

214 / p3-d-ksl-upq-April 09

MCA SEM-III
Software Engineering
(REVISED COURSE)

27th May 2009
BB-9492

Con. 3106-09.

(Hours)

[Total Marks :

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Figures to the **right** indicate **full** marks.
1. (a) Write a program in PDL to sort 10 numbers. Draw the flow graph. How many test cases should be derived to test the program completely ? Write a complete set of test cases. **15**
 - (b) Compare hardware reliability with software reliability. **5**
 2. (a) What are the components of the use case diagram ? Explain their usage with the help of example. **10**
 - (b) Discuss various key process areas of CMM at various maturity levels. **10**
 3. (a) Explain the boundary value analysis testing technique with the help of an example. **10**
 - (b) What are the advantages of developing the prototype of a system ? **10**
 4. (a) List & explain the tools & techniques for performing risk monitoring & control. **10**
 - (b) What are size metrics ? How is function point metric advantages over LOC metric ? Explain. **10**
 5. (a) Discuss the relationship between quality factor & quality criteria in Mc Call's software quality model. **10**
 - (b) Explain the Putman resource allocation model. What are the limitations of this model. **10**
 6. (a) Discuss various types of COCOMO model. Explain the phase wise distribution of effort. **10**
 - (b) What is software maintenance ? Describe various categories of maintenance. Which category consumes maximum effort & why ? **10**
 7. Write short notes on :— **20**
 - (a) Software Reengineering
 - (b) Four P's in Software Management
 - (c) Work Breakdown Structure
 - (d) IT projects success factors.

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MCA SEM-III
Operation Research

25th May 2009

Con. 2274-09.

(REVISED COURSE)

BB-9489

(3 Hours)

[Total Marks : 100

- N.B:
- (1) Question No. 1 is compulsory.
 - (2) Attempt any four out of remaining six questions.
 - (3) Assume any necessary data but justify the same.
 - (4) Figures to the right indicate marks.
 - (5) Use of calculator is allowed.

1 a) Determine the solution space graphically for the following inequalities. [10]

$$\begin{aligned} x_1 + x_2 &\leq 4 \\ 4x_1 + 3x_2 &\leq 12 \\ -x_1 + x_2 &\geq 1 \\ x_1 + x_2 &\leq 6 \\ x_1, x_2 &\geq 0 \end{aligned}$$

Which constraints are redundant? Reduce the system to the smallest number of constraints that will define the same solution space.

Find the solution of the problem

Maximize $z = 6x_1 + 2x_2$

Subject to the above conditions.

b) For the following set of activities and different time estimates for a project [10]

Activity	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
(t_o) Opt time (days)	3	2	6	2	5	3	3	1	2
(t_p) Pessimistic time (days)	15	14	30	8	17	15	27	7	8
(t_l) Most likely time (days)	6	5	12	5	11	6	9	4	5

- (i) Draw the network
- (ii) Determine the expected task times and their variances.
- (iii) Find the earliest and latest expected times to reach each node.
- (iv) Find the critical path. What is the probability that the project will be completed by 27 days [Given $P(z=0.35)=0.1368$].

2 a) Use Simplex method to Maximize $z=107x_1+x_2+2x_3$ [10]

Subject to:

$$\frac{14}{3}x_1 + \frac{1}{3}x_2 - 2x_3 + x_4 = 7$$

$$16x_1 + \frac{1}{2}x_2 - 6x_3 \leq 5$$

$$3x_1 - x_2 - x_3 \leq 0$$

$$x_1, x_2, x_3, x_4 \geq 0$$

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b) Find the initial basic feasible solution using Least Cost Method for the following transportation problem [10]

		Distribution Centre				Supply
		A	B	C	D	
Plant	1	2	3	11	7	6
	2	1	0	6	1	1
	3	5	8	15	9	10
Requirement		7	5	3	2	

3 a) Use two phase method to maximize $z = 2x_1 + 3x_2 - 5x_3$ [10]
 Subject to: $x_1 + x_2 + x_3 = 7$
 $2x_1 - 5x_2 + x_3 \geq 10$
 $x_1, x_2, x_3 \geq 0$

b) A solicitor's firm employs typists on hourly basis for their daily work. There are 5 typists and their charges and speeds are different. According to an earlier understanding, only one job is given to one typist and the typist is paid for the all hour, even when he works for a fraction of an hour. Find least cost allocation for the following data. [10]

Typist	Rate/hr(Rs.)	No of pages typed/hr
A	5	12
B	6	14
C	3	8
D	4	10
E	4	11

Job	No of pages
P	199
Q	175
R	145
S	298
T	178

4 a) Solve the following problem by dual simplex method. [10]

Minimize: $z = x_1 + 2x_2 + 3x_3$
 Subject to: $2x_1 - x_2 + x_3 \geq 4$
 $x_1 + x_2 + 2x_3 \leq 8$
 $x_2 - x_3 \geq 2$
 $x_1, x_2, x_3 \geq 0$

b) Four jobs 1, 2, 3, and 4 are to be processed on each of the five machines A, B, C, D and E in the order ABCDE. Find the total minimum elapsed time if no passing of jobs is permitted. [10]

Job	Machine				
	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

Also find the idle time for each machine.

5 a) Write short notes on [10]
 (i) Inventory problem
 (ii) Branch and bound algorithm to solve Traveling Salesman Problem.

b) Solve using Gomory's cutting plane method. [10]
 Maximize $z = 5x_1 + 7x_2$
 Subject to: $-2x_1 + 3x_2 \leq 6$
 $6x_1 + x_2 \leq 30$
 $x_1, x_2 \geq 0$ and integer.

6 a) Explain the following with suitable example [10]
 (i) Explain with suitable examples: person zero sum game, pure strategy
 (ii) Dual of a Primal LPP

b) The Simple Engineering Company has a machine whose purchase price is Rs. 80,000. The expected maintenance costs and resale price in different years are given here [10]

Year	1	2	3	4	5	6	7
Maintenance costs (Rs)	1000	1200	1600	2400	3000	3900	5000
Resale Value (000 Rs.)	75	72	70	65	58	50	45

At what time interval in your opinion, should the machine be replaced?

7 a) There is a plan to rebuilt houses as a part of a relief plan for the earthquake victims. The houses are to be built in a simple 4 step procedure. The details of the procedure are as follows:-

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Activity	Normal Time (days)	Crash Time (days)	Normal Costs (Rs)	Crash Costs (Rs)
1-2	5	4	170	240
1-3	9	6	310	550
2-3	6	4	80	200
2-4	10	8	130	230
3-4	6	4	110	290

There is a fixed cost of Rs 120 per day. Find the cost of a house after second crashing? [10]

b) Two companies A and B are competing for the same product. Their different strategies are given in the following payoff matrix: [10]

		Company B			
		I	II	III	IV
Company A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Use dominance principle to find optimal strategies.

Year	1	2	3	4	5
Maintenance (Rs)	1000	1200	1400	1600	1800
Resale Value (1000 Rs)	77	72	70	62	50

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V-Ex-1-09-E-Scan-15

MCA SEM-III

Management Information System

29th May 2009

Con. 2536-09.

BB-9495

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Answer any **four** out of remaining **six** Questions.
(3) Answers to questions should be **grouped** and written **together**.

1. (a) Can you automate the process of decision making answer is yes and no, comments your answer in both the cases. 10
(b) What is business process ? Explain types of Business Information system from a functional perspective. 10
2. (a) Why does decision maker resort to bounded rationality in a Decision making situation ? Can a decision be called as right or wrong ? What problems a manager has to face in making rational decision ? 10
(b) What are concepts of Information ? What are the parameters on the basis of that the quality of information can be measured ? 10
3. (a) Distinguish among top, middle and operational management plans in terms of goal, scope and content. 10
(b) What problem does the System Analyst face in Ascertaining the information requirement at various level of management and how are these problems tackled ? 10
4. (a) Why is a long plan of MIS necessary ? How is it linked with business plan of the organization ? 10
(b) In the process of development of MIS when would you use prototype approach and when would you use life cycle approach explain it ? 10
5. (a) What do you mean by Business Strategy ? Is it a Long Range or a Short Range Planning ? Can an organization have more than one strategy ? Justify your answer. 10
(b) What is decision support system ? Describe various components of DSS. 10
6. (a) What is Enterprise System ? How does it work and what are business processes supported by Enterprise system ? 10
(b) What is organization ? What is behavioral view and features of the organization ? 10
7. Write short notes on any **four** :— 20
 - (a) Expert System
 - (b) push v/s pull based S.C.M
 - (c) Levitt's model ?
 - (d) Analytical and Operational C.R.M.
 - (e) Simon's Decision Model
 - (f) TPS.

V-Ex-I-09-E-Scan-1

MCA SEM-III

18th May 2009

Database Management Systems

Con. 2473-09.

BB-9594

(OLD COURSE)

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** out of remaining **six** questions.

1. XYZ College is divided into several schools. Each school is composed of several 20 departments. Each department may offer courses. Each department may have many professors assigned to it. Each professor may teach up to four classes. Student may enroll in several classes. Each department has several students. Each student has only a single major and is associated with a single department. Each student has an advisor in his or her department. Each advisor counsels several students :—
(a) Construct an ER diagram for the XYZ college. Document all assumptions that you make for designing. 20
(b) Write schema definition and normalize all tables to 3NF for the above ER diagram.
2. (a) Draw a state chart diagram and discuss typical states that a transaction goes through during execution. 10
(b) Explain the database system architecture. Explain how is it different from the conventional file system. 10
3. (a) Explain the responsibilities of DBA. 10
(b) What is deadlock ? Explain the deadlock detection and prevention technique. 10
4. (a) What are functional dependencies ? Explain closure and minimal cover for FD. 10
(b) Explain the desirable properties of decomposition. 10
5. Differentiate between following :— 20
(a) 2PL and Rigorous 2PL
(b) Network and Hierarchical Model
(c) 3NF and BCNF
(d) Sparse Index and Dense Index.
6. (a) Explain log-based recovery. 10
(b) What is serializability ? Explain how two schedules becomes view serializable. 10
7. Write Short notes on the following (Any Four) :— 20
(a) ACID properties
(b) Triggers
(c) Multivalued Dependency
(d) View
(e) Foreign Key.

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Database Management System

18th May 2009

Con. 2264-09.

(REVISED COURSE)

BB-9480

(3 Hours)

[Total Marks : 100]

Note: Q 1 is compulsory. Attempt any 4 out of remaining six questions.

- Q 1** A college library holds books for its members to borrow. Each book may be written by more than one author. Any one author may have written several books. If no copies of a wanted book are currently in stock, a member may make a reservation for the title until it is available. If books are not returned on time a fine is imposed and if the fine is not paid the member is barred from loaning any other books until the fine is paid. **20**
- (a) Construct an ER diagram for the above library system. Document all assumptions that you make for designing.
- (b) Write schema definition and normalize all tables to 3NF for the above ER diagram
- Q2** (a) Consider the following relational schema: **10**
employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
Underline indicates key.
- Write SQL query for the following:**
- (i) Find the names of all employees who earn more than every employee of AXIS bank.
- (ii) Find the names, street address, and cities of residence of all employees who work for HDFC bank and earn more than \$10,000 per annum.
- (iii) Find the company with the most employees.
- (iv) Give all employees of State Bank of India a 10 percent salary raise.
- (v) Find the names of all employees in this database who live in the same city as the company for which they work.
- (b) Differentiate following(Any Two): **10**
- (i) Strong Entity Vs Weak Entity
- (ii) Primary memory Vs Secondary memory
- (iii) Tree structured indexing & Hash based indexing

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- Q 3** (a) What is data model? What is the relational data model? What is data independence and how does a DBMS support it? **10**
(b) What is Bell-LaPadula model? Explain **10**
- Q 4** (a) What is normalization? What are the two required conditions for normalization through decomposition of data? **10**
(b) What is functional dependency? How is it different from multi valued dependency? When are two sets of functional dependencies are equivalent? **10**
- Q 5** (a) What is an index on a file of records? What is a search key for an index? Why do we need indexes? **10**
(b) Discuss the various steps of processing a high level query. **10**
- Q 6** (a) What are locks in DBMS and why they are used? What is write-ahead logging and why is it used? **10**
(b) What is transaction? Draw state diagram and discuss typical states that transaction goes through during execution. **10**
- Q 7** Write short note on the following (Any 4) : **20**
(a) Candidate Key
(b) 2PL
(c) Closure of set of FD
(d) Shadow Paging
(e) Views

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V-Ex-I-09-E-Scan-71

MCA SEM-III
Object Oriented Programming
with C++

22 May 2009

Con. 2700-09.

BB-9486

(3 Hours)

[Total Marks : 100

- N.B :** (1) Question No. 1 is compulsory.
(2) Attempt any **four** questions from the **rest**.

1. (a) Explain the difference between C and C++. 10
(b) What is Inheritance ? Explain the different types of inheritance supported by C++. 10
2. (a) What is STL ? Explain any four containers in details. 10
(b) Write a program to overload preincrement and post-increment operator. 10
3. (a) Explain exception handling mechanism in C++. 10
(b) Write a program in C++ to copy the contents of one text file to another. 10
4. Write notes on :— 20
 - (i) Classes and objects
 - (ii) New operator
 - (iii) Scope resolution operator
 - (iv) Namespaces.
5. (a) Explain different Data types supported by C++. Explain the type Casting for primitive and derived data types. 10
(b) Explain the difference between Run time polymorphism and Compile time polymorphism with suitable example. 10
6. (a) Explain pointers and Virtual functions in C++. 10
(b) What is operator overloading ? Explain the advantages and disadvantages of Operator Overloading. 10
7. (a) Write a Class Bank Account. Define constructs to open an account. Define methods to deposit, withdraw and check balance. 10
(b) Explain the difference between :— 10
 - (i) Overloading and Overriding
 - (ii) Constructor and Destructor.

Con. 2478-09.

Object Oriented Programming
with C++
(3 Hours)

BB-9600

[Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** from the remaining **six** questions.

(3) Program should be well documented. Make constructors and destructors as **required**.

1. (a) What is inheritance ? What is the order of invocation of constructors and destructors in base and derived class ? 10
(b) Define and explain the concepts of OOP with example. 10
2. (a) What are static data members in a class ? Also discuss how memory is allocated to them. 10
(b) What do you mean by polymorphism ? How do you achieve run time polymorphism ? 10
3. (a) Write a program that defines a class 'distance' that stores distance value in meters. Perform operation $d3 = d1 + d2$ on its objects. 10
(b) What are the components of Standard Template Library ? 10
4. (a) Define a template class 'vector' and calculate sum of all elements of the vector. Instantiate a float and integer vector from it. 10
(b) Explain new and delete operators in dynamic memory management. 10
5. (a) What is multiple inheritance ? What ambiguity arises in it and how can it be resolved ? 10
(b) Write a short note on file handling in C++. 10
6. Write short notes on any **four** of the following :— 20
 - (a) Abstract Class
 - (b) Exceptions
 - (c) Friend Functions
 - (d) Private access specifier
 - (e) Copy Constructor.
7. Differentiate between the following :— 20
 - (a) Macro/Inline function
 - (b) Aggregation/Composition
 - (c) Structure/Union
 - (d) Function Overloading/Function Overriding.

604 : G-m.

MCA SEM-III
Data Communication Networks
(OLD)

20th May 2009

Con. 2317-09.

BB-9597

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** out of remaining.
(3) Assume **suitable** data wherever **required**.
(4) State your **assumption clearly**.
(5) Answer to the **sub-question** of the individual question should be written **together**.
(6) **Figures to right** indicate **marks**.

1. (a) What is the need of Routing Algorithm ? In which layer it is implemented ? **10**
Discuss Shortest path Routing Algorithm.
(b) Explain the operation of CSMA/CD. Discuss various Persistent algorithm used. **10**
2. (a) Discuss 4-way handshake for TCP connection Termination. **10**
(b) Discuss UN-Guided media of transmission (any **two**). **5**
(c) What is multiplexing ? Find minimum bandwidth required for — **5**
(i) FDM
(ii) 5 lines each require 4000 Hz
(iii) 200 Hz Guard Band.
3. (a) Compare circuit, packet and message switching. **10**
(b) Calculate LRC and VRC for following bit pattern using even parity **5**
1001011 0001100 1000000 1110111
(c) Explain the concept of Tunneling. **5**
4. Write short notes on (any **four**) :— **20**
(a) HDLC
(b) FDDI
(c) DNS
(d) FTP
(e) Flooding routing algorithm.
5. (a) Explain internet protocol (version 6) Header. **10**
(b) Explain the concept of sliding window. Explain Go back N protocol. **10**
6. (a) Explain ISO reference model in brief. **5**
(b) Find Checksum for following bit sequence. Assume a 16 bit segment size **5**
1001001110010011 and 1001100001001101
(c) Explain TCP header in detail. **10**
7. (a) Explain IEEE 802.6 and 802.4 standards. **10**
(b) List different service provided by Data Link Layer. Explain different types of framing. **10**

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MCA SEM-III
Data Communication Networks

20 May 2009

Con. 2268-09.

(REVISED COURSE)

BB-9483

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions of remaining.
(3) Assume **suitable** data wherever **required**.
(4) State your assumption **clearly**.
(5) Answer to the sub-question of the individual question should be written **together**.
(6) **Figures to right** indicate marks.

1. Write short notes on any **four** :— 20
(a) RSA algorithm
(b) ARP
(c) HDLC
(d) Guided Media of Transmission
(e) FDM.
2. (a) Explain Optimality Principal. Explain in detail Link State Routing Algorithm. 10
(b) Explain three way handshake for TCP Connection establishment. 10
3. (a) Explain the concept of sliding window. Explain any one sliding window protocol. 10
(b) Explain IEEE 802.5 (Token Ring). 5
(c) Construct Hamming Code for 10011101. 5
4. (a) Differentiate any **two** :— 10
(i) Pure Aloha/Slotted Aloha
(ii) Bit Stuffing/Byte Stuffing
(iii) Message Switching/Packet Switching.
(b) What is Fragmentation ? Why is it required ? How is it done ? 10
5. (a) The IP address is 140.179.220.200 and subnet mask is 255.255.224.000. 5
Find out the subnet address. How many subnets would you form ?
(b) Compare ISO/OSI and TCP/IP Reference Model. 5
(c) Explain GEO, MEO and LEO categories of satellite. 10
6. (a) w.r.t. IP address — Discuss. 10
Class A, B, C, D and E address.
Subnetting, Masking and Super-netting.
(b) Explain Bit Map collision free protocol. 5
(c) Explain PCM (Pulse Code Modulation). 5
7. (a) Data Link Layer Header put CRC at trailer rather than header why ? A bit stream 10
10011101 is transmitted using CRC method. The Generator polynomial is $X^3 + 1$.
Show actual bit transmitted.
Suppose the fourth bit from left is inverted during transmission show that this error
is detected at receiver end.
(b) Explain in detail DES algorithm. 10