P832

[3833] - 101

M.Sc.

COMPUTER SCIENCE

CS - 11 - 101 : Principles of Programming Languages

(Sem. - I)

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

Instructions to the candidates:

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

Q1) Attempt All: **[8×2=16]**

a) State various datatypes predicates in LISP with their purpose.

b) Define precedence and associativity.

c) State the concept of row-major and column major order.

d) Define control predicates in PROLOG.

e) What are First and Second class subroutines?

f) Define communication & synchronization.

g) Differentiate type casting & coercion.

h) What is "This" in c++? State the equivalent keywords for it in another programming Language.

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

a) Differentiate interpretation and compilation by stating their comparative advantages and disadvantages.

b) State the problem with using an association list. How it is solved?

c) Define exception. Explain how exception handling is carried out in C++ & JAVA with suitable example.

d) Represent the implementation for the given shared multiple inheritance.
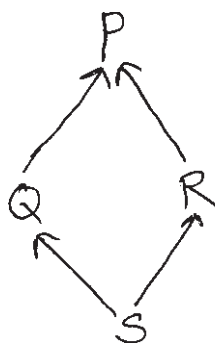
e) i) What is Cambridge Polish notation? State the language using it with suitable example.

ii) What is a dangling reference? State the two mechanisms used to catch it.

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

a) Describe the static allocation of space for non-recursive subroutine.

b) Explain Type Equivalence.

c) Generate the efficient target code / jump code for the given code segment.

   if ((a>b) and (c>d)) or (e< >f) then

       Then-statement;

   else

       else-statement;

d) Define thread and coroutine. State the steps used to turn coroutines into threads.

e) Define
   i) Leaf - routine.
   ii) Volatile - variable.
   iii) Internal module.
   iv) External module.

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

a) Explain the concept of logically - controlled loops.

b) Explain how in-line expansions are different from subroutines.

c) Consider the following structure definition in C. Give a likely memory layout for a object of type book on 32-bit machine using-
   i) Alingment restriction.
   ii) Packed record.

   Struct book
   {
       int b-code;
       Char b-name[3];
       float b-price;
   };

d) Explain RPC.

e) Explain initialization and finalization by stating their related issue.

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

    a)   Explain how CASE form is different from COND form with their syntax and suitable examples.

    b)   Write a LISP function r-rotate-n, which rotates n elements of a given list to the right.

          eg. (r-rotate-n '(a b c d e) 3)

                  expected o/p → (c d e a b)

    c)   Define dynamic database in PROLOG. Discuss dynamic database predicates.

    d)   Write a PROLOG Program to count the number of words in a given sentence.

    e)   Write a PROLOG program to prove that

          "A table supports a bottle".

          -If x is on the top of y, y supports x.

          -If x is above y and they are touching each other then x is on the top of y.

          -A bottle is above the table.

          -A bottle is touching the table.

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P833

[3833] - 102
M.Sc. - I
COMPUTER SCIENCE
CS11 - 102 : Object Oriented Software Engineering
(2008 Pattern) (Sem. - I)

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*

Q1) Attempt all of the following: **[8 × 2 = 16]**
    a) What is UML?
    b) What is modeling?
    c) What is object orientation?
    d) Define the following terms:-
       i) Abstract class.
       ii) Fork.
    e) What is meant by "including a use case".
    f) Explain what do you mean by polymorphism.
    g) Explain concurrent tasks.
    h) Explain Inception concept.

Q2) Attempt any four of the following: **[4 × 4 = 16]**
    a) What is object oriented software development.
    b) Write a note on object design process.
    c) Write a note on Integration Testing.
    d) Discuss the components of Activity Diagram.
    e) Explain in detail "Partitioning the Analysis Model".

Q3) Attempt any four of the following: **[4 × 8 = 32]**
    a) Draw a class diagram for "Hospital Management System".
    b) Draw a sequence diagram and object diagram for "UNIVERSITY EXAMINATION SYSTEM", University has different courses for both internal and external examinations are conducted and mark-list is generated for the same.
    c) Consider an Automatic water level control system, which is used for controlling the water flow. Identify the different states and draw a state transition diagram.

P.T.O

d) Draw a Component and Deployment diagram for "Placement Consultancy".

e) Draw a state diagram and activity diagram for considering different scenarios for tea/coffee making machine.

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

a) Write a short note on object oriented testing.

b) 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.

c) Write a note on Jacobson method.

d) Draw a collaboration diagram for "Result Systems".

e) Discuss the task Management component.

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P834

[3833] - 103

M.Sc.

COMPUTER SCIENCE (Sem. - I)

CS11 - 103: Distributed Database Concepts

(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)   *All questions are compulsory.*

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

    a)   State the 4 different types of data fragmentation in a DDBMS.

    b)   Define the following terms.

        i)   "Processing Locality" in a DDBMS.

        ii)   "Complete Locality" of an application in a DDBMS.

    c)   Consider the following relations.

        Doctor (doctor-num, name, dept)

        Patient (patient=no, name, dept, treat, doctor-num)

    Draw an operator tree for the following query, defined on the above relations:-

        select patient. name, doctor.name from patient, doctor where

        (treat = "intensive") or

        (doctor. dept = "surgery");

    d)   Consider the following relations

    Student (sno, name, class, city)

    Course (course no, name, type)

    Stud-Course (sno, course no, grade)

    The following is the fragmentation schema for the above relations :

$$C_1 = \sigma_{Course\,no<10}^{(Course)},$$

$$C_2 = \sigma_{Course\,no\,\geq 10}^{(Course),} \quad S_1 = \sigma_{City="Pune"}^{(Student),} \quad S_2 = \sigma_{City\neq "Pune"}^{(Student)}$$

The derived fragments of Stud - Course is as follows.

$$SC_1 = Stud\text{-}Course \underset{Sno=Sno}{\overset{\infty}{}} S_1$$

$$SC_2 = Stud\text{-}Course \underset{Sno=Sno}{\overset{\infty}{}} S_2$$

Draw a join graph and state its type for the following joins, defined on the above relations.

i) Student $\underset{Sno=Sno}{\overset{\infty}{\bowtie}}$ Stud – Course

ii) Course $\underset{Course\ no=Course\ no}{\overset{\infty}{\bowtie}}$ Stud – Course

e) State the rule of idempotency of unary operators?

f) Define the following terms, with an eg. for each.

   i) A flat transaction.   ii) A nested transaction.

g) State the different ways of implementing a lock Manager in a DDBMS.

h) State the different types of failures that can occur in a DDB.

Q2) Attempt any 4:   **[4 × 5 = 20]**

a) Write a short note on "Reduction for Derived fragmentation". Illustrate with an eg.

b) Define the following terms:

   i) The local internal schema

   ii) The global conceptual schema

   iii) The local conceptual schema

   iv) The external schema

   v) A hybrid fragmentation.

c) Write a short note on the Query decomposition layer of Query processing in a DDB.

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

   i) Pessimistic concurrency control algorithms.

   ii) Optimistic concurrency control algorithms.

e) State the following protocols, with an advantage of each.

   i) The ROWA protocol.

   ii) The WAL protocol.

Q3) Attempt any 4:   **[4 × 6 = 24]**

a) Consider the following global schema.

      doctor (dno, dname, dcity)

      doc-hosp (dno, hno, day)

      hospital (hno, hname, hspec, hcity)

The following is the fragmentation schema of the above relations.

$$d_1 = \sigma_{dno \leq 'd_2'}^{(Doctor)}$$

$$d_2 = \sigma_{dno > 'd_2'}^{(Doctor)}$$

The relation doc-hosp is indirectly fragmented as

$$dh_1 = doc\text{-}hosp \underset{dno=dno}{\infty} d_1$$

$$dh_2 = doc\text{-}hosp \underset{dno=dno}{\infty} d_2$$

The relation hospital is vertically fragmented as

$$h_1 = \Pi_{hno, \ hname}^{(hospital)}$$

$$h_2 = \Pi_{hno, \ hspec, \ hcity}^{(hospital)}$$

Transform the following query into a reduced query on fragments. (Show all steps of transformation and specify the rules used at each step)
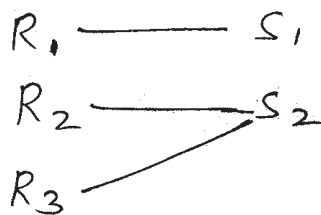
Select hname, hcity from

doctor d, doc-hosp dh, hospital h where

d.dno = dh. dno and dname like

"%J%" and dh. hno = h. hno;

b)   Consider the following partitioned join graph, for the fragments of global relations R & S

Let the following information about the profiles of the relations be known.

Size (R) = Size (S) = 100

Size (R ∞ S) = 2 × size (R)

Card (Ri) = 20, card (Sj) = 100;

Card (Ri ∞ Sj) = 20

Site (Ri) = i, Site (Sj) = j

Assume that the cost of a tuple access is 1 unit and a tuple transfer is 10 units.

Assume the result of R ∞ S is to be shipped to site 4. Give a good solution to this problem, without using semijoins.

c) Consider the following 2 allocations of fragments:-
   i) R_1 at site 1; R_2 at site 2; R_3 at site 3.
   ii) R_1 & R_2 at site1; R_3 at site 3.
   With the following applications (all with the same frequency of activation)
   A_1, issued at site1, reads 5 records of R_1 and 5 records of R_2.
   A_2, issued at site 3, reads 5 records of R_3 and 5 records of R_2.
   A_3, issued at site 2, reads 10 records of R_2.
   1) If we take locality of Reference as objective, which solution is best?
   2) If we take complete locality of applications as objective, which solution is best?
   3) Assume now that A_3 updates 10 records of R_2. Taking locality of reference as objective, which solution is best?

d) Consider a data item x. Let RTM $(x) = 21$ and WTM $(x) = 20$. Let the pair $<P_i(x), TS>$ denote a prewrite request of transaction Ti on the item x with timestamp TS. Indicate the behavior of TS method with 2 phase commitment , if the following sequence of requests is received.

   $<P_1(x), 22 > < P_2(x), 26 > < R_3(x), 19>$
   $<R_4(x), 23 > , < W_1(x), 30>, < R_5(x), 24>,$
   $<P_6(x), 18>, < R_7(x), 27>, < W_2(x), 31>$

e) Consider the following DWFG given below:-
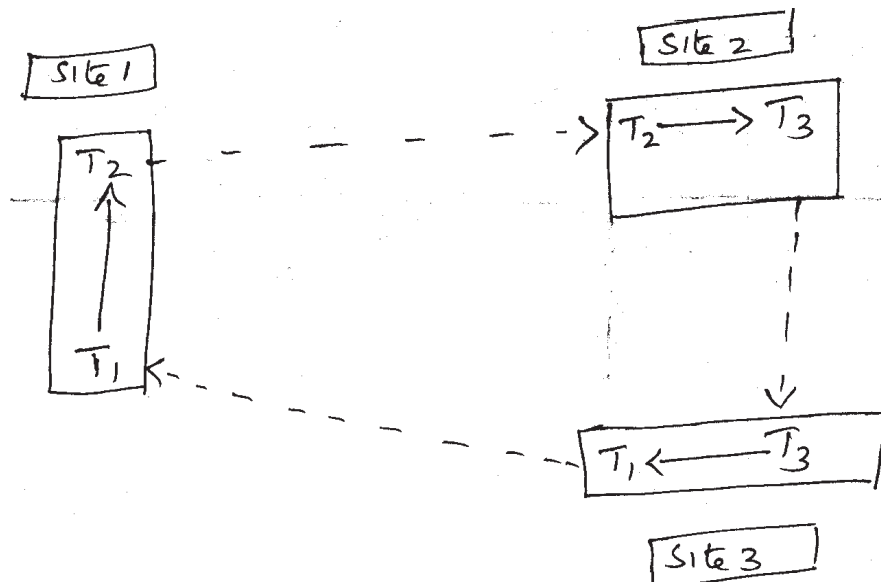
   Detect the deadlock, if any, using the Distributed deadlock detection algorithm.

Q4) Attempt any 4: [4 × 5 = 20]

a) Write short notes on the following

    i)   Hierarchical deadlock detection.

    ii)   Distributed deadlock detection.

b) Write a short note on

       "Variations in 2PC"

c) "Conservative timestamp ordering protocol reduces the number of restarts but doesn't eliminate it completely" Comment.

d) Write a short note on "Promises of DDBS".

e) Write a short note on "Correctness Rules of Fragmentation".

P835

[3833] - 104

M.Sc.

COMPUTER SCIENCE

CS 11 - 104 : Design and Analysis of Algorithms

(Sem. - I)

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

Instructions to the candidates:

  1) *All questions are compulsory.*

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

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

  4) *Assume suitable data, if necessary.*

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

  a) Define θ notation and show that $4n^2 + 3n \text{ is } \theta(n^2)$.

  b) What are strongly connected components?

  c) State P and NP class problems.

  d) Define principle of optimality. State the difference between greedy method and dynamic programming.

  e) Huffman code is fixed length code. Justify.

  f) Define satisfiability problem.

  g) What is negative weighted cycle? How does it affect shortest path calculation.

  h) Give the control abstraction for divide and conquer strategy.

Q2) Attempt any four of the following: [4 × 5 = 20]

 a) Find an optimal solution to the Knapsack problem instance n = 4, m = 20 w = (20, 15, 12, 18) p = (25, 20, 18, 15).

  b) Define 8 queen's problem and give the formulation for implicit and explicit constraints in case of 8 queen's problem.

  c) Explain the Bellman - Ford algorithm. What is its time complexing?

  d) Order the following functions in ascending order of their growth rates and justify $n^2 \log n$, $30n^2$, $n \log n$, $\log n$, 2^n.

  e) Explain any Sorting algorithm that uses divide and conquer strategy. What is its complexity?

P.T.O

Q3) Attempt any four of the following: **[4×5 = 20]**

a) What is a minimum cost spanning tree? Explain Kruskal's algorithm to obtain minimum spanning tree and apply it on the following graph.
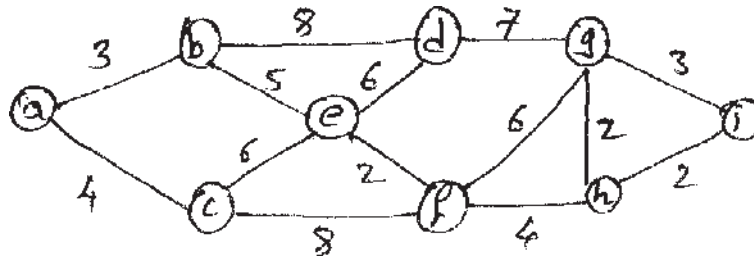

b) Explain how Strassen's approach differs from the ordinary matrix multiplication algorithm. Derive the time complexity required by Strassen's matrix multiplication.

c) What is a Hamiltonion cycle? Give a backtracking algorithm that finds all the Hamiltonian cycles in a graph.

d) Consider the following instance for job sequencing with deadlines problem where $n = 4$, $(p_1, p_2, p_3, p_4) = (75, 50, 27, 30)$ and $(d_1, d_2, d_3, d_4) = (2,1,2,1)$. Give the solution obtained using greedy method.

e) Explain Travelling salesperson problem using dynamic programming. Find the shortest path for following instance of TSP defined by cost matrix.

$$\begin{bmatrix} 0 & 15 & 10 & 20 \\ 7 & 0 & 5 & 10 \\ 6 & 13 & 0 & 12 \\ 9 & 8 & 7 & 0 \end{bmatrix}.$$

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

a) Draw the portion of state space tree by LCBB for the Knapsack problem instance given by $w = (7, 6, 5, 4, 3)$, $p = (15, 10, 12, 8, 5)$ and $m = 12$.

b) Give the depth first search and breadth first search for the following. Show all the steps.
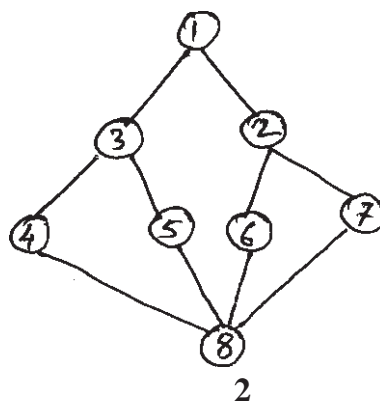
c) Explain sum of subsets problem with an example. Give the implicit and explicit constraints in case of fixed tuple size solution to problem. Give the bounding function for the same.

d) What is a flow network? Explain Ford Flukerson algorithm to find maximum flow and illustrate the following network where *s* is source and *t* is sink.
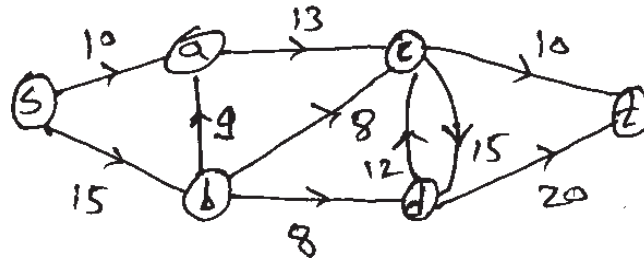
e) Write in detail the functions that characterize a non-deterministic algorithm.

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

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[3833] - 201

M.Sc. - I

COMPUTER SCIENCE

CS - 201 : Advanced Networking

(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 are compulsory.*

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

a) Why is the expiration timer value six times that of the periodic timer value?

b) Define fully qualified domain name.

c) Which problem is solved by Tomlinson's clock based method?

d) Define streaming live audio/video.

e) Discuss the learning process of bridge.

f) State the significance of D & M bits of IPv4 used in fragmentation.

g) Why does a newly added host need to know the address of the name server?

h) A router running RIP has a routing table with 20 entries. How many garbage collection timers are needed to handle this table if five routes are invalid?

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

a) Create shortest path tree by using Dijkstra algorithm for node B. Explain the steps.
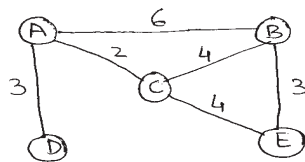
b) How flow control & error control is handled in TFTP?

c) Discuss fast ethernet implementations.

d) How would a connection be established with a file server which runs on a special hardware.

e) Explain any two ICMP query messages.

P.T.O.

Q3) Attempt any four of the following: **[4 × 4 = 16]**
   a) Discuss any two scenarios of e mail architecture.
   b) Explain socket interface for connectionless iterative server.
   c) How DHCP performs address allocation?
   d) Explain the problems posed with RPC.
   e) Explain the functions & object attributes of SMI.

Q4) Attempt any four of the following: **[4 × 4 = 16]**
   a) Explain the different mode of operations used in TELNET.
   b) Explain three protocol scenarios for establishing a connection using three way handshake.
   c) In a datagram, the M bit is zero, the value of HLEN is 5, the value of total length is 200, and the offset value is 200. What is the number of the first byte and number of the last byte in this datagram? Is this the last fragment, the first fragment or a middle fragment? Justify.
   d) What is the need of SIP? Explain all messages used in SIP.
   e) Explain ATM architecture.

Q5) Attempt any four of the following: **[4 × 4 = 16]**
   a) Explain the request & response headers used in HTTP.
   b) How FTP solves the problem of heterogeneity between FTP client & FTP server.
   c) How crash recovery is handled in transport layer?
   d) Discuss different mechanisms to take care of the carrying capacity of the subnet.
   e) Discuss response message of DNS.

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P837

[3833] - 202

M.Sc. (Sem. - II)

COMPUTER SCIENCE - I

CS - 202 : Unix Internals

(2005 Pattern & 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)   List any four functions of clock interrupt handler.

    b)   What is the significance of dup2 system call? Explain it with its syntax in brief.

    c)   A buffer whose status is delayed write cannot be read by a process. Comment and justify.

    d)   In-core copy of inode contains one of the fields as inode number where as inode number is not the field of disk inode. Why?

    e)   When does a kernel check for a receipt of a signal?

    f)   What are major and minor numbers of device files?

    g)   What are the actions taken by Kernel when a process incurs a page fault for a page marked 'demand fill' or 'demand zero'.

    h)   The U area of a process contains the fields that must always be accessible to the Kernel even if the process is not running. Comment and justify.

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

    a)   A process may increase or decrease the size of its data region by using setpgrp system call.

    b)   The Kernel clears the addresses of user signal catchers in U area while invoking exec system call.

    c)   The Kernel can lock and unlock an allocated inode independant of the value of the reference count.

    d)   When page stealer decides to swap out a page, it will copy the page on swap device even if it is already on swap device and no process has modified its contents.

    e)   The Kernel writes the newly allocated inode to disk before it writes the directory with the new name to disk while creating a file.

P.T.O

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

a) In block read ahead algorithm, when I/O of second block is completed, Kernel releases the buffer allocated to that block. Why? What is the advantage of block read ahead?

b) When a process is exited, how process group leader exit and parent exit are handled?

c) Why does Kernel give error. When enough space is not available in memory while executing fork and brk system call.

d) Give the steps that Kernel follow to open a device.

e) What do you mean by process sleeping at interruptible priority? What is sleep address?

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

a) Write a program in C to create a named pipe. The named pipe is created in a writer process that will write a message "Interprocess Communication" into pipe. Write reader process also to read the named pipe contents and print it.

b) Write a program in C that will take directory name and filename as command line arguments and check whether the file is present in the specified directory.

c) Explain the behaviour of the following program.

```
#include <signal.h>
main (int argc, char *argv[]);
{
    int i, ret_val, ret_code;
    if (argc >=1)
        Signal (SIGCLD, SIG_IGN);
    for (i=0 ; i<15; i++)
        if (Fork ( ) = = 0)
        {
            Printf("child proc %x\n", getpid ( ) );
            exit (i);
        }
    ret_val = wait (&ret_code);
    Printf ("wait ret_val %x ret_code %x\n", ret_val, ret_code);
}
```

d) What is the purpose of the following program? Explain its behaviour.

```
#include <stdio.h>
#include <fcntl.h>
main (int argc, char *argv ( ));
{
    fd=open (argv [1], O_CREAT | O_WRONLY, 0600);
    dup2 (fd,1);
    close (fd);
    execlp (argv[2], argv [2], NULL);
    perror ("main");
}
```

e) Write a program in C to open a file in write append mode. Suppose the size of the file is n bytes. At the $(n+100)^{th}$ byte of the same file, write the string "UNIX INTERNALS".

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

a) There are two process groups containing 1 and 2 processes respectively. CPU time is allocated uniformly between these two groups using fair share scheduler. Initial priority of a process is 50. Clock interrupts the system 60 times a second. Base level priority is 60. With fair share scheduler, show how priorities will change after each second and how different processes will be selected for execution in duration of 4 seconds.

b) Answer in brief.

i) What is map table? For what it is used?

ii) What do '.' and '..' entries of a directory store? At what offset they are located?

c) What are real user id and effective user id? Explain.

d) What is the need of mount ( )? What are the entries of mount table?

e) List and explain all the data structures used by Kernel for manipulation of files.

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[3833] - 203

P838

M.Sc. - I (Sem. - II)
COMPUTER SCIENCE
CS - 203 : Software Architecture
(2005 Pattern & 2008 Pattern)

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

Instructions to the candidates:

　　1)　Neat diagrams must be drawn wherever necessary.
　　2)　All questions are compulsory.
　　3)　Assume suitable data, if necessary.
　　4)　All questions carry equal marks..

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

　　a)　Define the term "Architectural style".

　　b)　What makes a pattern?

　　c)　What do you mean by "Architectural Patterns"?

　　d)　Briefly explain- "polymorphism" YRASP.

　　e)　What are types of Responsibility?

　　f)　Briefly explain- "Maverick" Framework.

　　g)　What are the features of "velocity" Framework?

　　h)　What are the advantages of components?

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

　　a)　Are there benefits of Iterative Development? How long should an Iteration be? What is an Iteration Timeboxing?

　　b)　What is software Architecture? Why software Architecture is important?

　　c)　Explain layered system Architectural style.

　　d)　How pattern meets the objectives of software Architecture?

　　e)　What is a Design Pattern? What are the essential elements of a Design Patterns?

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

　　a)　Consider a drawing editor that lets user draw and arrange graphical elements (lines, polygons, text, etc.) into pictures and diagrams. The drawing editor's key abstraction is the graphical object, which has an editable shape and can draw itself. The interface for graphical objects is defined by an abstract class called shape. The editor defines a subclass of shape for each king of graphical object: a lineshape class for lines, a polygenshape class for polygens, and so forth.

　　　　Select the most appropriate design pattern to address the above problem. Give structure and participants for this application.

P.T.O

b) With the help of example, illustrate controller YRASP.
c) Explain Intent. and Applicability of Factory Method Design Pattern.
d) What are the participants of Facade Design Pattern?
e) Give structure and collaboration of observer Design Pattern.

Q4) Attempt the following (Any Four): **[4 × 4 = 16]**
a) What are the consequences and implementation issues of state Design Pattern?
b) What do you mean by coupling? What are the types of coupling?
c) Write a short note on MVC Model.
d) What are the scopes of Resources in struts Framework?
e) Define the term "Framework". What are the characteristics of framework?

Q5) Attempt the following (Any Four): **[4 × 4 = 16]**
a) Write a short note on RMI over Ⅱₒₚ.
b) With the help of diagram, explain web Tier of struts framework.
c) What are the different approaches for component based development?
d) An online banking application form contains information such as Account No., Name, Date of Birth, Email Address and Mobile No., Mobile No. is optional field.
   Apply validation frame work for the above application.
e) The website contains a home page displaying information about Mobile handsets. On clicking the 'Mobile' URL, a home page asks for brand, features, and price range. When a page is submitted, an index page displays a list of handsets, 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.

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P839

[3833] - 301

M.Sc.

COMPUTER SCIENCE

CS21 - 301 : Software Metrics & Project Management
(Old & New) (Sem. - III)

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

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

Q1) Attempt the following: **[8 × 2 = 16]**
   a) State the importance of GQM.
   b) State three attributes of software size.
   c) Define CPI & SPI.
   d) Define project charter.
   e) State any two difference between AOA & PDM.
   f) State tools & techniques used in quality assurance.
   g) Define status report & progress report used in project communication management.
   h) Define fault & failure in software.

Q2) Attempt any four of the following: **[4 × 4 = 16]**
   a) Explain project & product life cycle in detail.
   b) What is CCB? Explain change control system role in project management.
   c) Explain WBS & OBS with an example.
   d) Explain the use of weighted scoring model with an example.
   e) What is project plan? State the elements involve in the project plan. What is the format of IEEE standard software project management plan.

Q3) Attempt any four of the following: **[4 × 4 = 16]**
   a) Define:
      i) Gantt chart.
      ii) PERT.
   b) The critical path on a project can change as the project progress - Justify with an example.
   c) Explain the process involve in quality management.
   d) As a group size increases, management challenges increases in communication point of view - Justify.
   e) What are the different areas for identification of risks.

P.T.O

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

   a) State the process involve in Human Resource Management. Also explain "Rolls & Responsibilities" in detail.

   b) Write a note on risk management plan.

   c) Write a note on solicitation planning.

   d) State the internal & external attributes related with process, products & resources. Also define internal & external attributes of the project.

   e) A project involves developing a complex software including a large database. The data capture routines are written in 'C' & data storage routines are written in 'sql'. Construct GQM tree to track coder productivity.

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

   a) Write steps involve in planning of data collection.

   b) State the activities involve in data analysis. Explain sampling & data distribution technique.

   c) What is CMM? Explain five levels of the CMM model.

   d) What is metrics plan? What are the different changes considered while revising the plan.

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

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P840

[3833] - 302

M.Sc.

COMPUTER SCIENCE

CS21 - 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 wherever necessary.*

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

   a)   Explain the terms-dwell time and hopping sequence.

   b)   What is meant by roaming in GSM?

   c)   List the additional messages in optimized mobile IP.

   d)   State any two advantages of I-TCP.

   e)   What is KVM?

   f)   What is Frequency Division Duplex (FDD)?

   g)   Give examples of the following communication devices:

      i)   Mobile and wired.

      ii)   Mobile and wireless.

      iii) Fixed and wired.

      iv) Fixed and wireless.

   h)   List the important interfaces and class in the RMS package (javax.microedition.rms)

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

   a)   Write a note on the Radio subsystem of GSM.

   b)   Explain the encapsulation mechanisms used in mobile IP in brief.

   c)   Which technique is used to reduce narrowband interference? Explain its types.

   d)   What are the similarities and differences in the tasks performed by the foreign agent in I-TCP and snooping TCP?

   e)   Explain the need for a specialized MAC for wireless communication.

Q3) Attempt any four of the following: **[4 × 4 = 16]**
   a) List the transaction service classes of WTP and explain any one.
   b) Explain the procedure of a mobile originated call in GSM.
   c) What is mobility binding? Explain the registration procedure.
   d) Explain the various profiles in J2ME.
   e) How does T-TCP reduce standard TCP overheads?

Q4) Attempt any four of the following: **[4 × 4 = 16]**
   a) What are the extensions added by DSDV to standard distance vector algorithm? Why are they needed?
   b) What are the important features of windows CE and Symbian Operating Systems?
   c) Explain any 4 configuration parameters to adapt TCP to wireless environments.
   d) Explain the short Messaging Service Architecture.
   e) Which additional features are offered by WSP/B adapted to web browsing?

Q5) Attempt any four of the following: **[4 × 4 = 16]**
   a) Explain the term interference in SDMA, TDMA, FDMA and CDMA. How are guard spaces assigned in these systems?
   b) Explain the WAP Push Architecture.
   c) Write a short note on alternative metrics.
   d) Explain the role of various entities in mobile IP.
   e) Explain the GPRS architecture.

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[3833] - 303

P841

M.Sc. (Sem. - III)
COMPUTER SCIENCE
CS23 - 303 : Information Systems Security
(New & Old 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.

Q1) Attempt all of the following: **[8 × 2 = 16]**
   a)   What is authentication? List the different types of authentication.
   b)   List the steps used in output transformation of IDEA.
   c)   Explain how birthday attack is used to detect collisions in message digest algorithms.
   d)   What is steganography?
   e)   Explain DNS spoofing.
   f)   State script based approach to achive SSO.
   g)   Discuss Padding step used in MD5.
   h)   What is roaming certificates?

Q2) Attempt any four of the following: **[4 × 4 = 16]**
   a)   Explain the AH & ESP protocols used in IPsec.
   b)   Discuss the various steps used in verification of digital certificate.
   c)   Explain how subkeys are generated in Blowfish algorithm.
   d)   Explain message digest. What are the key requirements of message digest?
   e)   Explain why is SHA more secure than MD5.

Q3) Attempt any four of the following: **[4 × 4 = 16]**
   a)   Explain how is screened host Firewall. Dual-homed bastion different from screened host Firewall. Single homed bastion?
   b)   Explain any one one-way authentication mechanism with its advantages & drawbacks.
   c)   Discuss the different types of intruders. Explain any one intrusion detection mechanism.
   d)   Explain X.800 security services in detail.
   e)   Ruhi meets Aarya & says zewfidrkzfejpjkvdjjvtlizxp. If she is using modified ceaser cipher. What does she want to convey?

                                                              P.T.O

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

   a) How does the one time initialization step works in AES?

   b) Given two prime numbers P=17 & Q = 23. Find out N.E & D in an RSA encryption process.

   c) What are the broad level differences between CRL, OCSP & SCVP?

   d) What is authentication tokens? Explain challenge response tokens.

   e) Explain how RSA is useful for digital signatures.

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

   a) When a user wants to send an email to multiple recipients, how PGP handles the security?

   b) A & B want to establish a secret key using Deffie Hellman key exchange protocol. Assuming the values are $n = 17$, $g = 13$, $x = 4$ & $y = 6$. Find out the values of A, B, K_1 & K_2.

   c) Discuss any two major transactions supported by SET.

   d) What is buffer overflow? List the four buffer overflow vulnerabilities in the SSL handshakes.

   e) Discuss how encryption happens in RC5.

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