 M·E-I Sem-Comp 21/5/09

Algorithms and complexity

Con. 3228-09. (1) **BB-5685**

(3 Hours) **[Total Marks : 100**

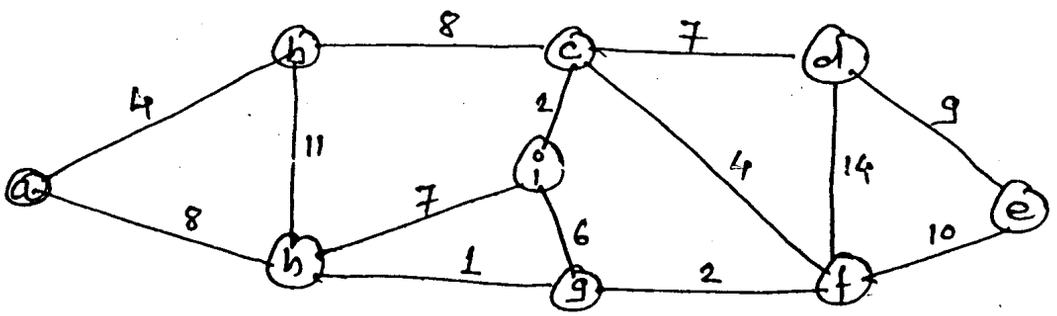
N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) Given X = [A, B, C, B, D, A, B] and Y = [B, D, C, A, B, A] **10**
Find least common sequence and the length of the sequence.
(b) Write down the steps for RSA encryption Algorithm. **10**
Consider a RSA Key set with p = 11, q = 29, n = 219 and e = 3.
What value of 'd' should be stored in secret key ?
What is encryption of the message M = 200 ?

2. (a) Prove— 'Clique problem is NP-complete'. **10**
(b) Insert the keys 6, 3, 91, 42, 62, 89, 55, 32, 98, 1 into hash table of length **10**
m = 12, using open addressing with primary hash function h'(k) = K mod m.
Show results of inserting keys using
(i) Linear probing
and (ii) Quadratic probing with
$C_1 = 1$ and $C_2 = 3$

3. (a) Define— 0, θ, Ω and state their interretationship.
Explain—Bitonic sorter with example. **10**
(b) Generate fixed length and variable length Huffman code for following set of **10**
frequencies—
a : 30 b : 5 c : 2 d : 28 e : 13
f : 10 g : 8 h : 20 i : 6

4. (a) Evaluate minimum spanning tree using Krushkal's Algorithm **10**

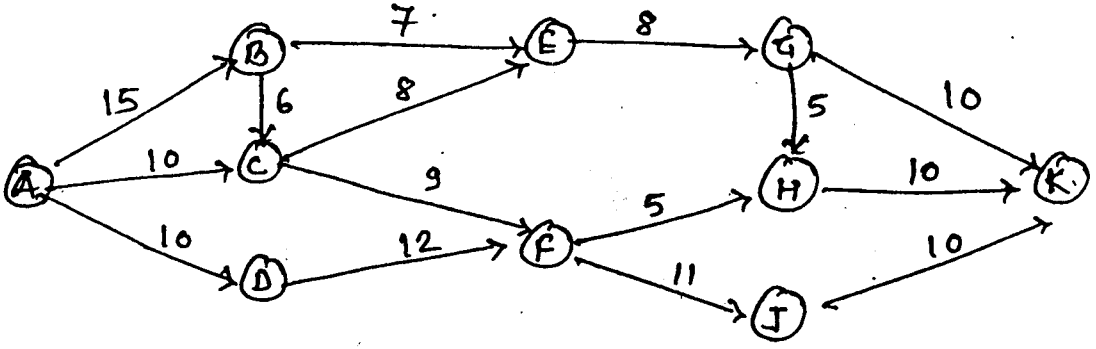


(b) Find solution for following system of different constraints **10**

$x_1 - x_2 \leq 8$
$x_4 - x_5 \leq 10$
$x_2 + x_4 \geq 20$
$x_3 - x_2 \geq 9$
$x_5 - x_3 \geq 5$
$x_4 + x_1 \geq 0$
$x_1 - x_3 \leq 2$
$x_3 - x_4 \leq 5$

[TURN OVER

5. (a) Explain class P, NP, NP-Head and NP. Complete.
   (b) Evaluate the maximum flow from mode A to K for given graph. Also Draw Residual N/W and Flow N/W.



6. (a) Find optimal solution for matrix-chain multiplication with dimension sequence. 10
   < 5, 18, 3, 10, 2, 15, 4 >
   (b) Prove—If x is root of an n-node subtree, then call INORDER_WALK(x) take $\alpha(n)$ time 10

7. Write short notes on (any **four**) :— 20
   (a) Chinese-Remainder Theorem
   (b) Greedy Algorithm
   (c) Master method of recurrence
   (d) Dynamic programming
   (e) Vertex-Cover problem.

M.E- I Sem - Comp. 26/5/09

P4–Exam.–09–290

Object Oriented Analysis & Design

Con. 3150–09.

BB–5688

(3 Hours) (2) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume suitable data if **necessary**.

1. (a) What are parameterized classes, metaclasses and nesting of classes ? Give examples for each. **10**
   (b) Explain the different approaches used for analysis that are relevant to object oriented systems. **10**

2. (a) What is dynamic modelling ? Explain dynamic modelling with reference to state, events, conditions, activity, state and event generalization, shot diagram, internal actions, controlling operations. Give example of each. **10**
   (b) Explain the conceptualisation activity of Macro-development process in detail. **10**

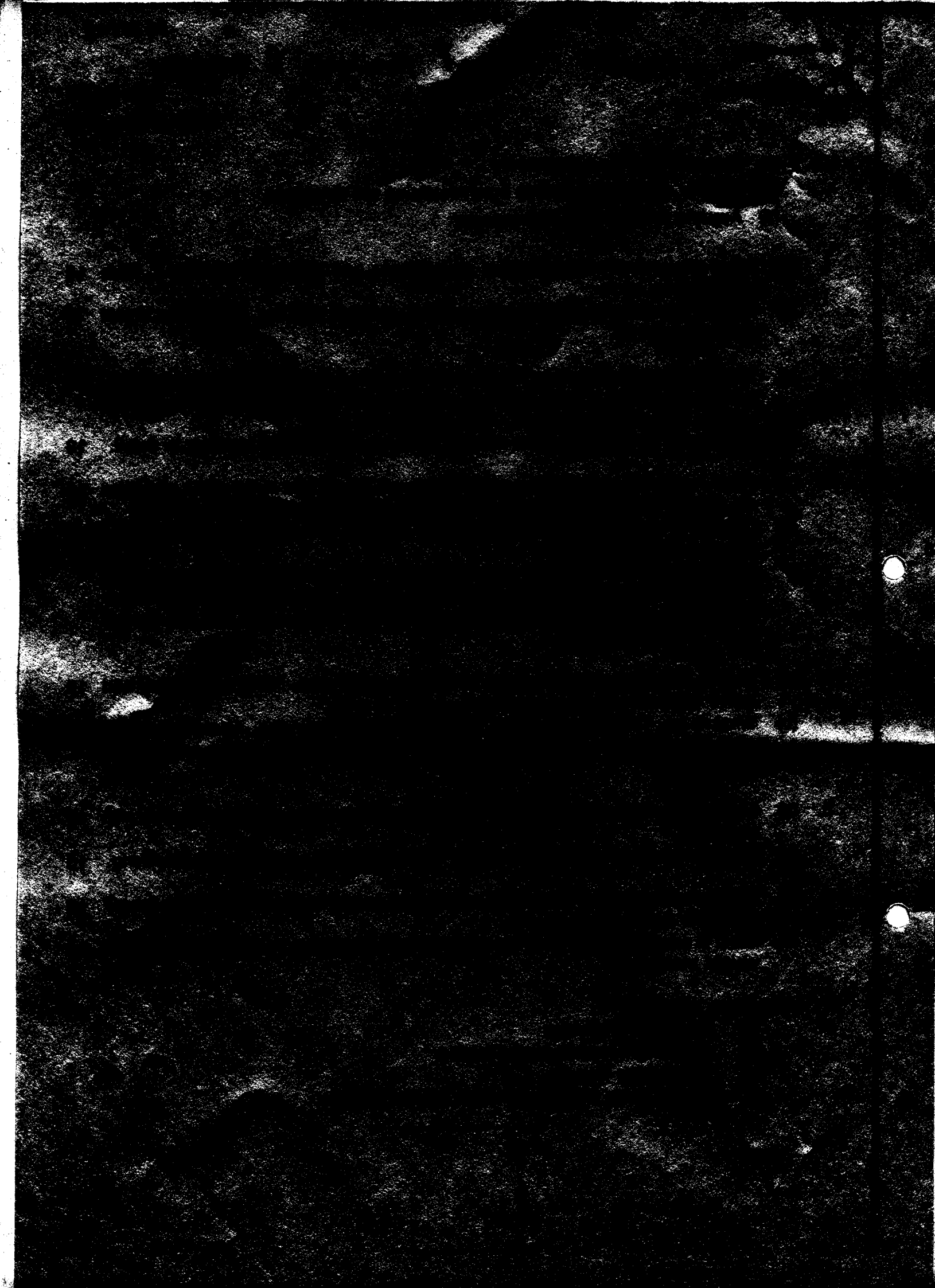
3. (a) What makes the software inherently complex ? How might same of the problems associated with software design be mitigated by design tools or methods ? **10**
   (b) Draw (i) a class diagram and (ii) module diagram for road traffic management system as explained below :— **10**
   Traffic controller controls the signals (3 types) and also assigns duties to traffic policemen who are assigned to any road (highway or subhighway). Traffic police keep a wath over the drivers and fines them if they violate rules and also reports errors related to signals.

4. (a) Explain the object identify and its role during its lifespan. What are passive and active objects ? Give appropriate examples of each. **10**
   (b) What do you mean by abstraction ? Give appropriate examples. Also what is entity abstraction, action abstraction, virtual machine abstraction and coincidental abstraction. **10**

5. (a) How can you construct interaction diagram from use case analysis ? Explain with example. **10**
   (b) Explain the different stages of object oriented project scheduling and tracking. **10**

6. (a) Why is documentation of a system architecture and its implementation necessary ? What are essential documents. **10**
   (b) What is concurrency ? How can you distinguish between heavy weight and light weight process ? **10**

7. Write short notes on :— **20**
   (a) Resource Allocation
   (b) Object Oriented Software Testing
   (c) Technology Transfer
   (d) History state, Orthogonal state, Nested states.



M.E- I Sem - Comp. 26/5/09

P4–Exam.–09–290

Object Oriented Analysis & Design

Con. 3150–09.

BB–5688

(3 Hours) (2) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume suitable data if **necessary**.

1. (a) What are parameterized classes, metaclasses and nesting of classes ? Give examples for each. **10**
   (b) Explain the different approaches used for analysis that are relevant to object oriented systems. **10**

2. (a) What is dynamic modelling ? Explain dynamic modelling with reference to state, events, conditions, activity, state and event generalization, shot diagram, internal actions, controlling operations. Give example of each. **10**
   (b) Explain the conceptualisation activity of Macro-development process in detail. **10**

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   (b) Draw (i) a class diagram and (ii) module diagram for road traffic management system as explained below :— **10**
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4. (a) Explain the object identify and its role during its lifespan. What are passive and active objects ? Give appropriate examples of each. **10**
   (b) What do you mean by abstraction ? Give appropriate examples. Also what is entity abstraction, action abstraction, virtual machine abstraction and coincidental abstraction. **10**

5. (a) How can you construct interaction diagram from use case analysis ? Explain with example. **10**
   (b) Explain the different stages of object oriented project scheduling and tracking. **10**

6. (a) Why is documentation of a system architecture and its implementation necessary ? What are essential documents. **10**
   (b) What is concurrency ? How can you distinguish between heavy weight and light weight process ? **10**

7. Write short notes on :— **20**
   (a) Resource Allocation
   (b) Object Oriented Software Testing
   (c) Technology Transfer
   (d) History state, Orthogonal state, Nested states.

M.E-I Sem -Comp 30/5/09

V-Ex-I-09-G-Scan-48 Elective -I :- Neural Networking & Fuzzy Syster

Con. 3506-09. (3) **BB-5694**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** .is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume **suitable data** wherever **required** but **justify** them.

1. (a) Explain with suitable diagram Error Back Propagation Training algorithm. **10**
   (b) Explain any four defuzzification methods with suitable diagrams. **10**

2. (a) Explain Hopfield Network in detail. **10**
   (b) Explain the architecture of Bidirectional associative memory. How is storage and retrieval performed in BAM ? **10**

3. (a) Explain the concept of linearly separable and linearly non-separable patterns. **10**
   (b) State different properties of fuzzy set. **10**

4. (a) Explain different fuzzy membership functions. **8**
   (b) What do you mean by learning ? List different learning rules and explain any three using suitable diagram. **12**

5. (a) Explain with an example Convex and Non-convex fuzzy sets. **6**
   (b) Explain with neat diagram supervised and unsupervised learning. **6**
   (c) Explain with example fuzzy relations. **8**

6. Design a fuzzy logic controller for a train approaching a station. The inputs are distance from the station and speed of the train. The output is brake power. Use (i) Triangular Membership function. (ii) Four descriptors for each variable, (iii) Appropriate defuzzification method. Prove the condition for which the brake power will be more. **20**

7. Write notes on the following :— **20**
   (a) Neuro-Fuzzy System.
   (b) Character recognition using Neural Network.

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M-E -I Sem- Comp 41609

VT-April-09- 341 Elective I:- Network Protocols & Networking

Con. 3549–09. (4) **BB–5703**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of remaining **six** questions.

1. (a) How many class A, B and C networks exist ? Exactly how many hosts can a network in each class have ? Explain. **10**
   (b) System "A" and "B" are on the same network connected through ethernet and having ETH Address OXB234567890AB and OXB23456781234. IP Address of systems A and B are 198·162·1·1 and 198·162·1·2 show the ARP request and reply packets. **10**

2. (a) Compare the following :— **10**
      (i) ARP and RARP
      (ii) IPv4 and IPv6.
   (b) Explain silly window syndrome. Explain Nagle's algorithm and Clark's solution. **10**

3. (a) An ICMP message has arrived with the header as shown below : **10**
      05 00 11 12 11 03 03 02 (Hex)
      Analyse the header.
   (b) Comment on "Internet Protocol provides an unreliable, connectionless datagram delivery service". **10**

4. (a) Explain TCP state transition diagram. **10**
   (b) Explain congestion control in TCP. **10**

5. (a) Explain in detail Path Vector Routing. **10**
   (b) The following is the dump of UDP header in hex format **10**
      06 32 00 OD 00 IC E2 17
      (i) What is the source port number ?
      (ii) What is the destination port number ?
      (iii) What is the total length of datagram ?
      (iv) What is the length of the data ?
      (v) What is the client process ?

6. (a) Explain different ICMP message formats. **10**
   (b) Explain in detail how DNS offers a hierarchical naming scheme. **10**

7. Write short note on any **four** :— **20**
   (a) Socket Programming in TCP/IP

M.E- II Sem – Comp 1815109

May 09 HP 53
Con. 3036-09.

Software Engineering (5)

BB-5829

(3 Hours) **[Total Marks 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assumptions must be **justified**.

1. (a) What is process ? How CMMI represents a process Meta model ? Explain different capability levels. What generic goals are defined by CMMI ? **10**
   (b) Explain different Evolutionary Process Models. Give two examples of software projects that would be applicable to the incremental model. **10**

2. (a) Focus on different Architecture Design Styles. **10**
   (b) Which Analysis and Modeling Principles should be followed during analysis and design ? **10**

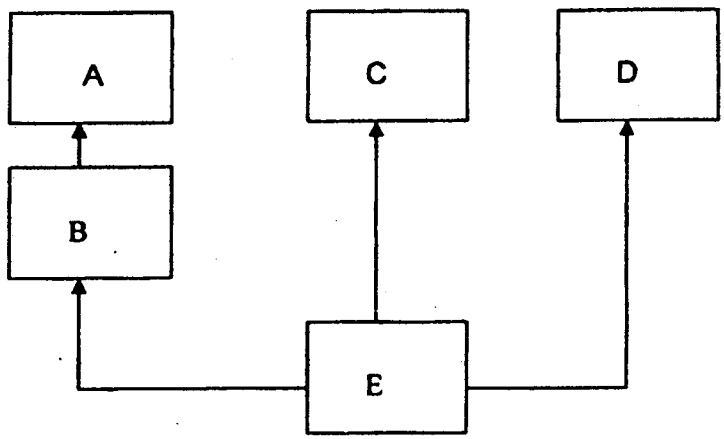
3. (a) What is difference between Flow chart and Structure chart ? Draw structure chart for the following program template. **10**

```
void main()
{
  int sum,n,no_of_elements, a[100];
  readnum(a,no_of_elements);
  sort(a,no_of_elements);
  input(n);
  sum = add(a,n);
  print(sum);
}
void readnum(int a[ ], int n)
{
}
void sort(int a[ ], int n)
{
        :
        :
  swap(a[ i ],a[ j ]
        :
}
void add(int a[ ], int n)
{
}
```

   (b) Consider a project to develop a full screen editor. The major components identified are (i) Screen edit (ii) Command language interpreter (iii) File input and output (iv) Cursor movement (v) Screen movement. The estimated sizes for these modules are 4K, 2K, 2K, 3K, 5K delivered source code lines. Use the COCOMO model to determine
      (i) Overall cost and schedule estimates (Assume cost driver rating as normal)
      (ii) Cost and schedule estimates for different phases.

[TURN OVER

4. (a) How Object Oriented Development differ from Function Oriented Development ? 10
   (b) Good object oriented design should not contain multiple inheritance. How will you modify the following design, give modified inheritance template ? 10



5. (a) What is cyclometric complexity ? Draw CFG for the following PDL and verify cyclometric complexity using different formulas. 10

```
s1;
s2;
if( c1 or c2)
begin
   s3;
   while (c3) s4;
   s5;
   do s6 while(c4);
   s7;
   if(c5) s7 else s8;
end
else
s9;
for I = 1 to 10 do s10;
s11;
```

   (b) What is test case, design test cases for bubble sort algorithm ? (You can consider any algorithm you know) 10

6. (a) Focus on McCall's Quality Factors. What are ISO 9126 quality attributes ? 10
   (b) Focus on Metrics for the design Model. 10

7. (a) A legacy system has 1000 modules. The latest release required that 95 of these modules be changed 50 new modules were added and 30 old modules were removed compute the SMI for the system. 10
   (b) Explain the measures of Reliability and Availability. 10

M.E - II Sem - Comp

Distributed Operating System

2215109

746 : H-m.

BB-5832

Con. 3229-09.

(3 Hours)

[Total Marks : 100

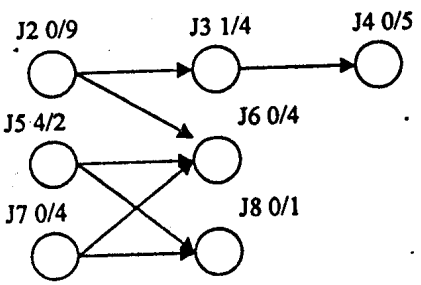
N.B. (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** out of the remaining **six** questions.

1. (a) With respect to distributed systems bring out the significance of : access transparency, location transparency, performance transparency, migration transparency, concurrency transparency and scalability. **14**
   (b) Explain the roles played by short term scheduler, long term scheduler and mid-term scheduler with respect to process states. **6**

2. (a) What is a leap second and why is it used ? Discuss and compare the Christian's and Berkley algorithms for clock synchronization in distributed systems. **10**
   (b) Discuss a distributed algorithm for mutual exclusion. Explain how the algorithm behaves when any process crashes. **10**

3. (a) What are Client and Server Stubs and how are they used in remote procedure calls ? Discuss merits and demerits of message passing using blocking and non-blocking operations. **10**
   (b) Discuss types of deadlocks, solutions for deadlocks and any one de-centralised deadlock detection algorithm. **10**

4. (a) What are the issues in designing a real-time OS ? What are hard and soft jobs ? **8**
   (b) In a priority driven real-time scheduling algorithm Job J_i has higher priority than J_k if $i < k$. Calculate effective release time and effective deadline of all jobs in given figure : (first parameter is release time and second is deadline) **12**



5. (a) With the help of suitable example, explain Byzantine general problem to get agreement in faulty system. **10**

(b) Discuss the sender initiated and receiver initiated heuristic algorithms for processor allocation in distributed systems. Which of these is more optimal for heavy loads and why ? **10**

6. (a) Discuss in detail the Unix inode structure. Evaluate its maximum capacity and convert virtual address 36000 to (block no, offset) pair for a block of size 1K. **10**

(b) Discuss following scenarios for retrieval of a buffer :— **10**

(i) Block in hash queue and buffer is free

(ii) Block not in hash queue and buffer on free list marked "delayed write" => flush "delayed write" buffer and allocate another buffer.

7. Write short notes on any **two** :— **20**

(a) Distributed Shared Memory

(b) NFS

(c) EDF using RTOS scheduling

(d) RPC and its significance in Distributed systems.

M·E - II Sem - Comp. 2715109.

Con. 3240-09. Advanced Database management System (7) BB-5835

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** of remaining **six** questions.
(3) Assume any **suitable data** if **necessary** and **clearly state** it.

1. (a) Consider a relation TENANT (NAME, CITY, STREET#, APT#, APT-TYPE, RENT, LANDLORD, ADDRESS), where following functional dependencies hold. **10**
APT#, STREET#, CITY → ADDRESS
ADDRESS → APT-TYPE
NAME, ADDRESS → RENT
LANDLORD, APT-TYPE → RENT
(i) Are the following relation schemes in third normal form ? Why/why not ?
Apartment (APT-TYPE, ADDRESS, RENT)
DWELLER (NAME, ADDRESS, RENT)
(ii) What updating and insertion anomalies do you find in TENANT, APARTMENT and DWELLER relations ?
(iii) Can you convert the relation TENANT into BCNF ? Justify your answer.

(b) Draw the serializable graphs for the schedules S1 and S2, and state whether each schedule is (i) conflict serializable or not and (ii) view serializable or not. If a schedule is conflict/view serializable, write down the equivalent serial schedule(s). **10**
Sl : r1(X) ; r2(Z) ; r1 (Z) ; r3(X) ; r3(Y) ; w1(X) ; w3(Y) ; r2(Y) ; w2(Z) ; w2(Y) ;
S2 : r1(X) ; r2(Z) ; r3(X) ; r1(Z) ; r2(Y) ; r3(Y) ; w1(X) ; w2(Z) ; w3(Y) ; w2(Y) ;

2. (a) List all possible types of failure in a distributed system. Consider a failure that occurs during 2PC for a transaction. For each possible failure, explain how 2PC ensures transaction atomicity despite the failure. **10**

(b) Explain concurrency control in distributed data base management system. **10**

3. (a) Explain with example ARIES recovery procedure. **10**

(b) How can you include the method signature into each class of the OODB schema ? **10**

4. Consider university database that keep track of students and their majors, transcripts and registration at University's courses. Several sections of each course are offered and each section is related to the instructor who is teaching. It also keeps track of the sponsored research projects of faculty and graduate students of the academic departments of the particular college. The database also keeps track of research grants and contracts awarded to the university. A grant related to one principle investigator and to all researchers it supports.

(a) Design a graphical object database schema and Create the ODL classes and specify methods for each class. **15**

(b) Answer the following queries in Object Query Language. **5**

(i) Retrieve the names of all students who completed the course called "C++".

(ii) Retrieve the top three computer science majors based on GPA.

5. (a) Give the DTD for an XML representation of the following nested-relational schema. 14

Emp = (ename, ChildrenSet setof(Children), SkillsSet setof(Skills)
Children = (name, Birthday)
Birthday = (day, month, year)
Skills = (type, ExamsSet setof(Exams))
Exams = (year, city)
Write the following queries in XQuery.

(i) Find the names of all the employees who have a child, whose birthday is in "March"

(ii) Find those employees who took an examination for the skill type "data entry" in the city "Mumbai".

(iii) List all the skill types in Emp.

(b) What are data management issues in mobile Database ? 6

6. Consider an airline database system. The information is to maintain about airline description and Reservation description. The database is distributed over four major sites located at Mumbai, Bangalore, Chennai, and Kolkata .Consider that your global server is located at Mumbai at which data warehouse is kept.

(a) Design the star schema and implement the data warehouse using any database of your choice. Only consider the core implementation like implementation of operational systems tables, Creation of data warehouse tables, transfer of data from operational system to data warehouse, creation of materialized view etc. 14

(b) Answer the following queries from the materialized view created : 6

(i) Find the total number of "KING FISHER" flights available and their departure time from Bangalore to Chennai on 10-06-2009.

(ii) Find the ticket confirmation, if not confirmed then waiting number in the "JET AIRWAYS" from Mumbai to Chennai on 10-06-2009.

(iii) Request for reservation in the given type of class (economic or business etc.) from Kolkata to Mumbai in "INDIAN AIRLINES" on 10-06-2009.

7. Write detail notes on (any **three**) :— 20

(a) Object Oriented Multimedia DATABASE Schema design.

(b) Internet Databases and Web server.

(c) Database Security.

(d) Deductive Database.

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I-09-G-Scan-59

M.E - II Sem - Comp 1/6/09

Advances in Management Information

Con. 3157-09. (8) **BB-5844**

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable data** if **required**.

1. (a) Define MIS and explain different components of MIS. **10**
   (b) Explain different activities performed during Conceptual design. **10**

2. (a) What is information ? Explain characteristics of quality information. **10**
   (b) Give five examples of data and information generated from the data. **10**

3. (a) Explain Simon's model of Decision Making. What is structured, unstructured and programmed decisions ? Give example of each. **10**
   (b) What is the need to understand Organizational structure and functional activities when designing MIS ? **10**

4. (a) An MIS is to be designed for an Educational Organization. Identify stakeholders, theirs information need and source of data. **10**
   (b) Explain different tools used for information gathering. Give situation where each of them can be used effectively. **10**

5. (a) Discuss the advantages and disadvantages of extending the formal public system, at the expense of the formal private system and the informal public system. **10**
   (b) Is Transaction Processing System must for MIS Implementation ? Explain with example transaction, batch transaction processing systems. **10**

6. (a) What are the activities performed during MIS Implementation ? **10**
   (b) What is systems approach to MIS Design ? **10**

7. Write short notes on :— **20**
   (a) ERP
   (b) CRM
   (c) Web Site and Web Portal.
   (d) OLTP and OLAP.

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M.E - II Sem - Comp

Image Processing (9)

5/6/09

Con. 3169-09. **BB-5850**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** of remaining **six** questions.
(3) Assume any **suitable** data if **necessary**.
(4) **Figures** to the **right** indicate **full** marks.

1. Justify/Solve the following :— **20**
   (a) If we want to resize a 1024 x 768 image to one that is 600 pixels wide with the same aspect ratio as the original image, what should be the height of the resized image.
   (b) Orthogonal transforms are useful tool for imlage processing.
   (c) Picture quality depends on change of grid size and grey levels.
   (d) Run length coding is lossless coding but may not give data compression always.
   (e) HIT or MISS transform is used for finding local patterns of pixels.

2. (a) Explain the components of an Image processing system. **10**
   (b) Explain Homomorphic filtering. **10**

3. (a) Explain in detail filtering in frequency domain. **10**
   (b) Given histogram **(a)** and **(b)** modify histogram **(a)** as given by histogram **(b)**. **10**

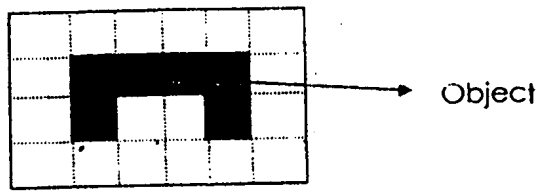
Histogram (a)

Grey Level	0	1	2	3	4	5	6	7
No. of Pixels	790	1023	850	656	329	245	122	81

Histogram (b)

Grey Level	0	1	2	3	4	5	6	7
No. of Pixels	0	0	0	614	819	1230	819	614

4. (a) Find the Huffman code for the following stream of data **10**
   { a,a,a,a,a,a,b,b,b,c,c,c,c,c,c,d,d,d,d,d,d,d,d,d,e,e,e,e,e,f,f } explain how does this kind of coding achieve compression.
   (b) Explain region split and merge. Apply and explain a scheme to extract the continuous central black object from the image. **10**



[TURN OVER

5. (a) What are different types of redundancies in digital image ? 6

(b) Apply graph theoretic technique to determine edge corresponding to minimum cost on the image given, also show the combined graph. 6

5	6	1
6	7	0
7	1	3

(c) Write 8 x 8 Hadamard transform matrix. Sketch its signal flow diagram (Butterfly diagram). 8

6: (a) Name and explain boundary descriptors. 10

(b) Define and explain Moments, Normalized moments and central moments. 10

7. Write short Notes on :—**(4 marks each)** 20

(a) Rotation invariance of chain codes

(b) K-L Transforms.

(c) Image compression standards

(d) Signature

(e) LoG and DoG and its computation.

———S———