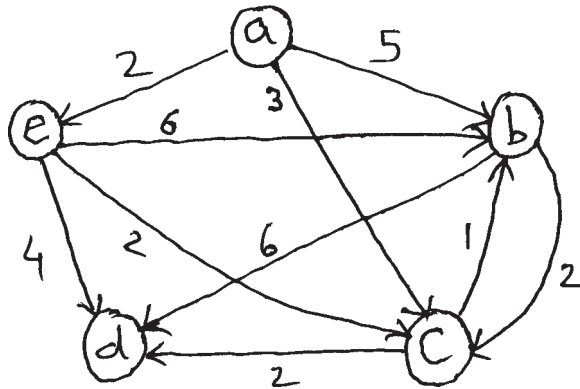

Q3) Attempt any <u>four</u>:   [4 × 5 = 20]

   a)   What are the minimum & maximum number of elements in a heap of height h? Is an sorted array, a min heap? Justify.

   b)   A string X can be transformed into string Y by applying a sequence of edit operations such as insert, delete, and interchange with associated costs of 1, 1, and 2 respectively. Give the recurrence relation for the value of the optimal solution when the problem is to be solved using dynamic programming. For X=a, a, b, a, a, b, a, b, a, a and Y=b, a, b, a, a, b, a, b, b. Give the matrix of the values computed in bottom-up manner.

   c)   What is strongly connected component? Illustrate the strongly connected components algorithm on the following graph.
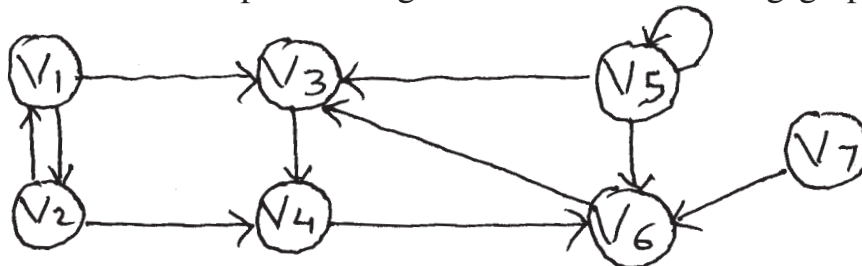
d) Write a nondeterministic algorithm for sorting n elements.

e) What is longest common subsequence problem? Show that it satisfies optimal substructure property. Give an algorithm based on dynamic programming to compute length of an LCS.

f) Apply Dijkstra's algorithm on the following graph:

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

a) Use Strassen's algorithm to compute the matrix product of following matries giving each computational step.

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

b) Let P_1, P_2, ..., P_n be n programs to be stored on a disk. Program P_i requires S_i kilobytes and the capacity of disk is D kilobytes where

$D < \sum\limits_{i=1}^{n} S_i$. Give separate greedy algorithm for the following objective

functions.

i) To maximize the number of programs held on disk.

ii) To use as much capacity of disk as possible. Are the solutions for both algorithms optimal? Justify.

c) Consider the travelling salesman instance defined by the following cost matrix. Obtain the reduced cost matrix. Which node will be next selected in LCBB approach?

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

d) Consider 0/1 knapsack problem with n = 3, W = (2, 3, 4), P = (5, 6, 8). Using dynamic programming, devise the recurrence relation for the problem and solve it. Determine the optimal profit for the knapsack capacity 7.

e) Find out the maximum flow from the network, where S is source and t is sink.
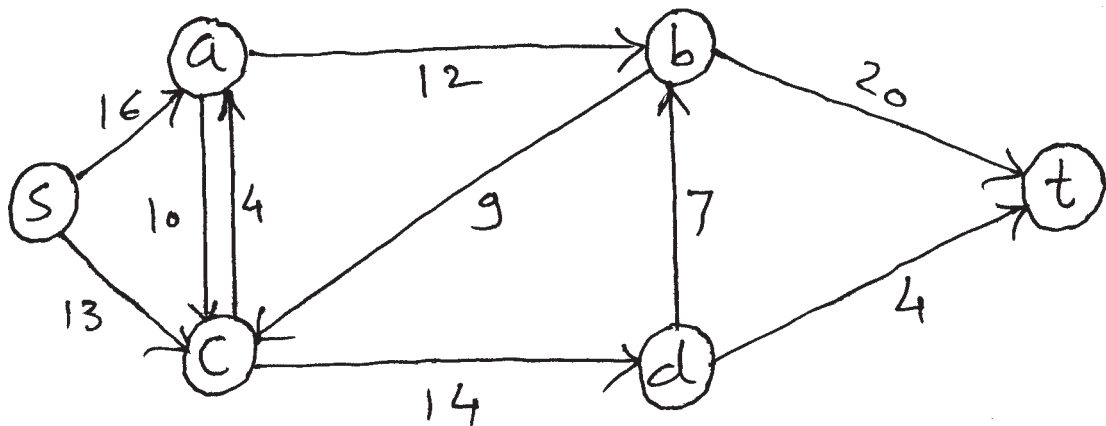
f) Apply Prim's and Kruskal's algorithm to obtain minimum spanning tree for the following graph.

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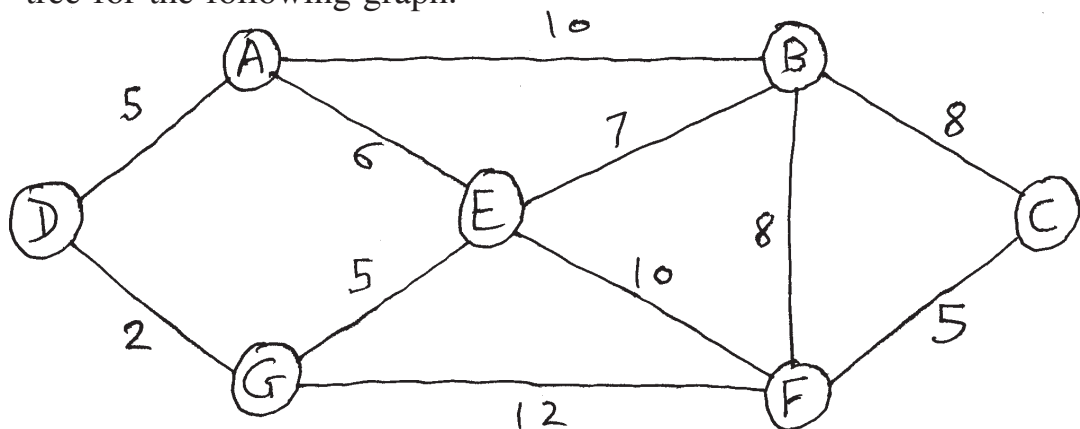
P373

[3633] - 201

M.Sc. - I (Sem. - II)

COMPUTER SCIENCE

CS - 201 : Advanced Networking

(2005 Pattern (Old) & 2008 Pattern (New))

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)   Assume suitable data, if necessary.

4)   All questions are compulsory.

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

a)   An Ethernet MAC sublayer receive 1510 bytes of data from LLC layer. Can the data to be encapsulated in frame? What is size of data in each frame?

b)   Explain UDP user datagram.

c)   State the purpose of keepalive timer in TCP.

d)   Differentiate BOOTP and RARP.

e)   A packet has arrived in which the offset value is 100, the value of HLEN is 5 and the value of total length field is 100. What is number of first byte and last byte.

f)   List the sections of DNS in internet with two examples each.

g)   In addition to ICMP4, which protocols are required instead of neighbour solicitation and advertisement, group membership in ICMP6.

h)   State the NVT characters for : Refusal to enable option, No operation, Are you there? Abort out put.

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

a)   Explain steps in header translation in transition from IPV4 to IPV6.

b)   Explain different types of links used in OSPF.

c)   Explain transition state in DHCP.

d)   In DNS a resolver sends a query message to find an IP address for host "atc. fhda.edu". Show the query message. Make necessary assumptions.

e)   Describe three catageries of frames by MPEG to temperally compressed data.

P.T.O.

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

    a)   Explain NVT character set used in option negotiation.

    b)   How connection establishment is handled in TFTP?

    c)   Explain different data structure and transmission modes used in data connection in FTP.

    d)   Explain the occasions in which segment is retransmitted in modern TCP implementation.

    e)   Why push data and urgent data are required in TCP data transfer?

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

    a)   Why SMTP is push protocol?

    b)   Explain static documents in web.

    c)   Describe the role of SNMP. Why SMI is required?

    d)   Why sliding window protocol is used in TCP? Explain.

    e)   When does a receiver generate acknowledgement? Explain types of acknowledgement in TCP.

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

    a)   Explain various application of TFTP.

    b)   Explain different steps involved in RPC.

    c)   Write a note on ATM layer.

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

    e)   Explain interior gateway routing protocol.

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P374

[3633] - 202

M.Sc. - I

COMPUTER SCIENCE

CS - 202 : Unix Internals

(2005 Pattern (Old) & 2008 Pattern (New)) (Sem. - II)

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

Instructions to the candidates:

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

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

    3)   *All questions carry equal marks.*

    4)   *Assume suitable data, if necessary.*

    5)   *All questions are compulsory.*

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

    a)   Suppose the kernel does a delayed write of a block. What happens when another process takes that block from its hash queue? From the free list?

    b)   It is possible for some block numbers in an inode have the value 0, even though later blocks have non-zero value. If a process attempts to read data from such a block, what happens?

    c)   Write various flags used in status field of an in-core inode.

    d)   What actions kernel takes when process write byte number 10240 to a file, the highest numbered byte yet written to the file?

    e)   What is the purpose of kernel register triple 3?

    f)   What special actions kernel takes when a group leader process associated with a control terminal calls exit ()?

    g)   What is the output of setuid (uid) system call, when effective user id is that of superuser and not of superuser?

    h)   Under what circumstances kernel swap out processes from main memory.

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

    a)   The kernel always spawn or schedule a special process to handle interrupts.

b)   There should never be free inodes whose inode number is less than the remembered inode number.

c)   Growreg is never called directly by kernel for text region.

d)   Process 1 is a user level process as opposite to process 0.

e)   If the swapper attempts to swap out a process but cannot find space on the swap device, a system deadlock is possible.

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

a)   Explore the race condition for a locked buffer in algorithm getblk.

b)   Calculate Block Number and Byte offset into Block for inode number 539. Assuming that Block 2 is beginning of the inode list, each disk inode is of 64 byte and one disk block is of 1 KB.

c)   Explain any two anomalies exist in the algorithm for the treatment of signals.

d)   Suppose the user executes the following command.
i)   mount /dev/ dsk1   / usr
ii)   cd /usr / src / uts
iii) cd ../../..
Describe what kernel does during execution of third command.

e)   A, B and C are three processes executing at given time instance. Each process has initial priority of 60. Every process, when get scheduled, executes for 1 time quantum which is of 1 second. The clock interrupts the system 60 times in a second. No other process is in the state 'ready to run'. The nice value of process C is set to 20. Assuming that process A gets scheduled for execution at the beginning of first time quantum. Show how the priorities of the process will change and how they will scheduled during next 4 time quantums using the simple schedular.

f)   What operation kernel can perform on Clists and Cblocks?

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

a)   Write a C Program that prints the owner file type, access permissions and access time of files supplied as parameters.

b)   Explain the behaviour of the following program.
# include <fcntl.h>
main()
{   int fd1, fd2, fd3;
     char b1 [512], b2 [512], b3 [512], b4 [512];

fd1 = open ("etc/passwd", O_RDONLY);

fd2 = open ("etc/passwd", O_RDONLY);

read (fd1, b1, sizeof (b1));

read (fd2, b2, sizeof (b2));

fd3 = dup (fd1);

read (fd3, b3, sizeof (b3));

read (fd1, b4, sizeof (b4));

close (fd1);

read (fd3, b1, sizeof (b1));

}

c) Explain the behaviour of the following program.

main (argc, argv)

int argc, char * argv [ ];

{exec (argv [0], argv [0], 0); }

d) Consider the following C Program

char name [ ] = "file" ;

main ()

{ int fd;

fd = creat (name, 0666);

}

Explain what kernel does during execution of creat system call with the help of assembly code shown below :

Address	Meaning of instruction
# Code for main	
58	move 0666 onto stack
5e	move stack pointer and move variable "name" onto stack
64	call C library for creat
# Library code for creat	
7a	move data value 8 into data register 0.
7c	operating system trap
7e	branch to address 86 if carry bit clear
80	jump to address 13C
86	return from subroutine

#	Library code for errors in system call	
	13 c	move data register 0 to location 20 e (error no)
	142	move constant – 1 into data register 0
	146	return from subroutine.

  e) Write a C program where parent and child do not share file.

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

  a) Describe any four inconsistencies checked by fsck.

  b) List and describe all the data structures used by the kernel for the manipulation of process address space.

  c) Explain the working of page stealer process.

  d) List all functions performed by clock interrupt handler.

  e) Write a short note on establishment of a control terminal.

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[3633] - 203

M.Sc. - I

COMPUTER SCIENCE

CS - 203 : Software Architecture

(2005 Pattern (Old) & 2008 Pattern (New)) (Sem. - II)

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

Instructions to the candidates:

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

   2)   *All questions carry equal marks.*

   3)   *All questions are compulsory.*

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

   a)   What do you mean by Agile Unified Process?

   b)   State different Architectural views.

   c)   List the different components of Repository Architectural style.

   d)   Define - software Architecture.

   e)   What are the participants of factory method Design Pattern?

   f)   " Low cohesion is desirable". Justify.

   g)   What are the advantages of struts?

   h)   "It is easy to reuse component". Comment.

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

   a)   Briefly explain Iterative Development Life cycle.

   b)   What is a UML? Give different applications of UML.

   c)   Which factors influence software Architecture?

   d)   Explain Event Based, Implicit Invocation Architectural style.

   e)   Write a short note on Heterogenous Architecture.

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

   a)   Consider a user interface toolkit that supports multiple look-and-feel standards, such as Motif and Presentation Manager. Different look-and-feels define different appearances and behaviours for user interface " Widgets" like scroll bars, windows, and buttons. To be portable across

look-and-feel standards, an application should not hard-code its widgets for a particular look and feel. Instantiating look-and-feel specific classes of widgets throughout the application make it hard to change the look and feel later.

Select the most appropriate design pattern to address the above problem. Give structure and participants to illustrate use of design pattern.

b) Consider three classes datatable, coloum, and field. A datatable contains many coloumns, and a coloumn is used by a field.

"Who should be responsible for creating instance of coloumn?" Discuss the given problem by applying most appropriate GRASP.

c) What are the elements of design pattern?

d) Differentiate - Design Pattern versus software Architecture.

e) Give intent, and implementation of singleton Design Pattern.

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

a) Discuss consequences and implementation of Farade Design Pattern.

b) What are the participants, and implementations of Iterator Design Pattern?

c) Write a short note on Pure Fabrication GRASP.

d) Explain velocity framework.

e) How EIS tier, and middle tier works in a functional application tier?

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

a) An online credit card application form contains information such as Name, Date of Birth, Qualification, Annual Income, and Email Address, Qualification is optional field.

Apply validation framework for the above application.

b) The website contains a home page displaying information about Resale Cars. On clicking the 'Car' URL, a home page asks for model, year, and price range. When a page is submitted, an index page displays a list of cars, and prices along with the link to the car details.

Design a struts application along with the struts components needed to design the above application.

c) With the help of diagram, explain MVC.

d) How to select the proper framework?

e) What are the advantages of components?

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P733

[3633]- 301
M.Sc.
COMPUTER SCIENCE
CS - 301 : Software Metrics and Project Management
(Old & New Course) (Sem.-III)

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

Instructions to the candidates:

    1)   Neat diagrams must be drawn wherever necessary.

    2)   All questions carry equal marks.

    3)   Assume suitable data, if necessary.

    4)   All questions are compulsory.

Q1) Attempt <u>all eight</u> of the following :   **[8 × 2 = 16]**

    a)   What do you mean by project?

    b)   Define change control board.

    c)   Explain Internal and External attribute of software measures.

    d)   Define fault and failure in software metrics.

    e)   Which factor affects a software reliability model?

    f)   Define MTTF and MTBF.

    g)   State and explain types of measures.

    h)   List basic components of metric plan.

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

    a)   Compare software product and software project.

    b)   Discuss project life cycle.

    c)   State advantages of a good project management.

    d)   What are the contents of overview of the project?

    e)   What is project scope management?

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

    a)   Explain the work breakdown structure.

    b)   Which are the dependencies among project activities.

c) Explain the cost estimation tools of a project.

d) Discuss outputs of quality control process.

e) "Staff turnover is one of the major project risk". Justify.

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

a) Discuss role of communication management in a particular project.

b) Discuss the basic responses to risk.

c) Explain different types of contract in project procurement management.

d) Write a short note on GQM paradigm.

e) "You cannot control what you cannot measure". Justify.

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

a) Illustrate software reliability growth problem.

b) "The basic problem of reliability theory is to predict when a system will eventually fail". Justify.

c) What is metrics plan? State goals behind developing metrics plan.

d) Write a short note on measurement plan.

e) What are the different CMM levels?

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P734

[3633]- 302
M.Sc.
COMPUTER SCIENCE
CS - 302 : Mobile Computing
(Old & New Course) (Sem.- III)

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 figures/diagrams wherever required.*

Q1) Attempt all of the following :   **[16]**

   a) List all command types provided by J2ME.

   b) What is connected limited device configuration (CLDC)?

   c) What is transaction-oriented TCP?

   d) What is Record Enumeration?

   e) List all communication protocols supported by connection framework in J2ME.

   f) What is user mobility and device portability in mobile communication?

   g) What are the advantages of cellular system?

   h) What is variable timing advance? Why it is used in GSM?

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

   a) Name the main elements of GSM and describe their functions.

   b) What is reverse tunneling? Why it is needed in mobile IP?

   c) What are the features of Wireless Session Protocol/Browsing (WSP/B)?

   d) What are the advantages and disadvantages of spread spectrum technology?

   e) Why CSMA/CD fails in the wireless network?

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

   a) What are the reasons for handover in GSM? Describe different handover scenarios.

b) Name the main elements of mobile IP and describe their functions.

c) How does Indirect-TCP isolate problems on the wireless link? What are the main drawbacks of this solution.

d) What are the features of Wireless Markup Language (WML)?

e) How J2ME is different than J2SE?

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

a) What are the additional elements required for GPRS? What are the functions of these elements?

b) Why is routing in multi-hop ad-hoc network is complicated?

c) What are the advantages and disadvantages of snooping-TCP?

d) Explain logical model of Wireless Application Environment (WAE)?

e) Explain MMS architecture?

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

a) Which additional messages are required in optimized mobile IP?

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

c) What are the advantages and disadvantages of CDMA?

d) What are the constraints possible on Text Box?

e) Describe all the identifiers associated with mobile station in GSM.

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P735

[3633]- 303
M.Sc.
COMPUTER SCIENCE
CS - 303 : Information Systems Security
(Old & New Course) (Sem.-III)

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

Instructions to the candidates:

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

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

   a)   What is access control? How different is it from availability?

   b)   What is a Trojan Horse? What is the principle behind it?

   c)   Why cross certification of CA's are required?

   d)   How does certificate-based authentication works?

   e)   Explain buffer overflow attack on SSL.

   f)   What is purpose of the SSL alert protocol?

   g)   Explain congestion attack.

   h)   What is stegnography?

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

   a)   Discuss the concept of phishing and pharming.

   b)   Discuss the idea of algorithm modes with detail explanation of OFB mode.

   c)   Explain the encryption process of RC5.

   d)   What is real crux of RSA?

   e)   Discuss the application and advantages of IP sec.

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

   a)   Explain how NAT works with an example.

   b)   How Oakley Key determination protocol is used in IP sec?

c) Discuss all steps of Kerberos Protocol.

d) Why is anonymous offline electronic money dangerous? Discuss the double spending problem.

e) How attackers break the security of packet filter fire wall?

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

a) Out line the broad level steps in SET.

b) Discuss the mechanisms used by QRA for checking the user's proof of possession of the private key.

c) Explain subkey generation process for each round in IDEA.

d) List the steps involved in working of MD5. Explain process blocks in detail.

e) What is digital certificate? Which are the types of digital certificate?

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

a) Alice meets Bob and says bj bnqq in xhzxx ymj uqfs. If she is using modified caesar cipher. What does she want to convey?

b) Given two prime numbers P = 7 and Q = 5, find out N, E and D in an RSA encryption process.

c) What is message digests? What are the requirements of message digests?

d) Explain any one mutual authentication mechanism with it's advantages and drawbacks.

e) Explain the working of 3-D secure protocol.

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