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P 983

[3934] - 203
M.C.A. - I (Under Science Faculty)
COMPUTER SCIENCE
CS - 203 : Object Oriented Programming
(C ++ Programming)
(2008 Pattern) (Sem. - II)

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

a) Define the following :

i) Class

ii) Object

iii) Manipulator

iv) Constructor

b) Explain the concept of data abstraction in object oriented programming.

c) Write short note on the benefits of object oriented programming.

d) What is an inline function? Give the merits and demerits.

e) What is operator overloading? Why is it necessary to overload operator?

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

a) Explain multiple and multilevel Inheritance with example.

b) What is an exception? When it is used?

c) Describe the various file mode operations?

d) Explain function template with example.

P.T.O.

e) Give the characteristics of the following iterators :
   i) Input
   ii) Output
   iii) Forward
   iv) Bidirectional.

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

a) Write an object oriented program in C + + to store the following details.
Base class members : Empcode, Name, Designation, Age.
Derived class members : Basic, Earnings, Deductions, Net - Salary carry out the following methods.
   i) Create a master table
   ii) List all records
   iii) Search according to emp - code.

b) Write a C + + Program to sort n elements in descending order. Use any sorting technique (Function overloading is expected).

c) Write a C + + program which has 2 class members a, b. Overload - & - - operators where - will negate, where as - will decrement the values of a & b.

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

a) Write a function template to find the biggest of 3 numbers.

b) Explain the use of static members with a suitable example.

c) Write short note on any 2 types of constructors.

d) Differentiate between function overloading and function overriding.

e) What is early binding and late binding ?

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

a) Write a C + + program that prompts the user for a positive number if negative number is entered then throw an exception as number not positive.

b) Write a C + + program for concantanating 2 strings use dynamic constructor.

c) Write a C + + program which takes a file as input from user and changes the case of every alphabet in the file.

d) Explain hybrid inheritance with suitable example.

e) Trace the output

```
class base
    { Public :
        void baseFun {cout << "frombase" << endl}
    }
Class deri : public base
    { Public :
        Void baseFun ( ) {cout << "from Derived" << endl}
    }
Void someFunc (base *baseobj)
    {
        baseobj → baseFun ( )
    }
int main ( )
{   base baseObject;
    SomeFunc (& baseObject)
    deri deriObject
    SomeFunc (& deriObject);
}
```

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Total No. of Questions : 5] **[Total No. of Pages : 3**

P984

[3934] - 204
M.C.A. - I (Science Faculty)
COMPUTER SCIENCE
CS - 205 : Database Management System
(2008 Pattern) (New) (Sem. - II)

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

Instructions to the candidates :

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

Q1) Attempt any four of the following : **[4 × 4 = 16]**

a) Define file processing system. Discuss any three its disadvantages.

b) Define SQL. Explain its basic structure with example.

c) Define :

i) Strong entity. ii) Existence dependency.

iii) Total participation. iv) Descriminator.

d) Explain ACID properties of a transaction.

e) What is a timestamp ordering protocol? State Thomas' write rule.

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

a) Define DBA. Discuss any three functions of DBA.

b) What is mapping cardinality? Explain it with examples.

c) Discuss pattern matching operators in SQL with examples.

d) Consider the relation scheme R(A,B,C,D,E) and F = {A $\rightarrow$B, C$\longrightarrow$ D, A$\longrightarrow$E}. Is the decomposition of R into (ABC), (BCD) & (CDE) lossless? Justify i.e. R_1= (ABC), R_2 = (BCD), R_3 (CDE).

e) Explain recoverable and cascadeless schedules.

P.T.O.

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

a) What is data independence ? Explain it.

b) Explain the concept of specialization and generalization with examples.

c) What do you mean by nested queries? Explain its any two common uses with examples.

d) What is canonical cover? state the procedure to compute it.

e) Consider the following transactions. Find out any two non-serial schedules which are serializable to a serial schedule $< T_1, T_2, T_3 >$

T_1	T_2	T_3
read (a)	read (c).	read (a)
a : = a - 100	c : = c ∗ 10;	a : = a + a ∗.12
write (a).	write (c).	write (a)
read (b)	read (d)	read (c)
b : = b + 100	d : = d - 1000	c : = c + 1000;
write (b)	write (d)	write (c)

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

a) Describe the components of a storage manager.

b) Explain the difference between where and having clause with examples.

c) Explain the commands used to assign privileges to user and remove them from user with examples.

d) Explain multi - valued dependency with its uses.

e) Consider the list representing the sequence of events in an interleaved execution of set of transactions T_1, T_2, T_3, & T_4 assuming two - phase locking protocol. Is there a dead lock? Justify your answer.

Time	Transaction	Code
t_1	T_1	Lock (P,X)
t_2	T_2	Lock (Q,S)
t_3	T_3	Lock (P,S)
t_4	T_4	Lock (Q,S)
t_5	T_1	Lock (Q,X)
t_6	T_2	Lock (R,X)
t_7	T_3	Lock (R,X)
t_8	T_4	Lock (P,S)

Q5) a) Attempt <u>any two</u> of the following : **[2 × 4 = 8]**

i) What is an ER diagram? Discuss its major components.

ii) Define a view. State its purpose. Discuss with syntax how to create and delete a view.

iii) Discuss set membership and range specifier operators in SQL with examples.

b) Attempt the following : **[4 × 2 = 8]**

A management institute offers various courses each course has many subjects. One subject can be taught by many teachers and one teacher can teach more than one subjects.

i) Identify the entities with their attributes and relationship and draw a E - R diagram.

ii) Normalize and design the database with necessary constraints.

iii) Write a SQL to find the course with maximum subjects.

iv) Write a SQL to display all the teachers who teach the subject "Business Mgt".

■ ■ ■

Total No. of Questions : 4] **[Total No. of Pages : 3**

P985

[3934] - 301

M.C.A. (Science Faculty)

CS - 301 : Design and Analysis of Algorithms

(New Course) (2008 Pattern) (Sem. - III)

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

Instructions to the candidates :

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

Q1) Attempt All: **[8 × 2 = 16]**

a) Why Asymptotic Notations for time complexity can be "Somewhat" misleading?

b) What do you mean by best-case time complexity of Quick Sort?

c) What is Prefix codes? Give one example.

d) What is principle of Optimality?

e) What is Backtracking? Who introduced this idea?

f) What is FIFO in Branch-and-Bound?

g) Define Bipartite Graph. Give example.

h) Define NP-Complete and NP-hard.

Q2) Attempt ANY FOUR : **[4 × 5 = 20]**

a) Write and explain Dijkstra's Algorithm.

b) Prove that Counting Sort is Stable Sort method.

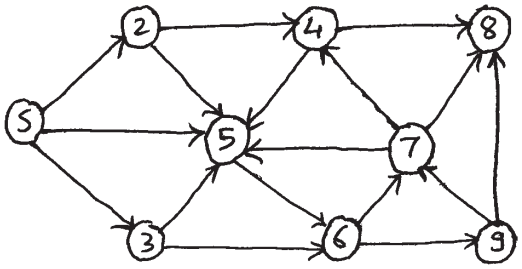
c) Solve the following fractional knapsack instance using greedy method.

n = 8, C = 15, $(P_1, P_2, \ldots\ldots\ldots\ldots\ldots, P_8) = (12, 4, 5, 3, 8, 8, 12, 1)$, $(W_1, W_2, \ldots\ldots\ldots\ldots, W_8) = (4, 3, 5, 6, 1, 4, 10, 4)$.

d) Apply Back tracking to solve the following instance of sum of subsets problem : W = (1, 3, 4, 5) and m = 11.

P.T.O.

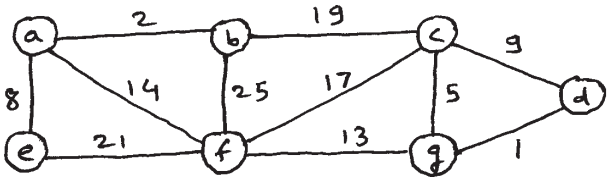
e) Apply BFS on the following graph.



Q3) Attempt <u>ANY FOUR</u> : **[4 × 8 = 32]**

a) What is Strassen's matrix multiplication? Obtain and solve its recurrence relation.

b) What do you mean by minimum spanning tree? Obtain the same using Prim's and Kruskal's algorithm respectively for the following graph.



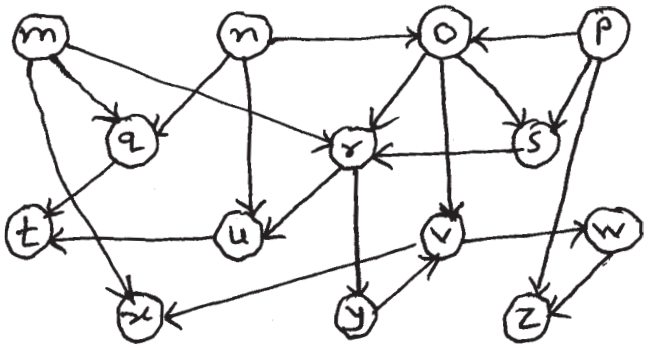
c) Consider the traveling Salesperson instance defined by the cost matrix:

$$\begin{bmatrix} \infty & 3 & 5 & 9 & 18 \\ 7 & \infty & 8 & 5 & 8 \\ 3 & 6 & \infty & 3 & 9 \\ 12 & 14 & 18 & \infty & 14 \\ 8 & 9 & 6 & 11 & \infty \end{bmatrix}$$

Obtain reduced cost matrix and portion of the state space tree generated by LCBB.

d) Let X = abaabbaaaba, and Y = abaababa. Find minimum cost edit sequence that transforms X into Y.

e) Obtain topological sort for the following graph.



Q4) Attempt ANY THREE : **[3 × 4 = 12]**

a) Solve all-pairs shortest-path problem for the following graph.

$$\begin{array}{c} \\ A \\ B \\ C \end{array} \begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{bmatrix} 0 & 1 & 2 \\ 3 & 0 & \infty \\ 1 & 2 & 0 \end{bmatrix} \end{array}$$

b) Explain 8-queens problem.

c) Write Insertion sort algorithm.

d) Obtain and solve recurrence for Average case-behavior of merge sort.

e) Find an optimal placement for 8 programs on 3 tapes where programs are of lengths 6, 31, 22, 27, 30, 9, 5, 3.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P986

[3934] - 302
M.C.A. - II (Under Science Faculty)
COMPUTER SCIENCE
CS - 302 : Computer Networks
(2008 Pattern) (Sem. - III) (New)

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

Instructions to the candidates :

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

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

a) What is Polling and Token Passing?

b) Define Data Rate and Signal Rate.

c) What are the different generations of ethernet with their increasing speeds?

d) Define Mesh and Star Topology.

e) What is piggybacking? Give it's advantages.

f) What are the supporting protocols of IP in Network layer?

g) What is tunneling?

h) Show the NRZ- L and Manchester encoding for the bit stream 11001100.

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

a) How Network layer implement connectionless and connection oriented services?

b) Explain virtual LAN.

c) Compare coaxial cable with Fiber Optics.

d) Explain CSMA / CA.

e) Construct a CRC message for the given polynomial $x^{11} + x^{10} + x^9 + x^6 + x^5 + x^4 + x^2 + 1$ and the generator polynomial is $x^5 + x^3 + x + 1$.

P.T.O.

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

a) Explain PAR Protocol.

b) Explain the difference between the Bridged & Switched Ethernet.

c) What is protocol? Explain the key elements of a protocol.

d) Compare circuit switching and packet switching.

e) What is channelization? Explain any two channelization protocols.

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

a) What is CSMA? Explain 1, p & n persistent.

b) What are the deficiencies of IPv4? Explain the advantages of IPv6 over IPv4.

c) Explain the following fields of IEEE 802.3 Mac Frame.

i) Preamble . ii) SFD.

iii) Data and padding. iv) CRC.

d) Explain TCP/ IP model.

e) What is Shannon's capacity formula? Find out the max. no. of bits / sec transmitted for channel of 6kHz bandwidth and the signal to noise ratio is 50db.

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

a) Differentiate between physical, logical and port addresses.

b) What is congestion? Explain any two congestion control policies.

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

d) Explain service primitives.

e) What are the different characteristics of line coding?

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P969

[3934] - 41
M.C.A. - II (Under Science Faculty)
COMPUTER SCIENCE
CS - 401 : Graphics
(Old) (2005 Pattern) (Sem. - IV)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions are compulsory.***

Q1) Attempt any two of the following : **[2 × 5 = 10]**

a) Compare flood fill and boundary fill methods.

b) Explain DDA circle drawing algorithm.

c) Translate a polygon with co-ordinates A(2, 5), B(7, 10) and C(10, 2) by 3 units in x-direction & 4 units in y'-direction.

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

a) Explain BMP file structure.

b) Explain mid point subdivision algorithm.

c) What is parallel projection? Explain types of parallel projection.

d) Show that 2D reflection through x-axis followed by 2D reflection through the line y = –x is equivalent to a pure rotation about the origin.

e) Explain phong shading algorithm.

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

a) What are the different antialiasing ray-tracing techniques? Explain any one technique in detail.

b) Explain z-buffer algorithm.

c) Explain Display view storage tube with advantages.

d) Explain 3-D viewing.

e) Apply each of the following transformation on the pt. p[6, 7]

i) Shearing about x-axis by 3 units.

ii) Rotation about origin by 45° in clockwise direction.

P.T.O.

Q4) Attempt any four of the following : **[4 × 5 = 20]**

a) Use the cohen-sutherland algorithm to clip two lines P1(40, 15) - P2(75, 45) and P3(70, 20) - P4(100, 10) against a window A(50, 10), B(80, 10) C(80, 40) and D(50, 40).

b) What are the properties of Bezier curve?

c) Explain starbust method of character generation.

d) Explain CMY color model.

e) Compare plasma display with raster scan CRT.

Q5) Attempt any five terms : **[5 × 2 = 10]**

a) Refresh rate.

b) Aspect ratio.

c) Coefficient of reflection.

d) Inter polation.

e) Dithering.

f) Homogeneous co-ordinates.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P970

[3934] - 42

M.C.A. (Science Faculty)

CS - 402 : ARTIFICIAL INTELLIGENCE

(Old Syllabus) (2005 Pattern) (Sem. - IV)

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 any four : **[4 × 4 = 16]**

a) What do you mean by A.I. technique? Explain.

b) Explain production system in detail.

c) Write steepest Ascent Hill climbing algorithm.

d) Write any four applications of A.I.

e) Differentiate : declarative vs. procedural knowledge.

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

a) Explain repeat predicate of prolog in detail.

b) Construct and describe partitioned semantic net representing the sentence "All Indians Love Cricket".

c) Describe any four predicates used in LISP.

d) Define a recursive function in LISP to return maximum from a list taken as command line argument.

e) Write a prolog program for logon with infinite attempts without the use of repeat.

P.T.O.

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

a) Write a prolog program for medical diagnosis system.

b) Explain Best-First search algorithm.

c) What do you mean by frames? Explain.

d) Differentiate : Forward vs. Backward reasoning.

e) What do you mean by Question Answering in predicate logic resolution?

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

a) Write and explain AO* algorithm.

b) Write Movie Script.

c) Explain unification algorithm in detail.

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

a) Represent the following sentence in WFF and convert it to clause form: "All Romans who know Marcus either hate Caesar or think that anyone who hates anyone is crazy".

b) Construct CD for the following sentence : "Since smoking can kill you, I stopped".

c) Give state-space representation for water jug problem.

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Total No. of Questions : 5] **[Total No. of Pages : 5**

P971

[3934] - 43

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

CS - 403 : Advance Database Management System

(Old) (2005 Pattern) (Sem. - IV)

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 : **[1 × 20 = 20]**

Consider the following BCNF relational schema for a portion of a company database.

Project (pno, proj_name, proj_base_dept, proj_mgr, topic, budget)

Manager (mid, mgr_name, mgr_dept, salary, age, sex)

Note that each project is based in some department, each manager is employed in some department and the manager of a project need not be employed in the same department. Suppose you know that the following queries are the five most common queries in the work load for this university and all five are roughly equivalent in frequency and importance :

1) List the names, ages and salaries of managers of a user-specified sex working in a given department. You can assume that, while there are many departments, each department contains very few project managers.
2) List the names of all projects with managers whose ages are in a user-specified range.
3) List the names of all departments such that a manager in this department manages a projects based in this department.
4) List the name of the project with the lowest budget.
5) List the names of all managers in the same department as a given project.

P.T.O.

a) These queries occur much more frequently than updates, so you should build what ever indexes you need to speed up these queries. Given this information, design a physical schema for the company database that will give good performance for the expected workload.

b) Redesign the physical schema assuming the set of important queries is changed to be the following.

   i) Find the total of the budgets for projects managed by each manager; that is, list proj-mgr and the total of the budgets of projects managed by that manager, for all values of proj-mgr.

   ii) Find the total of the budgets for projects managed by each manager but only for managers who are in a user specified age range.

   iii) Find the number of male managers.

   iv) Find the average age of managers.

Q2) State True / False and Justify the following (any five) : **[5 × 2 = 10]**

a) Attributes mentioned in a WHERE clause are candidates for indexing.

b) Setting a latch before reading or writing a page ensures that the physical read or write operation is atomic.

c) ROLLBACK aborts multiple transactions.

d) In shared-disk system, each CPU has a private memory.

e) Using an oid to refer to an object is same as a using a foreign key to refer to a tuple in another relation.

f) In Data Warehouse, data is transformed to reconcile semantic Mismatches.

g) An algorithm is scalable if the running time grows in proportion to the dataset size, holding the available system resources constant.

Q3) Attempt the following (any five) : **[5 × 2 = 10]**

a) What do you mean by vertical partitioning of BCNF Relations?

b) With the help of example, explain the concept of serializability.

c) Illustrate the concept of Fuzzy checkpoint.

d) What is pipelined parallelism?

e) Describe the storage and Access methods in ORDBMS.

f) Draw a diagram of Typical Data Warehouse Architecture.

g) What are the steps of KDD process?

Q4) Attempt the following (any four) : **[4 × 5 = 20]**

a) For each of the following queries, identify one possible reason why an optimizer might not find a good plan. Rewrite the query so that a good plan is likely to be found.

i) No index is available

```
SELECT Avg (E.Sal)
FROM Employee E
GROUP By E.dno
HAVING E.dno = 22
```

ii) The sid in reserves is a foreign key that refers to sailors.

```
SELECT S.sid
FROM sailors S, Reserves R
WHERE S.sid = R.sid
```

b) Consider the following actions taken by transaction T1 on database objects X and Y :

R(X), W(X), R(Y), W(Y)

i) Give an example of another transaction T2 that, if run concurrently to transaction T without seme form of concurrency control, could interfare with T1.

ii) Explain how the use of strict 2PL would prevent interference between the two transactions.

iii) Strict 2PL is used in many database systems. Give two reasons for its popularity.

c) Consider the following classes of schedules : Serializable, conflict-serializable, view-serializable, recoverable, avoids-cascading-aborts, and strict. For each of the following schedules, state which of the preceding classes it belongs to. If you cannot decide whether a schedule belongs in a certain class based on the listed actions, explain briefly.

i) T1 : R(X), T2 : W(X), T1 : W(X), T2 : Abort, T1 : Commit

ii) T1 : R(X), T2 : W(X), T1 : W(X), T2 : Commit, T1 : Commit

d) Consider the execution shown in following figure. In addition, the system crashes during recovery after writing two log records to stable storage and again after writing another two log records

LSN		Log
00		begin-checkpoint
10		end-checkpoint
20		update : T1 writes P1
30		update : T2 writes P2
40		update : T3 writes P3
50		T2 commit
60		update : T3 writes P2
70		T2 end
80		update : T1 writes P5
90		T3 abort
		CRASH, RESTART

i) What is the value of LSN stored in the master log record?

ii) What is done during Analysis?

iii) What is done during Redo?

iv) What is done during Undo?

e) Consider the following sequences of actions, listed in the order they are submitted to the DBMS :

Sequence S1 : T1 : R(X), T2 : W(X), T2 : W(Y), T3 : W(Y)
T1 : W(Y), T1 : commit, T2 : commit, T3 : commit

Sequence S2 : T1 : R(X), T2 : W(Y), T2 : W(X), T3 : W(Y)
T1 : W(Y), T1 : commit, T2 : commit, T3 : commit

for each sequence and for each of the following concurrency control mechanisms, describe how the concurrency control mechanism handles the sequence. Assume that the timestamp of transaction Ti is i.

i) Timestamp concurrency control with buffering of reads and writes and the Themas Write Rule.

ii) Multiversion concurrency control.

Q5) Attempt the following (any four) : **[4 × 5 = 20]**

a) How to use Benchmark?

b) In detail, explain Optimistic Concurrency Control.

c) Write a short note on ARIES.

d) What is Distributed Catalog Management?

e) Describe the functionality issues and efficiency issues in ORDBMS query processing.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P972

[3934] - 44

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

CS - 405 : Management Information System and Decision Support System

(Old) (2005 Pattern) (Sem. - IV)

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

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***All questions carry equal marks.***

Q1) Attempt the following (any four) : **[4 × 4 = 16]**

a) What do you mean by system stress?

b) What is the value of Information in decision making?

c) What is the meaning of system performance? How do you measure efficiency and effectiveness of the system?

d) Explain the role of control in system.

e) What are the limitations of Human Information Processing?

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

a) Explain prototyping life cycle approach for MIS Design.

b) Explain Information system for operational control.

c) How to improve the quality of decision making?

d) What is sensitivity analysis? Discuss its importance.

e) Explain integrated EIS and DSS.

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

a) Open system Vs. Closed system.

b) Data processing Vs. Information processing.

c) MIS Vs. DSS.

d) Decoupling Vs. Simplification.

e) Short term memory Vs. Long term memory.

P.T.O.

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

a) What is Information system for management control?

b) Explain Information system for strategic planning.

c) What is the role of DSS in MIS?

d) How DSS support decision making under stress?

e) Explain the needs of EIS.

Q5) Write a short note on (any four) : **[4 × 4 = 16]**

a) Decomposition.

b) Error and Bias.

c) MIS Design Approaches.

d) Feedback control.

e) Human as an Information Processor.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P973

[3934] - 51
M.C.A. (Science Faculty)
CS - 501 : Mobile Computing
(Old) (2005 Pattern) (Sem. - V)

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

Instructions to the candidates:

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

Q1) Attempt any four of the following : **[16]**

a) What are the advantages and disadvantages of wireless networking?
b) Define small scale fading. Compare fast fading with slow fading.
c) Why CSMA/CD scheme fails in wireless networks? Give reasons.
d) Explain the process of client initialization using DHCP.
e) Why baseband signals cannot be directly transmitted in a wireless system.

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

a) Explain Direct sequence spread spectrum with its advantages and disadvantages.
b) What is multipath propagation effect? What are the causes behind this effect?
c) Explain MACA protocol. State its advantages and disadvantages.
d) Explain Indirect-TCP with its advantages.
e) Explain the architecture of Wireless Application Protocol.

Q3) Answer any four of the following : **[16]**

a) Explain system architecture of IEEE 802-11.
b) Define Ad-hoc network, hard hand off, soft hand off and cell dragging.
c) Compare SDMA and TDMA.
d) Explain the process of delivery of IP packets to Mobile Node.
e) What is pulse shaping? Why it is needed? State any two pulse shaping techniques.

P.T.O.

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

a) Explain Mobile-TCP and state its advantages and disadvantages.

b) What is reverse tunneling? What are the problems associated with reverse tunneling.

c) Explain 4 phases of HIPERLAN 1 access scheme.

d) Explain Phase Shift Keying (PSK). State its advantages.

e) Define Bet rate, signaling rate, synchronous transmission and line coding.

Q5) Answer any four of the following : **[16]**

a) Explain packet reservation multiple access protocol.

b) Explain handover mechanism used in HIPERLAN 2.

c) Explain CDMA with example.

d) What are advantages and disadvantages of cellular structure?

e) Explain frequency hoping with its advantages and disadvantages.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P974

[3934] - 52
M.C.A. - III (Under Science Faculty)
COMPUTER SCIENCE
CS - 502 : Expert System
(2005 Pattern) (Sem. - V) (Old)

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

Instructions to the candidates:

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

Q1) Attempt any 4 of the following : **[4 × 4 = 16]**

a) What do you mean by knowledge base? Give any eg. for showing facts and rules in a simple knowledge base.
b) Explain Radian Rule.
c) Explain Analogical Reasoning Architectures.
d) What are the main advantages in keeping knowledge base separate from the control module in knowledge based system?
e) Explain the features of a good knowledge base system building tool.

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

a) Explain why robustness in a learner is important in real world environment.
b) Explain why a learning component should have a scope.
c) Describe the general learning model.
d) Explain rote learning and learning by being told.
e) Knowledge Acquisition is difficult. Why?

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

a) Describe learning Automata & its components.
b) Write a short note on perceptron model.
c) How a learning automata is being used in temperature control setting for your office each morning?
d) Define & describe CLA.
e) Write a short note on intelligent editors.

P.T.O.

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

a) Describe the terms :

i) Object ii) Induction

iii) Concept iv) Selective and constructive induction.

b) What is inductive bias? Describe it with 3 egs.

c) Work out an eg. of concept learning network structures. The concept to be learned is the concept Arch. Create both positive & negative training egs.

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

a) Write short note on :

i) Simulated Annealing.

ii) Hop field network model.

b) Describe Supervised & Unsupervised learning.

c) Describe knowledge acquisition & give an eg. for each of the following types of knowledge

i) a fact. ii) a rule

iii) a concept. iv) a procedure

v) a relationship

❖ ❖ ❖ ❖

Total No. of Questions : 5] **[Total No. of Pages : 2**

P975

[3934] - 53

M.C.A. - III (Under Science Faculty)

COMPUTER SCIENCE

CS - 503 : Software Project Management

(2005 Pattern) (Sem. - V) (Old)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions are compulsory.***

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

a) Explain in details project management tools.

b) Explain about fundamental design concepts.

Q2) Attempt any two of the following : **[2 × 4 = 8]**

a) Explain metrices for S/W quality and productivity.

b) Write a note on Static Analysis.

c) How risk can be identified? Discuss risk reduction method.

Q3) Write a short note on any three of the following : **[3 × 4 = 12]**

a) Testing techniques.

b) Phased life-cycle model.

c) Maintenance tools and Techniques.

d) Tools for S/W project scheduling.

Q4) Attempt any four of the following : **[4 × 8 = 32]**

a) Explain software Acquisition.

b) Explain in brief software Architecture.

c) What are do's and don'ts of good coding style?

d) Explain any four common problems and solutions in the software development process.

e) Explain in detail single entry, single exit construct.

P.T.O.

Q5) Justify the following : **[4 × 3 = 12]**

a) 'Project manager tries to reduce high staff turnover'.

b) Varification is fundamental concept in S/W design.

c) 'Make a module too general too restrict'.

d) User are more involved in system prototype method.

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Total No. of Questions : 5] **[Total No. of Pages : 3**

P976

[3934] - 54
M.C.A. - III (Science Faculty)
COMPUTER SCIENCE
CS - 504 : Advanced Modeling Techniques
(2005 Pattern) (Sem. - V) (Old)

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) Case study : **[16]**

A computerized system is to be designed for a system where several authors can write a book simultaneously over a network. A book has several chapters which in turn will have sections & sub-sections. Authors can add data in form of paragraphs to existing sub-sections or if needed, add new sub-sections (sections, chapters etc). Authors can delete (modify) data added by all authors. However one of the author is designated as editors, who can add, modify, delete paragraphs added by any author ie. that author can add, remove statements or even words.

Apart from the pages containing the chapters, there are other pages such as preface, forward, index, references, contents etc. Authors can add these pages or existing pages can be modified model above system using UML techniques & draw the following diagrams :

a) Class diagram.
b) Use case diagram.
c) Sequence diagram.
d) Activity diagram.

Q2) Attempt <u>any two</u> of the following : **[2 × 4 = 8]**

a) Write a short note on UML?
b) A role name is a name that uniquely identifies one end of association, comment.
c) Discuss the different steps used in constructing object model in analysis phase.

P.T.O.

Q3) Attempt any three of the following : **[3 × 4 = 12]**

a) Explain the usage of component diagram by giving suitable example.

b) What is metamodel? Explain with an example.

c) What are different types of relationships supported by UML?

d) How a system can be divided into subsystems?

Q4) State whether true or false. Justify (any six) : **[6 × 2 = 12]**

a) Association can be recursive.

b) Actors in use case diagram are persons who interact with system.

c) UML is mainly used for software systems.

d) An abstract class is a class that can have direct instance.

e) Messages in collaboration diagram are numbered.

f) Multiplicity is key factor in association.

g) Entities in E-R model are the same as objects in object model.

h) A data store must have at least one data flow into it and one dataflow out of it.

Q5) Attempt any four of the following : **[4 × 8 = 32]**

a) Prepare a class diagram for a system for distributing electronic mail ore a network is needed. Each user of the system should be able to send mail from any computer account & receive mail on one designated account. There should be provision for answering or forwarding mail, as well as saving messages in files or printing them. Also users should be able to send messages to several other users at once through distribution list. Each computer on the network should hold any messages send to other computers which are down.

b) Draw state diagram & activity diagram for ice-create preparing machine. Consider different scenarios. You can get different flavours.

c) Prepare a class diagram showing at least eight relationships among the following classes. Include associations, aggregations & generalization. show multiplicity you may add additional attributes if necessary. Add atleast one attribute to each class.

Expression, constant, variable, function, argument list, relational operators, term factor, arithmetic operator, statement, program.

d) Prepare a DFD for a system for processing results of students. The student fills in the examination form giving details about subject & centre etc which is an input to the system student pays examination fees & given fee receipt & the admit card examination is conducted at various centres. Centres provide the absentee report. The evaluation department provides marks of students in each subject. The mark sheet and the merit list are the outputs of the system.

e) If a personal computer, a disk controller is typically used to transfer a stream of bytes from a floppy disk drive to a memory buffer with the help of CPU. The controller signals the CPU each time a new byte is available. The data is then read & stored before another byte is ready. The disk controller senses that data is read & signals that data is not available. If any byte is not read before the next byte comes along the disk controller goes into data lost error state. The host can then reset the disk controller back into data not available state to continue the process. Draw a sequence diagram showing normal & exceptional flow in data transfer in the data controller.

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P979

[3934] - 103

M.C.A. (Under Science Faculty)

MATHEMATICS

CS-103 : Mathematical Foundation

(New Course) (Sem. - I) (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.***

Q1) Attempt any four of the following: **[16]**

a) Let A = {*a, b, c, d*}, B = {1, 2, 3}. How many one-one functions are there from set A into set B? How many onto functions are there from set A into set B? Justify your answer.

b) Prove that $(A \cap B)^c = A^c \cup B^c$.

c) Let *m* and *n* be the number of elements in sets A and B respectively. Prove that the number of elements in a set A x B is *mn*.

d) Give an example of a function which does not have an inverse. Justify.

e) Let 'N' be an equivalence relation on a set A. Prove that any two equivalence classes are either identical or disjoint.

f) Give an example of a relation which is antisymmetric but not symmetric. Justify.

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

a) Whether function *f*: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \to R$, defined as $f(x) = \tan x$ is one-one and onto? Justify. Also, find the range of function *f*.

b) Let *a, b, p* $\in$ Z, *p* be a prime.
If *p*/(*ab*) then prove that either *p*/*a* or *p*/*b*.

c) Find greatest common divisor of 4999 and 1109. by Euclidean algorithm.

d) Let *a, b, m* $\in$ Z, $m \neq 0$.
If $a \equiv b \pmod m$ then prove that $a^k \equiv b^k \pmod m$, for $k \in N$.

e) Find all solutions of the congruence equation
$9x \equiv 21 \pmod{30}$.

f) Find the solution for the following system of congruences.
$x \equiv 2 \pmod 3$, $x \equiv 3 \pmod 5$ and $x \equiv 2 \pmod 7$.

P.T.O.

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

a) Find the quotient and the remainder when the polynomial $q(x) = x^5 + 3x^3 + 2x + 1$ is divided by $x^3 + 2x + 3$

b) Find all roots of the polynomial,
$f(x) = x^4 + 2x^3 - 17x^2 - 2x + 15$.

c) Find order of the following permutation.

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 4 & 3 & 7 & 5 & 1 & 2 & 6 & 8 \end{pmatrix}$$

d) Define odd permutation and hence determine whether the following permutation σ is even or odd? Is the inverse of σ an odd permutation? where

$$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 4 & 3 & 7 & 5 & 1 & 2 & 6 & 8 \end{pmatrix}$$

e) Write a composition table for the set $Z_5 - \{\overline{0}\} = \{\overline{1}, \overline{2}, \overline{3}, \overline{4}\}$ with operation multiplication modulo 5 (X_5). Whether X_5 is a binary operation on $Z_5 - \{\overline{0}\}$? Justify

f) Prove that U(9) = $\{\overline{1}, \overline{2}, \overline{4}, \overline{5}, \overline{7}, \overline{8}\}$ is a group with respect to the operation multiplication modulo 9 (X_9)

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

a) Let G be a group. If $x^{-1} = x$, $\forall\ x \in G$, then prove that G is abelian.

b) Find the inverse of the following matrix by adjoint method.

$$A = \begin{bmatrix} -1 & -2 & 3 \\ -2 & 1 & 1 \\ 4 & -5 & 2 \end{bmatrix}$$

c) Solve the following system of equations by Cramer's rule.
$x + 2y + 3z = 14$; $2x - y + 5z = 15$; $3x - 2y - 4z = -13$.

d) Give an example of a relation which is symmetric but neither reflexive nor transitive. Justify.

e) Define composition of two functions.

Let $f(x) = 2x + 3$ and $g(x) = x^2 - \frac{1}{x} + 2$. Find fog.

f) Find the remainder when 9^{201} is divided by 10.

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

a) Show that $p \wedge (q \vee r)$ and $(p \wedge q) \vee (p \wedge r)$ are logically equivalent by truth table.

b) Show that $\neg (p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.

c) What is the truth value of $\exists x(x^2 \leq x)$ if the domain consists of all real numbers? What is the truth value of this statement if the domain consists of all integers? Justify.

d) Prove the following statement by method of contradiction. "If $3n+2$ is odd then n is odd".

e) Show that the equation $x^2 + 3y^2 = 8$ has no solution in integers by the method of exhaustive proof.

f) i) Let Q(x, y) denote the statement "$x^2 = y - 3$". What are the truth values of the propositions Q(1, 2) and Q(3, 0).

ii) Translate the following sentence in symbolic form.

"Some lawyers who are politician are not congressmen".

Total No. of Questions : 5] **[Total No. of Pages : 3**

P987

[3934] - 303

M.C.A. - II (Science Faculty)

COMPUTER SCIENCE

CS-303 : Introduction to System Programming & Operating System Concepts

(Sem. - III) (2008 Pattern) (New)

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

Instructions to the candidates:

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

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

a) What is assembler?
b) Explain multiprocessor system (parallel system).
c) What is pthreads?
d) Explain linked allocation method in file system.
e) What is spooling process?
f) What are compile-time, load-time, execution-time binding?
g) Explain any two schedulars:
   i) Long term ii) Short term iii) Medium term schedular
h) What is semaphores?

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

a) Define the essential properties of the following types of operating systems:
   i) Batch ii) Time sharing
   iii) Real time iv) Distributed.
b) Consider the following processes with the length of CPU burst time given in millisec. & their arrival times in millisecond.
   What is the average waiting time and turnaround time for these processes with preemptive SJF scheduling algorithm?

Process	Arrival Time	Burst-time
P_1	0.0	7
P_2	2.0	4
P_3	4.0	1
P_4	5.0	4

P.T.O.

c) Write a note on PCB.

d) What are the necessary conditions for a deadlock to occur?

e) Explain the purpose of file attributes.

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

a) Let head of a moving disk with 200 tracks numbered from 0 to 199 is currently at 80. It has served the previous request at 70. Consider the queue of requests as follows:

100, 40, 25, 60, 120, 90, 110.

Compute the total head movements using

SSTF and LOOK algorithm.

b) What is a resource allocation graph? What is its role in dealing with deadlock?

c) What is critical section?

d) Explain priority scheduling algorithm.

e) Explain contiguous memory allocation method.

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

a) Consider the following snapshot of a system. A system has 5 processes P_0 through P_4 and three resource types A, B, C.

Resource type 'A' has 10 instances, 'B' has 5 & 'C' has 7 instances.

Process Name	Allocation	Max	Available
	ABC	ABC	ABC
P_0	010	753	332
P_1	200	322	
P_2	302	902	
P_3	211	222	
P_4	002	433	

Answer the following questions using Banker's Algorithm.

i) What is the content of Matrix Need?

ii) Is the system in a safe state?

b) Explain the scheduling criteria followed for different CPU scheduling algorithms.

c) Explain dining philosopher's problem.

d) Write a note on file operations.

e) Compare and contrast different memory allocation methods.

First Fit, Best Fit and Worst Fit.

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

a) Consider the following reference string:

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

How many page faults occurs for the following algorithms.

i) LRU

ii) Optimum

Number of frames = 3.

b) Write a note on counting.

c) Explain deadlock recovery techniques.

d) Write a note on Multi level Queue Scheduling.

e) Explain the concept of bounded buffer.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P988

[3934] - 304

M.C.A. (Science Faculty)

COMPUTER SCIENCE

CS-305 : Event Driven Programming (Win32 SDK)

(2008 Pattern) (New Syllabus) (Sem. - III)

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

Instructions to the candidates:

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

Q1) A college database stores information about teachers. Such as tid, tname, dept etc., in a data source named 'tedata'. Write a SDK program which is menu driven having following facilities: **[12]**

- Displays list of teachers streamwise.
- Displays list of departments, on selecting a particular department, displays all teachers from that department.
- Delete a teacher.

(Make use of ODBC APIs. WinMain not needed)

Q2) Write program statements using Win 32 APIs for any four of the following: **[4 × 5 = 20]**

a) Display caret at the center of the client area and should be moved to appropriate direction by one pixel whenever left, right, up, and down arrow keys are pressed.

b) Display Vertical Scroll Bar and add keyboard interface to it.

c) Display "Hello World" message at a position wherever left mouse button is pressed and erased when released.

d) Capturing the mouse for an application Window.

e) Displays a text box in which user can type 'n' characters and then upon pressing 'ok' button shows the value of 'n' in another text box.

P.T.O.

Q3) Answer in brief, any eight: **[8 × 2 = 16]**

a) Give syntax of Win32 API to create a new thread.

b) Which header files are included in Windows.h.

c) What is the size of PSTR and LPSTR data type in 32-bit version of windows. Why?

d) Why iLength parameter is needed in Textout API?

e) How to obtain Width and Height of characters in the system font?

f) Differentiate: Get DC vs. BeginPaint.

g) What do you mean by message Q threads and non-message - Q threads. How are they same?

h) Give syntax of API used to obtain handle to a popup menu.

i) What are the contents of lParam and wParam for WM - SIZE message?

j) What is the use of WINAPI in Win Main declaration.

Q4) Justify True/False : (any Six) **[6 × 2 = 12]**

a) 32-bit programs are more immune to certain problem involving threads than 16-bit?

b) RepeatCount is always one for key up messages.

c) The effect of HideCaret is additive.

d) Windows 98/NT are non preemptive multitasking environments.

e) GetAsyncKeyState API is used for real-time keyboard status check.

f) Program can call WndProc indirectly.

g) A 'false' value in the last argument of Invalidate Rect API will not erase the background.

h) For scroll bars created as a part of window, one can safely ignore lParam.

Q5) Attempt any Four: **[4 × 5 = 20]**

a) How to create Persistent Storage for threads which is unique to each thread?

b) How DLL can contain some memory that is shared among various applications?

c) How to link a program with a library module while the program is running?

d) Why Queues are used and how synchronization is achieved for keyboard messages?

e) What do you mean by deserialized message queue? Explain.

Total No. of Questions : 5] **[Total No. of Pages : 3**

P989

[3934] - 401

M.C.A. (Under Science Faculty)

CS 401 : INTRODUCTION TO UNIX AND UNIX INTERNALS

(2008 Pattern) (New) (Sem. - IV)

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) Write a shell command which finds all the word "printf" from given files a.c. and b.c. Write this output to file output .txt.

b) What do you mean by processor execution level?

c) Give physical layout of Unix file system.

d) What do you mean by operating system trap?

e) Under which circumstances kernel will insert the buffer at the beginning of free list.

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

g) What are the contents of mount table entry?

h) Which formula is used by kernel to calculate a priority of a process running in user mode using fair share schedular.

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

a) The kernel is not separate set of processes that run in parallel to user processes.

b) An Incore Inode is on free list if and only if it is unlocked.

c) If a process is waiting to write named pipe and there are no more reader processes, there will never be a reader process.

d) Every process has a private u area, yet the kernel accesses it as if there were only one u area in the system.

e) Freerey never called for sticky bit text region.

P.T.O.

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

a) Explore the race condition for locked buffer.

b) If a process wants to access byte offset 37775g in a file, find block number and byte offset in that block.

c) Explore the race condition in unlink system call.

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

e) List all functions performed by clock interrupt handler.

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

a) Explain the behaviour of the following program.

```
# include <fentl.h>
main ( )
{  int fd;
   char b1[20], b2[512], b3[1024];
   fd = open ("/etc/passwd", O_RDONLY);
   read (fd, b1, 20);
   read (fd, b3, 1024);
   read (fd, b2, 512);
}
```

b) Write a C program where parent and child process share file.

c) Write a shell script to accept a file name from user and check whether it is directory, regular readable file or regular writeable file. Give appropriate message accordingly.

d) Explain the behaviour of the following program.

```
main ( )
{  char * end pt;
   char *  sbrk( );
   int brk ( );
   end pt = 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) Explain the behaviour of the following program

```
main ( )
{  f( );
   g( );
}
f( )
{  V for k ( );
}
g( )
{  int blast [100], i;
   for (i = 0; i < 100; i++)
       blast [i] = i;
}
```

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

a) Explain any two events for sleep that are sure to happen and one event that are not sure to happen.

b) What is region? Explain the information of region table entry.

c) Describe what operations kernel does during execution of exit system call.

d) Explain the working of page stealer process.

e) Explain various data structures (with suitable figures) which gets updated after execution of process A and process B.

Process A

fd_1 = open ("/etc/passwd", O_RDONLY);

fd_2 = open ("local", O_RDWR);

fd_3 = open ("/etc/passwd", O_WRONLY);

fd_4 = dup (fd_1);

Process B

fd_1 = open ("/etc/passwd", O_RDONLY);

fd_2 = open ("private", O_RDONLY);

Total No. of Questions : 5] **[Total No. of Pages : 2**

P990

[3934] - 402

M.C.A. - II (Science Faculty)

COMPUTER SCIENCE

CS 402 : Advanced Networking and Mobile Computing

(2008 Pattern) (New) (Sem. - IV)

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

Instructions to the candidates:

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

Q1) Attempt ALL: **[8 × 2 = 16]**

a) List any Four protocols which uses services of TCP.

b) What is smooth handover in mobile IP?

c) What is the size of window for host A if the value of rwnd is 3000 bytes and the value of cwnd is 3500 bytes?

(rwnd is receivers window cwnd is congestion window)

d) What are the main goals of GSM system?

e) In what situation mobile IP requires DHCP? How IPV_6 solves the problem of addressing for mobile IP?

f) What is good code for CDMA?

g) How is HTTP similar to FTP?

h) Why TELNET uses NVT ASCII coding?

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

a) Explain architecture of Electronic Mail using MTA and MAA.

b) What are the advantages and disadvantages of mobile TCP?

c) Compare SDMA and FDMA.

d) Describe the functions of MS and SIM. How and where is user related Data represented/stored in GSM system?

e) What are the location dependent services possible in mobile wireless network?

P.T.O.

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

a) Explain GPRS architecture with all its components.

b) What are the issues to be considered while connecting different LANs using bridges?

c) Why routing in multihop ad-hoc networks is complicated?

d) Explain WAP push architecture with proxy gateway.

e) Why do we need a DNS system when we can directly use an IP address? Name any four generic domains along with their purpose.

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

a) What type of service does UDP provides to the application? If UDP is so powerless, why would a process want to use it?

b) What is reverse tunneling? Why it is needed?

c) Why baseband signal can not be transmitted as it is in the wireless network?

d) Explain architecture of WAP.

e) What are the three types of web documents? What are the ways of creating such documents?

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

a) Why handover is required in GSM? What are the different handover scenarios possible in GSM?

b) Explain architecture of bluetooth.

c) What is triangular routing? How this problem can be resolved in mobile IP?

d) How TCP uses three-way handshaking for connection termination? When half-open/half-closed connection is possible?

e) Why FTP is required? Why FTP uses two separate connections? What type of data is exchanged using data connection?

Total No. of Questions : 4] **[Total No. of Pages : 4**

P991

[3934] - 403

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

CS - 403 Distributed Database Systems

(Sem. - IV) (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 carry equal marks.***
4) ***All questions are compulsory.***

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

a) What is fragmentation? Why is it necessary in DDBMS?

b) What is Query decomposition? List different steps in query decomposition.

c) Select Ename, Pname

from Emp, Asg, Proj

Where duration > 12

and Emp. eno = Asg. eno

and Proj. Pno = Asg. Pno

Where relations Emp(eno, ename, title)

Asg(eno, pno, duration, resp)

Proj(pno, pname, budget, Loc)

Draw a query graph for the above query.

d) Define: i) Autonomy ii) Heterogeneity

e) State different alternatives for implementing LRM algorithms.

f) Explain: i) Serializability ii) Atomicity

g) Justify true or false. Replication of data in DDBMS reduces reliability of distributed data.

h) State different types of failures in DDBMS.

P.T.O.

Q2) Attempt any four: **[4 × 5 = 20]**

a) Explain client server architectural Model.

b) Explain correctness rule of fragmentation.

c) Define transaction. Explain different types of transactions.

d) What is distributed DBMS? Explain different layers of transparency.

e) Explain layers of query processing.

Q3) Attempt any four: **[4 × 6 = 24]**

a) Assume that relation Proj is fragmented as follows:

$\text{Proj 1} = \sigma_{pno} \leq \text{“}p_2\text{”}\ (\text{PROJ})$

$\text{Proj 2} = \sigma_{pno} > \text{“}p_2\text{”}\ (\text{PROJ})$

Further more relation Asg is indirectly fragmented

$\text{Asg1} = \text{Asg}\ \alpha_{pno}\ \text{PROJ 1}$

$\text{Asg2} = \text{Asg}\ \alpha_{pno}\ \text{PROJ 2}$

and relation Emp is vertically fragmented as

$\text{Emp1} = \Pi_{eno,\ ename}\ (\text{EMP})$

$\text{Emp2} = \Pi_{eno,\ title}\ (\text{EMP})$

Transform the following query into a reduced query on fragments

Select ename
from Emp, Asg, Proj
Where Proj.Pno = Asg. Pno
and Emp. eno = Asg. eno
and Pname = “Instrumentation”.

[Note for “Instrumentation” Pno = P_1]

b) Let Q = $\{q_1$ ----- $q_5\}$ be a set of queries.
A = $\{A_1$ ---- $A_5\}$ be a set of attributes, and
S = $\{ S_1, S_2, S_3\}$ be a set of sites. The matrix (a) represents the attribute usage matrix and matrix (b) represents access frequencies. Find the attribute affinity matrix. Assume that refi (qk) = 1 $\forall$ qk & si and A_1 is the key attribute.

	A_1	A_2	A_3	A_4	A_5
q_1	0	1	1	0	1
q_2	1	1	1	0	1
q_3	1	0	0	1	1
q_4	0	0	1	0	0
q_5	1	1	1	0	0

(a)

	S_1	S_2	S_3
q_1	10	20	0
q_2	5	0	10
q_3	0	35	5
q_4	0	10	0
q_5	0	15	0

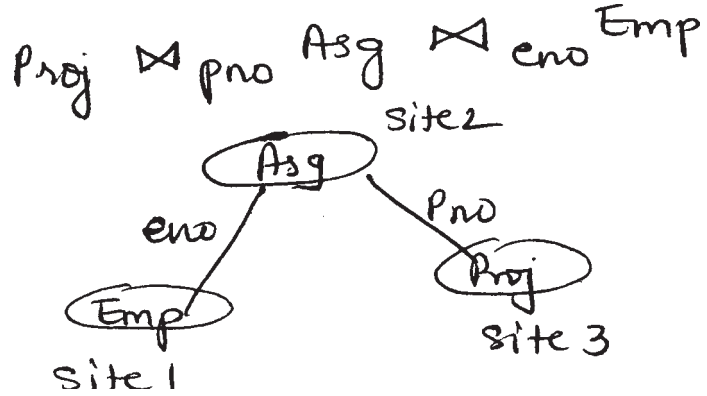
(b)

Use bond energy & vertical fragmentation algorithm to obtain vertical fragmentation.

c) Simplify the following query using idempotency rules.

```
Select title
from emp
Where (NOT)(title = "programmer")
and (title = "programmer')
or (title = " Electrical Engg")
and (NOT (title = "electrical Engg"))
or Ename = "John"
```

d) Consider the join graph given below for the relational algebra query.



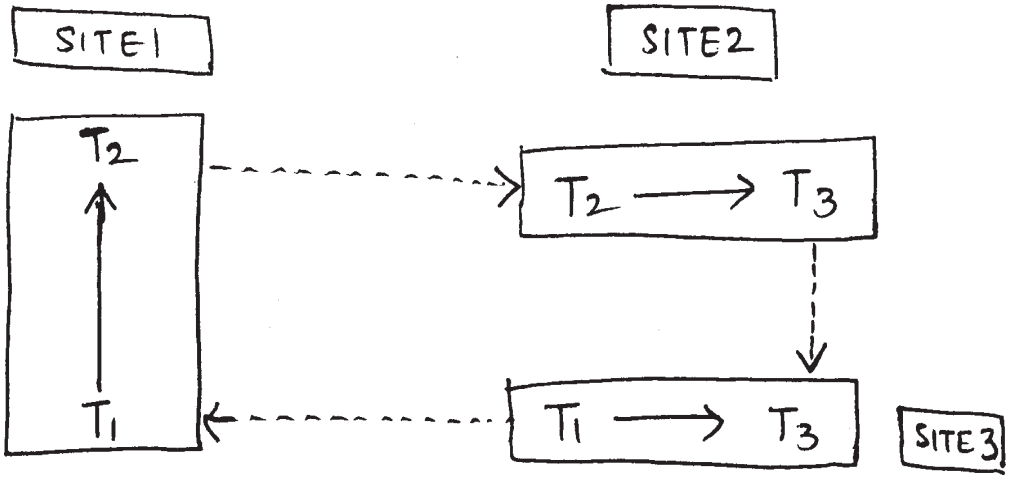
Using the information given below, describe a join program that will need minimum data transfer.

Size (Emp) = 100 Size (Asg ⋈ Emp)= 300

Size (Asg) = 200 Size (Asg ⋈ Proj) = 200

Size (Proj) = 300

e)



Consider the DWFG given above. Detect the deadlock using the distributed deadlock detection diagram.

Q4) Attempt any four: **[4 × 5 = 20]**

a) State different LRM algorithms. Explain any one in detail.

b) Explain Centralized 2PL and distributed 2PL algorithms.

c) Explain 2 phase commit protocol.

d) What is a deadlock? Explain deadlock handling methods.

e) Write a short note on Semijoin strategy for query processing in DDBMS.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P992

[3934] - 404

M.C.A. (Sem. - IV) (Under Science Faculty)

COMPUTER SCIENCE

CS-405 : Object Oriented Software Engineering

(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 carry equal marks.***
4) ***All questions are compulsory.***

Q1) Case Study: **[16]**

A system is to be designed for a general store dealing in various items. Members enjoy various facilities and can purchase items as and when they need them. The store has several counters and one can get almost all kinds of items after visiting these counters.

A person can become a member by paying initial membership amount. A credit card is then issued to him/her. He/she can pay the outstanding amount on quaterly basis. System sends a reminder to the members. Defaulters are not allowed to purchase the items until the pending amount is cleared. Model this system using UML techniques & draw the following diagrams.

1) Class diagram
2) Use case diagram
3) Activity diagram
4) Collaboration diagram

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

a) Explain the significance of notes in object diagrams.

b) Write a short note on white bon testing.

c) Discuss the advantages of UML.

d) Explain iterative development cycle of unified process.

e) Explain grouping elements of UML.

P.T.O.

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

a) Write note on object design process.

b) What is a qualifier? Explain with suitable eg.

c) Explain : error, fault & failure.

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

e) What is an agile process?

Q4) State True/false and justify your answer (any 4): **[4 × 4 = 16]**

a) Messages in collaboration diagram are numbered.

b) A dependency is a structural relationship.

c) Component is a physical and non-replaceable part of a system.

d) An event has no duration.

e) Meta class instances are object classes.

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

a) People use elevators to nove from one floor to another. Discuss different scenarios and prepare a sequence diagram showing different events and event enchanges between objects.

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

c) Prepare object diagram showing atleast sin relationships among the following object classes. Show multiplicity and add atleast 6 attributes. File system, file directory. ASCII file, disk, ordinary file, drive, track.

d) Draw component diagram for E-mail system.

e) Consider a ATM for a banking system. Identify all the use cases & draw the use case diagram.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P1028

[3934]-504
M.C.A - III (Science Faculty)
COMPUTER SCIENCE
CS - 505 : Software Testing and Quality Assurance
(Sem. - V) (New) (2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsary.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***

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

a) What is module testing?

b) Define term "Indicator" with eg.

c) Define Stub.

d) Explain in short testing in client server architecture.

e) Define process capability ratio.

f) Write steps for drawing run charts.

g) Explain in brief formal technical review.

h) Why automated testing tools are used?

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

a) Differentiate between white & black box testing.

b) Explain cyclomatic complexity.

c) Discuss the differences between 3 major components of statistical methodology.

d) How are quality costs measured & collected in an organisation?

e) Differentiate between ISO 9000 & ISO 9001 standards.

P.T.O.

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

a) Write steps for deriving test cases.

b) What is integration testing?

c) What is meant by sampling distribution.

d) Explain regression testing with eg.

e) State the requirements of ISO 9001 standard.

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

a) What is six - sigma quality? Explain in detail.

b) Differentiate between validation & verification in SQA

c) Explain Testing process in detail.

d) What are the advantages of cause - and - effect diagram.

e) Explain statement coverage criterion in white box testing.

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

Write a short note on

a) SQA plan.

b) Testing for real time system.

c) Function oriented metrices.

d) Quality movement.

e) Junit & Loadrunner.

Total No. of Questions : 5] **[Total No. of Pages :4**

P977

[3934] - 101
M.C.A. (Under Science Faculty)
COMPUTER SCIENCE
CS - 101 : C Programming
(Sem. - I) (2008 Pattern) (New)

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

Instructions to the candidates:

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

Q1) a) Trace the output (any two) **[2 × 4 = 8]**

i)
```
main ( )
{
    int i = 0;
    while (i ++ < = 5);
    {
        printf (" %d", i);
    }
}
```

ii)
```
main ( )
{
    float a = 1.5;
    float *b, *c;
    b = & a;
    c = b;
    printf ("\n %u %u %u", a, b, c) ;
    printf ("\n %f %f %f %f %f", a,* (&a), *&a, *b, *c);
}
```

P.T.O.

iii)
```
main ( )
{
    func ( );
    func ( );
}
void func ( )
{
    auto int i = 0;
    register int j=0;
    static int k=0;
    i++; j++; k++,
    printf ("%d %d %d", i, j, k);
}
```

b) Find out the error and explain (any two) : **[2 × 4 = 8]**

i)
```
main ( )
{
    struct  abc.
    {    int i ;
    } ;
    abc A ;
    A.i = 25;
    printf ("%d", A-i);
}
```

ii)
```
main ( )
{    int × = 1;
    switch (x)
    {
        case 0 : x = 1;
        case 1 : x = 3;
        case 2 : x + = 4;
        case 3 : x = 2;
    }    default : x + = 2;
        print f ("\n %d", x);
}
```

iii)
```
# include < stdio.h >
# define PI 3.14
# define AREA (r, h) (PI * r * r * h);
void main ( )
{
        float a = AREA (3, 5);
        printf ("%f", a);
        printf ("Area is %c", AREA (AREA (2 ,3), 3,1)),
}
```

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

a) Compare break and continue with example.

b) Explain call by value and call by reference. Give an example of each.

c) What is the use of format specifier? List different types of format specifiers.

d) Explain the concept of function returning pointers and pointers to the function.

e) What are the static variables? What are the two types of static variables?

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

a) Write a function which accepts an integer & checks whether it is a palindrome or not.

b) Write a recursive function to calculate m^n.

c) Write a C program to accept a decimal number and convert it into hexadecimal.

d) Write a C program for matrix multiplication.

e) Write a C program to display first n prime numbers.

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

a) What is a pointer? Is division of two pointers allowed? Explain following operations on pointers with example.

   i) Decrement

   ii) Comparison

   iii) Indirection

b) Differentiate between malloc and calloc with example.

c) Write a short note on C preprocessor.

d) Write the use of fread ( ) and fwrite ( ) and explain its use.

e) What are the limitations of static memory allocations?

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

a) Write a C program to accept an integer from command prompt and calculate multiplication of digits.

b) Write a C program to create a file & reverse the contents of the file.

c) Write a C program to accept and display information of n parts (partno, description, qty, price) using structure.

d) Write a C program to create a file and display number of lines and number of characters.

e) Write a menu driven program for following options.

   i) Read 2 strings

   ii) Stringcompare

   iii) Stringconcat

Total No. of Questions : 5] **[Total No. of Pages :2**

P978

[3934] - 102

M.C.A. (Science Faculty)

CS - 102 : COMPUTER ARCHITECTURE

(Sem. - I) (New) (2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt any <u>four</u> : **[4 × 4 = 16]**

a) Draw and explain 4:1 multiplexer with active low strobe input.

b) What are interrupts? Explain the terms

i) Software interrupts ii) Hardware interrupts.

c) State the features of PCI bus.

d) What are parallel computer structures? Explain any one structure.

e) Explain internal structure of 80×87 arithmetic co-processor.

Q2) Attempt any <u>two</u> : **[2 × 8 = 16]**

a) Draw block diagram of IC-8255 and explain it in detail.

b) Explain the working of S-R flip-flop with logic diagram and truth table. What is the drawback of S-R flip flop? Explain how S-R flip flop can be converted into D flip-flop.

c) Explain with suitable example any four addressing modes of microprocessor.

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

a) Draw and explain 1:4 De-multiplexer with logic diagram.

b) What is the full form of ISA and EISA bus? Compare ISA and EISA bus.

c) What is DMA? Draw block diagram of DMA controller.

d) Explain the concept of pipelining with suitable example.

e) Explain with neat block diagram 'Register section' of 80486 microprocessor.

P.T.O.

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

a) State the features of USB bus.

b) Explain 3 to 8 line decoder using logic diagram.

c) With logic diagram, explain the working of 2-bit flash type Analog to Digital converter.

d) Explain I/o Interface with block diagram.

e) Draw and explain Decimal to BCD encodet.

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

a) Explain with neat diagram 3-bit binary counter using flip-flops. Differentiate between synchronous and Asynchronous counter.

b) Explain 3 bit R/2R Digital to Analog converter. Compare binary weighted Digital to Analog converter with R/2R type.

c) i) Explain any one parallel processing mechanism in uniprocessor computers.

ii) Explain 'Address Unit' of Intel 80286 microprocessor.

Total No. of Questions : 5] **[Total No. of Pages :6**

P980

[3934] - 104
M.C.A. - I (Under Science Faculty)
MATHEMATICS
CS - 105 : Graph Theory
(Sem. - I) (2008 Pattern) (New Course)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any four of the following : **[4 × 4 = 16]**

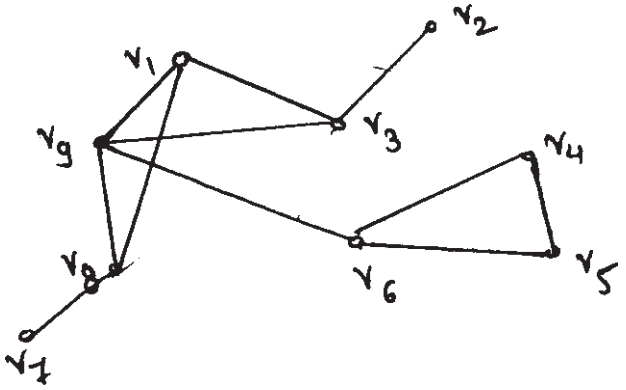
a) Explain Konigsberg problem.

b) Draw the following graphs.

i) Complete bipartite graph which is regular.

ii) Hamiltonian but not Eulerian graph.

c) Find all isthmus and cutvertices in the following graph.

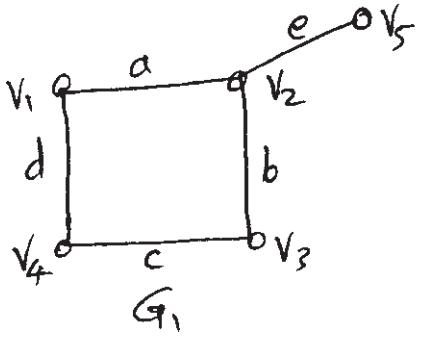


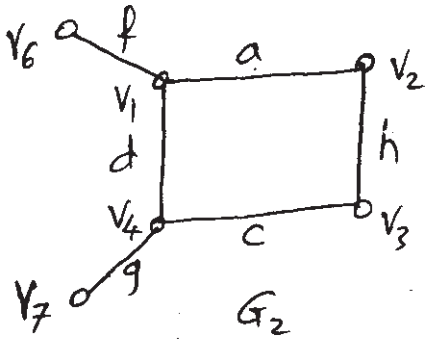
d) Draw the graph of following adjacency matrix and find complement of its underlying graph.

$$\begin{bmatrix} 2 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

P.T.O.

e) For the following graphs G_1 and G_2, find ring sum of G_1 and G_2.





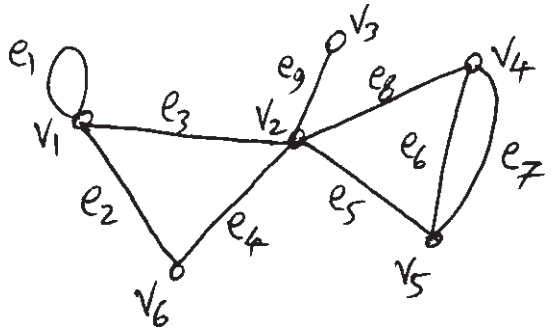
f) Solve the following recurrence relation

$a_{n+2} + 2a_{n+1} + a_n = 9\ (2^n)$, $a_0 = 2$, $a_1 = 4$.

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

a) A digraph has 6 vertices and 7 edges in which each vertex has out degree either equal to 1 or 2. Determine the number of vertices in this digraph of each out degree and draw such a digraph.

b) Draw two spanning trees for the following graph.



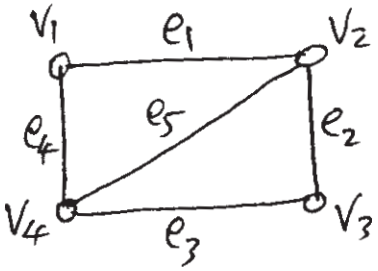
c) Any connected graph with n vertices and n–1 edges is a tree.

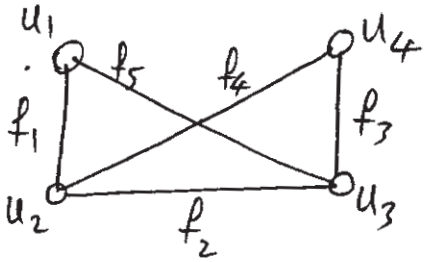
d) Find the number of ways of distributing 10 different books among 4 different shelves, so that each shelf gets at least 2 and at most 7 books.

e) Define the following :

i) Directed graph ii) Weighted graph.

f) Show that the following pair of graphs are isomorphic.

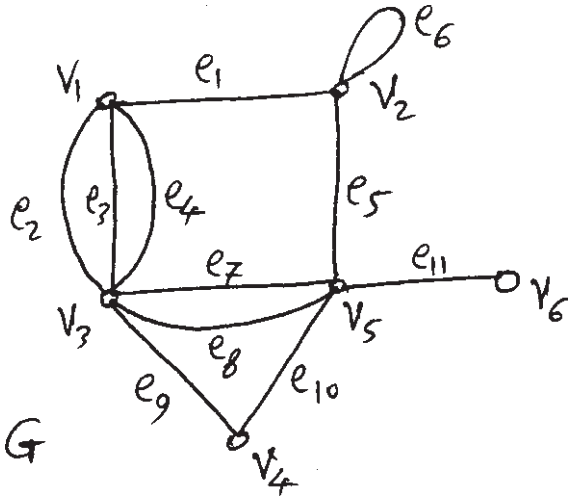




Q3) Attempt any four of the following : **[4 × 4 = 16]**

a) Let G be a simple *r*-regular graph with *e* edges. Prove that if *r* is odd then *r* divides *e*.

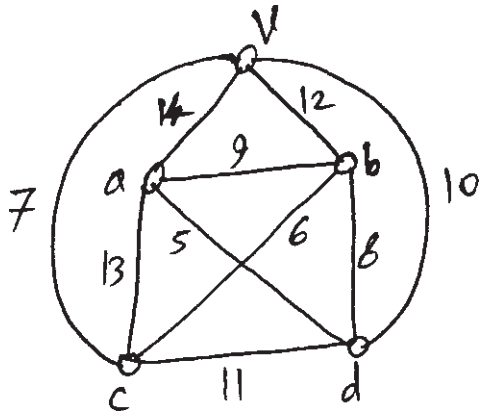
b) Let G be the graph given below. Find G [U] and G [F], where $U = \{V_2, V_3, V_4, V_5\}$, $F = (e_1, e_2, e_8, e_{11}\}$ and G [A] means G induced by set A.



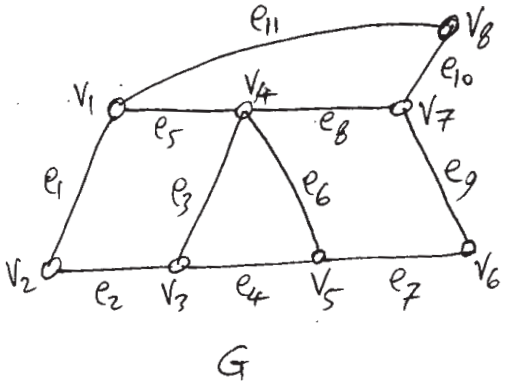
c) Let G be a simple graph with *n* vertices and *k* components. Let n_i be the number of vertices in the i^{th} component, $1 \leq i \leq k$. Then prove that.

$$\sum_{i=1}^{k} n_i^2 \leq (n-k)^2 + (2n-k).$$

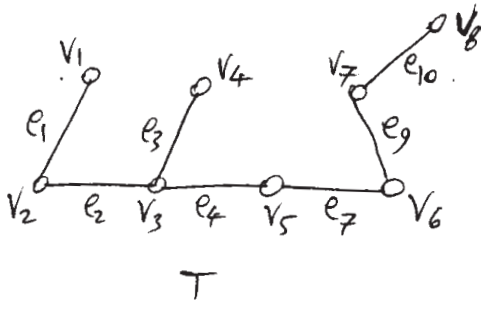
d) Solve the travelling salesman problem for a sales person based at *v* in the following graph.



e) List all fundamental circuits of the following connected graph(G) with respect to the given spanning tree (T).



G



T

f) Draw weakly connected and strongly connected digraph on four vertices.

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

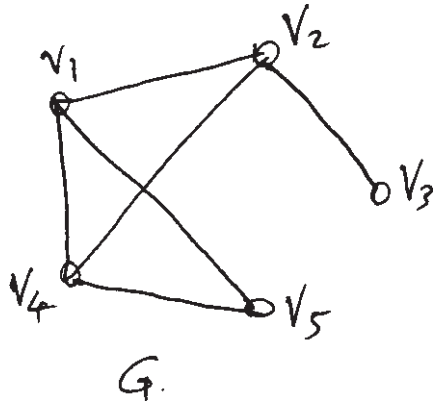
a) Draw the arborescence and express in polish notation, the expression $(3x + y)\,(6a - 3b)^2$.

b) Solve the recurrence relation,

$a_n = 3a_{n-1} + 4a_{n-2}$, for $n \geq 2$ and $a_0 = a_1 = 1$.

c) Write Prim's algorithm.

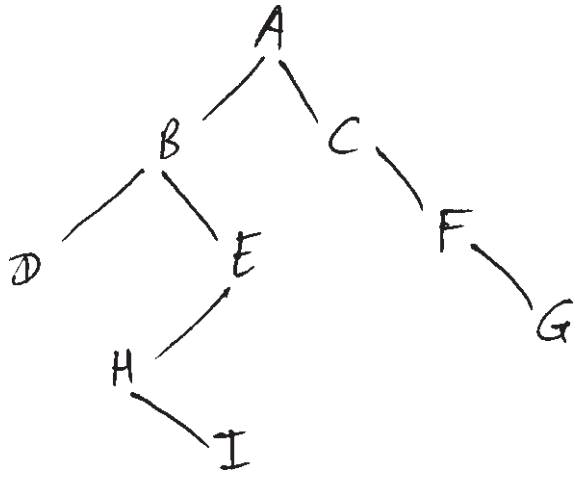
d) Fuse the vertices V_3 and V_5 of the following graph G and hence find diameter of the resultant graph.



G.

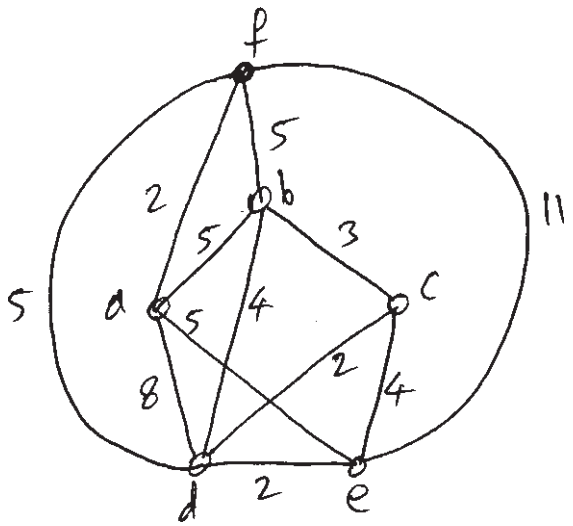
e) Find the maximum edge connectivity of a graph with 8 vertices and 16 edges.

f) Obtain preorder and postorder traversals for the following binary tree.



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

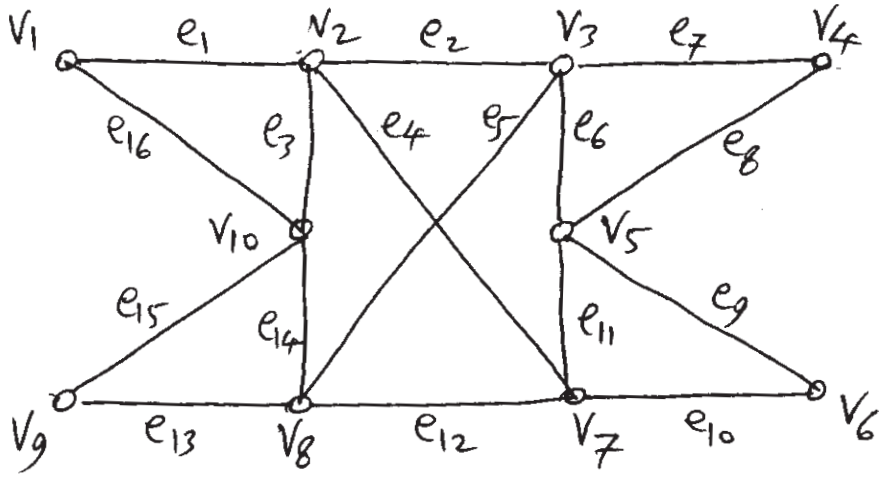
a) Using Dijkstra's algorithm. Find the shortest path from vertex 'a' to all vertices in the weighted graph below.



b) i) Determine the rank and nullity of the graphs, K_5 and $K_{2,3}$.

ii) A tree on *n* vertices with 2 vertices of degree 2, 1 vertex of degree 3 and 3 vertices of degree 4, find the number of vertices of degree 1.

c) Using Fleury's algorithm find Euler tour in the following graph G.



G

✪✡✪✡

Total No. of Questions : 5] [Total No. of Pages :2

P981

[3934] - 201

M.C.A. - I (Science Faculty)

COMPUTER SCIENCE

CS - 201 : Data and File Structures Using 'C'

(Sem. - II) (2008 Pattern) (New)

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

a) Explain linked list. State various types of linked lists.

b) Define a binary tree. Discuss its implementations.

c) Define & Explain a graph in terms of adjacency matrix with suitable example.

d) Write a recursive function for binary search method.

e) Write a function for bubble sort.

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

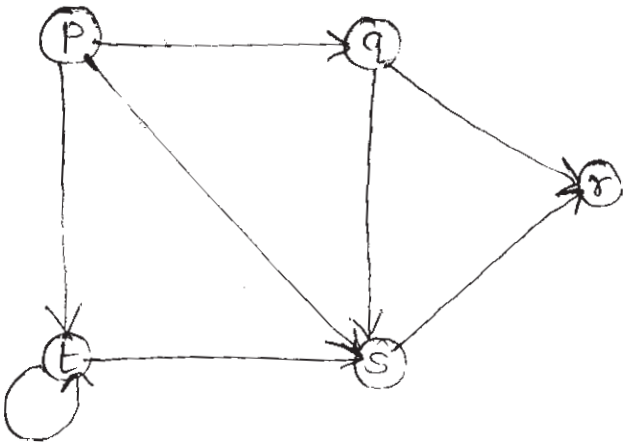
a) Define & explain a stack.

b) Describe dynamic memory allocation with its various strategies.

c) Discuss the types of rotations used in AVL tree.

d) Define sequential file organisation state its advantages & disadvantages.

e) Consider the given graph. Represent it using adjacency list. Find indegree, outdegree & total degree of each vertex in a graph.



P.T.O.

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

a) Represent stack contents for each step of converting infix expression to its equivalent postfix expression. Infix expression = (A + B) * (C * D / E) - F

b) Write a function to insert a node in a singly linked list.

c) Construct a binary search tree using a given data set traverse it using all tree traversal methods.

(80, 60, 90, 55, 65, 85, 95)

d) Write a function for bubble sort.

e) Differentiate primary & secondary indices.

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

a) Define & explain a queue.

b) Write a function to create & display doubly circular linked list.

c) Apply heap sort on a given set of data to sort it in ascending order (25, 5, 75, 20, 60, 10, 80, 30).

d) Explain B^+ tree with its node structure.

e) i) Define - Hash table, collision.

ii) Define recursion. State the data structure used init.

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

a) Define ADT. Discuss any two ADTs.

b) Write a function for insertion & deletion operations on a static queue.

c) Write a function to perform pop operation on a dynamic stack.

d) Write a function to display a circular queue & count total queue elements dynamically.

e) Describe sparse & dense indices.

Total No. of Questions : 5] **[Total No. of Pages :3**

P982

[3934] - 202
M.C.A. - I (Science Faculty)
CS - 202 : Theoretical Computer Science
(Sem. - II) (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 carry equal marks.***
4) ***All questions are compulsory.***

Q1) Attempt any four of the following : **[4 × 4 = 16]**

a) Define :

i) Symbol

ii) Prefix

iii) Language

iv) Empty string

b) Find the languages of the following.

i) (a* b*)

ii) $\{a^n b^n \mid n \geq 1\}$

c) Construct NFA which accepts all strings containing every symbol in alphabetical order over $\Sigma = \{p, q, a, b\}$

d) Construct DFA for $L = L_1 \cap L_2$ over {a, b}

where L_1 = all strings starting with 'a'.

L_2 = all strings not having 'ab' as substring.

e) Write a regular expression for the following language :

i) consisting of string having length divisible by 3 over {a}

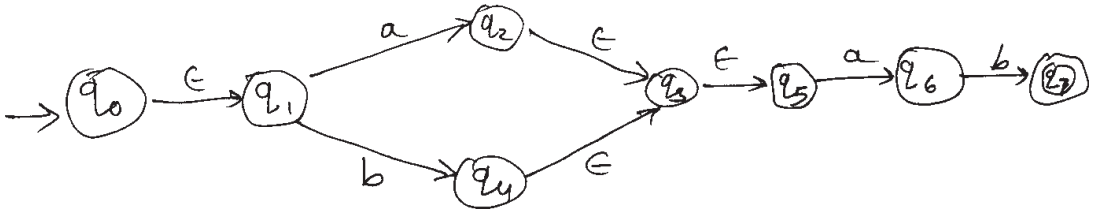
ii) containing a string in which the 4^{th} character from the right end of string is always b over $\Sigma = \{a, b\}$.

P.T.O.

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

a) Define & Design a moore machine that outputs valid or invalid for a language : L = a (a + b)* b

b) Construct equivalent DFA for NFA of the following figure.



c) Minimize the following DFA, M = {{q_0 .....q_4}, {a, b}, δ, q_0, {q_2,q_4}} Where δ is

δ	a	b
q_0	q_1	q_2
q_1	q_1	q_3
q_2	q_0	q_1
q_3	q_1	q_4
q_4	q_3	q_1

d) Show that the regular sets are closed under union with an example.

e) Construct the NFA equivalent to the following expression.
(ab + ba) * a (a b*)

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

a) i) Construct a CFG for the following language
$L = \{a^n b^m c^n \mid n > 1, m > 0\}$

ii) Find a leftmost derivation for substring 001100 using the grammar
G = { {S, A}, {0, 1}, {S → 0AS | 0, A → S |A| SS | 10, S}}

b) Remove unit production from the following grammar

S → A | bb

A → B | b

B → S | a

c) Convert the following grammar into Greibach normal form.

S → ABC

A → a | b

B → Bb | aa

C → aC | cC | ba

d) Construct regular grammar for the following DFA.

e) Construct PDA to accept all those string containing equal number of a's & b's.

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

a) Construct PDA equivalent to CFG

$S \rightarrow a\,AA$

$A \rightarrow as \mid bs \mid a$

b) Define Instantaneous description of PDA. State two methods for defining languages accepted by PDA with an example.

c) Show that the CFL's are closed under intersection.

d) Define :

i) Parse tree ii) Reduction

e) Show that the language $L = \{a^n b^n c^n \mid n \geq 1\}$ is not context free language.

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

a) Design a TM which recognize well formedness of parenthesis over {(,[,{,},],)}.

b) Define TM. State the difference between LBA & TM.

c) Construct a TM for language $L = \{a^n b^n a^n \mid n \geq 1\}$

d) What is undecidable problem? What do you mean by saying that the halting problem of TM is undecidable.

e) Design a TM which will replace every occurrence of a substring '11' by '10' over {0, 1}.

✪✡✪✡

Total No. of Questions : 5] **[Total No. of Pages : 2**

P993

[3934]-501
M.C.A (SCI)
COMPUTER SCIENCE
CS - 501 : Cryptography and Network Security
(Sem. - V) (New - 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.***

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

a) Explain the working of cookies.

b) How message digests are used to avoid the storage & transmission of clear text passwords?

c) List the different fields of X. 509 authentication service?

d) What are the limitations of Firewall?

e) What are the different types of Access control.

f) Write the steps in creation of digital certificates.

g) Define : cross certification and certificate revocation list (CRL)

h) Using simple columnar transposition technique construct the cipher text of the following plain text. Assume number of columns = 6 and the order of columns is 4, 3, 2, 5, 6, 1)
"UNIVERSITY OF PUNE NUMBER ONE IN INDIA"

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

a) What is virus? What are the various categories of virus?

b) Write the steps to achieve better security.

c) Explain following terms.
   i) Cryptanalysis.
   ii) Brute Force Attack.
   iii) Encryption.
   iv) Cryptography Techniques.

d) Explain in short the types of algorithms and modes of algorithm.

e) Discuss the broad level steps in DES and list the steps of one round in DES.

P.T.O.

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

a) What are the variations of triple DES, explain in brief.

b) Explain how RSA can be used to perform digital signatures?

c) Explain encryption process in RC5.

d) Explain the mathematical theory behind Diffie - Hellman key exchange algorithm.

e) Compare Symmetric and Asymmetric key cryptography.

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

a) Write down the steps to verify digital certificates.

b) How the randomness is added to message digest scheme of clear text passwords?

c) Write short note on Dual homed host architecture.

d) Comment : SSL is located between application and transport layers.

e) What functionalities are offered by S/MIME?

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

a) Consider the plain text.

"DOG"

Using Hill Cipher construct the cipher text. Let the key matrix be

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix}$$

b) Consider the plain text

"UNIVERSITY OF PUNE"

One time pad is QACDZMOUXGIJNVBP

Using vernam cipher construct the cipher text.

c) Apply play fair technique and convert the following plain text into cipher text plain text : EXAMINATION SECTION

d) Consider the values of n = 11 and g = 13. Apply Diffie - Hellman algorithm and generate keys K_1 and K_2.

e) Consider the plain text "10". Let P = 13.and Q = 7. Construct the cipher text using RSA algorithm and also decrypt the cipher text you have constructed to get the original plain text.

♦♦♦♦

Total No. of Questions : 5] **[Total No. of Pages : 2**

P994

[3934]-502
M.C.A. (Science Faculty)
CS - 502 : Internet Programming Using PHP
(Sem. - V) (New Syllabus) (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: **[8 × 2 = 16]**

a) What is the difference between = = and = = = operators? Give an example.

b) How to find out all the properties of a method and its purent class.

c) What do you mean by Introspection?

d) What do you mean by HTTP? and URL?

e) What do you mean by associative arrays?

f) What is XML? What is DOM?

g) Give two uses of JSON format.

h) What is the difference between require and require - once?

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

a) How do browsers read XML? Explain.

b) How to generate XML response from the server using PHP? Explain with suitable code.

c) Explain garbage collection in PHP.

d) Explain lookbehind and lookahead features provided by "perl compatible regular expressions".

e) How does XML improve hyperlinking? Explain.

P.T.O.

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

a) Write a PHP program, which will accept a string from user and reverse each word of it using stack.

b) Write a PHP script to accept file name with no extension and list all files with given filename.

c) Write a PHP program which accept student's name and class on first page, marks in 4 subjects on second page and displays the name of the student and average marks on third page using cookies.

d) Write a PHP script to create class 'shape' and its subclass 'triangle', 'square', and 'circle', to display the area of selected shape.

e) Write PHP function to find union of two arrays.

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

a) What is an iterator? What are the different iterator functions provided by PHP?

b) Explain how to combine cookies and sessions?

c) How to generate XML database response from the server? Explain.

d) Explain various style sheets used in XML.

e) Explain reading and writing of files with suitable example.

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

a) Explain how to send email from a PHP script.

b) What are the differences between GET and POST methods.

c) How to get jSON response into a variable from a script?

d) Explain anonymous function. Write an anonymous function to find largest of two numbers.

e) How to access properties and methods and also explain this variable. Explain with suitable example.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P995

[3934]-503
M.C.A. (Science Faculty)
COMPUTER SCIENCE
CS - 503 : Design Pattern
(Sem. - V) (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.***

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

a) Define layered architectural pattern.

b) What do you mean by relaxed layered system.

c) What is a design pattern?

d) Give intent of abstract factory.

e) How to use Adapter design pattern?

f) What is a intent of observer design pattern?

g) "Idioms are highly portable between programming languages". Justify.

h) "Idioms provide a vehicle for communication". Comment.

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

a) What is a pattern? What makes a pattern?

b) Discuss consequences of pipe and filter architectural pattern.

c) Illustrate the steps to implement the black board architectural pattern.

d) What are benefits and liabilities of broker architectural pattern.

e) Define model - view controller architectural pattern? What do you mean by document view?

P.T.O.

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

a) How the catalog of design pattern is organized?

b) When to use abstract factory design pattern?

c) What are the benefits of prototype design pattern?

d) Give structure and participants of prototype design pattern.

e) What are the consequences of singleton design pattern?

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

a) Discuss issues to be consider while implementing adapter design pattern.

b) State and explain consequences of decorator design pattern.

c) Which are the common situations for applying proxy design pattern.

d) Write a short note on consequences of proxy design pattern.

e) In detail, give collaboration of command design pattern.

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

a) How to implement command design pattern?

b) What are the situations to use observer design patterns?

c) Explain strategy design pattern with the help of structure and participants.

d) "Style guides that contain collected idiom work better". Justify.

e) Write a short note on counted pointer idiom.