

This question paper contains 5 printed pages.

: 4625

Your Roll No.

B.Sc. Prog. / III

AS

**CS-302 : SOFTWARE ENGINEERING AND
DATABASES**

(Admissions of 2005 and onwards)

Time : 3 hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

All questions are compulsory.

All questions in a Section must be answered together.

SECTION A

(Software Engineering)

1. Discuss in brief the purpose of Software Engineering. Explain any *two* challenges faced by software engineers. 4
2. What do you understand by "risk" in the context of Software Engineering? Discuss the various activities performed for risk management. 4
3. Explain the Prototyping Model used for Software Engineering. Discuss the strengths and weaknesses of this model. 4

P. T. O.

4. What is Software Requirement Specification? Discuss the characteristics of a good SRS. 4
5. Differentiate between the following terms :
(a) Process Metric and Product Metric
(b) Unit Testing and Integration Testing. 4
6. Explain COCOMO Model briefly. Compute the effort for an office automation project with the following specifications :
Size = 4 KLOC
Constants $a=3.0$, $b=1.12$
Rating for all cost drivers as nominal. 5

SECTION B

(Databases)

7. Describe the three schema architecture. Why do we need mappings between levels of schema? Explain the difference between logical data independence and physical data independence. 7
8. Discuss the entity integrity constraint and referential integrity constraint using appropriate examples. Why are they considered important? 4
9. Explain through examples why we need to do

Normalization. What are first, second and third normal forms of relations? Give example of a relation which is in 2NF but not in 3NF. 4

10. Draw an ER diagram for a bank database. Each bank can have multiple branches and each branch can have multiple savings accounts and loan accounts. Bank has a unique code, name and address as its attributes. Each branch of the bank has a unique branchno (branch number) and address. Each account has unique accno (account number), balance and type. Similarly loan account is associated with loanno (unique), amount and type. Each customer can have multiple savings accounts and loan accounts in the bank. Customer has a cno (unique), name, address, phoneno and dateofbirth. Age of the customer can be derived from the dateofbirth attribute. 4

11. Prove the following inference rules :

(a) Decomposition or projective rule :

$$\{X \rightarrow YZ\} \mid = X \rightarrow Y$$

(b) Pseudo transitive rule :

$$\{X \rightarrow Y, WY \rightarrow Z\} \mid = WX \rightarrow Z \quad 2$$

12. Differentiate between the following terms :

- (a) Stored attribute and Derived attribute
 (b) Key and Superkey

- (c) Weak Entity and Strong Entity
- (d) Single valued attribute and Multi valued attribute.

4

SECTION C

(Software Engineering and DBMS)

13. Which software development process model would you use for developing the following software and why? Also identify the various functional modules in this system.

“A spreadsheet software such as Microsoft Excel, that has some basic features and many other desirable features that use these basic features.”

2+4

14. Create a DFD and data dictionary for a Payroll System.

4

15. Consider the following relational schema for library database. The “sno” denotes student number, “bno” denotes book number and other attribute names are self-explanatory.

Student (sno, name, class, age)

Book (bno, title, author, publisher)

Borrowed (sno, bno, date)

Write the following queries in SQL :

- (a) Write the “create table” statement for the relation Book. Assume appropriate data types for various attributes. Ensure the integrity constraint that “bno” should be exactly 5 digits long.
- (b) Insert a new tuple in the relation “Book”, assume your own data values.
- (c) Change the date of the book borrowed in the table “Borrowed”, whose “bno” is 1234 to “8 Apr, 2011”.
- (d) Display “sno” of students who have borrowed any book published by the publisher “Pearson”.
- (e) Display the names of students who have borrowed more than five books.
- (f) Find the name and age of the oldest student. 8

16. Given the following universal relation R :

$R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies :

$$Z = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$$

Derive the primary key for R. Decompose R into 2NF and then 3NF relations. Compute the closures $\{A\}^+$ and $\{B\}^+$ with respect to Z. 7