

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FIFTH SEMESTER EXAMINATION, DECEMBER 2012

THIRD YEAR

COMPUTER SCIENCE (Honours)

Date : 17/12/2012

Time : 11 am – 3 pm

Paper : V

Full Marks : 100

Use separate answer-book for each group

Group – A

(Answer **any four** questions)

1. a) How does data redundancy create problem in file processing system? Illustrate. 3
b) What is data independence in a database schema design? What are its various levels? Explain. 1+4
c) What are the advantages of a relational data model over a network data model? 2
2. Consider the following relations for a database that keeps track of student enrolment in courses and the books adopted for each course:
STUDENT (SSN, Name, Major, Bdate)
COURSE (Course#, Cname, Dept)
ENROLL(SSN, Course#, Quarter, Grade)
BOOK_ADOPTION(Course#, Quarter, Book_ISBN)
TEXT(Book_ISBN, Book_Title, Publisher, Author)
Specify the following queries in SQL:–
a) List the number of courses taken by all students named 'Rupam' in Winter 1999 (i.e. Quarter='W99'). 3
b) Produce a list of textbooks (include Courses, Book_ISBN, Book_Title) for courses offered by the 'Computer Science' department that have used more than two books. 3
c) List any department that has all its adopted books published by 'Tata McGraw Hill'. 4
3. a) Define and explain DIVISION operation with proper example. 4
b) Discuss the role of Database Administrator. 3
c) Explain Aggregation in ER model. 3
4. a) What are the simple and composite attributes of an entity? How are they represented in the ERD? 2+2
b) What do you mean by the mapping cardinalities of an entity? For a binary relationship set, what are the different mapping cardinalities? 1+4
c) Define superkey of a relation. 1
5. a) Let $R = (A, B, C, D, E, F)$ be a relational schema with the following functional dependencies:
 $A \rightarrow F, E \rightarrow B, AE \rightarrow D$ and $B \rightarrow C$.
Find out the key for R. 3
b) Define BCNF. Why is it said to be the stronger form of 3NF? 2+2
c) Is it better to consider candidate keys instead of a primary key in defining 2NF and 3NF? Justify. 3
6. a) Write an algorithm to test a dependency-preserving decomposition. 5
b) Explain the use of B* tree in database indexing. 5

Group – B

(Answer **any two** questions)

7. a) Discuss on any two characteristics of object oriented programming paradigm. 4
b) What are the different access specifiers used in C++? Give proper example. 1½+3
c) Illustrate the concept of method overloading. 4
8. a) What do you mean by Early binding and Late binding? How Late binding is achieved in C++? 2+2
b) “Constructor can’t be virtual but Destructor can be” – Justify with suitable examples. In what way does a pure virtual destructor differ from virtual destructor? 3+3
c) Why we need to pass reference in a copy constructor as an argument? 2½
9. a) What do you mean by Namespace? Why we required it? Can Namespace be nested? IF so, illustrate it with proper example. 2+2+2
b) What do you mean by “Handling an Exception”? How can you handle multiple exceptions in a single catch block?
“Following one try block, there must be only one catch block” – Is the above statement True? If not, why? 2+2+2
c) Write only one operator that can’t be overloaded using Friend function. ½

Group – C

10. Answer **any two** questions: 2½×2
a) What is software crisis? 2½
b) What is the importance of an SRS? 2½
c) Differentiate between logical DFD and physical DFD. 2½
d) State the disadvantages of the classical waterfall model. 2½

Answer **any three** questions from Question No. 11 to 15:

11. a) What is a control flow graph? State the rules to define a correct control flow graph. 2+3
b) Draw a CFG to check the nature of a triangle when the sides are taken as inputs. 5
12. a) What do you mean by cohesion and coupling in a software design process? Why is it said that for a good design it is desirable to have a high cohesion but a low coupling? 2+2
b) What are the six task regions of a typical spiral model? Explain their importance. 3+3
13. a) Draw a DFD of a mailing system that is run in a post office. Consider any entity, process that may be suitable for the above system. 6
b) Define the term MTBF for a computer-based system. State its significance. 2+2
14. a) Write down the importance of data dictionary in the context of good software design. 2
b) What is transaction analysis? How can this be achieved? Explain. 6
c) State whether the following statement is true or false. Justify your answer.
“Functional requirements address maintainability, portability and usability issues.” 2
15. a) Represent the following relations among classes using UML diagram:
i) Students credit 5 courses each semester. Each course is taught by one or more teachers.
ii) An order consists of one or more order items. Each order item contains the name of the item, its quantity and the date by which it is required. Each order item is described by an item type specification object having details such as it’s vendor address, it’s unit price and the manufacturer. 2+3
b) Write down about different types of views of a system captured by UML diagram. 5

