QUESTION BANK

MCA

SEMESTER II

VOL. II

QUESTION BANK

DATABASE MANAGEMENT SYSTEMS

MCA 108

DATABASE MANAGEMENT SYSTEMS - MCA 108
MCA - II

UNIT - I

I   **Test Your Skills:**

(a)   **State Whether the Following Statements are True or False:**

1   Data is also called metadata.
2   In DBMS, data files are the files that store the database information.
3   The external schema defines how and where the data are organized in physical data storage.
4   A collection of data designed for use by different users is called a database.
5   In a database, data integrity can be maintained.
6   The data in a database cannot be shared.
7   The DBMS provides support languages used for the definition and manipulation of the data in the database.
8   Data catalog and data dictionary are the same.
9   Using database redundancy can be reduced.
10   Metadata is also known as data about data.
11   Structured query language (SQL) and query by example (QBE) are the examples of fourth generation language.
12   A feature of relational database is that a single database can be spread across several tables.
13   The primary difference between the different data models lies in the methods of expressing relationships and constraints among the data elements.
14   The plan (or formulation of scheme) of the database is known as schema.
15   The physical schema is concerned with exploiting the data structures offered by a DBMS in order to make the scheme understandable to the computer.
16   Object-oriented data model is a logical data model that captures the semantics of objects supported in object-oriented programming.
17   Using a set of files is better than using a database.
18   Data redundancy means multiple copies of the same data item.
19   A transaction cannot update a record, delete a record, modify a set of records and so on.
20   DBMS manage concurrent databases access and prevents from the problem of loss of information or loss of integrity.

Ans.   (1)(T), (2)(T), (3)(F), (4)(T), (5)(T), (6)(F), (7)(T), (8)(T), (9)(T), (10)(T), (11)(T), (12)(T), (13)(T), (14)(T), (15)(T), (16)(T), (17)(F), (18)(T),19(T), 20(T)

(a)   Multiple Choice Questions:

1   Which of the following is related to information?
    (a)   Data
    (b)   Communication
    (c)   Knowledge
    (d)   All of these.

2   Data is:
    (a)   A piece of fact
    (b)   Metadata
    (c)   Information
    (d)   None of these.

3   Which of the following is element of the database?
    (a)   Data
    (b)   Constraints and schema
    (c)   Relationships
    (d)   All of these.

4   What represent a correspondence between the various data elements?
    (a)   Data
    (b)   Constraints
    (c)   Relationships
    (d)   Schema

5   Which of the following is an advantage of using database system?
    (a)   Security enforcement
    (b)   Avoidance of redundancy
    (c)   Reduced inconsistency
    (d)   All of these.

6   Which of the following is characteristic of the data in a database?
    (a)   Independent
    (b)   Secure
    (c)   Shared
    (d)   All of these.

7   Relationships could be of the following type:
    (a)   One-to-one relationship
    (b)   One-to-many relationships
    (c)   Many-to-many relationships
    (d)   All of these.

8   In a file-oriented system there is:
       (a)   Data inconsistency
       (b)   Duplication of data
       (c)   Data independence
       (d)   Al of these.

9   In a database system there is:
       (a)   Increased productivity
       (b)   Improved security
       (c)   Economy of scale
       (d)   All of these.

10   VDL is used to specify:
       (a)   Internal schema
       (b)   External schema
       (c)   Conceptual schema
       (d)   None of these.

11   The DML provides following functional access to the database:
       (a)   Retrieve data and/or records
       (b)   Add (or insert) records
       (c)   Delete records from database files
       (d)   All of these

12   4GL has the following components inbuilt in it:
       (a)   Query languages
       (b)   Report generators
       (c)   Spreadsheets
       (d)   All of these.

13   Which of the following is database element?
       (a)   Data
       (b)   Constraints and schema
       (c)   Relationships
       (d)   All of these.

14   What separates the physical aspects of data storage from the logical aspects of data
       representation?
       (a)   Data
       (b)   Schema
       (c)   Constraints
       (d)   Relationships

15   What scheme defines how and where the data are organized in a physical data storage?
      (a)   External
      (b)   Internal
      (c)   Conceptual
      (d)   None of these.

16   Which of the following schemas defines the stored data structures in terms of the database model used?
      (a)   External
      (b)   Conceptual
      (c)   Internal
      (d)   None of these

17   Which of the following schemas defines a view or views of the database for particular users?
      (a)   External
      (b)   Conceptual
      (c)   Internal
      (d)   None of these

18   A collection of data designed to be used by different people is called.
      (a)   Database
      (b)   RDBMS
      (c)   DBMS
      (d)   None of these

19   Which of the following is an object-oriented feature?
      (a)   Inheritance
      (b)   Abstraction
      (c)   Polymorphism
      (d)   All of these

20   A physical data models are used to
      (a)   Specify overall logical structure of the database
      (b)   Describe data and its relationships
      (c)   Higher-level description of storage structure and access mechanism
      (d)   All of these

21   Which data model organizes the data in the form of tables and relations?
      (a)   Relational Model
      (b)   Hierarchical Model
      (c)   Network Model

22   Which company has developed the hierarchical model?
      (a)   Oracle

(b)   IBM
    (c)   Sun MicroSystems
    (d)   Microsoft
23   The name of the system database that contains descriptions of data in the database is
    (a)   Data dictionary
    (b)   Metadata
    (c)   Table
    (d)   None of these

24   System catalog is a system-created database that describes:
    (a)   Database objects
    (b)   Data dictionary information
    (c)   User access information
    (d)   All of these

25   Following is the type of metadata:
    (a)   Operational
    (b)   EDW
    (c)   Data mart
    (d)   All of these

26   What is refined data?
    (a)   Knowledge
    (b)   Information
    (c)   Statistics
    (d)   None of the above

27   Which of the following is a database element?
    (a)   Data
    (b)   Relationships
    (c)   Constraints and Schema
    (d)   All of the above

28   What defines how and where data are organized in physical data storage?
    (a)   Internal schema
    (b)   External schema
    (c)   Conceptual schema
    (d)   None of the above

29   What defines a view or views of the database for particular users?
    (a)   Internal schema
    (b)   External schema
    (c)   Conceptual schema
    (d)   None of the above

30   To access information from a database, you need a _____
    (a)   EIS

(b) DBMS
(c) MIS
(d) None of the above

31   Which of the following is an advantage of a database?
(a) Reduction in Redundancy
(b) Avoidance of inconsistency
(c) Security enforcement
(d) All of the above

32   Which of the following is an example of a database application?
(a) Computerized library systems
(b) ATMs
(c) Flight reservation systems
(d) All of the above

33   DBMS stands for_____?
(a) Data blocking and Management Systems
(b) Database Management Systems
(c) Database Business Management Systems
(d) None of the above

34   What is the name of the system database that contains descriptions of the data in the database?
(a) Metadata
(b) Data dictionary
(c) Table
(d) None of the above

35   IMS stands for _____
(a) Information Management System
(b) Internal Mechanical Security
(c) International Managers Society
(d) None of the above

36   Which of the following is the oldest database model?
(a) Hierarchical
(b) Network
(c) Relational
(d) Object Oriented

37   Which category of users need not be aware of the presence of the database system?
(a) DBA
(b) Naive
(c) Casual
(d) Application Programmers

38   Pick entities from the following:
     i.   vendor
     ii.   student
     iii.   attends
     iv.   km/hour
- (a)   i, ii, iii
- (b)   i, ii, iv
- (c)   i and ii
- (d)   iii and iv

39   By relation cardinality we mean
- (a)   number of items in a relationship
- (b)   number of relationships in which an entity can appear
- (c)   number of items in an entity
- (d)   number of entity sets which may be related to a given entity

40   If an entity appears in only one relationship then it is
- (a)   a 1:1 relationship
- (b)   a 1:N relationship
- (c)   a N:1 relationship
- (d)   a N:M relationship

41   Entities are analogous to
- (a)   Relations
- (b)   DBMS
- (c)   Attributes
- (d)   Tuples

42   Attributes of ER correspond to
- (a)   Rows of a table
- (b)   Degree of a table
- (c)   Columns of a table
- (d)   None

43   Number of tuples of a relation is called as
- (a)   Degree
- (b)   Cardinality
- (c)   Extension
- (d)   None

44   A relation with degree, 2 is known as
- (a)   Binary
- (b)   2-ary relation
- (c)   N-ary relation
- (d)   None

45   A virtual relation is also known as
        (a)   View
        (b)   Table
        (c)   Snapshot
        (d)   None of the above

46   What is the cardinality of table with 100 rows and 10 columns?
        (a)   100
        (b)   10
        (c)   250
        (d)   None

47   Degree of a table with 100 rows and 10 columns?
        (a)   100
        (b)   10
        (c)   250
        (d)   None

48   For every relationship, there are How many possible referential integrity actions?
        (a)   One
        (b)   Two
        (c)   Six
        (d)   Indefinite

49   Which of the following attributes are required in a table design?
        (a)   Foreign key
        (b)   Primary key
        (c)   All attributes
        (d)   No attributes

50   A primary key should be defined with:
        (a)   NULL
        (b)   NOT NULL
        (c)   Both (a) and (b)
        (d)   Neither (a) nor (b)

51.   Let us consider *phone_number* ,which can take single or several values .
        Treating *phone_number*as an _____ permits instructors to have several phone
        numbers (including zero) associated with them.
        (a)   Entity
        (b)   Attribute
        (c)   Relation
        (d)   Value

52. The total participation by entities is represented in E-R diagram as
    (a)   Dashed line
    (b)   Double line

    (c)   Double rectangle
    (d)   Circle

53. Given the basic ER and relational models, which of the following is INCORRECT?
    (a)   An attribute of an entity can have more than one value
    (b)   An attribute of an entity can be composite
    (c)   In a row of a relational table, an attribute can have more than one value
    (d)   In a row of a relational table, an attribute can have exactly one value or a NULL value.

54. Which of the following indicates the maximum number of entities that can be involved in a relationship?
    (a)   Minimum cardinality
    (b)   Maximum cardinality
    (c)   ERD
    (d)   Greater Entity Count

55. In E-R diagram generalization is represented by
    (a)   Ellipse
    (b)   Dashed ellipse
    (c)   Rectangle
    (d)   Triangle

56. What is a relationship called when it is maintained between two entities?
    (a)   Unary
    (b)   Binary
    (c)   Ternary
    (d)   Quaternary

57. Which of the following is a low level operator?
    (a)   Insert
    (b)   Update
    (c)   Delete
    (d)   Directory

58. Key to represent relationship between tables is called
    (a)   Primary key
    (b)   Secondary Key
    (c)   Foreign Key
    (d)   None of the mentioned

59. A window into a portion of a database is
   (a) Schema
   (b) View

   (c) Query
   (d) Data dictionary

60. A primary key is combined with a foreign key creates
   (a) Parent-Child relation ship between the tables that connect them
   (b) Many to many relationship between the tables that connect them
   (c) Network model between the tables that connect them
   (d) None of the mentioned

Ans. (1)(a), (2)(a), (3)(d), (4)(c), (5)(d), (6)(d), (7)(d),(8)(d),(9)(d),(10)(d),(11)(b), (12)(d), (13)(d), (14)(d), (15)(a), (16)(b), (17)(b), (18)(a), (19)(b), (20)(d), (21)(a), (22)(b), (23)(b), (24)(d), (25)(d), (26)(b), (27)(d), (28)(a), (29)(b), (30)(b), (31)(d), (32)(d), (33)(b), (34)(b), (35)(a), (36)(a), (37)(b), (38)(c),(39)(b),(40)(a), (41)(a), (42)(c), (43)(b), (44)(a), (45)(a), (46)(a), (47)(b), (48)(a), (49)(b), (50)(b), (51)(c), (52)(b), (53)(a), (54)(b), (55)(c), (56)(d), (57)(b), (58)(b), (59)(c), (60)(a)

(c) Fill in the Blanks:

1   Data is raw_____where information is _____.
2   Two important languages in the database system are (a) _____and (b) _____.
3   To access information from a database, one needs a _____.
4   SQL stands for_____.
5   The four components of data dictionary are (a) _____(b)_____, (c)_____ (d) _____.
6   The two types of data dictionaries are (a)_____and (c)_____.
7   CODASYL stands for_____
8   LPTF stands for _____
9   In mid-1960s, the first general purpose DBMS was designed by Charles Bachman at General Electric, USA was called _____.
10 First recipient of the computer science equivalent of the Nobel Prize, called Association of Computing Machinery (ACM) Turning Award, for work in the database area, in 1973 was _____.
11 When the DBMS does a commit, the change made by the transaction is made _____.
12 Relational data model stores data in the form of a _____
13 A subschema is a _____of the schema.
14 The conceptual/internal mapping defines the correspondence between the _____view and the _____.
15 Information Management System (IMS) was developed jointly by _____ and _____.
16 In Relational Model, rows are referred to as _____ and columns are referred to as _____.

17   In the hierarchical model the relationship between records is expressed as _____.

18   In the Relational Model, the number of columns in a table is termed as ___

19   The domain in the relational model is said to be atomic if the elements of the domain consist of _____ units.

Ans.   (1)(Fact, Processed data), (2)(DDL, DDM), (3)(DBMS), (4)(Structured Query language), (5)(entity, attribute, relationships, key), (6)((a) Active data dictionary, (b) passive data dictionary), (7)(Conference of Data Systems Languages), (8)(List processing task force), (9)(integrated data store), (10)(Bachman), (11)(Permanent), (12)(Table),(13)(Inherits), (14)(Conceptual, Stored database),(15)(IBM, North American Aviation), (16)(records/tuples, attributes), (17)(parent-child), (18) (degree), (19)(indivisible)

II   Short Answer Type Questions:

1   What is database system? Explain.
2   What is the meaning of data independence and data integrity?
3   Explain operational data, schemes and instances.
4   Explain Data models.
5   What is database management system? Why do we need a DBMS?
6   What is data dictionary? Explain its function with a neat diagram.
7   What are the components of data dictionary?
8   What is entity and attribute? Give some examples of entities and attributes in a manufacturing environment.
9   Why are relationships between entities important?
10   What is the difference between a data definition language and a data manipulation language?
11   What do you mean by redundancy? What is the difference between controlled and uncontrolled redundancy? Illustrate with examples.
12   Define the following terms:
        (a) Data   (b)   Database System
        (c) DBMS   (d)   Data Independence
        (e) DBA   (f)   Data Integrity
13   Who is DBA? What are the responsibilities of a DBA?
14   Discuss advantages and disadvantages of file-oriented system.
15   Discuss the advantages and disadvantages of a DBMS.
16   Explain the difference between external, internal and conceptual schemas.
17   What is a data model?
18   What is logical data independence and why is it important?
19   What is the difference between physical data independence and logical data independence?
20   Describe the structure of a DBMS.
21   Describe the main components of a DBMS.
22   What is a transaction?
23   What do you mean by a data model? Describe the different types of data models used.
24   Define the following terms:
        (a)   Data independence

       (b)   Query processor
       (c)   DDL processor
       (d)   DML processor
       (e)   Run time database manage.

25   How is traditional file processing approach different than DBMS approach? Explain.

26   What do you mean by generalization and specialization? Explain with a suitable diagram.

27   What are the problems with E-R models ?

28   Differentiate between derived attributes and stored attributes.

29   What is Role name ?

30   Explain the difference among an entity, entity type and entity set.

31   Differentiate between Degree and Cardinality.

32   How are the three terms; Redundancy, Consistency, and Lack of integrity are interrelated in connection with a database?

33   Name some commonly used logical data models.

34   What are weak and strong entities? Explain with examples.

35   Why do we call ER diagram a conceptual model of a database?

36   What is data abstraction?

37   What is the difference between procedural and non-procedural DML ?

38   What are interfaces ? Explain in brief.

39   Explain the mapping constraints in detail.

40   Discuss the concepts of Aggregation. Give two examples where this concept is useful ?

41   Differentiate between DBMS and RDBMS.

42   What is Relational Database Management System

43   What are the benefits of DBMS ?

44   Differentiate between Datafile and Databases.

45   Differentiate between Record and Field.

III   Long Answer Type Questions:

1   Describe the three-tier ANSI-SPARC architecture. Why do we need mapping between different schema levels? How do different schema definition languages support this architecture?

2   Discuss the advantages and characteristics of the three-tier-architecture.

3   Discuss the concept of data independence and explain its importance in a database environment.

4   Explain the difference between external, conceptual and internal schemas. How are these different schema layers related to the concepts of physical and logical data independence?

5   Describe in detail the different types of DBMS.

6   (a)   Make an ER diagram for a library system? Clearly mention all the entities their attributes and the relationship among the entities.
      (b) Map this ER model into corresponding relational model.

7   How does the concept of object identity in the object-oriented model differs from the concept of entity in the entity-relationship model, and tuple equality in the relationship model?

8   What are the software components in a client-server DBMS? Compare the two-tier and three-tier client server architecture.

9   What are the differences among hierarchical, network and relational data model?

10   Explain the following with their advantages and disadvantages:
       (a)   Hierarchical database model
       (b)   Network database model
       (c)   Relational database model
       (d)   E-R data models
       (e)   Object-oriented data model.

11   Describe the basic features of the relational data model. Discuss their advantages, disadvantages and importance of the end-user and the designer.

12   A university has an entity COURSE with a large number of courses in its catalog. The attributes of COURSE include COURSE-NO, COURSE-NAME and COURSE-UNITS. Each course may have one or more different courses as prerequisites or may have no prerequisites. Similarly, a particular course may be a prerequisite for any number of course, or may not be a prerequisite for any other course. Draw an E-R diagram for this situation.

13   A company called M/s ABC Consultants Ltd. has an entity EMPLOYEE with a number of employees having attributes such as EMP-ID, EMP-NAME, EMP-ADD and EMP-BDATA. The company has another entity PROJECT that has several projects having attributes such as PROJ-ID, PROJ-NAME and START-DATE.   Each employee may be assigned to one or more projects, or may be assigned to a project. A project must have at least one employee assigned and may have any number of employees assigned. An employee's billing rate may vary by project and the company wishes to record the applicable billing rate (BILL-RATE) for each employee when assigned to a particular project.
       By making additional assumptions, if so required, draw an E-R diagram for the above situation.

14   Draw an E-R diagram for an enterprise or an organization you are familiar with.

15   What is meant by the term client/server architecture and what are the advantages and disadvantages of this approach?

16   Differentiate between schema, subschema and instances.

17   An organization purchases items from a number of suppliers. Suppliers are identified by SUP-ID. It keeps track of the number of each item type purchased from each supplier. It also keeps a record of supplier's addresses. Supplied items are identified by ITEM-TYPE and have description (DESC). There may be more than one such addresses for each supplier and the price charged by each supplier for each item type is stored.
       Identify the entities and relationships for this organization and construct an E-R diagram.

18   Assume we have the following application that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following:
   •   We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.
   •   Each team has many players, and each player belongs to one team. Each player has a number(unique identifier), name, DoB, start year, and shirt number that he uses.
   •   Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.

- For each match we need to keep track of the following:
  - The date on which the game is played
  - The final result of the match
  - The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
  - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
  - Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referee.

  Design an ER diagram to capture the above requirements. State any assumption you have that affects your design (use the back of the page if needed). Make sure cardinalities and primary keys are clear.

19   What kind of data model supports a top-down data structure to store data? What are its advantages and disadvantages?
20   How do you transform a many-to-many relationship into a relation? Give example.
21   How can we identify individual instances of a weak entity set? Describe how schema for a weak entity can be defined. How can we convert a weak entity set into a strong entity set?
22   Describe the structure of a DBMS. If your operating system is upgraded to support some new functions on OS files (e.g., the ability to force some sequence of bytes to disk), which layer(s) of the DBMS would you have to rewrite to take advantage of these new functions?
23   Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors, Associate with each patient, a log of various test and examination conducted.
24   How is E-R model converted to relational database? Explain with examples.
25   Differentiate among the terms super key, candidate key, primary key and partial key with examples.
26   Justify the following staements:
      (a)   Table must have a key.
      (b)   Weak entities do not have their own key attributes.
      (c)   Referential integrity constraints is not must for joining of two tables.
      (d)   Naming to a constraint is useful.
27   Explain the features of EER.
28   Explain the application areas of databases.
29   Explain the difference between ER and EER model.
30   Explain UML diagrams.

UNIT - II

I   Test Your Skills:

(a)   State Whether the Following Statements are True or False:

1   In 1980 Dr. E.F. Codd was working with Oracle Corporation.
2   Cardinality of a table means the number of columns in the table.

3   In the RDBMS terminology, an attribute means a column or a field.
4   A candidate key is an attribute that uniquely identify a row in a table.
5   The foreign key and the primary key should be defined on the same underlying domain.
6   Superkey is an attribute, or set of attributes, that uniquely identifies a tuple within a relation.
7   A table cannot have more than one attribute, which can uniquely identify the rows.
8   Having clause is equivalent of WHERE clause and is used to specify the search criteria or search condition when GROUP BY clause is specified.
9   The DISTINCT keyword is illegal for MAX and MIN.
10   The transaction control statements manage all the changes made by the DML statement.
11   Foreign key in a relation is one arbitrarily chosen from the set of candidate keys of that relation.
12   NULL values are sometimes permitted in primary key attributes.
13   Some information is useless.
14   NULL values are sometimes permitted in foreign key attributes.
15   Data independence means each piece of data in the database is independent of other pieces.
16   In nested queries, one SELECT statement is written inside another.
17   If HAVING is specified, ORDER BY clause is specified.
18   HAVING clause is used to eliminate groups just as WHERE is used to eliminate rows.
19   ALTER TABLE command enables us to delete columns from a table.
20   In SQL, it is not possible to create local or global temporary tables within a transaction.
21
Ans. (1)(F),   (2)(T), (3)(T),   (4)(F), (5)(T), (6)(T), (7)(F), (8)(T), (9)(T), (10)(T), (11)(F), (12)(F), (13)(T), (14)(F), (15)(F), (16)(F), (17)(T), (18)(F), (19)(T), (20)(F)

(b)   Multiple Choice Questions:

1   Who developed SEQUEL?
     (a)   Dr. E.F. Codd
     (b)   Chris Date
     (c)   D.Chamberlain
     (d)   None of these

2   Which of the following is used to get all the columns of a table ?
     (a)   *
     (b)   @
     (c)   %
     (d)   #

3   The first commercial RDBMS is:
     (a)   INGRESS
     (b)   DB2
     (c)   ORACLE
     (d)   None of these.

4   Which of the following is not a DCL statement?

(a)   Rollback
(b)   Grant
(c)   Revoke
(d)   None of these

5   Which of the following is the result of a select statement?
(a)   Trigger
(b)   Index
(c)   Table
(d)   None of these

6   Which of the following clause specifies the table or tables from where the data has to be retrieved?
(a)   Where
(b)   Table
(c)   From
(d)   None of these

7   How many tables can be joined to create a view?
(a)   1
(b)   2
(c)   Database dependent
(d)   None of these

8   Which of the following can be used to get those items that fall within a range?
(a)   IN
(b)   BETWEEN
(c)   DISTINCT
(d)   LIKE

9   Which of the following constitutes a basic set of operations for manipulating relational data?
(a) Predicate calculus
(b) Relational algebra
(c) Relational calculus
(d) None of the above

10   Which of the following is not a relational algebraic operation that is not form the set theory?
(a)   Union
(b)   Intersection
(c)   Cartesian product
(d)   Select

11 Which of the following is not a relational algebraic operation that is developed specifically for the relational databases?
(a) Select
(b) Union
(c) Join
(d) Project

12 Which is the symbol used to denote the SELECT operation?
(a) Sigma
(b) Rho
(c) Pi
(d) None of the above

13 Which of the following operations need the participating relations to be union compatible?
(a) UNION
(b) INTERSECTION
(c) DIFFERENCE
(d) All of the above

14 What will be the number of columns of CARTESIAN PRODCUT if the participating relations have 5 and 7 columns respectively?
(a) 5
(b) 12
(c) 35
(d) None of the above

15 What will be the number of columns of CARTESIAN PRODCUT if the participating relations have 5 and 20 rows respectively?
(a) 5
(b) 20
(c) 25
(d) 100

16 Which of the following is the operation that is used if we are interested in only certain attributes or columns of a table?
(a) SELECT
(b) PROJECT
(c) UNION
(d) JOIN

17 Which of the following is not a procedural language?
(a) Relational Algebra
(b) SQL
(c) Relational calculus
(d) None of the above

18	Who developed QBE?
   (a)	C.J. Date
   (b)	E.F. Codd
   (c)	M.M. Zloof
   (d)	None of the above

19	What is the expansion of QBE?
   (a)	Query by Example
   (b)	Query by Experiment
   (c)	Question before evaluation
   (d)	None of the above

20	Who developed Structured English Query Language?
   (a)	E.F. Codd
   (b)	D. Chamberlain
   (c)	Chris Date
   (d)	None of the above

21	Which of the following is the first commercial RDBMS?
   (a)	DB2
   (b)	INGRESS
   (c)	ORACLE
   (d)	None of the above

22	Which of the following is IBM's first RDBMS?
   (a)	DB2
   (b)	IMS
   (c)	SQL/DS
   (d)	None of the above

23	Which of the following company now known as the Oracle Corporation?
   (a)	Stepware Inc.
   (b)	Relational Software Inc.
   (c)	Rational Inc.
   (d)	Oracle Software Inc.

24	What is the process that is done to SQL before execution, to check for proper syntax and to optimize the request called?
   (a)	Syntax checking
   (b)	Performance tuning
   (c)	Parsing
   (d)	Optimizing

25	Which of the following is a valid SQL data type?
   (a)	CHARACTER

(b)   NUMERIC
(c)   FLOAT
(d)   All of the above

26   Which of the following is not a data definition language statement?
    (a)   CREATE
    (b)   ALTER
    (c)   DROP
    (d)   SELECT

27   Which of the following is not a DCL statement?
    (a)   GRANT
    (b)   REVOKE
    (c)   ROLLBACK
    (d)   None of the above

28   Which of the following is a comparison operator?
    (a)   =
    (b)   LIKE
    (c)   BETWEEN
    (d)   All of the above

29   Which of the following consists of a row of column headings, together with zero or more rows of data values?
    (a)   COMPOSITE INDEX
    (b)   UNIQUE INDEX
    (c)   TABLE
    (d)   None of the above

30   In which of the following cases will the RDBMS specify a default value for the column if there are no values for it?
    (a)   NOT NULL WITH DEFAULT
    (b)   COLUMN DEFAULT
    (c)   NOT NULL UNIUE
    (d)   None of the above

31   Which of the following database object does not physically exist?
    (a)   Base table
    (b)   Index
    (c)   View
    (d)   None of the above

32   How many tables can be joined to create a view?
    (a)   1
    (b)   2
    (c)   Database dependent

(d)   None of the above

33   Which of the following is a structure that provides faster access to the rows of a table
       based on the values of one or more columns?
       (a)   Table
       (b)   View
       (c)   Index
       (d)   None of the above

34   Which of the following index is made up of more than one column?
       (a)   Composite index
       (b)   Clustered index
       (c)   Simple index
       (d)   None of the above

35   Which of the following index can occur only one per table?
       (a)   Distinct index
       (b)   Unique index
       (c)   Simple index
       (d)   Clustered index

36   Which question corresponds best to the following query?
       SELECT CID, CDUR - 1,' = PRICE'
       FROM COURSES
       ORDER BY 2
       (a)   Select three columns from the COURSES table, of which the third one has a
               constantvalue, i.e. " = PRICE". Leave an empty line after every second line.
       (b)   Select two columns from the COURSES table, the second one gets as title " =
               PRICE".Sort the data according to the second column, in ascending order.
       (c)   Select three columns from the COURSES table, of which the third one has a
               constantvalue, i.e. " = PRICE". Sort the data according to the second column, in
               ascending order.
       (d)   Select two columns from the COURSES table, of which the second one has a
               constantvalue, i.e. " = PRICE". Sort the data according to the second column, in
               ascending order

37   What is the default order of Order by clause?
       (a)   Descending
       (b)   Ascending
       (c)   Random
       (d)   None of the above

38   View the Exhibit and examine the structure of the EMPLOYEES and DEPARTMENTS
       tables.
       Which SET operator would you use in the blank space in the following SQL statement to
       list the departments where all the employees have managers?

SELECT department_id
FROM departments

____
SELECT department_id
FROM employees
WHERE manager_id IS NULL;

  a.   Union
  b.   Minus
  c.   Intersect
  d.   Union all

39   View the Exhibit and examine the data in the EMPLOYEES tables.

Evaluate the following SQL statement: SELECT employee_id, department_id FROM
employees
WHERE department_id= 50 ORDER BY department_id
UNION
SELECT employee_id, department_id
FROM employees
WHERE department_id= 90
UNION
SELECT employee_id, department_id
FROM employees
WHERE department_id= 10;
What would be the outcome of the above SQL statement?

  (a)   The statement would execute successfully and display all the rows in the
        ascending order of DEPARTMENT_ID.
  (b)   The statement would execute successfully but it will ignore the ORDER BY
        clause and display the rows in random order.
  (c)   The statement would not execute because the positional notation instead of the
        column name should be used with the ORDER BY clause.
  (d)   The statement would not execute because the ORDER BY clause should appear
        only at the end of the SQL statement, that is, in the last SELECT statement.

40   Which CREATE TABLE statement is valid?

  (a)   CREATE TABLE ord_details
        (ord_no NUMBER(2) PRIMARY KEY, item_no NUMBER(3) PRIMARY KEY,
        ord_date date NOT NULL);
  (b)   CREATE TABLE ord_details
        (ord_no NUMBER(2) UNIQUE, NOT NULL, item_no NUMBER(3),
        ord_date date DEFAULT SYSDATE NOT NULL);
  (c)   CREATE TABLE ord_details
        (ord_no NUMBER(2) ,

24

item_no NUMBER(3),
ord_date date DEFAULT NOT NULL, CONSTRAINT ord_uq UNIQUE (ord_no), CONSTRAINT ord_pk PRIMARY KEY (ord_no));

(d)   CREATE TABLE ord_details
(ord_no NUMBER(2), item_no NUMBER(3),
ord_date date DEFAULT SYSDATE NOT NULL, CONSTRAINT ord_pk PRIMARY KEY (ord_no, item_no));

41   Grant and Revoke are
(a)   DDL
(b)   DML
(c)   DCL
(d)   None

42   ALTER command can be used to
(a)   change the table structure
(b)   change the table data
(c)   add rows to the table
(d)   Delete rows from table

43   The result of a SQL SELECT statement is a
(a)   Report
(b)   Form
(c)   File
(d)   Relation

44   Keyword BETWEEN is used :
(a)   For ranges
(b)   To limit the columns shown
(c)   As a wildcard
(d)   None of the above

45   A subquery must be
(a)   in braces
(b)   in Capital Letters
(c)   in parenthesis
(d)   in brackets

46   To remove duplicate, the qualifier used :
(a)   ONLY
(b)   UNIQUE
(c)   DISTINCT
(d)   SINGLE

47   A query with in a query is called as

(a)   New query
(b)   Child Query
(c)   Sub Query
(d)   None

48   To remove duplicate rows, the qualifier used:
(a)   ONLY
(b)   UNIQUE
(c)   DISTINCT
(d)   SINGLE

49   DBA stands for
(a)   database administrator
(b)   Database accumulator
(c)   Database animator
(d)   Mone

50.   DCL stands for
(a)   Data Calculation language
(b)   Data control language
(c)   Data communication language
(d)   None

51   Which one of the following is a set of one or more attributes taken collectively to uniquely identify a record?
(a)   Candidate key
(b)   Sub key
(c)   Super key
(d)   Foreign key

52   Consider attributes ID , CITY and NAME . Which one of this can be considered as a super key?
(a)   NAME
(b)   ID
(c)   CITY
(d)   CITY , ID

53   The subset of super key is a candidate key under what condition ?
(a)   No proper subset is a super key
(b)   All subsets are super keys
(c)   Subset is a super key
(d)   Each subset is a super key

54   A _____ is a property of the entire relation, rather than of the individual tuples in which each tuple is unique.
(a)   Rows

(b)   Key
(c)   Attribute
(d)   Fields

55   Which one of the following attribute can be taken as a primary key?
(a)   Name
(b)   Street
(c)   Id
(d)   Department

56   Which one of the following cannot be taken as a primary key ?
(a)   Id
(b)   Register number
(c)   Dept_id
(d)   Street

57   A attribute in a relation is a foreign key if the _____ key from one relation is used as an attribute in that relation.
(a)   Candidate
(b)   Primary
(c)   Super
(d)   Sub

58   The relation with the attribute which is the primary key is referenced in another relation. The relation which has the attribute as primary key is called
(a)   Referential relation
(b)   Referencing relation
(c)   Referenced relation
(d)   Referred relation

59   The _____ is the one in which the primary key of one relation is used as a normal attribute in another relation
(a)   Referential relation
(b)   Referencing relation
(c)   Referenced relation
(d)   Referred relation

60   A _____ integrity constraint requires that the values appearing in specified attributes of any tuple in the referencing relation also appear in specified attributes of at least one tuple in the referenced relation.
(a)   Referential
(b)   Referencing
(c)   Specific
(d)   Primary

Ans. (1)(d), (2)(a), (3)(a), (4)(a), (5)(c), (6)(c), (7)(a), (8)(c), (9)(b), (10)(d), (11)(b), (12)(a), (13)(d), (14)(b), (15)(d), (16)(b), (17)(c), (18)(c), (19)(a), (20)(b), (21)(d), (22)(c), (23)(b), (24)(c), (25)(d), (26)(d), (27)(c), (28)(d), (29)(c), (30)(c), (31)(c), (32)(c), (33)(c), (34)(a), (35)(b),(36)(c),(37)(b),(38)(b),(39)(d),(40)(d), (41)(c), (42)(a), (43)(d), (44)(a), (45)(d), (46)(c), (47)(c), (48)(c), (49)(a), (50)(b), (51)(a), (52)(b), (53)(c), (54)(b), (55)(d), (56)(b), (57)(d), (58)(c), (59)(b), (60)(a)

(c)   Fill in the Blanks:

1   The relational model is based on the core concept of _____.
2   Degree of the table means the number of _____ in a table.
3   A domain is a set of _____values.
4   The smallest unit of data in the relational model is the individual _____.
5   A _____ is set of possible data values.
6   A table can have only one _____ key.
7   Tuple relational calculus was originally proposed by _____ in _____.
8   SQL was first implemented on a relational database called _____.
9   DROP operation of SQL is used for _____Tables from the schema.
10   The _____clause specifies a summary query.
11   _____ is Oracle's Command Line interpreter.
12   The NUMBER data type is used to store _____ and_____ numbers.
13   The RAW/LONG RAW data types are used to store _____ data.
14   The _____ data type is a Unicode-only type.
15   _____ is used to store variable length alphanumeric data.
16   Oracle uses_____ to store address of each rows of the table.
17   _____ data type is used to represent date and time.
18   The argument p stands for _____ and s stands for _____ in NUMBER data type.
19   _____ holds unstructured binary data.
20   The VARCHAR data type can hold up to _____ characters.
21   The precision of NUMBER data type ranges from ___ to ___ .
22   Character expressions placed within the insert into statement must be enclosed in _____ quotes.
23   VARCHAR is defined _____ standard and VARCHAR2 is defined by _____.
24   RAW data type can have a maximum length of _____bytes.
25   LONG data can be used to store arrays of binary data in _____format.
26   _____is much faster than varchar/varchar2.
27   The standard format for date is _____
28   LONG can be used to store of length up to _____
29   _____values cannot be used in subqueries, functions and expressions.
30   The default value for CHAR data type is ___.
31   The maximum length of data that can be stored by CHAR is _____characters

Ans. (1)(Relation and set theory), (2)(Number of columns), (3)(Legal or atomic values), (4)(Field), (5)(Field), (6)(Primary), (7)(Dr. Codd, 1972), (8)(System R), (9)(Deleting),

(10)   (Group   by),   (11)   (SQL   *   Plus),   (12)(fixed,   floating point),(13)(binary),(14)(NCHAR), (15)(VARCHAR), (16)(ROWID), (17)(DATE), (18)(precision, scale), (19)(BLOB),(20)(4000), (21)(1,38), (22)(Single), (23)(ANSI, Oracle),(24)(255), (25)(ASCII), (26)(CHAR), (27)(DD-MON-YY), (28)(2GB), (29)(LONG), (30)(1), (31)(2000)

II   Short Answer Type Questions:

1   Why null values are introduced in the database?
2   What primary characteristics should OID posses?
3   Define the referential integrity constraints in Relational Databases.
4   Why we may choose to define a view?
5   Why can we have only one primary index on a file but several secondary Indexes?
6   What is the retention option in a Network Model?
7   Explain union compatibility of sets?   Name the operations for which the condition must be checked.
8   Name the situation in which DBMS approach is not suitable.
9   When the following SQL command is given, what will be the effect of retrieval on the EMPLOYEE database of M/s KLY System Ltd of Table.

    (a)   SELECT   EMP-NO, EMP-LNAME, EMP-FNAME, DEPT
            FROM   EMPLOYEE
            WHERE   SALARY=>4000;
    (b)   SELECT   EMP-FNAME, EMP-LNAME, DEPT, TEL-NO
            FROM   EMPLOYEE
            WHERE   EMP-NO = 123456;
    (c)   SELECT   EMP-NO, EMP-FNAME, DEPT, SALARY
            FROM   EMPLOYEE
            WHERE   EMP-LNAME = 'kumar';
    (d)   SELECT   EMP-NO, EMP-LNAME, EMP-FNAME
            FROM   EMPLOYEE
            WHERE   SALARY=>7000;

Table: EMPLOYEE file of M/s KLY System Ltd.

EMPLOYEE							
EMP-NO	EMP-LNAME	EMP-FNAME	SALARY	COUNTRY	BIRTH-CITY	DEPT	TEL.NO.
106519	Mathew	Thomas	4000	India	Mumbai	DP	2431322
112233	Smith	John	4500	Italy	Rome	MFG	2423206
123456	Kumar	Rajeev	6000	India	Delhi	DP	2427982
123243	Martin	Jose	3500	India	Jamshedpur	HR	2437981
109876	Singh	Abhishek	4800	USA	NewYork	MFG	2147008
111222	Parasar	Alka	5100	USA	New Jersey	HR	2145063
165243	Kumar	Avinash	6500	UK	London	MFG	2407841

lives (person_name, street, city)

works (<u>person_name</u>, company_name, salary)
located_in (<u>company_name</u>, city)
manages (<u>person_name</u>, manager_name)

10   Consider the relational database above. Give an expression in relational algebra for each of the queries below:
- (a)   Find the name of all employees who work for National Commercial Bank.
- (b)   Find the name and street of all employees who work for National Commercial Bank and earn more than $150,000.
- (c)   Find all employees who do not work for National Commercial Bank.
- (d)   Find all employees who live in the same city as the company they work for.
- (e)   Assume the companies may be located in several cities. Find all companies located in every city in which National Commercial Bank is located.
- (f)   Find all employees who live in the same city and on the same street as their manager.
- (g)   Find all employees who earn more than every employee at Jamaica Citizens Bank.

11   Give an expression for each of the following requests:
- (a)   Modify the database so that Jones now lives in Kingston.
- (b)   Give all employees of National Commercial Bank a 10% raise.
- (c)   Delete all tuples in the *works* relation for employees of National Commercial Bank.
- (d)   Give all managers a 10% raise.
- (e)   Give all managers a 10% raise unless the salary becomes greater than $100,000. In such cases give only a 3% raise.

12   What is outer join?
13   Discuss the various datatypes in SQL.
14   Discuss the various operators in SQL.
15   Explain the statement that relational algebra operators can be composed. Why is the ability to compose operators important?
16   How many types of integrity constraints are there?
17   Differentiate between primary and unique key.
18   What is check constraint?
19   What is DCL?
20   Differentiate between SQL and No SQL.
22   How a database can be secured?
23   What are the features of SQL?
24   Differentiate between SQL and SQL *PLUS.
25   Explain the components of SQL.

III   Long Answer Type Questions:

1   Write SQL statements to perform the following operations on the EMPLOYEE data file of M/s KLY System Ltd., of Table
- (a)   Get employee's number, employee's name, and telephone number for all employees of DP Department.

(b) Get employee's number, employee's name, department and telephone number for all employees of Indian origin.

Table - EMPLOYEE file of M/s KLY System Ltd.

EMPLOYEE							
EMP-NO	EMP-LNAME	EMP-FNAME	SALARY	COUNTRY	BIRTH-CITY	DEPT	TEL.NO.
106519	Mathew	Thomas	4000	India	Mumbai	DP	2431322
112233	Smith	John	4500	Italy	Rome	MFG	2423206
123456	Kumar	Rajeev	6000	India	Delhi	DP	2427982
123243	Martin	Jose	3500	India	Jamshedpur	HR	2437981
109876	Singh	Abhishek	4800	USA	NewYork	MFG	2147008
111222	Parasar	Alka	5100	USA	New Jersey	HR	2145063
165243	Kumar	Avinash	6500	UK	London	MFG	2407841

(c) Add 250 in the salary of employees belonging to USA.
(d) Remove all records of employees getting salary of more than 6000.
(e) Add new employee details, whose details are as follows: employee no.: 106520, last name: Joseph, first name: Gorge, Salary: 8200, country: AUS, birth place: Melbourne, department: DP, and telephone no.: 334455661

2 Consider the following relational schema
Account (account-number, branch-name, balance)
Loan (Loan-number, branch-name, balance)
Depositor (Customer-name, Account-number)
Borrower (Customer-name, Loan-number)
Write queries in SQL for the following:
(a) Find all loan numbers for loan made at Bombay branch.
(b) Find all customers who have both a loan and an account at the bank.
(c) Find the average account balance at each branch.
(d) Find the number of depositors at each branch.
3 (a) How is traditional file processing approach different than DBMS approach? Explain.
(b) Why can we have only one primary index on a file but several secondary indexes?
(c) Define the terms: DDL, DML and DCL.

4 What is relational algebra? Discuss its various operations in detail.
5 Give the differences between equi-join and natural join with example.
6 Difference between inner and outer join.
7 Explain Codd's rules for relational database.
8 Explain the various types of constraints in Oracle. Give examples.

9   Explain the difference between using functions with and without grouping attributes in relational algebra. Give examples.
10   Define the following with respect to SQL
        (i) Specifying alias (ii) UNIQUE function
        (iii) ORDER BY clause (iv) LIKE predicate
        (v) Asterisk (*)
11   Consider the relations given below
        Borrower (id-no, name)
         Book (accno., title, author, borrower-idno)
        (a)   Define the above relations as tables in SQL making real world assumptions about the type of the fields. Define the primary keys and the foreign keys.
        (b)   For the above relations answer the following queries in SQL
        (i)   What are the titles of the books borrowed by the borrower whose id-no in 365.
        (ii)   Find the numbers and names of borrowers who have borrowed books on DBMS in ascending order in id-no.
        (iii)   List the names of borrowers who have borrowed at least two books.

12   Consider the relations defined below:
         PHYSICIAN (regno, name, telno, city)
         PATIENT (pname, street, city)
         VISIT (pname, regno, date_of_visit, fee)
         Where the regno and pname identify the physician and the patient uniquely respectively.
        Express queries (i) to (iii) in SQL.

        (i)   Get the name and regno of physicians who are in Delhi.
        (ii)   Find the name and city of patient(s) who visited a physician on 31 August 2004.
        (iii)   Get the name of the physician and the total number of patients who have visited her.
        (iv)   What does the following SQL query answer
                    SELECT DISTINCT name
                    FROM PHYSICIAN P
                    WHERE NOT EXISTS
                    (SELECT *
                    FROM VISIT
                    WHERE regno = p.regno)
13   Explain the six clauses of Select.
14   Differentiate between DCL, DML and DCL commands with the help of examples.
15   What are constraints? Explain different types of constraints.
16   Create an employee table and

 Insert following three employees:

Jonie Weber, Secretary, 28, 19500.00
Potsy Weber, Programmer, 32, 45300.00
Dirk Smith, Programmer II, 45, 75020.00

After they're inserted into the table, enter select statements to:

1. Select all columns for everyone in your employee table.
2. Select all columns for everyone with a salary over 30000.
3. Select first and last names for everyone that's under 30 years old.
4. Select first name, last name, and salary for anyone with "Programmer" in their title.
5. Select all columns for everyone whose last name contains "ebe".
6. Select the first name for everyone whose first name equals "Potsy".
7. Select all columns for everyone over 80 years old.
8. Select all columns for everyone whose last name ends in "ith".

17   Explain relational algebra and relational calculus.

UNIT - III

I   Test Your Skills:

(a)   State Whether the Following Statements are True or False:

1   Is it possible to modify a Datatype of a column when column contains data.
2   Can we enable or disable database trigger.
3   Cursor holds temporary results.
4   NULL is never True or False.
5   SQL queries can be used inside PL/SQL code.
6   PL/SQL was released in 1994.
7   An implicit cursor can only be used when the SQL query retrieves one and only one record.
8   A function is a subprogram that carries out a specific task and returns a value.
9   BEFORE triggers execute the trigger action after the triggering statement is executed.
10   Row level triggers execute once for each row in a transaction.

Ans.   (1)(F), 2(T), 3(F), (4)(T), (5)(T), (6)(F), (7)(T), (8)(T), (9)(F), (10)(T)

(b)   Multiple Choice Questions:

1   Transaction ends
   (a)   Only when it is Committed
   (b)   Only when it is Rolledback
   (c)   When it is Committed or Rolledback
   (d)   None of the above

2   A Database Procedure is stored in the Database
   (a)   In compiled form
   (b)   As source code
   (c)   Both A & B
   (d)   Not stored

3   Dedicated server configuration is
  (a)   One server process – Many user processes
  (b)   Many server processes – One user process
  (c)   One server process – One user process
  (d)   Many server processes – Many user processes

4   Which of the following does not affect the size of the SGA?
  (a)   Database buffer
  (b)   Redolog buffer
  (c)   Stored procedure
  (d)   Shared pool

5   What does a COMMIT statement do to a CURSOR?
  (a)   Open the Cursor
  (b)   Fetch the Cursor
  (c)   Close the Cursor
  (d)   None of the above

6   Which of the following is TRUE?
  (1)   Host variables are declared anywhere in the program
  (2)   Host variables are declared in the DECLARE section
  (a)   Only 1 is TRUE
  (b)   Only 2 is TRUE
  (c)   Both 1 & 2are TRUE
  (d)   Both are FALSE

7   Which of the following is NOT VALID is PL/SQL?
  (a)   Boolboolean;
  (b)   NUM1, NUM2 number;
  (c)   deptnamedept.dname%type;
  (d)   date1 date := sysdate

8   Which of the following is not correct about an Exception?
  (a)   Raised automatically / Explicitly in response to an ORACLE_ERROR
  (b)   An exception will be raised when an error occurs in that block
  (c)   Process terminates after completion of error sequence.
  (d)   A Procedure or Sequence of statements may be processed.

9   Which of the following is not correct about User_DefinedExceptions ?
  (a)   Must be declared
  (b)   Must be raised explicitly
  (c)   Raised automatically in response to an Oracle error
  (d)   None of the above

10   A Stored Procedure is a
     (a)   Sequence of SQL or PL/SQL statements to perform specific function
     (b)   Stored in compiled form in the database
     (c)   Can be called from all client environments
     (d)   All of the above

11   Which of the following statement is false?
     (a)   Any procedure can raise an error and return an user message and error
           number.
     (b)   Error number ranging from 20000 to 20999 are reserved for user defined
           messages.
     (c)   Oracle checks Uniqueness of User defined errors.
     (d)   Raise_Application_error is used for raising an user defined error.

12   Find the ODD one out of the following:
     (a)   OPEN
     (b)   CLOSE
     (c)   INSERT
     (d)   FETCH

13   Which of the following is a cursor operation?
     (a)   DECLARE
     (b)   OPEN and FETCH
     (c)   CLOSE
     (d)   All of the above

14   Which of the following is not an executable statement?
     (a)   DECLARE
     (b)   OPEN
     (c)   FECTH
     (d)   CLOSE

15   Which of the following is the clause that makes a singleton SELECT different from
     the normal SELECT?
     (a)   WHERE
     (b)   INTO
     (c)   IN
     (d)   None of the above

16   How many attributes are associated with cursors?
     (a)   1
     (b)   2
     (c)   3
     (d)   4

17   Which of the following attribute of implicit cursor always evaluates to false?

(a)   %FOUND
(b)   %OPEN
(c)   %NOTFOUND
(d)   %ROWCOUNT

18   Which of the following can be used to supplement declarative referential integrity, to enforce complex business rules or to audit changes to data?
(a)   Synonyms
(b)   Tables
(c)   Triggers
(d)   None of the above

19   Which of the following can initiate a trigger?
(a)   Insert
(b)   Update
(c)   Delete
(d)   All of the above

20   Which of the following SQL standard support triggers?
(a)   SQL-89
(b)   SQL-2
(c)   SQL-3
(d)   SQL-4

21   Which of the following trigger is executed once for each row in a transaction?
(a)   Row-level Triggers
(b)   Statement-level Triggers
(c)   Repetitive Triggers
(d)   All of the above

22   Which of the following is the default trigger that is created using the CREATE TRIGGER command?
(a)   Row level Trigger
(b)   Statement level Trigger
(c)   Before trigger
(d)   After trigger

23   Which of the following command is used to delete a trigger?
(a)   Delete trigger
(b)   Replace trigger
(c)   Drop trigger
(d)   None of the above

24   What is the name of a trigger that initiates another trigger?
(a)   Triggering Trigger
(b)   Automatic Initiation Trigger

(c) Cascading Trigger
(d) None of the above

25 Which of the following specifies a boolean expression that must be true for the trigger to fire?
(a) Trigger Action
(b) Triggering Event
(c) Trigger Restriction
(d) None of the above

26 Which of the following trigger will be executed before modifying each row affected by the triggering statement?
(a) Before Statement Trigger
(b) After Row Trigger
(c) Before Row Trigger
(d) None of the above

27 Which of the following is not true in case of triggers?
(a) Triggers accept parameters.
(b) Triggers are executed implicitly
(c) Execution of triggers is transparent to the users.
(d) A trigger can invoke another trigger.

28 A database is divided into logical storage units called as
(a) Tables
(b) Records
(c) Tablespaces
(d) None of the above

29 A file used to govern the initialization of the instance is known as
(a) Shared file
(b) Parameter file
(c) Read-only file
(d) None of the above

30 SGA stands for
(a) System Go Ahead
(b) Software Global Area
(c) System Global Area
(d) None of the above

31 Under which two circumstances do you design database triggers? (Choose two)
(a) To duplicate the functionality of other triggers.
(b) To replicate built-in constraints in the Oracle server such as primary key and foreign key.

(c)   To guarantee that when a specific operation is performed, related actions are performed.

(d)   For centralized, global operations that should be fired for the triggering statement, regardless of which user or application issues the statement.

32   This statement fails when executed:

CREATE OR REPLACE TRI GGER CALC_TEAM_AVG
AFTER I NSERT ON PLAYER
BEGIN
INSERT INTO PLAYER_BATSTAT (PLAYER_I D, SEASON_YEAR, AT_BATS, HI TS)
VALUES (: NEW. I D, 1 997, 0, 0) ;
END;

To which type must you convert the trigger to correct the error?
(a)   Row
(b)   Statement
(c)   ORACLE FORM trigger
(d)   Before

33   The OLD and NEW qualifiers can be used in which type of trigger?
(a)   Row level DML trigger
(b)   Row level system trigger
(c)   Statement level DML trigger
(d)   Row level application trigger
(e)   Statement level system trigger
(f)   Statement level application trigger

34   Trigger are not supported in
(a)   Delete
(b)   Update
(c)   Views
(d)   All of the mentioned

35   The CREATE TRIGGER statement is used to create the trigger. THE _____ clause specifies the table name on which the trigger is to be attached. The _____ specifies that this is an AFTER INSERT trigger.
(a)   for insert, on
(b)   On, for insert
(c)   For, insert
(d)   Both a and c

36   What are the after triggers?
(a)   Triggers generated after a particular operation
(b)   These triggers run after an insert, update or delete on a table

(c)　　These triggers run after an insert, views, update or delete on a table
(d)　　Both b and c

37　　The variables in the triggers are declared using
(a)　　　-
(b)　　　@
(c)　　　/
(d)　　　/@

38　　Which of the following is NOT an Oracle-supported trigger?
(a)　　BEFORE
(b)　　DURING
(c)　　AFTER
(d)　　INSTEAD OF

39　　Which of the following is true concerning triggers?
(a)　　We do not create them with SQL.
(b)　　They execute against only some applications that access a database.
(c)　　They have an event, condition, and action.
(d)　　They cannot cascade (cause another trigger to fire).

40　　Which prefixes are available to Oracle triggers?
(a)　　　: new only
(b)　　　: old only
(c)　　Both :new and : old
(d)　　Neither :new nor : old

41　　Oracle is a
(a)　　NDBMS
(b)　　BDBMS
(c)　　RDBMS
(d)　　None

42　　SGA stands for
(a)　　System global area
(b)　　System Go area
(c)　　System Go ahead
(d)　　None

43　　SGA has
(a)　　4 Caches
(b)　　5 Caches
(c)　　3 Caches
(d)　　2 Caches

44　　A database is divided into logical storage units called as

(a)   Tables
(b)   Records

(c)   Tablespaces
(d)   None

45   A buffer used to store results of the recent query.
(a)   Package
(b)   Trigger
(c)   Exception
(d)   Cursor

46   Functions returns using the statement
(a)   Call
(b)   Return
(c)   Return <datatype> <function name>
 (d)   None

47   Give number of rows retrieved by cursor
(a)   % FOUND
(b)   % RETURN
(c)   % FOUND %
(d)   % ROW COUNT

48   What is NOT an advantage of stored procedure?
(a)   Code sharing
(b)   Security
(c)   Optimization
(d)   Measured network traffic

49   ORACLE supports which kinds of triggers?
(a)   INSTEAD of
(b)   BEFORE
(c)   AFTER
(d)   ALL

50   For what purpose are views used?
(a)   Hide rows
(b)   Hide SQL statements
(c)   Hide columns
(d)   All of the above

51   How many bytes does each character in the UTF8 encoding take up?
(a)   1
(b)   2
(c)   3

(d)   All mentioned above

52   PL/SQL has two types of subprograms, procedures and functions. Which subprogram is used to compute a value?
(a)   Procedure
(b)   Function
(c)   Both A & B
(d)   None of the above

53   Which data type is not allowed in the definition of PL/SQL record?
(a)   A Collection
(b)   A Scalar
(c)   Both A & B
(d)   None of the above

54   In the SQL Cursor, which attribute is TRUE when a cursor has some remaining rows to fetch, and FALSE when a cursor has no rows left to fetch?
(a)   %ROWCOUNT
(b)   %FOUND
(c)   %NOTFOUND
(d)   %ISOPEN

55   For which Exception, if a SELECT statement attempts to retrieve data based on its conditions, this exception is raised when no rows satisfy the SELECT criteria?
(a)   TOO_MANY_ROWS
(b)   NO_DATA_FOUND
(c)   VALUE_ERROR
(d)   DUP_VAL_ON_INDEX

56   In the PL/SQL block below, how many rows will be inserted in the messages table?
```
DECLARE
v_start_sales NUMBER := 2;
v_end_sales NUMBER := 100;
BEGIN
FOR i IN v_start_sales..v_end_sales LOOP
INSERT INTO messages(msgid)
VALUES v_start_sales;
END LOOP;
END;
```
(a)   0
(b)   99
(c)   1
(d)   100

57   Which collection types is also known as index-by tables, lets you look up elements using arbitrary numbers and strings for subscript values?
     (a)   Associative arrays
     (b)   Nested tables
     (c)   Varrays
     (d)   None of the above

58   Assigning a value to a collection element can cause exceptions, such as
     (a)   If the subscript is NULL or is not convertible to the right datatype, PL/SQL raises the predefined exception VALUE_ERROR. Usually, the subscript must be an integer. Associative arrays can also be declared to have VARCHAR2 subscripts.
     (b)   If the subscript refers to an uninitialized element, PL/SQL raises SUBSCRIPT_BEYOND_COUNT.
     (c)   If the collection is atomically null, PL/SQL raises COLLECTION_IS_NULL.
     (d)   All mentioned above

59   Which is a procedural extension of Oracle- SQL that offers language constructs similar to those in imperative programming languages?
     (a)   PQL
     (b)   Advanced SQL
     (c)   PL/SQL
     (d)   SQL

60   Which of the following retains duplicate rows in the result of a query or in an aggregate expression?
     (a)   ALL
     (b)   DISTINCT
     (c)   PRIOR
     (d)   None of the above

Ans. (1)(c), (2)(c), (3)(c), (4)(c), (5)(d), (6)(b), (7)(b), (8)(c), (9)(c), (10)(d), (11)(c), (12)(c), (13)(d), (14)(a), (15)(b), (16)(d), (17)(b) (18)(c), (19)(d), (20)(c), (21)(a), (22)(b), (23)(c), (24)(c), (25)(c), (26)(c), (27)(a), (28)(c), (29)(b), (30)(c), (31)(c,d), (32)(a),(33)(a), (34)(c), (35)(b), (36)(b), (37)(b), (38)(b), (39)(c), (40)(c), (41)(c), (42)(a), (43)(c), (44)(c), (45)(d), (46)(c), (47)(d), (48)(d), (49)(d), (50)(a), (51)(d), (52)(b) (53)(a), (54)(b), (55)(d), (56)(b), (57)(a), (58)(d), (59)(c), (60)(a)

(c)   Fill in the Blanks:

1   The maximum number of triggers that can be applied to a single table are _____.
2   _____ exceptions in PL/SQL are the errors that do not cause a run time error.
3   _____ cursors are defined by the programmers.
4   The _____marks a specific point in the current transaction up till which changes have been stored.
5   Cursor supports ___ attributes.

6   There are two types of PL/SQL procedures_____ procedures and _____procedures.

7   Parameters can be passed to procedures in three modes_____ mode, _____ mode and _____ mode.

8   The three sections in an anonymous block are_____, _____and _____.

9   The _____statement undoes all changes since the last commit.

10 _____is a user defined name for a PL/SQL object.

11 The Oracle database architecture can be described in terms of _____ and _____ structures.

12 The logical structure for Oracle RDBMS consists of the elements called_____ and _____.

13 Each database has at least one Tablespace called _____Tablespace.

14 Each Tablespace is a collection of one or more_____.

15 An _____is a specific number of contiguous data blocks that are allocated for storing a specific type of information.

16 The level of logical database storage above an extent is called a _____.

17 An Oracle database can use _____types of segments.

18 There are_____ Oracle background processes.

19 PMON stands for _____

20 _____ is used to clean transactions that were pending in a distributed database.

Ans.   (1)(12), (2)(User defined), (3)(Explicit), (4)(SAVEPOINT), (5)(4), (6)(anonymous/local, stored), (7)(IN, OUT, IN OUT), (8)(declaration, execution, exception), (9)(ROLLBACK), (10)(Identifier), (11)(logical, physical), (12)(Tablespace, Schema), (13)(SYSTEM), (14)(datafiles), (15)(extent), (16)(segment), (17)(four), (18)(nine), (19)(Process Monitor), (20)(RECO)

II   Short Answer Type Questions:

1   Write a short note on PL/SQL.
2   Explain the types of variables in PL/SQL.
3   What are the limitations of PL/SQL?
4   What are the advantages of PL/SQL?
5   Compare scalar and composite data types of PL/SQL.
6   What are reserved words? Can these be used as identifiers?
7   What are literals?
8   How many values can a scalar variable contain?
9   What is required in variable declaration?
10 What is a variable's scope?
11 What do you understand by a variable's visibility?
12 What is meant by implicit and explicit type conversion?
13 What is transaction handling? How does PL/SQL carry it out?
14 Write a short note on cursors in PL/SQL.
15 What are four cursor commands?

16   How is data retrieved from a cursor? What implications does this process bring to cursor attributes?
17   Define a procedure in PL/SQL.
18   Difference between actual and formal parameters.
19   What is a trigger?
20   What is the difference between a trigger and procedure?
21   What are row level and statement level triggers?
22   Write syntax to create a trigger.
23   When would you recommend BEFORE triggers.
24   How do you access column values in triggers?
25   What are tablespaces?
26   What are instances?
27   Difference between SQL and PL/SQL.
28   Define stored procedure.
29   Distinguish between cursor and trigger.
30   What are the components of Physical Storage in Oracle database system?
31   What is the importance of a Control File**?**
32   Write a program using PL/SQL to reverse a string.
33   Write a program to find all Armstrong number in the range of 0 to 999.
34   What are the two types of variable attributes in PL/SQL ?
35   What are composite data types ?
36   How records are initialized in PL/SQL ?

III   Long Answer Type Questions:

1   Explain the key features of Oracle in detail.
2   Describe the architecture of PL/SQL.
3   Explain the data types of PL/SQL.
4   Discuss various types of blocks in PL/SQL.
5   How errors in a PL/SQL block are be managed?
6   What different types of procedures are supported in PL/SQL? Give an example of each.
7   How are stored procedures different from local procedures?
8   What are the advantages of stored procedures?
9   What is a function? Is it another type of stored procedure? Why? How?
10   A bank accepts fixed deposits for one year or more and the policy it adopts on interest is as follows:
        (i)   If a deposit is less than Rs. 2000 and for 2 or more years, the interest rate is 5% compound annually.
        (ii)   If a deposit is Rs. 2000 or more but less than 6000 and for 2 or more years, the interest rate is 7% compounded annually.
        (iii)   If a deposit is more than Rs. 6000 and is for 1 year or more, the interest is 8% compounded annually.
        (iv)   On all deposits for 5 years or more, interest is 10% compounded annually.
        (v)   On all other deposits not covered by above conditions, the interest is 3% compounded annually.

Given the amount deposited and the number of years, write a program to calculate the money in the customer's account at the end of the specified time.

11   Write PL/SQL script to determine whether the salary (field sal) of employee 2763 in EMP table is less than 7500 or not. If it is, give the employee an increment of 15% otherwise display a message 'No increment given'.

12   Write PL/SQL script to print complete ASCII table.

13   A table called STUDENT is present in the database. The attributes of the table are Rollno, Name, Mark1, Mark2, Mark3, TotMark. Do the following:
      (i)   Write PL/SQL blocks to update TotMark as Mark1+Mark2+Mark3.
      (ii)   Also insert details into Result, which should contain RollNo, Name and Result where Result is "Pass" if TotMark is more than 32 otherwise, Result is "Fail".

14   Create a stored procedure that provides the details of customer name and city from table CUSTOMERS having structure (cid, cname, city, status, credit). To obtain these details, the customer number is passed to the procedure.

15   Write PL/SQL script that uses an explicit cursor named cur_student to retrieve the first and last name from all the records in the STUDENT table, and then displays each first and last name using DBMS_OUTPUT command. Use a LOOP…EXIT WHEN loop to process the cursor.

16   Create a trigger that raises an error if a user attempts to delete a row from the employee table

17   Create a trigger that prints the change in salary every time salary of an employee is changed.

18   Discuss the architecture of Oracle in detail.

19   Discuss the background processes of Oracle in detail.

20   Consider the table Employee (empno, ename, job, deptno, salary). Write a PL/ SQL code to increase the salary of the empno 7369 by 30percent, if he is a 'Manager' , by 20 percent , if he is a 'Salesman' otherwise increase his salary by 10 percent.

21   What are users defined and system defined exceptions in Oracle? How are they handled?

22   What are the components of Logical Storage in Oracle database system? Explain.

23   What are parameterized cursors? Explain in detail.

24   Discuss the various control structures of PL/SQL with examples.

25   What are implicit and explicit cursors in Oracle? Explain.

26   Explain BEFORE and AFTER triggers. Write a trigger for when a user insert any record in the table emp(empno, ename, job deptno) same emp1(empno, ename, job, deptno.)

27   How are system defined errors handled in PL/SQL ?

28   Write a PL/SQL program to find out the salaries of employees by using PL/SQL tables.

29   Explain how the records can be assigned in PL/SQL.

30   Write a program that will accept the employee number and return the details of that employee by using the %TYPE attribute.

31   Write a program that will raise the TOO_MANY_ROWS exception.

32   Write a program that will raise the NO_DATA_FOUND exception when the SELECT statement does not retrieve any record.

UNIT - IV

I   Test Your Skills:
(a)   State Whether the Following Statements are True or False:

1   In 3NF Relation should not have a non-key attribute functionally determined by another non-key attribute.
2   Every relation is 3NF is also in BCNF.
3   If X > Y, then Y$\rightarrow$ X (Y functionally determines X)
4   A relation schema R is in 3NF if every nonprime attribute A in R is fully functionally dependent on the primary key of R.
5   Second normal farm is based on the concept of full functional dependency.
6   The transitivity inference rule of functional dependency states:
       (X$\rightarrow$ Y, Z$\rightarrow$ Y)$|$=X$\rightarrow$ Z.
7   The normal form of a relation refers to the lowest normal form condition that it meets.
8   Normalization of data helps in reducing insertion, deletion and updation anomalies.
9   The normalization is carried out in practice so hat the resulting designs are of high quality.
10   If a relation is in BCNF then it is also in 3NF.
11   The granularity of data item in a database can affect the performance of concurrency control and recovery.
12   In optimistic concurrency control technique the three phases are in the order: validation phase, read phase, write phase.
13   Shadow paging is recovery technique in a database.
14   A schedule S is called serial if, for every transaction T participating in the schedule, all the operations of T are executed non-consecutively in the schedule.
15   A schedule S of n transactions is serializable if it is equivalent to some serial schedules of the same n transactions.
16   A binary lock can have three states.
17   A transaction is either performed in entirety or not performed at all.
18   The changes applied to the database by a committed transaction may be lost because of some failure.
19   The isolation is enforced by the concurrency control subsystem of DBMS.
20   The read set of a transaction is the set of items it writes.

Ans.   (1)(T), (2)(F), (3)(F), (4)(F), (5)(T), (6)(F), (7)(F), (8)(T), (9)(T), (10)(T), (11)(T), (12)(F), (13)(T), (14)(F), (15)(T), (16)(F), (17)(T), (18)(F), (19)(T), (20)(F)

(b)   Multiple Choice Questions:

1   If every non-key attribute is functionally dependent on the primary key, then the relation will be in:
       (a)   First normal form
       (b)   Second normal form
       (c)   Third normal form
       (d)   Fourth normal form

2   Given the functional dependencies

X →W; X→Y; Y→Z   and Z→PQ

Which of the following doesn't hold well?
(a)   X→Z
(b)   W→Z
(c)   X→WY
(d)   None of the above

3   Relations produced from an E-R model will always be in
(a)   First normal form
(b)   Second normal form
(c)   Third normal form
(d)   Fourth normal form

4   Third normal form is inadequate in situation where the relation
(a)   Has multiple candidate keys
(b)   Has candidate keys that are composite
(c)   Has overlapped candidate keys
(d)   None of the above

5   An attribute of one table matching the primary key of another table, is called as
(a)   Foreign key
(b)   Secondary key
(c)   Candidate key
(d)   Composite key

6   If a relation scheme is in BCNF, then it is also in
(a)   First normal form
(b)   Second normal form
(c)   Third normal form
(d)   Fourth normal form

7   A primary key when combined with a foreign key create
(a)   Parent child relationship between the tables that connect them.
(b)   Network model between the tables that connect them.
(c)   Many-to-many relationship between the tables that connect them.
(d)   None of the above.

8   The set of permitted value for each attribute is called its
(a)   Attribute set
(b)   Attentive range
(c)   Domain
(d)   Group

9   The airline reservation system, the enables are date, flight number, place of departure, destination, type of plane & seats available. The primary key is

(a)   Flight number
(b)   Flight number + place of departure
(c)   Flight number+ date
(d)   Flight number + destination

10   A functional dependency of the form X➔Y is trivial if
(a)   YC= X
(b)   Y C X
(c)   X C =Y
(d)   X C Y and Y C X

11   The concept of locking can be used to solve the problem of
(a)   Lost update
(b)   Uncommitted dependency
(c)   Inconsistent data
(d)   Deadlock

12   In transactions, in ACID property A stands for
(a)   Atomicity
(b)   Acidity
(c)   Alphabetically
(d)   None of the above.

13   Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R.
(a)   It will result in a deadlock situation.
(b)   It will immediately be granted.
(c)   It will immediately be rejected.
(d)   It will be granted as soon as it is released by A.

14   A schedule S of n transactions is serializable if it is equivalent to some
(a)   Serial schedule of the same n transactions.
(b)   Non-serial schedule of the same n transactions.
(c)   Serial schedule of different n transactions.
(d)   Non-serial schedule of different n transactions.

15   In two-phase locking protocol.
(a)   All unlocking operations precede the first lock operation.
(b)   All locking operations precede the first unlock operation.
(c)   Locking and unlocking takes place simultaneously.
(d)   None of the above.

16   Transaction timestamp is:
(a)   Not unique for each transaction
(b)   Larger for older transaction

(c)   Unique identifier assigned to each transaction.
(d)   None of the above.

17   The granularity of a database item can be chosen to be
(a)   A whole file
(b)   A database record
(c)   The whole database
(d)   All of the above.

18   If the complete execution of the transaction(s) takes the database from one consistent state to the other then that property of transaction is called:
(a)   Isolation
(b)   Durability
(c)   Consistency preservation
(d)   None of the above

19   Which of the following is not the state that the transaction undergoes?
(a)   Failed
(b)   Active
(c)   Partially committed
(d)   Non active

20   Timestamp can be generated by:
(a)   Counter
(b)   Current date/time
(c)   None of the above
(d)   Both (a) and (b)

21   Which of the following is the formal process for deciding which attributes should be grouped together in a relation?
(a)   Normalization
(b)   Performance Tuning
(c)   Optimization
(d)   None of the above

22   Who developed normalization process?
(a)   C.J. Date
(b)   E.F. Codd
(c)   Donald Chamberlain
(d)   Collin White

23   Who developed the BCNF?
(a)   Boyd and Cromwell
(b)   Date and Codd
(c)   Date and White

(d)   Boyce and Codd

24   What is the expansion of BCNF?
      (a)   Boyd-Cromwell Normal Form
      (b)   Boyce-Codd Normal Form
      (c)   Boyd-Codd Normal Form
      (d)   All of the above

25   Which of the following is the result of a transitive dependency?
      (a)   Insertion anomaly
      (b)   Modification anomaly
      (c)   Deletion anomaly
      (d)   All of the above

26   Which of the following is true?
      (a)   Normalized data is the best representation of data.
      (b)   Data stored non-redundantly will be accessed faster than data stored many times.
      (c)   Normalized tables are the best way to store data.
      (d)   All of the above

27   How many inference rules are there for functional dependencies?
      (a)   4
      (b)   5
      (c)   6
      (d)   7

28   Which property ensures that each functional dependency is represented in some
      individual relations resulting after decomposition?
      (a)   Dependency preservation property
      (b)   Fully Functional dependency
      (c)   Lossless Join
      (d)   None of the above

29   Every relation in BCNF is also in
      (a)   3NF
      (b)   2NF
      (c)   1NF
      (d)   None of the above

30   A table that contains one or more repeating groups is in which normal form?
      (a)   1NF
      (b)   2NF
      (c)   3NF
      (d)   Unnormalized Form

31   A relation is said to be in 3 NF if

(i)   it is in 2 NF
(ii)   non-key attributes are independent of one another
(iii)   key attribute is not dependent on part of a composite key
(iv)   has no multi-valued dependency

(a)   i and iii
(b)   i and iv
(c)   i and ii
(d)   ii and iv

32   Given the following relation it is not 3 NF because
Student (roll no, name, course no, course max. marks, year of study, address)
(a)   it is not in 2 NF
(b)   it does not have composite key
(c)   non-key attributes course no and course max. marks are functionally dependent
(d)   it has more than 3 non-key attributes

33   Given the following relation
Student (roll no, name, course no, course max. marks, year of study, address)
The corresponding 3 NF relations are
(a)   student (roll no, name, year of study, address)
        course (course no, course max. marks)
(b)   student (roll no, name, year of study, address)
        student (roll no, course no)
        course (course no, course max. marks)
(c)   student (roll no , name, address)
        year (roll no, year of study)
        course (course no, course max. marks)
(d)   student (roll no, name, address)
        course (course no, course max. marks, year of study)

34   BoyeCodd Normal Form (BCNF) is needed when
(a)   two non-key attributes are dependent
(b)   there is more then one possible composite key
(c)   there are two or more possible composite overlapping keys and one attribute
        of a composite key is dependent on an attribute of another composite key
(d)   there are two possible keys and they are dependent on one another

35   A relation is said to be in BCNF when
(a)   it has overlapping composite keys
(b)   it has no composite keys
(c)   it has no multivalued dependencies
(d)   it has no overlapping composite keys which have related attributes

36   A 3 NF relation is converted to BCNF by

(a)   removing composite keys
(b)   removing multivalued dependencies
(c)   dependent attributes of overlapping composite keys are put in a separate
       Relation
(d)   dependent non-key attributes are put in a separate table

37   BCNF is needed because
(a)   otherwise tuples may be duplicated
(b)   when a data is deleted tuples may be lost
(c)   updating is otherwise difficult
(d)   when there is dependent attributes in two possible composite keys one of the
       attributes is unnecessarily duplicated in the tuples

38   Given the relation
      Supplier(s_id, p_order, s_name, qty)
      Given that there is a unique s_name for each s_id and that s_id, p_order is a
      composite key, find the correct statement among the following:
(i)   this relation is a BCNF
(ii)   this is 3 NF relation
(iii) this is a 2 NF relation
(iv)   this is a 1 NF relation

(a)   i and ii
(b)   ii and iii
(c)   i and iv
(d)   i and iii

39   A relation project guidance
      Project Guidance(professor, project, student no. st-name, dept)
      A professor can give many projects to many students
      A project will have many students
      A project may be guided by many professors
      The 4 NF relation corresponding to this are
(a)   Prof_Project (professor, st_name, dept)
       Proj_stud (project, student no.)
(b)   Prof_stud (professor, student no)
       Proj_stud (project, student no)
       Student (student no, st_name, dept)
(c)   Student (student no, st_name, dept)
       Professor(professor, project)
(d)   Professor(professor, project, dept)
       Student (student no, st_name, dept)

40   A 3 NF relation is split into 4 NF
(a)   by removing overlapping composite keys

(b)   by splitting into relations which do not have more than one independent multivalued dependency

(c)   removing multivalued dependency
(d)   by putting dependent non-key attribute in a separate table

41   In ……….. normal forms, any multivalued attributes have been removed.
(a)   First
(b)   Second
(c)   Third
(d)   Fourth

42   A (n) …………….. is an attribute in a relation that serves as a primary key of another relation in the same.
(a)   Composite key
(b)   Foreign key
(c)   Identifier key
(d)   Primary key

43   In the process of decomposition is called as
(a)   Normalization
(b)   Generalization
(c)   Aggregation
(d)   Specalization

44   A relation Schema R is in ……….. if it is in 3NF and satisfies an additional constant that for every FD X->A. X must be a candidate key.
(a)   1 NF
(b)   2 NF
(c)   3 NF
(d)   BCNF

45   A relation between 2 set of attributes is called as
(a)   Join dependency
(b)   Association
(c)   Functional Dependency
(d)   Multivalued dependency

46   In 1NF, the value of the attribute must be
(a)   Atomic
(b)   Single
(c)   Multivalued
(d)   Null

47   The process of Normalization is
(a)   Iterative

(b)   Non-reversible
(c)   Reversible
(d)   None

48   Which normal form is most desirable ?
(a)   DKNF
(b)   3 NF
(c)   BCNF
(d)   4 NF

49   A functional dependency is a relationship between
(a)   Tables
(b)   Columns
(c)   Attributes
(d)   Rows

50   Two or more attributes that can be a key are called :
(a)   determinants
(b)   primary key
(c)   Composite key
(d)   foreign key

51   The normal form which satisfies multivalued dependencies and which is in BCNF is
(a)   4 NF
(b)   3 NF
(c)   2 NF
(d)   All of the mentioned

52   Which of the following is a tuple-generating dependencies ?
(a)   Functional dependency
(b)   Equality-generating dependencies
(c)   Multivalued dependencies
(d)   Non-functional dependency

53   The main task carried out in the _____ is to remove repeating attributes to separate tables.
(a)   First Normal Form
(b)   Second Normal Form
(c)   Third Normal Form
(d)   Fourth Normal Form

54   Which of the normal form is based on multivalued dependencies?
(a)   First
(b)   Second
(c)   Third

(d)   Fourth

55   Which forms has a relation that possesses data about an individual entity?
      (a)   2NF
      (b)   3NF
      (c)   4NF
      (d)   5NF

56   If a multivalued dependency holds and is not implied by the corresponding functional
      dependency, it usually arises from one of the following sources.
      (a)   A many-to-many relationship set
      (b)   A multivalued attribute of an entity set
      (c)   A one-to-many relationship set
      (d)   Both a and b

57   Which of the following has each related entity set has its own schema and there is an
      additional schema for the relationship set?
      (a)   A many-to-many relationship set
      (b)   A multivalued attribute of an entity set
      (c)   A one-to-many relationship set
      (d)   Both a and b

58   In which of the following , a separate schema is created consisting of that attribute and
      the primary key of the entity set.
      (a)   A many-to-many relationship set
      (b)   A multivalued attribute of an entity set
      (c)   A one-to-many relationship set
      (d)   Both a and b

59   Fifth Normal form is concerned with
      (a)   Functional dependency
      (b)   Multivalued dependency
      (c)   Join dependency
      (d)   Domain-key

60   In 2NF
      (a)   No functional dependencies (FDs) exist.
      (b)   No multivalued dependencies (MVDs) exist.
      (c)   No partial FDs exist.
      (d)   No partial MVDs exist.

Ans.   (1)(c),   (2)(b),   (3)(c),   (4)(a,b,c),   (5)(a),   (6)(c),   (7)(a),   (8)(c),   (9)(c),   (10)(a),
       (11)(a, b, c), (12)(a), (13)(b), (14)(a), (15)(b), (16)(c), (17)(d), (18)(c), (19)(d), (20)(d)
       (21)(a), (22)(b), (23)(d), (24)(b), (25)(d), (26)(d), (27)(c), (28)(a), (29)(a), (30)(d),
       (31)(c), (32)(c), (33)(b), (34)(c), (35)(d), (36)(c), (37)(d), (38)(d), (39)(b), (40)(b),

(41)(d), (42)(b), (43)(a), (44)(d), (45)(b), (46)(a), (47)(a), (48)(b), (49)(c), (50)(c), (51)(a), (52)(c), (53)(a), (54)(d), (55)(c), (56)(d), (57)(a), (58)(b), (59)(c), (60)(c)

(c)   Fill in the Blanks:

1   Normalization of data helps in _____redundancy.
2   An attribute of relation schema R is called as _____attribute of R if it is a member of some candidate key of R.
3   A relation schema R is in _____if whenever a nontrivial functional dependency X → A holds in R, then X is a super key of R..
4   In 1NF Relations should have no _____attributed or nested attributes.
5   A functional dependency X → Y is a _____if some attribute A € X can be removed from X and the dependency still holds.
6   A functional dependency is the property of the _____.
7   The normal form of a relation refers to the _____ normal form it meets.
8   Normalization process was first proposed by _____.
9   The process of storing the join of higher normal form relations as a base relation, which is in lower normal form is known as_____.
10   The multi-valued attributes that are themselves composite are called _____attributes.
11   Transaction processing systems are systems with large databases and hundreds of _____users that are executing database transactions.
12   The size of a data item is called its_____.
13   A transaction is _____preserving if its complete execution takes(s) the database from one consistent state to another.
14   In two-phase locking in shrinking phase, during which existing locks can be _____but no new locks can be acquired.
15   The main goal of recovery is to ensure the _____property of a transaction.
16   A serial schedule shows _____ processing because no interleaving of operations from different transactions is permitted.
17   A timestamp is a unique _____ generated by the system
18   Locking data item prevents multiple transactions from _____ the item concurrently.
19   LOCK(X) = _____then the item X cannot be accessed by a database operation that requests the item.
20   _____operation sets the LOCK(X) to 0.

Ans.   (1)(minimizing), (2)(prime), (3)(BCNF), (4)(non-atomic), (5)(partial dependency), (6)(semantics), (7)(highest), (8)(Codd), (9)(Denormalization), (10)(Nested), (11)(concurrent), (12)(granularity), (13)(consistency), (14)(released), (15)(atomicity), (16)(Inefficient), (17)(identifier), (18)(accessing), (19)(!), (20)(unlock_item(X))

II   Short Answer Type Questions:

1   What is a functional dependency?
2   What are the possible sources of information that defines the functional dependencies that hold among the attributes of a relation schema?
3   What is meant by the closure of a set of functional dependencies? Illustrate with an example.
4   What is a minimal set of functional dependencies? Does every set of dependencies have a minimal equivalent set? Is it always unique?
5   What does the term unnormalized relation refer to?
6   What undesirable dependencies are avoided when a relation is in 2NF?
7   Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stranger form of 3NF?
8   What is meant by the attribute presentation condition on decomposition?
9   What is the dependency presentation property for decomposition? Why is it important?
10   Why is a multivalued dependency? What type of constraint does it specify? When does it arise?
11   Define fourth normal form. When is it violated? Why is it useful?
12   Define fifth normal form. Why 5NF is also called project-join normal form (PJNF).
13   Consider the following database relation containing the attributes:
      Book-Id, Subject-Category-of-book, Name-of-author and Nationality-of-author.
      What is the highest normal form satisfied by the relation.
14   Let R = (ABCDEF) be a relation scheme with the functional dependencies
      C→F, E→A, EC→D, A→B. What is the key for R?
15   Consider a relation R (A, B, C, D, E) with the following dependencies:
      AB→C, CD→E, DE→ B
      Is AB a candidate key of this relation? If not, is ABC? Explain your answer.
16   Consider the following; F = {A→C, AC→D, E→AD, E→H} and G = {A→CD, E→AH}. Check whether they are equivalent.
17   Consider the following functional dependencies in a database.
      Date-of-birth →   Age
      Age   →   Eligibility
      Name   →   Roll-Number
      Course-Number →   Instructor
      Roll-Number   →   Name
      Course-Number →   Course-Name

      State the highest normal form of the:
      Relation (Roll-number, Name, Date-of-Birth, Age)
18   What is meant by the concurrent execution of database transactions in a multiuser system?
19   Discuss why concurrency control is needed and give examples.
20   Discuss the different types of failures. What is meant by catastrophic failure?
21   Discuss the actions taken by the read-item and write-item operations on a database.
22   What is the system log used for? What are transaction commit points, and why are they important?
23   What is a schedule? Define the concepts of recoverable, cascade less, and strict schedules, and compare them in terms of their recoverability.

24   Draw a state diagram, and discuss the typical states that a transactions goes through during execution.
25   What is the difference between conflict equivalence and view equivalence?
26   What is serial schedule? What is a serializable schedule?
27   What is the difference between the constrained write and the unconstrained write assumptions? Which is more realistic?
28   Define the violations caused by each of the following dirty read, nonrepeatable read and functions.
29   What is the two-phase locking protocol? How does it guarantee serializability?
30   What are some variations of the two-phase locking protocol? Why is strict or rigorous two-phase locking often preferred?
31   Compare binary locks to exclusive/shared locks.   Why is the latter type of locks preferable?
32   Discuss the problems of deadlock and starvation, and the different approaches to dealing with these problems.
33   Describe the wait-die and would-n-wait protocols for deadlock prevention.
34   Describe the cautions waiting, no waiting and timeout protocols for deadlock prevention.
35   What is a predicate lock?
36   What is a phantom record?
37   Discuss the problem that a phantom record can cause for concurrency control.
38   When are batches used?
39   What are intention locks?
40   What is multiple granularity locking? Under what circumstances is it used?
41   What type of locks are needed for insert and delete operations.
42   What is a timestamp? How does the system generate timestamps?
43   What are UNDO-type and RE DO- type log entries?
44   Describe the write ahead logging protocol.
45   Describes the UNDO and REDO operations, and the recovery techniques that use each.
46   Identify three typical lists of transactions that are maintained by the recovery subsystem.
47   Distinguish between Functional dependency and multivalued dependency.
48   What are distributed database management systems?
49   What benefit is provided by Strict 2PL? What disadvantages result?
50   Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed?
51   When the system recovers from a crash, it constructs an undo-list and a redo-list. Explain why log records for transactions on the undo-list must be processed in reverse order while those log records for transactions on the redo-list are processed in a forward direction.

III   Long Answer Type Questions:

1   Define first, second, and third normal forms when only primary keys are considered. How do the general definitions of 2NF and 3NF, which consider all keys of a relation, differ from those that consider only primary key?
2   Prove that any relation schema with two attributes is in BCNF.

3   Determine all 4NF violations for the relation schema R(X, Y, Z, W) with multivalued dependencies X$\rightarrow\rightarrow$Y and X$\rightarrow\rightarrow$Z.

4   Prove that a functional dependency satisfies the formal definition of multivalued dependency.

5   An instance of a relation schema R (ABC) has distinct values for attribute A. Can you conclude that A is a candidate key for R.?

6   Explain Oracle & Architecture.

7   Explain shared Database Access Mechanism in detail in Oracle 8 Architecture.

8   Explain oracle software structure.

9   Explain database storage and database protection.

10   (a)   Discuss the purpose of normalization & normalization process. What are the normal forms? Explain with suitable example.

       (b)   What is transaction? Explain acid properties of transaction.

11   Define concurrent access of database. What are the reasons for which concurrency control is required? List the rule of serializability. Write suitable example for mentioning reason of concurrency method.

12   (a)   What is dead lock? Explain dead lock handling techniques with appropriate examples.

       (b)   How can the database be recovered through Shadow Paging Scheme.

13   Write short notes on (Any Two):
       (a)   Data Warehousing
       (b)   Distributed Database
       (c)   Object Oriented Database Management System
       (d)   DBA

14   Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?

15   Discuss two multi-version techniques for concurrency control.

16   What is a certify lock? What are the advantages and disadvantages of using certify locks?

17   How do optimistic concurrency control techniques differ from other concurrency control techniques?

18   Discuss the typical phases of an optimistic concurrency control method.

19   How does the granularity of data items affect the performance of concurrency control? What factors affect selection of granularity size for data items?

20   What is the system log used fro? What are the typical kinds of entries in a system log?

21   What are checkpoints, and why are they important, what are transaction commit points, and why are they important?

22   How are buffering and caching techniques used by the recovery subsystem?

23   Describe the shadow paging recovery technique. Under what circumstances does it not requires a log?

24   What is the difference between the UNDO / RE and UNDO/NO-REDO algorithms for recovery with immediate update? Develop the outline for an UNDO/NO-REDO algorithm.

25   Discuss the immediate update technique of recovery technique in both single-user and multi-user environments. What are the advantages and disadvantages of immediate update?

26 How can recovery handle transaction operations that do not affect the database, such as the printing of reports by a transaction?

27 What are the before image (BFIM) and after image (AFIM) of a data item? What is the difference between in-place updating and shadowing, with respect to their handling of BFIM and AFIM?

28 How is concurrency handled by DBMS? Explain the working of two phase locking protocol.

29 When can the deadlock happen between two running transactions?

30 Consider the following two transactions
T1 : read (A);
read (B);
 B = A + B;
write (B)
T2 : write (A)
read (B)
 Add lock and unlock instructions so that the transaction T1 and T2 observe two-phase locking protocol. Is it deadlock free?

31 What are the problems if one were not to normalize? When do these problems surface?

32 Consider the relation
Book (accno, author, author_address, title, borrower_no, borrower_name, pubyear)
with the following functional dependencies
   - accno title
   - accnopubyear
   - author accno
   - accno author
   - author author_address
   - accnoborrower_no
   - borrower_noborrower_name
   (i)   Normalize the relation. Clearly show the steps.
   (ii)   For each decomposed relation identify the functional dependencies that apply and identify the candidate key.

33 Explain: (i)   Functional Dependency and 3rd NF
                (ii)   Multivalued dependency and 4th NF

34 How are read and write locks used to handle concurrency?

35 Explain with suitable example the conversion of table from 1st I normal form to 3rd Normal form.

36 Explain how the databases can be secured.

37 Explain the difference between (i) 3rd normal form and BCNF (ii) Transitivity and functional dependency. (iii) Functional Dependency and its Closure

38 Explain the circumstances under which Normalization can be avoided.

QUESTION BANK

SOFTWARE ENGINEERING

MCA110

QUESTION BANK
SOFTWARE ENGINEERING - MCA 110
MCA - II

UNIT - I

I   **Test Your Skills:**

(a)   **State Whether the Following Statements are True or False:**

1   Software does not wear out.
2   The data dictionary is a repository of various data flows defined in a DFD
3   Statistically, the maximum percentage of errors belongs to design phase.
4   Use case approach was developed by I. Jacobson and others.
5   RAD stands for Relative Application Development.
6   Zero level DFD is known as context diagram.
7   Spiral Model has high reliability requirements.
8   RAD Model has high reliability requirements.
9   Software costs more to maintain than it does to develop.
10   Process adopted for one project is same as the process adopted from another project.
11   One can choose Waterfall Model if the project development schedule is tight.

Ans.   (1)(T), (2)(T), (3)(F), (4)(T), (5)(F), (6)(T), (7)(T), (8)(F), (9)(T), (10)(F), (11)(F)

(b)   **Multiple Choice Questions:**

1   Product is
      (a)   Deliverables
      (b)   User expectations
      (c)   Organisation's effort in development
      (d)   None of the above

2   To produce a good quality product, process should be
      (a)   Complex
      (b)   Efficient
      (c)   Rigorous
      (d)   None of the above

3   Concepts of software engineering are applicable to
      (a)   Fortran language only
      (b)   Pascal language only
      (c)   'C' language only
      (d)   All of above

4   Management of software development is dependent on
        (a)   People
        (b)   Product
        (c)   Process
        (d)   All

5   During software development which factor is most crucial?
        (a)   People
        (b)   Product
        (c)   Process
        (d)   Project

6   Software engineering approach is used to achieve:
        (a)   Better performance of hardware
        (b)   Error free software
        (c)   Reusable software
        (d)   Quality software product

7   Spiral model was developed by
        (a)   Bev Littlewood
        (b)   Berry Boehm
        (c)   Roger Pressman
        (d)   Victor Basili

8   If requirements are frequently changing, which model is to be selected?
        (a)   Waterfall
        (b)   Prototyping
        (c)   RAD
        (d)   Iterative Enhancement

9   If limited user participation is available, which model is to be selected
        (a)   Waterfall
        (b)   Spiral
        (c)   Iterative enhancement
        (d)   Any

10   Which is not a non-functional requirement?
        (a)   Efficiency
        (b)   Reliability
        (c)   Product features
        (d)   Stability

11   Which of the following is true of the V-model?
        (a)   It states that modules are tested against user requirements.
        (b)   It only models the testing phase.
        (c)   It specifies the test techniques to be used
        (d)   It includes the verification of designs.

12   Selection of a model is based on
      (a)   Requirements
      (b)   Development team
      (c)   Users
      (d)   Project type and associated risk
      (e)   All of the mentioned

13   Which two models doesn't allow defining requirements early in the cycle?
      (a)   Waterfall & RAD
      (b)   Prototyping & Spiral
      (c)   Prototyping & RAD
      (d)   Waterfall & Spiral

14   If you were a lead developer of a software company and you are asked to submit a
      project/product within a stipulated time-frame with no cost barriers, which model would
      you select?
      (a)   Waterfall
      (b)   Spiral
      (c)   RAD
      (d)   Incremental

15   Which two of the following models will not be able to give the desired outcome if user's
      participation is not involved?
      (a)   Waterfall & Spiral
      (b)   RAD & Spiral
      (c)   RAD & Waterfall
      (d)   RAD & Prototyping

16   A company is developing an advance version of their current software available in the
      market, what model approach would they prefer?
      (a)   RAD
      (b)   Iterative Enhancement
      (c)   Both a & b
      (d)   Spiral

17   Which of the following is not an attribute of software engineering?
      (a)   Efficiency
      (b)   Scalability
      (c)   Dependability
      (d)   Usability

18   Choose the correct option from given below:
      (a)   Prototyping Model facilitates re-usability of components
      (b)   RAD Model Model facilitates re-usability of components
      (c)   Both RAD & Prototyping Model facilitates re-usability of components
      (d)   None

19   The first item defined for a new system is its
      (a) Storage
      (b) Outputs
      (c) Inputs
      (d) Processing

20   Software engineering primarily aims on
      (a)   reliable software
      (b)   cost effective software
      (c)   reliable and cost effective software
      (d)   none of the above

21   Which one of the following is not a software process quality?
      (a)   Productivity
      (b)   Portability
      (c)   Timeliness
      (d)   Visibility

22   _____&_____ are two kinds of software products.
      (a)   CAD, CAM
      (b)   Firmware, Embedded
      (c)   Generic, Customized
      (d)   None of above

23   What are the three generic phases of software engineering?
      (a)   Definition, development, support
      (b)   What, how, where
      (c)   Programming, debugging, maintenance
      (d)   Analysis, design, testing

24   Which one of the following is not an application of embedded software product?
      (a)   Key pad control of a security system
      (b)   Pattern recognition game playing
      (c)   Digital function of dashboard display in a car
      (d)   None of above

25   Purpose of process is to deliver software
      (a)   in time
      (b)   with acceptable quality
      (c)   that is cost efficient
      (d)   both a & b

26   The work associated with software engineering can be categorized into three generic
      phases, regardless of application area, project size, or complexity namely the_____
      phase which focuses on *what*, the_____ phase which focuses on *how* and
      the_____ phase which focuses on *change*.

i.   support
ii.   development
iii.   definition
(a)   1, 2, 3
(b)   2, 1, 3
(c)   3, 2, 1
(d)   3, 1, 2

27   Which of the following activities of a Generic Process framework provides a feedback report?
(a)   Communication
(b)   Planning
(c)   Modeling &Construction
(d)   Deployment

28   Software feasibility is based on which of the following
(a)   Business and marketing concerns
(b)   Scope, constraints, market
(c)   Technology, finance, time, resources
(d)   Technical prowess of the developers

29   Which one of the following is not an Umbrella Activity that complements the five process framework activities and help team manage and control progress, quality, change, and risk.
(a)   Re-usability Management
(b)   Risk management
(c)   Measurement
(d)   User Reviews
(e)   Software Quality Assurance

30   Four types of change are encountered during the support phase.Which one of the following is not one that falls into such category?
(a)   Translation
(b)   Correction
(c)   Adaptation
(d)   Prevention

31   Which of the following life cycle model can be chosen if the development team has less experience on similar projects?
(a)   Spiral
(b)   Waterfall
(c)   RAD
(d)   Iterative Enhancement Model

32   System Study involves
      (a)   Study of an existing system
      (b)   Documenting the existing system.
      (c)   Identifying current deficiencies and establishing new goals
      (d)   All of the above
      (e)   None of the above

33   The primary tool used in structured design is a:
      (a)   Structure chart
      (b)   Data-flow diagram
      (c)   Program flowchart
      (d)   Module
      (e)   None of the above

34   In a _____ one module of the new information system is activates at a time.
      (a)   System Development Life Cycle
      (b)   CASE tool
      (c)   Phased Conversion
      (d)   Success factors
      (e)   None of the above

35   In Prototyping
      (a)   BASIC is used
      (b)   COBOL is used
      (c)   4GLs are used
      (d)   system is documented
      (e)   None of the above

36   The step-by-step instructions that solve a problem are called _____.
      (a)   An algorithm
      (b)   A list
      (c)   A plan
      (d)   A sequential structure
      (e)   None of the above

37   The approach used in top-down analysis and design is
      (a)   To identify the top level functions by combining many smaller components into a single entity
      (b)   To prepare flow charts after programming has been completed
      (c)   To identify a top level function an d then create a hierarchy of lower-level modules and components.
      (d)   All of the above
      (e)   None of the above

38 Which of the following is not a factor in the failure of the systems developments projects?
    (a)   Size of the company
    (b)   Inadequate user involvement
    (c)   Failure of systems integration
    (d)   Continuation of a project that should have been cancelled
    (e)   None of the above

39 Software deteriorates rather than wears out because
    (a)   Software suffers from exposure to hostile environments
    (b)   Defects are more likely to arise after software has been used often
    (c)   Multiple change requests introduce errors in component interactions
    (d)   Software spare parts become harder to order

40 The primary tool used in structured design is a:
    (a)   data-flow diagram
    (b)   module
    (c)   structure chart
    (d)   program flowchart
    (e)   None of the above

41 Build & Fix Model is suitable for programming exercises of _____ LOC (Line of Code).
    (a)   100-200
    (b)   200-400
    (c)   400-1000
    (d)   above 1000

42 RAD stands for
    (a)   Relative Application Development
    (b)   Rapid Application Development
    (c)   Rapid Application Document

43 Which one of the following models is not suitable for accommodating any change?
    (a)   Build & Fix Model
    (b)   Prototyping Model
    (c)   RAD Model
    (d)   Waterfall Model

44 Which is not one of the types of prototype of Prototyping Model?
    (a)   Horizontal Prototype
    (b)   Vertical Prototype
    (c)   Diagonal Prototype
    (d)   Domain Prototype

45   Which one of the following is not a phase of Prototyping Model?
      (a)   Quick Design
      (b)   Coding
      (c)   Prototype Refinement
      (d)   Engineer Product

46   Which of the following statements regarding Build & Fix Model is wrong?
      (a)   No room for structured design
      (b)   Code soon becomes unfix-able & unchangeable
      (c)   Maintenance is practically not possible
      (d)   It scales up well to large projects

47   RAD Model has
      (a)   2 phases
      (b)   3 phase
      (c)   5 phases
      (d)   6 phases

48   What is the major drawback of using RAD Model?
      (a)   Highly specialized & skilled developers/designers are required.
      (b)   Increases re-usability of components.
      (c)   Encourages customer/client feedback.
      (d)   Both a & c.

49   SDLC stands for
      (a)   Software Development Life Cycle
      (b)   System Development Life cycle
      (c)   Software Design Life Cycle
      (d)   System Design Life Cycle

50   Which model can be selected if user is involved in all the phases of SDLC?
      (a)   Waterfall Model
      (b)   Prototyping Model
      (c)   RAD Model
      (d)   Both b & c

51   Which of these primary objectives have to be achieved for the requirement model?
      (a)   To describe what the customer requires
      (b)   To establish a basis for the creation of a software design
      (c)   To define a set of requirements that can be validated once the software
      (d)   All mentioned above

52   When elements of module are grouped because the output of one element serves as input
      to another element and so on, it is called _____ .
      (a)   Functional Cohesion
      (b)   Communicational cohesion

(c)   Sequential cohesion
(d)   Procedural cohesion

53   The spell check feature in word processor is a module of software.
(a)   True
(b)   False
(c)   can't say

54   Which tool consist of programming environments like IDE, in-built modules library and simulation tools?
(a)   Web development tools
(b)   Prototyping tools
(c)   Programming tools
(d)   Design tools

55   Abbreviate the term HIPO.
(a)   Hierarchical Input Process Output
(b)   High-level Input Process Output
(c)   Huge Input Process Output
(d)   None of the above

56   Compilers, Editors software come under which type of software?
(a)   System software
(b).   Application software
(c)   Scientific software
(d)   None of the above

57   How many phases are there in Scrum?
(a)   Two
(b)   Three
(c)   Four
(d)   Scrum is an agile method which means it does not have phases.

58   Which is not one of the types of prototype of Prototyping Model?
(a)   Horizontal Prototype
(b)   Vertical Prototype
(c)   Diagonal Prototype
(d)   Domain Prototype

59   How is plan driven development different from agile development?
(a)   Outputs are decided through a process of negotiation during the software development process.
(b)   Specification, design, implementation and testing are interleaved
(c)   Iteration occurs within activities

60   Which of the following statements regarding Build & Fix Model is wrong?
         (a)   No room for structured design
         (b)   Code soon becomes unfix-able & unchangeable
         (c)   Maintenance is practically not possible
         (d)   It scales up well to large projects

Ans.   (1)(a), (2)(b), (3)(d), (4)(d), (5)(a), (6)(d), (7)(b), (8)(b), (9)(d), (10)(c), (11)(d), (12)(e), (13)(b), (14)(c),(15)(d), (16)(c), (17)(c), (18)(c), (19)(b), (20)(c), (21)(b), (22)(c), (23)(a), (24)(b), (25)(d), (26)(c), (27)(d), (28)(c), (29)(d), (30)(a), (31)(a), (32)(d), (33)(a), (34)(c), (35)(c), (36)(a), (37)(c), (38)(a), (39)(b), (40)(c), (41)(a), (42)(b), (43)(d), (44)(c), (45)(b), (46)(d), (47)(c), (48)(d), (49)(a), (50)(c), (51)(d), (52)(c), (53)(c), (54)(c), (55)(a), (56)(a), (57)(b), (58)(c), (59)(c), (60)(d)

(c)   **Fill in the Blanks:**

1   The _____are the events that are used to ascertain the status of the project.
2   DFD stands for_____.
3   The term_____ is used to refer to any one who may have some direct or indirect influence on the system requirements.
4   DFD is a_____refinement approach.
5   A _____is defined as an evaluation or analysis of the potential impact of a proposed project or program.
6   FAST stands for_____
7   The agent that transforms the data from one state to another in DFD is called as
               _____ Or _____.
8   The Radial dimension of spiral model represents the_____ and Angular Dimension of spiral model represents the _____

Ans.   (1)(milestones), (2)(Data Flow Diagrams), (3)(stakeholder), (4)(top down), (5)(Feasibility study), (6)(Facilitated Application Specification Technique), (7)(process/bubble), (8)(cumulative costs, progress made in completing each cycle)

II   **Short Answer Type Questions:**

1   What is software crisis? Was Y2K a software crisis? List the reasons for software crisis?
2   What is software engineering? What are its various layers?
3   Distinguish between deliverables and milestones.
4   List out the characteristics of software processes.
5   Why is primary goal now shifting from producing good quality software to good quality maintainable software?
6   What do you understand by software development lifecycle? What are the advantages of developing a prototype of a system?
7   Why it is important to adhere to a life cycle model while developing a large software product?
8   Compare evolutionary and throwaway prototype.
9   How does 'project risk' factor affect the spiral model of software development?

10   Differentiate between functional and non functional requirements.
11   What do you understand by requirement elicitation? Illustrate.
12   List out requirement elicitation techniques. Which one is most popular and why?
13   What is meant by requirement analysis?
14   Write down some suggestions while constructing a data flow graph.
15   Differentiate between user and system requirements.
16   What are the components of software? Discuss how software differs from a program.
17   What are advantages of developing the prototype of a system? Is there any disadvantage? Explain.
18   Discuss the selection process parameters for a life cycle model.
19   What do you understand by software crisis? What are its symptoms and causes? What are its remedies?
20   What do you understand by software development process? What problems might occur if a software development organization does not use any specific development process?
21   Define CASE.
22   Describe the role of management in software development with the help of examples.
23   Distinguish between generic and customized software products. Which one has larger share of market and why?
24   Why is software process difficult to improve?
25   Distinguish between generic and customized software products. Which one has larger share of market and why?
26   Differentiate between module and software component
27   Describe the role of management in software development with the help of examples.
28   Draw a level '0', level'1' and ER diagram for library management system.
29   What are the various requirement elicitation techniques? Explain FAST in detail.
30   Explain RAD model of software development. For what type of application it is mostly used.
31   Discuss the objectives of software design? How do we transform a informal design to a detail design.
32   Discuss the significance and use of requirement engineering. What are the problems in the formulation of requirements.
33   What is the use of data dictionary requirement analysis.
34   What are latest technologies used in software development?
35   How is software development different from other engineering?

III   Long Answer Type Questions:

1   Discuss the various elements of effective software engineering in detail.
2   What are the factors involved in the emergence of software engineering?
3   Explain the various characteristics of software engineering.
4   Discuss the reasons of software crisis.
5   What is software process? Also enumerate the activities common to all software processes.
6   Discuss the factors affecting current software engineering practices.

7   Describe the role of management in software development with the help of examples.
8   Discuss the linear sequential model along with its advantages and disadvantages.
9   Describe the RAD model. Discuss each phase in detail.
10   Discuss the characteristics for the selection of a life cycle model.
11   Compare iterative enhancement model and evolutionary process model.
12   What are crucial process steps of requirement engineering? Discuss with the help of a diagram.
13   Explain the importance of requirements. How many types of requirements are possible and why?
14   What are components of a use case diagram? Explain their usage with help of an example.
15   What do you mean by ER diagrams? State their purpose and usefulness.
16   What are the benefits of writing a SRS document template?
17   What are different components of SRS?
18   Enumerate the qualities of good SRS document.
19   Compare and contrast various software development lifecycle models.
20   Why is the analysis stage of software engineering considered so important? What approaches can be taken to ensure it is successful?
21   The spiral software process model explicitly incorporates risk into its process. Explain what type of software project would benefit from this process model. Defend your answer with an example.
22.   How are changes in software specifications monitored at various stages of software development?
23. Why is design a two level process? Why should the system design be furnished before starting the detail design, rather than starting the detailed design right after the requirements?
24   Discuss the Prototyping model. What is the effect of designing a prototype on the overall cost of the project?
25   What are the Characteristics of a good software requirement specification document?
26   What is a prototype? Under what circumstances is it beneficial to construct a prototype? Does construction of a prototype always increase the overall cost of software development?
27   Explain why it may not be prudent to use the spiral model for developing large software products.
28   Draw a labeled schematic diagram to represent the spiral model of software development. Is the number of loops of the spiral fixed? If your answer is affirmative, write down the number of loops of the spiral. If your answer is negative, explain how the number of loops of the spiral is determined
29   Discuss pitfalls of Waterfall model. What is the effect of coding on the overall cost of the project?
30   Define the term "Software engineering". Explain the major differences between software engineering and other traditional engineering disciplines.
31   What are various factors of management dependency in software development? Discuss each factor in detail.

32   Comment on the statement: "The term throw-away prototype is inappropriate in that these prototypes expand and enhance the knowledge base that is retained and incorporated in the final prototype; therefore they are not disposed of or thrown away at all."

33   Discuss the significance of using prototyping for reusable components and explain the problems, which may arise in this situation.

34   What are software developments models. Discuss various software development models.

35   A University has decided to engage a software company for the automation of student results management system for its UG program. What documents are needed by the company to build the software? Draw a context diagram for university result management system.

IV   Practical Questions:

1   Consider the problem of Payroll Management System and design the following
   (i)   Problem Statement
   (ii)   Use case diagram   (iii)   Use cases

2   Enumerate the steps involved in drawing an ERD and following these steps draw an ERD for Library Management System.

3   A University has many departments in its campus. Each of the department has one or more programmes which has got a limited number of seats. Every department have some classrooms with some fixed number of seats. Now lectures are to be held for each of the programme. You have to automate the system of allocating the classrooms for each of the lectures of the corresponding programme irrespective of the department.
   (i)   Draw a DFD
   (ii)   Draw a Database design along with data dictionary.

4   Consider the problem of result preparation automation system of B.Tech. courses(or MCA program) of any university and design the following:
   (i)   DFD up to level 1
   (ii)   Use case diagram
   (iii)   Use Case description for any one use case

5   An airline reservation is an association between a passenger, a flight and a seat. Select few pertinent attributes for each of these entity types and represent a reservation in E-R diagram.

6   Draw a DFD for borrowing a book in a library in which a borrower can borrow a book if it is available else he can reserve the book if he wishes to. He can borrow a maximum of these books.

7   What does the Control flow graph (CFG) of a program represent? Draw the CFG of the following program:
```
main () {
int y=1;
        if (y<0)
                if (y<0) y=3;
                else y = 0;
        printf ("%d\n", y);
        }
```

8   Consider the problem of Online Shopping and design the following
     (i)   Problem Statement
     (ii)   Use case diagram   (iii)   Use cases

UNIT - II

I   Test Your Skills:

(a)   State Whether the Following Statements are True or False:

1   COCOMO was developed initially by (b)W. Boehm.
2   The relationship of data elements in a module is called coupling.
3   Functional cohesion is the best type of cohesion.
4   Polymorphism is a feature of function oriented design.
5   Peak Manning is the maximum number of persons hired for the software development at peak time.
6   Software project estimation can never be an exact science, but a combination of good historical data and systematic techniques can improve estimation accuracy.
7   Project management is the process of scoping, planning, staffing, organizing, directing, and controlling the development of an acceptable system at a minimum cost within a specified time frame
8   One key to successful project management is to commit to a fixed budge and schedule as early as possible and then stick to it.
9   Scope defines the boundaries of a project
10   The project schedule should be developed with an understanding of the required tasks, task duration, and task prerequisites.

Ans.   (1)(T), (2)(F), (3)(T), (4)(F), (5)(T), (6)(T), (7)(T), (8)(T), (9)(T), (10)(T)

(b)   Multiple Choice Questions:

1   Function Count Method was developed by
     (a)   B. Beizer
     (b)   B. Boehm
     (c)   M. Halstead
     (d)   Alan Albrecht

2   Putnam Resource Allocation model is based on
     (a)   Function points
     (b)   Norden/Rayleigh curve
     (c)   Putnam theory of software management
     (d)   Boehm's observations on manpower utilization rate

3   Which one is not a risk management activity?
     (a)   Risk assessment
     (b)   Risk control
     (c)   Risk generation

(d)   None of above

4   Which is not a strategy for design?
      (a)   Bottom up design
      (b)   Top down design
      (c)   Embedded design
      (d)   Hybrid design

5   Function Point can be calculated by
      (a)   UFP*CAF
      (b)   UFP*FAC
      (c)   UFP*Cost
      (d)   UFP*Productivity

6   When two modules refer to the same global data area, they are related as
      (a)   External coupled
      (b)   Data coupled
      (c)   Control coupled
      (d)   Common coupled

7   How many stages are in COCOMO-II?
      (a)   2
      (b)   3
      (c)   4
      (d)   5

8   Which of the following represents the use of Conceptual models during engineering design?
      (a)   Understanding product design
      (b)   Under Girding Engineering Modeling
      (c)   All of the mentioned
      (d)   None of the mentioned

9   What are Design Class Models?
      (a)   They show classes in a software system
      (b)   They represent attributes, operations, association in abstraction from language.
      (c)   They show implementation details
      (d)   all of above

10   Conceptual models are useful for which of the following reasons?
      (a)   Understanding problem design
      (b)   Data Requirements and Product design
      (c)   Validating requirements
      (d)   (a),(c)
      (e)   All of the mentioned

11   Software Design consists of?
        (a)   Software Product Design
        (b)   Software Engineering Design
        (c)   (a), (b)
        (d)   None of the mentioned

12   Which of these is true?
        (a)   Analysis – Solving problem
        (b)   Design – Understanding problem
        (c)   (a), (b)
        (d)   None of the mentioned

13   Which of these are followed in case of software design process?
        (a)   Analysis occurs at start of product design with a product idea
        (b)   Analysis occurs at the end of engineering design with the SRS
        (c)   Product design resolution produces the design document
        (d)   Engineering design resolution produces the SRS

14   Which of these is not in sequence for generic problem solving strategy?
        (a)   Understand the problem
        (b)   Generate candidate solutions
        (c)   Iterate if no solution is adequate
        (d)   Select the Best solutions

15   Which of these is not in sequence for generic design process?
        (a)   Analyze the problem
        (b)   Evaluate candidate solutions
        (c)   Generate candidate solutions
        (d)   Finalize the Design

16   Why do you think iteration is important for design?
        (a)   To frequently reanalyze the problem
        (b)   To generate and improve solutions many time for better output
        (c)   (a), (b)
        (d)   b alone

17   What is true about generic software product design process?
        (a)   It begins with SRS
        (b)   It ends with Product Design Problem
        (c)   Analysis is done and end product is project mission statement
        (d)   None of the mentioned

18   Generic software engineering design process defined by which of these steps?
        (a)   Generic software engineering design process's first job after analysis is detailed
                design.
        (b)   Attention is turned later to architectural design.

(c)   Architectural design is followed by detailed design.
(d)   (a), (b)

19   Which of these is said to be true about resolution process in generic software engineering design process?
(a)   Architectural design is low resolution process.
(b)   Detailed design is high resolution process.
(c)   (a), (b)
(d)   None of the mentioned

20   Which step among these follows wrong sequence in software engineering design process?
(a)   Analyze problem
(b)   Generate candidate architecture
(c)   Finalize design
(d)   Select detailed design

21   Which of these states the goal of engineering design analysis?
(a)   To understand an engineering design problem
(b)   To provide an solution for a given problem
(c)   All of the mentioned
(d)   none of the mentioned

22   What methods can be followed if designers are out of good SRS or engineering design?
(a)   They must do whatever part of product design which remains undone.
(b)   Various approaches and techniques are to be followed to complete.
(c)   All of the above mentioned.
(d)   None of the above mentioned.

23   Why is Modeling one of the best way to carry out analysis?
(a)   During analysis, It serves as a good test for understanding
(b)   Provides further documentation for input to design resolution
(c)   All of the mentioned
(d)   None of the mentioned

24   Engineering design activities consists of which of the following?
(a)   Studying the SRS
(b)   Producing new models of the problem
(c)   Product design models
(d)   All of the mentioned

25   A generic software engineering design follows which of the activities?
(a)   Analysis
(b)   Architectural Design
(c)   Finalize Design
(d)   a,b
(c)   b,c

26 Architectural design stage includes which of the following activity?
 (a) Generate/Improve detailed design alternatives
 (b) Select architecture
 (c) Finalize Design
 (d) All of the mentioned

27 Detailed design stage includes which of the following activity?
 (a) Generate / Improve candidate architectures
 (b) Evaluate candidate architecture
 (c) Finalize Design
 (d) None of the mentioned

28 What is Analysis model?
 (a) Understanding of design problem
 (b) Representation of design problem solution
 (c) Representation of design problem
 (d) all of the mentioned

29 Which of the following is true?
 (a) A class model is representation of objects in a problem or a software solution
 (b) A object model is representation of classes in a problem or a software solution
 (c) All of the mentioned
 (d) None of the mentioned

30 Which of the following is true?
 (a) Class Diagram are graphical form of class models
 (b) Object Diagram are graphical forms of object models
 (c) All of the mentioned
 (d) none of the mentioned

31 Which of these are types of class model used in object oriented analysis?
 (a) Analysis Class models/ Conceptual Models
 (b) Design Class Models
 (c) Implementation Class Models
 (d) All of the mentioned

32 Which of the following represents the use of Conceptual models during product design?
 (a) Understanding the problem design
 (b) Setting Data Requirements
 (c) Validating Requirements
 (d) All of the mentioned

33 Top-down programming is
 (a) a group of related fields

(b)   a map of the programmer's view of the data

(c)   an approach in which the top module is first tested then program modules are added from the highest level to the lowest level

(d)   a series or group of components that perform one or more operations of a more complex system

(e)   None of the above

34   A decision table facilitates conditions to be related to
(a)   Actions
(b)   Programs
(c)   Tables
(d)   Operation
(e)   None of the above

35   Which of the following appropriately explains the desirable characteristic of good system design?
(a)   Modular approach
(b)   Proper documentation
(c)   Conversion
(d)   Long discussions
(e)   None of the above

36   In the system concepts, term Integration
(a)   implies structure and order
(b)   Refers to the manner in which each component functions with other components of the system.
(c)   Means that parts of the computer system depend on one another.
(d)   refers to the holism of systems
(e)   None of the above

37   Top down approach is used for
(a)   Development
(b)   Identification of faults
(c)   Testing and validation
(d)   Reverse engineering

38   Coupling and cohesion can be represented using a
(a)   Cause-effect graph
(b)   Dependence matrix
(c)   Structure chart
(d)   SRS

39   Which are the tools not used for System Analysis
(a)   System - test data
(b)   Decision table
(c)   Data Flow Diagram
(d)   Flowcharts

40   The worst type of coupling is
      (a)   Data coupling
      (b)   Control coupling
      (c)   Stamp coupling
      (d)   Content coupling

41   Java packages and Fortran subroutine are examples of_____
      (a)   Functions
      (b)   Modules
      (c)   Classes
      (d)   Sub procedures

42   Which of the property of software modularity is incorrect with respect to benefits software modularity?
      (a)   Modules are robust.
      (b)   Module can use other modules
      (c)   Modules can be separately compiled and stored in a library.
      (d)   Modules are mostly dependent.

43   _____ is a measure of the degree of interdependence between modules.
      (a)   Cohesion
      (b)   Coupling
      (c)   None of the mentioned

44   Which of the following is the best type of module coupling?
      (a)   Control Coupling
      (b)   Stamp Coupling
      (c)   Data Coupling
      (d)   Content Coupling

45   Which of the following is the worst type of module coupling?
      (a)   Control Coupling
      (b)   Stamp Coupling
      (c)   External Coupling
      (d)   Content Coupling

46   Which of the following is the worst type of module cohesion?
      (a)   Logical Cohesion
      (b)   Temporal Cohesion
      (c)   Functional Cohesion
      (d)   Coincidental Cohesion

47   Which of the following is the best type of module cohesion?
      (a)   Functional Cohesion
      (b)   Temporal Cohesion
      (c)   Functional Cohesion

(d)   Sequential Cohesion

48   Choose the option that does not define Function Oriented Software Design.
(a)   It consists of module definitions
(b)   Modules represent data abstraction
(c)   Modules support functional abstraction

49   In what type of coupling, the complete data structure is passed from one module to another?
(a)   Control Coupling
(b)   Stamp Coupling
(c)   External Coupling
(d)   Content Coupling

50   If all tasks must be executed in the same time-span, what type of cohesion is being exhibited?
(a)   Functional Cohesion
(b)   Temporal Cohesion
(c)   Functional Cohesion
(d)   Sequential Cohesion

51   If every requirement stated in the Software Requirement Specification (SRS) has only one interpretation, SRS is said to be
(a)   correct.
(b)   unambiguous.
(c)   consistent.
(d)   verifiable.

52   Modules X and Y operate on the same input and output data, then the cohesion is
(a)   Sequential
(b)   Communicational
(c)   Procedural
(d)   Logical

53   Coupling and cohesion can be represented using a
(a)   Cause-effect graph
(b)   Dependence matrix
(c)   Structure chart
(d)   SRS

54   In function point analysis, number of general system characteristics used to rate the system are
(a)   10
(b)   14
(c)   20
(d)   12

55   The model that assumes that effort and development time are functions of product size alone is
      (a)   Basic COCOMO model
      (b)   Intermediate COCOMO model
      (c)   Detailed COCOMO model
      (d)   All the three COCOMO models

56   CASE Tool is
      (a)   Computer Aided Software Engineering
      (b)   Component Aided Software   Engineering
      (c)   Constructive Aided Software Engineering
      (d)   Computer Analysis Software Engineering

57   FAST stands for
      (a)   Functional Application Specification Technique
      (b)   Fast Application Specification Technique
      (c)   Facilitated Application Specification Technique
      (d)   None of the above

58   The ISO quality assurance standard that applies to software engineering is
      (a)   ISO 9000
      (b)   ISO 9001
      (c)   ISO 9002
      (d)   ISO 9003

59   MTTF stands for
      (a)   Mean time to failure
      (b)   Maximum time to failure
      (c)   Minimum time to failure
      (d)   None of the above

60   KPA in CMM stands for
      (a)   Key Process Area
      (b)   Key Product Area
      (c)   Key Principal Area
      (d)   Key Performance Area

Ans.   (1)(d), (2)(b), (3)(c), (4)(c), (5)(a), (6)(d), (7)(b), (8)(c), (9)(d), (10)(e), (11)(c), (12)(d),
        (13)(a), (14)(c or d), (15)(b or c), (16)(c), (17)(d), (18)(d), (19)(d), (20)(c), (21)(a),
        (22)(c), (23)(c), (24)(d), (25)(d), (26)(b), (27)(c), (28)(c), (29)(d), (30)(c), (31)(d),
        (32)(d), (33)(c), (34)(a), (35)(a), (36)(d), (37)(a),(38)(b), (39)(a), (40)(d), (41)(b), (42)(d),
        (43)(b), (44)(c), (45)(c), (46)(d), (47)(a), (48)(b), (49)(b), (50)(b), (51)(b), (52)(b),
        (53)(b), (54)(b), (55)(b), (56)(b), (57)(c), (58)(b), (59)(a), (60)(a)

(c)   **Fill in the Blanks:**

1   A COCOMO model stands for_____
2   In Function Point Analysis, number of complexity adjustment factors is   _____
3   In Putnam Resource Allocation model, technology factor 'C' is defined as _____
4   The worst type of coupling is _____
5   The extent to which different modules are dependent upon each other is called   _____
6   _____design is an approach to software design which is decomposed into a set of interacting units where each unit has a clearly defined function.
7   KLOC stands for_____

Ans.   (1)(Constructive Cost Estimation Model), (2)(14), (3)(SK), (4)(Content coupling), (5)(coupling), (6)(Function Oriented), (7)(Thousand Lines of Code)

II   **Short Answer Type Questions:**

1   What are the various activities during project planning?
2   Discuss the infrastructure sector of COCOMO-II.
3   Describe the trade off between time versus cost in Putnam Resource Allocation model.
4   What is design? Describe the difference between conceptual and technical design.
5   If a module has logical cohesion, what kind of coupling is this module likely to have with others?
6   What is the difference between a flowchart and structure chart?
7   What problems are likely to arise if a module has low cohesion?
8   What is modularity? Give its two major characteristics.
9   Differentiate between a Pseudocode and Algorithm.
10   Explain the importance of software design in software development?
11   Distinguish between stamp coupling and control coupling.
12   What documents should be produced on completion of software design phase?
13   Explain Walston-Felix model and compare it with SEL model.
14   What is risk exposure? What techniques can be used to control each risk?
15   Give at least one example for each type of cohesion. The example should be either from O.S. or from any of widely used software.
16   List points of a simplified design process.
17   Is it possible to estimate software size before coding? Justify your answer with suitable examples.
18   Define Peak Manning.
19   What notation you will use to represent the repetitive call of module in Structure Chart?
20   Compare relative advantages of Function Oriented design and Object Oriented software design
21   What problems are likely to arise if two modules have high coupling.
22   What problems are likely to arise if a module has low cohesion?
23   There are significant risks even in student projects. Analyze a student project and list all the risk
24   Explain the Putnam resource allocation model. What are the limitations of this model?
25   Discuss typical software risks. How staff turnover problem affects software projects?

26   Explain the Putnam resource allocation model. What are the limitations of this model?
27   Explain the concept of function points. Why FPs are becoming acceptable in the industry?
28   What are the objectives of software design?
29   How do we classify the modularity of software?
30   Explain the steps to analyse and design Object Oriented System.
31   Write the program for calculations of roots of a quadratic equation. Generate cross reference list for the program and calculate WM(module weakness), LV (Average number of lives variables), y(average life of variables).

III   Long Answer Type Questions:

1   Describe the Function count method with an example.
2   Explain the basic and intermediate COCOMO model in detail.
3   Explain LOC method with an example.
4   Discuss various stages of COCOMO II. Which stage is more popular and why?
5   What is risk? Discuss various risk management activities.
6   Explain Putnam Resource Allocation model. What are the limitations of this model?
7   Compare and contrast Function Oriented design and Object Oriented design.
8   What is coupling? Discuss its various types with examples.
9   Define cohesion and its types with examples.
10   What are the various design strategies? Discuss.
11   Explain the various function oriented design techniques with suitable examples.
12   Explain why a design approach based on information hiding principle is likely to lead to a reusable and maintainable design. Illustrate with a suitable example.
13   Explain all the levels of COCOMO model. Assume that the size of an organic software product has been estimated to be 32,000 lines of code. Determine the effort required to develop the software product and the nominal development time.
14   What is risk? Is it economical to do risk management? What is the effect of this activity on the overall cost of the project?
15   Why should a software analyst prefer Object Oriented Analysis of Information Systems to the traditional methods of analyzing such systems?
16   Define Module Cohesion and explain various types of Cohesion.
17   What problems would you face if you are developing several versions of the same product according to a client's request, and you are not using any configuration management tools?
18   Is it true that a software product can always be developed faster by having a larger development team (you can assume that developers are equally proficient and have exactly similar experience)? Justify your answer.
19   Describe the various strategies of design. Which design strategy is most popular and practical?
20   Assuming the Putnam model, with S=100,000, C=5000, Do=15, Compute development time td and manpower development K_d.
21   Can a system ever be completely "decoupled"? That is, can the degree of coupling be reduced so much that there is no coupling between modules?

22   Explain the design guidelines that can be used to produce "good quality" classes or reusable classes.

23   How do object oriented design and structured design differs.

24   Consider a project with the following units.

No. of user inputs	=60
No. of user outputs	=40
No. of user enquires	=35
No. of files	=08
No. of external interfaces	=05

Assume that all complexity adjustment factors and weighting factors are average. Compute the function points for the project.

25   Suppose that a project was estimated to be 800 KLOC. Calculate the effort, development time and average staffing for each of three modes of COCOMO model.

26   What are the purposes of Data Flow diagrams, Entity-Relationship diagrams? Give an example diagram of each.

27   What is data modeling? Give 5 examples for data modeling.

28   What is the difference between SRS document and design document? What are the contents we should contain in the SRS document and design document

29   List and explain all the phases involved in the construction phase.

30   What are functional and non-functional requirements

IV   Practical Questions:

1   A system has 12 external inputs, 24 external outputs, fields 30 different external queries, manages 4 internal logical files and interfaces with 6 different legacy systems. All of these data are of average complexity, and the overall system is relatively simple. Compute Function Points for the system.

Solution:

$UFP=12*4+24*5+30*4+4*10+6*7=370$
$CAF=(0.65+0.01(14*2))= 0.93$
$FP=UFP*CAF= 370*0.93=344.1$

2   Compute the function point value for a project with the following information domain characteristics:
Number of user inputs=50
Number of user outputs=40
Number of user enquiries=35
Number of files=06
Number of external interfaces=04

Assume that all complexity adjustment values are average.

Solution:

UFP=50*4+40*5+35*4+6*10+4*7=628
CAF=(0.65+0.01(14*3))= 1.07
FP=UFP*CAF= 628*1.07=672

3 Suppose a system for office automation is to be designed It is clear from requirements that there will be five modules of size 4 KDLOC, 2 KDLOC, 1 KDLOC, 2 KDLOC and 3 KDLOC respectively.

Complexity, Reliability requirements are high, analyst capability is also high, programmer's capability and experience is low. All other factors are of nominal rating. Use COCOMO model to determine overall cost and schedule estimates. Also calculate the cost and schedule estimates for different phases.

Solution: Reliability is high i.e. 1.15
   Complexity is high i.e. 1.15
   Analyst capability is high i.e. 0.86
   Programmer's capability and experience is low i.e. 1.07

   EAF=1.15*1.15*0.86*1.07=1.2169
   $E=a_i(KDLO(c)^{b_i} * EAF$
   $=3.2(12)^{1.05} * 1.2169=52.91$ PM
   Development time $D=C_i(E)^{d_i}=2.5(52.91)^{0.38}=11.29$ M

Since size is only 12 KDLOC it is an organic small model. Phase wise effort distribution is given below:
System Design =0.16*52.91=8.465 PM
Detailed Design =0.26* 52.91=13.756 PM
Module cost and test =0.42*52.91=22.222 PM
Integration & test =0.16*52.91=8.465 PM

Phase wise time distribution is given below:
System Design =0.16*11.29=2.145 M
Detailed Design =0.24* 11.29=2.709 M
Module cost and test =0.39*11.29=4.403 M
Integration & test =0.18*11.29=2.032 M

4 Suppose that a project was estimated to be 400 KLOC. Calculate the effort and development time for each of the three modes i.e organic, semidetached and embedded using COCOMO model.

Solution:
(i) Organic mode
$E=2.4(400)^{1.05}=1295.31$ PM
$D=2.5(1295.31)^{0.38}=38.07$ M

(ii) Semidetached mode

$E = 3.0(400)^{1.12} = 2462.79$ PM
$D = 2.5(2462.79)^{0.35} = 38.45$ M

(iii) embedded mode
$E = 3.6(400)^{1.20} = 4772.81$ PM
$D = 2.5(4772.81)^{0.32} = 38$ M

5   A stand-alone project for which the size is estimated at 12500 LOC is to be developed in an environment such that the technology factor is 1200. Choosing a manpower build up $D_0 = 15$, calculate the minimum development time, total development man power cost, the difficulty , the peak manning, the development peak time, and the development productivity.

Solution

Size (S)	=	12500 LOC
Technology factor (c)	=	1200
Manpower build up $(D_\circ)$	=	15

Now S $=$ $CK^{\frac{1}{3}} t_d^{4/3}$

$$\frac{S}{C} = K^{\frac{1}{3}} t_d^{4/3}$$

$$\left(\frac{S}{C}\right)^3 = K t_d^4$$

Also we know D_0 $=$ $\dfrac{K}{t_d^3}$

K $=$ $D_0 t_d^3 = D_\circ t_d^3$

Hence $\left(\dfrac{S}{C}\right)^3$ $=$ $D_0 t_d^7$

Substituting the values, we get,

$$\left(\frac{12500}{1200}\right)^3 = 15 t_d^7$$

$$t_d = \left[\frac{(10.416)^3}{15}\right]^{\frac{1}{7}}$$

$$t_d \qquad = \qquad 1.85 \text{ years}$$

(i) Hence Minimum Development Time (t_d) $=$ 1.85 years

(ii) Total Development Manpower Cost K_d $=$ $\dfrac{K}{6}$

Hence, $\qquad\qquad\qquad\qquad$ K $=$ $15t_d^3$

$$= \quad 15\,(1.85)^3 = \quad 94.97 \text{ PY}$$

$$K_d \quad = \quad \frac{K}{6} = \frac{94.97}{6} = 15.83 \text{ PY}$$

(iii) Difficulty $D = \dfrac{K}{t_d^2}$ $=$ $\dfrac{94.97}{(1.85)^2}$ $=$ 27.75 Person/year

(iv) Peak Manning m_0 $=$ $\dfrac{K}{t_d \sqrt{e}}$

$$= \quad \frac{94.97}{1.85 x 1.648} \quad = \quad 31.15 \text{ Persons}$$

(v) Development Peak Time t_{od} $=$ $\dfrac{t_d}{\sqrt{6}}$

$$= \quad \frac{1.85}{2.449} \quad = \quad 0.755 \text{ years}$$

(vi) Development Productivity

$$= \quad \frac{\text{No. of lines of code (S)}}{\text{effort (} K_d \text{)}}$$

$$= \quad \frac{12500}{15.83} \quad = \quad 789.6 \text{ LOC/PY}$$

8 Suppose that a project was estimated to be 600 KLOC. Calculate the effort and development time for each of the three modes i.e., organic, semidetached and embedded

Solution:

ASSUMING BASIC COCOMO MODEL

The Table used is

	a	b	c	D
organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
embedded	3.6	1.20	2.5	0.32

1)   ORGANIC MODEL

Effort = $a*(size)^b$
$E = 2.4(600)^{1.05}$
logE=log2.4+1.05*log600
     =0.3802 + 1.05*2.7782
logE =3.29731

E=antilog(3.29731)
 Effort=1983 PM

Development Time=$c(E)^d$
$D=2.5(1983)^{0.38}$
logD=log2.5+0.38*log1983
          =0.3979+0.38*3.2974
          =1.6509
        D=antilog 1.6509
          =44.76
 Development Time= 44.76 months

2)   SEMIDETACHED MODEL

Effort = $a*(size)^b$
$E = 3.0(600)^{1.12}$
logE=log3.0+1.12*log600
     =0.4771 + 1.12*2.7782
logE =3.5886
E=antilog(3.5886)
Effort=3878 PM

Development Time=$c(E)^d$
        $D=2.5(3878)^{0.35}$
logD=log2.5+0.35*log3878

$$=0.3979+0.35*3.5886$$
$$=1.6539$$
$$D=\text{antilog } 1.6539$$
$$=45.07$$
Development Time= 45.07 months

3) EMBEDDED MODEL

$\text{Effort} = a*(\text{size})^b$
$E = 3.6(600)^{1.20}$
$\log E = \log 3.6 + 1.20*\log 600$
$\quad = 0.5563 + 1.20*2.7782$
$\log E = 3.8901$

$E = \text{antilog}(3.8901)$
Effort=7782 PM

$\text{Development Time} = c(E)^d$
$\quad D=2.5(7782)^{0.32}$
$\log D = \log 2.5 + 0.32*\log 7782$
$\quad\quad = 0.3979 + 0.32*3.8901$
$\quad\quad = 1.6427$
$\quad D = \text{antilog } 1.6427$
$=43.96$
Development Time= 43.96 months

3 Assuming the Putnam model, with S = 100, 00, C = 5000, D_0 = 15, Compute development time t_d and manpower development $K_{(d)}$

UNIT - III

I Test Your Skills:

(a) State Whether the Following Statements are True or False:

1 Program Length is denoted by N.
2 Language Level is defined as $\lambda = LV$.
3 Fault is error in the program.
4 Reliability of software is usually estimated at testing phase.
5 Defect rate is number of defects per function point.
6 Code inspection of a program is a dynamic testing technique
7 Almost one-half of a programmer's time is spent identifying and fixing errors in specifications.
8 Quality Control is a validation technique whereas Quality Assurance is a verification technique.

9   Mean Time To Repair (MTTR) is the time needed to repair a failed hardware module.

10   People metrics is not a category of software metrics.

Ans.   (1)(T), (2)(F), (3)(T), (4)(T), (5)(F), (6)(F), (7)(T), (8)(T), (9)(T), (10)(T)

(b)   Multiple Choice Questions:

1   Which one is not a category of software metrics?
     (a)   Product metrics
     (b)   Process metrics
(c)   Project metrics
     (d)   People metrics

2   Which is not a size metric?
     (a)   LOC
     (b)   Function count
     (c)   Program Length
     (d)   Cyclomatic Complexity

3   Minimal implementation of any algorithm was given the following name by Halstead
     (a)   Volume
     (b)   Potential Volume
     (c)   Effective Volume
     (d)   None of the above

4   Which one is not a measure of Software Science theory?
     (a)   Vocabulary
     (b)   Volume
     (c)   Level
     (d)   Logic

5   Minimum possible value of reliability is
     (a)   100
     (b)   10
     (c)   1
     (d)   0

6   Which level of CMM is for process control?
     (a)   Initial
     (b)   Defined
     (c)   Managed
     (d)   Optimizing

7   How many product quality factors have been proposed in McCall quality model?
     (a)   2
     (b)   3

(c) 11

(d) 6

8   Function oriented metrics were first proposed by?
     (a)   John
     (b)   Gaffney
     (c)   Albrecht
     (d)   Basili

9   Which of the following is not a product metric?
     (a)   Size
     (b)   Reliability
     (c)   Productivity
     (d)   Functionality

10   Which of the following is not a process metric?
     (a)   Productivity
     (b)   Functionality
     (c)   Quality
     (d)   Efficiency

11   Reliability in a software system can be achieved using which of the following strategies.
     (a)   Fault avoidance
     (b)   Fault tolerance
     (c)   Fault detection
     (d)   All the above

12   ………………. strategy assumes that residual faults remain in the system and can continue in operation after some system failures have occurre(d)
     (a)   Fault avoidance
     (b)   Fault tolerance
     (c)   Fault detection
     (d)   None of the above

13   ……………… involves modifying the system so that the fault does not recur.
     (a)   Failure detection
     (b)   Damage assessment
     (c)   Fault recovery
     (d)   Fault repair

14   …………………… is an approach to program development whereby programmers assume that there may be undetected faults or inconsistencies in their programs.
     (a)   Defensive programming
     (b)   Effective programming
     (c)   Strong programming
     (d)   Known programming

15   ……………… is a classification scheme, which shows how an object class is related to other classes through common attributes and services.
(a)   Hierarchy
(b)   Inheritances
(c)   Taxonomy
(d)   None of the above

16   ……………. is a list of names used by the systems, arranged alphabetically.
(a)   Data Library
(b)   Data Dictionary
(c)   Name Dictionary
(d)   System Dictionary

17   The ………………….. model of system design is a distributed system model which show how data and processing is distributed across a range of processors.
(a)   Repository
(b)   Client-server
(c)   Abstract machine
(d)   None of the above

18   The main design activities in the software design process are
i)   System specification   iii) Component design
ii)   Interface design   iv)   algorithm design
(a)   ii, iii and iv only
(b)   i, ii and iii only
(c)   i, iii and iv only
(d)   All i, ii, iii and iv

19   ……………………. is the process, which controls the changes made to a system, and manages the different versions of the evolving software product.
(a)   Software management
(b)   Configuration management
(c)   Version management
(d)   Release management

20   The different types of software maintenance systems are
(a)   Corrective maintenance
(b)   Adaptive maintenance
(c)   Perfective maintenance
(d)   All the above

21   In quantifying risk, the term RE represents
(a)   Risk expense
(b)   Related expense

    (c)   Risk exposure
    (d)   Risk evaluation

22   Which of the following are advantages of using LOC (lines of code) as a size oriented metric?
    (a)   LOC is easily computed
    (b)   LOC is a language dependent measure
    (c)   LOC is a language independent measure
    (d)   LOC can be computed before a design is completed

23   What is the present value of money of a $10,000 expenditure that you will spend one year from now if money is worth 14%?
    (a) $2630
    (b) $8770
    (c) $1600
    (d) $8600

24   What is the present value of money of a $10,000 expenditure that you will spend one year from now if money is worth 14%?
    (a) $2630
    (b) $8770
    (c) $1600
    (d) $8600

25   Which of the following techniques does not require the understanding of internal data structures and algorithms?
    (a)   Gray box testing
    (b)   Mutation testing
    (c)   Glass box testing
    (d)   All - pairs testing

26   The _____ is an application of a process management and quality improvement concepts to software development and maintenance.
    (a)   Malcom-Baldridge
    (b)   ISO 9000
    (c)   SEI/CMM
    (d)   QSI4000

27   Function point metric of a software also depends on the
    (a)   Number of function needed
    (b)   Number of final users of the software
    (c)   Number of external inputs and outputs
    (d)   Time required for one set of output from a set of input data

28   Which of the following verifies the product rather than the process?

        (a)   Inspection
        (b)   Quality Control
        (c)   Walkthrough
        (d)   Review

29   Which of the following is not a level in CMM?
        (a)   Managed
        (b)   Adhoc
        (c)   Predictable
        (d)   Optimised

30   Which is not a size metric?
        (a)   LOC
        (b)   Function count
        (c)   Program length
        (d)   Cyclomatic complexity

31   Which of the following is not a cost of quality?
        (a)   Prevention Cost
        (b)   Appraisal cost
        (c)   Failure cost
        (d)   Build cost

32   The process of identifying the kinds of software failures that can occur and then
        quantifying how likely it is that they will actually occur is
        (a)   Configuration management
        (b)   Risk management
        (c)   Contingency planning
        (d)   Process improvement

33   In which model functional expertise can be used to estimate cost
        (a)   Function point
        (b)   Expert judgment
        (c)   Top-down
        (d)   Bottom-up

34   Which one of the following ISO standard is used for software process?
        (a)   ISO 9000
        (b)   ISO 9001
        (c)   ISO 9003
        (d)   ISO 9000-3

35   Which of the following are parameters involved in computing the total cost of a software
        development project?

(a)   Hardware and software costs
(b)   Effort costs
(c)   Travel and training costs
(d)   All of the mentioned

36   Which of the following costs is not part of the total effort cost?
(a)   Costs of networking and communications
(b)   Costs of providing heating and lighting office space
(c)   Costs of lunch time food
(d)   Costs of support staff

37   What is related to the overall functionality of the delivered software?
(a)   Function-related metrics
(b)   Product-related metrics
(c)   Size-related metrics
(d)   None of the mentioned

38   Modules X and Y operate on the same input and output data, then the cohesionis
(a)   Sequential
(b)   Communicational
(c)   Procedural
(d)   Logical

39   IEEE 830-1993 is a IEEE recommended standard for
(a)   Software requirement specification
(b)   Software design
(c)   Testing
(d)   Both (a) and (b)

40   Key process areas of CMM level 4 are alsoclassified by a processwhichis
(a)   CMM level 2
(b)   CMM level 3
(c)   CMM level 5
(d)   All of the above

41   The ISO quality assurance standard that applies to software engineering is
(a)   ISO 9000
(b)   ISO 9001
(c)   ISO 9002
(d)   ISO 9003

42   Which one is not a software quality model?
(a)   ISO 9000
(b)   McCall model
(c)   Boehm model
(d)   ISO 9126

43   How many levels are present in CMM?
        (a)   three
        (b)   four
        (c)   five
        (d)   six

44   Which level of CMM is for process management?
        (a)   Initial
        (b)   Repeatable
        (c)   Defined
        (d)   Optimizing

45   In ISO 9126, time behavior and resource utilization are a part of
        (a)   Maintainability
        (b)   Portability
        (c)   Efficiency
        (d)   Usability

46   Which of the following is not a Probabilistic Model?
        (a)   Error seeding
        (b)   NHPP
        (c)   Input domain
        (d)   Halstead's software metric

47   Software reliability is defined with respect to
        (a)   time
        (b)   bugs
        (c)   failures
        (d)   quality

48   Failure In Time (FIT) is another way of reporting
        (a)   MTTR
        (b)   MTTF
        (c)   MTSF
        (d)   MTBF

49   MTTF stands for
        (a)   Minimum time to failure
        (b)   Mean time to failure
        (c)   Maximum time to failure
        (d)   None of the mentioned

50   The cost of software engineering includes approximately …………… of development
        costs and …………. of testing costs.
        (a)   50%, 50%
        (b)   40%, 60%

(c)   80%, 20%

(d)   60%, 40%

51   Which is the Layered Technology in Bedrock that supports Software Engineering?

(a)   Methods

(b)   Tools

(c)   Process

(d)   Quality Focus

52   SPICE Means _____.

(a)   Software Process Improvement and Capability Determination.

(b)   Software Process Improvement and Compatibility Determination.

(c)   Software Process Invention and Compatibility Determination.

(d)   Software Process Improvement and Control Determination.

53   The Phases of formal review process are mentioned below. Arrange them in the correct order.

i.   Planning

ii.   Review Meeting

iii.   Rework

iv.   Individual Preparations

v.   Kick Off

vi.   Follow Up

(a)   i,ii,iii,iv,v,vi

(b)   vi,i,ii,iii,iv,v

(c)   i,v,iv,ii,iii,vi

(d)   i,ii,iii,v,iv,vi

54   Cost of Production = Right The First time cost (RTF +-----------) .

(a)   Cost of Deployment

(b)   Cost of Quality

(c)   Cost of maintenance

(d)   Cost of Production

55   Which of the following items should **not** be included in the software project management plan?

(a)   The techniques and case tools to be used

(b)   Detailed schedules, budgets and resource allocations

(c)   The life cycle model to be used

(d)   The organisational structure of the development organisation, project responsibilities, managerial objectives and priorities

(e) None of the above.

56   A graphical technique for finding if changes and variation in metrics data are meaningful is known as

(a)   DRE (Defect Removal Efficiency)

     (b)   Function points analysis
     (c)   Control Chart
     (d)   All of the mentioned

57   Defects removal efficiency (DRE)depends on:
     (a)   E – errors found before software delivery
     (b)   D – defects found after delivery to user
     (c)   Both E and D
     (d)   Varies with project

58   Identify the correct option with reference to Software Quality Metrics.
     (a)   Integrity = [Sigma(1 – threat)] * (1 – security)
     (b)   Integrity = [1 – Sigma(threat)] * (1 – security)
     (c)   Integrity = [1 – threat * Sigma(1 – security)]
     (d)   Integrity = Sigma[1 – threat * (1 – security)]

59   MTTC falls the the category of
     (a)   Correctness:
     (b)   integrity
     (c)   maintainability

60   The arc-to-node ratio is given as r = a/n. What does 'a' represent in the ratio?
     (a)   maximum number of nodes at any level
     (b)   longest path from the root to a leaf
     (c)   number of modules
     (d)   lines of control

Ans.   (1)(d), (2)(d), (3)(b), (4)(d), (5)(d),(6)(d),(7)(b), (8)(c), (9)(c), (10)(b), (11)(d), (12)(b), (13)(d), (14)(a), (15)(c), (16)(b), (17)(b), (18)(d), (19)(b), (20)(d), (21)(c), (22)(a),(23)(b), (24)(b), (25)(d), (26)(c), (27)(c), (28)(b), (29)(c), (30)(d), (31)(d), (32)(b), (33)(b), (34)(d), (35)(d), (36)(c), (37)(a), (38)(b), (39)(a), (40)(c), (41)(b), (42)(a), (43)(c), (44)(d), (45)(c), (46)(d), (47)(a), (48)(d), (49)(b), (50)(d), (51)(d), (52)(a), (53)(c), (54)(b), (55)(e), (56)(c), (57)(c), (58)(d), (59)(c), (60)(d)

(c)   Fill in the Blanks:

1   Software Science measures are developed by_____
2   WM is known as the_____
3   _____is a count of the number of other components that can call, or pass control to component (a)
4   As the reliability increases, failure intensity _____
5   CMM stands for _____
6   In Logarithmic Poisson execution model, 'θ' is known as _____ interacting units where each unit has a clearly defined function.
7   Ability to prevent unauthorized access, whether accidental or deliberate, to program and data is known as_____

Ans.   (1)(Halstea(d), (2)(Module Weakness), (3)(FAN IN), (4) (decreases), (5)(Capability Maturity Model), (6) (failure intensity decay parameter), (7) (Security)

II   Short Answer Type Questions:

1   Define software metrics. Why do we really need metrics in software?
2   What is the importance of language level in Halstead theory of software science?
3   Why does lines of code (LO(c) not measure software nesting and control   structures?
4   Which one is the most appropriate size estimation technique and why?
5   Describe the concept of module weakness. Is it applicable to programs also?
6   Differentiate between process and product metrics.
7   Quality and reliability are related concepts but are fundamentally different in a number of ways. Discuss them.
8   Explain how CMM encourages continuous improvement of the software process.
9   Compare Basic execution model and Logarithmic Poisson execution model.
10   What do you understand by maturity of software development process?
11   Define the following:
        (a)   Live Variables
        (b)   Variable spans
        (c)   Module Weakness
12   Write down the major characteristics of software. Illustrate with a diagram that the software does not wear out.
13   Define each of the following term and derive/show their formula-
        (i)   Program Level
        (ii)   Potential Volume
        (iii)   Average life of a variable
        (iv)   FAN-OUT
14   Differentiate between various categories of metrics.
15   Explain the significance of software reliability engineering.
16   What are Software Metrics? Describe Data Structure Metrics.
17   Define Reliability?
18   Which one is the most appropriate size estimation technique and why?
19   Will exhaustive testing (even if possible for every small programs) guarantee that the program is 100% correct?
20   Describe the equivalence class testing method. Compare this with boundary value analysis techniques
21   Discuss cause effect graphing technique with an example.
22   Differentiate Functional Testing from Structural Testing.
23   Distinguish between alpha, beta and acceptance testing. How are the test cases designed for these tests?
24   Is it feasible to specify maintainability in the SRS? If yes, how would we specify it?
25   What is the difference between fault and failure?
26   What are the various categories of software metrics? Discuss with the help of suitable example.
27   What is software relaiblity?

28   List the name of some of the models for software reliability estimation?
29   Discuss the various software quality models.
30   What is coupling and cohesion? What is object-oriented design.

III   Long Answer Type Questions:

1   What are the various categories of software metrics? Explain each of them in   detail.
2   Explain the Halstead's Software Science metrics with example.
3   Define data structure metrics. How can we calculate the amount of data in a program?
4   Discuss the relevance of measurement in software engineering
5   What are Information Flow metrics? Illustrate their importance.
6   Discuss the effect of software metrics on software productivity.
7   How the software metrics can help in software management?
8   Several researchers in software metrics concentrate on data structure to measure complexity. Is data structure a complexity or quality issue, or both?
9   Compare Hardware Reliability and Software Reliability.
10   Explain the Boehm software quality model with the help of a block diagram.
11   Discuss the relationship between quality factors and quality criteria in McCall's software quality model.
12   What is ISO-9126 with McCall software quality model and highlight few advantages of ISO-9126?
13   Explain the Basic and Logarithmic Poisson execution model in detail.
14   Discuss various KPA of CMM at various maturity levels.
15   Compare and contrast ISO and CMM.
16   What are the advantages of using software standards? Explain.
17   Discuss the penalties and prizes of software reliability.
18   Do you agree with the statement "The degree of reliability of a software product is inversely proportional to the number of latent defects in it?" Justify your answer.
19   Describe the McCall software quality model. How many product quality factors are defined and why?
20   What is the significance of use case metrics? Is it really important to design such metrics.
21   Quality and Reliability are related concepts but are fundamentally different in a number of ways. Discuss them.
22   If an organization does not document its quality system, what problems would it face?
23   What are the various key process areas at defined level in CMM? Describe activities associated with one key process
24   Explain the significance of independent paths. Is it necessary to look for a tool for flow graph generation, if program size increases beyond 100 source lines?
25   Discuss the importance of path testing during structural testing.
26   What is the difference between white and black box testing? Is determining test cases easier in back or white box testing? Is it correct to claim that if white box testing is done properly, it will achieve close to 100% path coverage?

27   Compare ISO 9126 with CMM model and highlight few advantages of CMM.
28   Describe the various strategies of design. Which design strategy is most practical and why?
29   For some program having no. of unique operators n1=20 and number of unique operands
       n2 = 40. Compute the following:
           (a) Program Volume
           (b) Effort and time
           (c) Language Level
           (d) Program Level
           (e) Program Length
30   Define the meaning of software quality and detail the factors which affects the quality not
       productivity of a software product?
31   Give the detail of quality parameters which are used in a software system.
32   Define the meaning of quality assurance. Explain the role of testing in Quality assurance
33   Explain software reliability and define how software and hardware reliability related to
       each other.
34   Explain a good quality ensures a good software. Comment.

IV   **Practical Questions:**

1   The following parameters for basic and logarithmic Poisson models are given:

Basic execution time model	logarithmic Poisson models
λ_0=10 failures/CPU hr.	λ_0=30 failures/CPU hr
V_0=100 failures	θ=0.025/failure

       (a) Determine the additional failures and additional execution time required to reach the
           failure intensity objective of % failures/CPU hr for both models.
       (b) Repeat this an objective function of 0.5 failure/CPU hr. Assume that we start with the
           initial failure intensity only.

       Solution: (a)   (i)   Basic execution time model

$$\Delta\mu = \frac{V_0}{\lambda_0}(\lambda_P - \lambda_F)$$

$$= \frac{100}{10}(10-5) = 50 \text{ failures}$$

λ_P (Presently failure intensity) in this case is same as λ_0 (initial failure
intensity).

$$\text{Now,} \quad \Delta\tau = \frac{V_0}{\lambda_0} Ln\left(\frac{\lambda_P}{\lambda_F}\right)$$

$$= \frac{100}{10} Ln\left(\frac{10}{5}\right) = 6.93 \text{ CPU hr.}$$

(ii)   Logarithmic execution time model

$$\Delta\mu \quad = \quad \frac{1}{\theta} Ln\left(\frac{\lambda_P}{\lambda_F}\right)$$

$$= \quad \frac{1}{0.025} Ln\left(\frac{30}{5}\right) = 71.67 \text{ failures}$$

$$\Delta\tau \quad = \quad \frac{1}{\theta}\left(\frac{1}{\lambda_F} - \frac{1}{\lambda_P}\right)$$

$$= \quad \frac{1}{0.025}\left(\frac{1}{5} - \frac{1}{30}\right) = 6.66 \text{ CPU hr.}$$

Logarithmic model has calculated more failures in almost some duration of execution time initially.

(b)   Failure intensity objective (λ_F)   =   0.5 failures/CPU hr.

(i)   Basic execution time model

$$\Delta\mu \quad = \quad \frac{V_0}{\lambda_0}\left(\lambda_P - \lambda_{F)}\right)$$

$$= \quad \frac{100}{10}(10 - 0.5) = 95 \text{ failures}$$

$$\Delta\tau \quad = \quad \frac{V_0}{\lambda_0} Ln\left(\frac{\lambda_P}{\lambda_F}\right)$$

$$= \quad \frac{100}{10} Ln\left(\frac{10}{0.5}\right) \quad = \quad 30 \text{ CPU hr.}$$

(ii)   Logarithmic execution time model

$$\Delta\mu \quad = \quad \frac{1}{\theta} Ln\left(\frac{\lambda_P}{\lambda_F}\right)$$

$$= \quad \frac{1}{0.025} Ln\left(\frac{30}{0.5}\right) \quad = \quad 164 \text{ failures}$$

$$\Delta\tau \quad = \quad \frac{1}{\theta}\left(\frac{1}{\lambda_F} - \frac{1}{\lambda_P}\right)$$

$$= \quad \frac{1}{0.025}\left(\frac{1}{0.5} - \frac{1}{30}\right) \quad = \quad 78.66 \text{ CPU hr.}$$

2   Write a program for calculation of roots of quadratic equation. Generate cross reference list for the program and also calculate LVand WM for this program.

Solution

```
1       Program to calculate the roots of a quadratic equation */
2       #include <stdio.h>
3       #include <math.h>
4       main()
5       {
6       doubleaa, bb, cc, aux, root1, root2;
7       aa = 1.0;
8       printf("\nProgram to find the roots of a quadratic equation\n");
9       printf("of the form a*x*x + b*x + c = 0\n\n");
10      printf("Entering 0 for the value of a stops the program\n\n");
11      while ( aa != 0.0 )
12      {
13      /* Enter coefficients for equation */
14      printf("Enter value for a : ");
15      scanf("%lf", &a(a);
16      if ( aa == 0.0 )
17      {
18      /* Exit the while() loop, unless we want a division by 0 */
19      break;
20      }
21      printf("Enter value for b : ");
22      scanf("%lf", &b(b);
23      printf("Enter value for c : ");
24      scanf("%lf", &c(c);
25      aux = bb * bb - 4 * aa * cc;
26      if ( aux> 0.0 ) /* There are 2 solutions */
27      {
28      aux = sqrt( aux );
29      root1 = ( -bb + aux ) / ( 2 * aa );
30      root2 = ( -bb - aux ) / ( 2 * aa );
31      printf("\nThe roots %.4lf and %.4lf were found\n\n", root1,
32      root2 );
33      }
34      else if ( aux == 0.0 ) /* There is only one solution */
35      {
36      root1 = -bb / ( 2 * aa );
37      printf("\nA single root, %.4lf, was found\n\n", root1 );
38      }
39      else /* There is no real solution */
40      {
41      printf("\nNo real roots were found\n\n");
42      }
43      }
```

```
44      printf("\nEnd of program, goodbye!\n\n");
45      return;
```

Cross reference list

Aa	6	7	11	15	16	25	29	30	36
Bb	6	22	25	29	30	36			
Cc	6	24	25						
Aux	25	26	28	28	29	30	34	36	
root1	6	29	31	36	37				
root2	6	30	32						
X	9	9	9						
A	9	14							
B	9	21							
C	9	23							

Live variables per line

Line number	Live variables on the line	Count
7	aa	1
8	aa	1
9	aa	1
10	aa	1
11	aa	1
12	aa	1
14	aa	1
15	aa	1
16	aa	1
17	aa	1
19	aa	1
20	aa	1
21	aa	1
22	aa,bb	2
23	aa,bb	2
24	aa, bb, cc	3
25	aux, aa, bb, cc	4
26	aux, aa, bb	3
27	aux, aa, bb	3
28	aux, aa, bb	3
29	root1, aux, aa, bb	4
30	root1, root2,aux,aa,bb	5
31	root1, root2,aux,aa,bb	5
32	root1, root2,aux,aa,bb	5

33	root1, aux, aa, bb	4
34	root1, aux, aa, bb	4
35	root1, aux, aa, bb	4
36	root1, aux, aa, bb	4
37	root1	1
	Total	69

LV= Sum of count of live variables/ Count of executable statements

LV=69/45=1.53

γ= Sum of count of live variables/Total no. of variables
γ= 69/10=6.9

WM=LV * γ
=1.53 * 6.9=10.557

3   Assume that the failure intensity is 10 failures/CPU hr. The failure intensity decay parameter is 0.03/failure. We have experienced 75 failures upto this time. Find the failures experienced and failure intensity after 25 and 50 CPU hrs. of execution.

(a)   Failures experienced & failure intensity after 25 CPU hr:

$$\mu(\tau) = \frac{1}{\theta} Ln(\lambda_0 \theta \tau + 1)$$

$$= \frac{1}{0.03} Ln(10 \times 0.03 \times 25 + 1) = 71.33 \; failures$$

$$\lambda(\tau) = \lambda_0 / (\lambda_0 \theta \tau + 1)$$

$$= (10)/(10 \times .03 \times 25 + 1) = 0.85 \; failures / CPU \; hr.$$

(b)   Failures experienced & failure intensity after 50 CPU hr:

$$\mu(\tau) = \frac{1}{\theta} Ln(\lambda_0 \theta \tau + 1)$$

$$= \frac{1}{0.023} Ln(10 \times 0.03 \times 50 + 1) = 92.4 \; failures$$

$$\lambda(\tau) = \lambda_0 / (\lambda_0 \theta \tau + 1)$$

$$= (10)/(10 \times .03 \times 50 + 1) = 1.6 \; failures / CPU \; hr.$$

UNIT - IV

I   Test Your Skills:

(a)   State Whether the Following Statements are True or False:

1   Alpha testing is done by developer.
2   Verification is checking the product with respect to specification.
3   Boundary Value Analysis is a type of white box testing.
4   The DD path graph is known as decision to decision path graphs.
5   Testing is a positive activity.
6   One of the purposes of reverse engineering is to understand the source code and associated documents.
7   In Boehm model, ACT stands for actual change time.
8   Taute maintenance model has six phases.
9   Boundary value analysis belong to White Box Testing
10   Alpha testing is done at Developer's end.

Ans.   (1)(F), (2)(T), (3)(F), (4)(T), (5)(F),(6)(T), (7)(F), (8)(F),(9)(F), (10)(T)

(b)   Multiple Choice Questions:

1   Software mistakes during coding are known as
     (a)   Failures
     (b)   Defects
     (c)   Bugs
     (d)   Errors

2   Test suite is
     (a)   Set of test cases
     (b)   Set of inputs
     (c)   Set of outputs
     (d)   None of the above

3   Cyclomatic complexity is denoted by
     (a) $V(G)=e-n+2p$
     (b) $V(G)=\pi+1$
     (c) $V(G)=$number of regions of the graph
     (d)   all of the above

4   Which one is not the verification activity?
     (a)   Reviews
     (b)   Path testing
     (c)   Walkthroughs
     (d)   Acceptance testing

5   Site for alpha testing is
     (a)   Software company

(b)   Installation place
(c)   Anywhere
(d)   All of the above

6   In data flow testing, objective is to find
     (a)   All dc-paths that are not du-paths
     (b)   All du-paths
     (c)   All du-paths that are not dc-paths
     (d)   All dc-paths

7   Which one is not a category of maintenance?
     (a)   Corrective maintenance
     (b)   Effective maintenance
     (c)   Adaptive maintenance
     (d)   Perfective maintenance

8   Regression testing is known as
     (a)   The process of retesting the modified parts of the software
     (b)   The process of testing the design documents
     (c)   The process of reviewing the SRS
     (d)   None of the above

9   Which one is not a user documentation?
     (a)   Beginner's guide
     (b)   Installation guide
     (c)   SRS
     (d)   System administration

10   Legacy systems are
     (a)   Old systems
     (b)   New systems
     (c)   Undeveloped systems
     (d)   None of the above

11   White Box Techniques are also called as :-
     (a)   Structural Testing
     (b)   Design Based Testing
     (c)   Error Guessing Technique
     (d)   Experience Based Technique

12   What is an equivalence partition (also known as an equivalence class)?
     (a)   A set of test cases for testing classes of objects.
     (b)   An input or output range of values such that only one value in the range becomes a test case.
     (c)   An input or output range of values such that each value in the range becomes a test case.

(d)   An input or output range of values such that every tenth value in the range becomes a test case.

13   Exhaustive Testing is
(a)   Is impractical but possible
(b)   Is practically possible
(c)   Is impractical and impossible
(d)   Is always possible

14   Which of the following is the task of a Tester?
i.   Interaction with the Test Tool Vendor to identify best ways to leverage test tool on the project.
ii.   Prepare and acquire Test Data
iii.   Implement Tests on all test levels, execute and log the tests.
iv.   Create the Test Specifications
(a)   i, ii, iii is true and iv is false
(b)   ii,iii,iv is true and i is false
(c)   i is true and ii,iii,iv are false
(d)   iii and iv is correct and i and ii are incorrect

15   What can static analysis NOT find?
(a)   the use of a variable before it has been defined
(b)   unreachable ("dead") code
(c)   memory leaks
(d)   array bound violations

16   Software testing accounts to what percent of software development costs?
(a)   10-20
(b)   40-50
(c)   70-80
(d)   5-10

17   A reliable system will be one that:
(a)   Is unlikely to be completed on schedule
(b)   Is unlikely to cause a failure
(c)   Is likely to be fault-free
(d)   Is likely to be liked by the users

18   How much testing is enough?
(a)   This question is impossible to answer.
(b)   The answer depends on the risks for your industry, contract and special requirements.
(c)   The answer depends on the maturity of your developers.
(d)   The answer should be standardized for the software development industry.

19   Which of the following is not a characteristic for Testability?
      (a)   Operability
      (b)   Observability
      (c)   Simplicity
      (d)   Robustness

20   Cyclomatic Complexity method comes under which testing method?
      (a)   White box
      (b)   Black box
      (c)   Green box
      (d)   Yellow box

21   Which of these can be successfully tested using Loop Testing methodology?
      (a)   Simple Loops
      (b)   Nested Loops
      (c)   Concatenated Loops
      (d)   All of the above

22   To test a function, the programmer has to write a _____, which calls the function and passes it test data
      (a)   Stub
      (b)   Driver
      (c)   Proxy
      (d)   None of the above

23   Equivalence partitioning is:
      (a)   A black box testing technique used only by developers
      (b)   A black box testing technique than can only be used during system testing
      (c)   A black box testing technique appropriate to all levels of testing
      (d)   A white box testing technique appropriate for component testing

24   When a new testing tool is purchased, it should be used first by:
      (a)   A small team to establish the best way to use the tool
      (b)   Everyone who may eventually have some use for the tool
      (c)   The independent testing team
      (d)   The vendor contractor to write the initial scripts

25   Inspections can find all the following except
      (a)   Variables not defined in the code
      (b)   Spelling and grammar faults in the documents
      (c)   Requirements that have been omitted from the design documents
      (d)   How much of the code has been covered

26   White box testing, a software testing technique is sometimes called?
      (a)   Basic path
      (b)   Graph Testing

(c)   Dataflow
(d)   Glass box testing

27   Black box testing sometimes called?
(a)   Data Flow testing
(b)   Loop Testing
(c)   Behavioral Testing
(d)   Graph Based Testing

28   Which of the following is a type of testing?
(a)   Recovery Testing
(b)   Security Testing
(c)   Stress Testing
(d)   All of above

29   The objective of testing is ?
(a)   Debugging
(b)   To uncover errors
(c)   To gain modularity
(d)   To analyze system

30   _____is a black box testingmethod .
(a)   Boundary value analysis
(b)   Basic path testing
(c)   Code path analysis
(d)   None of above

31   Verification is:
(a)   Checking that we are building the right system
(b)   Checking that we are building the system right
(c)   Performed by an independent test team
(d)   Making sure that it is what the user really wants

32   A regression test:
(a)   Will always be automated
(b)   Will help ensure unchanged areas of the software have not been affected
(c)   Will help ensure changed areas of the software have not been affected
(d)   Can only be run during user acceptance testing

33   If an expected result is not specified then:
(a)   We cannot run the test
(b)   It may be difficult to repeat the test
(c)   It may be difficult to determine if the test has passed or failed
(d)   We cannot automate the user inputs

34   Which of the following could be a reason for a failure
      1)   Testing fault
      2)   Software fault
      3)   Design fault
      4)   Environment Fault
      5)   Documentation Fault

      (a)   2 is a valid reason; 1,3,4& 5 are not
      (b)   1,2,3,4 are valid reasons; 5 is not
      (c)   1,2,3 are valid reasons; 4 & 5 are not
      (d)   All of them are valid reasons for failure

35   Test are prioritized so that:
      (a)   You shorten the time required for testing
      (b)   You do the best testing in the time available
      (c)   You do more effective testing
      (d)   You find more faults

36   Which of the following is not a static testing technique?
      (a)   Error guessing
      (b)   Walkthrough
      (c)   Data flow analysis
      (d)   Inspections

37   Which of the following statements about component testing is not true?
      (a)   Component testing should be performed by development
      (b)   Component testing is also know as isolation or module testing
      (c)   Component testing should have completion criteria planned
      (d)   Component testing does not involve regression testing

38   During which test activity could faults be found most cost effectively?
      (a)   Execution
      (b)   Design
      (c)   Planning
      (d)   Check Exit criteria completion

39   Which, in general, is the least required skill of a good tester?
      (a)   Being diplomatic
      (b)   Able to write software
      (c)   Having good attention to detail
      (d)   Able to be relied on

40   The purpose of requirement phase is
      (a)   To freeze requirements
      (b)   To understand user needs

(c)   To define the scope of testing
(d)   All of the above

41   The process starting with the terminal modules is called -
(a)   Top-down integration
(b)   Bottom-up integration
(c)   None of the above
(d)   Module integration

42   The inputs for developing a test plan are taken from
(a)   Project plan
(b)   Business plan
(c)   Support plan
(d)   None of the above

43   Function/Test matrix is a type of
(a)   Interim Test report
(b)   Final test report
(c)   Project status report
(d)   Management report

44   Defect Management process does not include
(a)   Defect prevention
(b)   Deliverable base-lining
(c)   Management reporting
(d)   None of the above

45   What is the difference between testing software developed by contractor outside your
country, versus testing software developed by a contractor within your country?
(a)   Does not meet people needs
(b)   Cultural difference
(c)   Loss of control over reallocation of resources
(d)   Relinquishments of control

46   Positive testing is
(a)   running the system with line data by the actual user
(b)   making sure that the new programs do in fact process certain transactions
        according to Specifications
(c)   is checking the logic of one or more programs in the candidate system
(d)   testing changes made in an existing or a new program
(e)   None of the above

47   The rule(s) to follow in constructing decision tables is (are):
(a)   a decision should be given a name
(b)   the logic of the table is independent of the sequence in which conditions rules are
        written, but the action takes place in the order is which the events occur.
(c)   Standardized language must be used consistently.
(d)   All of the above

(e)   None of the above

48   During the maintenance phase
- (a)   System requirements are established
- (b)   System analysis is carried out
- (c)   Programs are tested
- (d)   All of the above
- (e)   None of the above

49   An appraisal, of a system's performance after it has been installed, is called system
- (a)   Planning
- (b)   Review
- (c)   Maintenance
- (d)   batch Processing
- (e)   None of the above

50   Sequential or series testing is
- (a)   Running the system with line data by the actual user
- (b)   Making sure that the new programs do in fact process certain transactions according to Specifications
- (c)   Is checking the logic of one or more programs in the candidate system
- (d)   Testing changes made in an existing or a new program
- (e)   None of the above

51   A decision table has
- (a)   Four portions
- (b)   Three portions
- (c)   Five portions
- (d)   Two portions

52   Equivalence class partitioning is related to
- (a)   Structural testing
- (b)   Black box testing
- (c)   Mutation testing
- (d)   All of the above

53   Verification is
- (a)   Checking the product with respect to customer's expectation
- (b)   Checking the product with respect to specification
- (c)   Checking the product with respect to the constraints of the project
- (d)   All of the above

54   Validation is
- (a)   Checking the product with respect to customer's expectation
- (b)   Checking the product with respect to specifications

(c)   Checking the product with respect to the constraints of the project
(d)   All of the above

55   Decision table are useful for describing situations in which:
    (a)   An action is taken under varying sets of conditions.
    (b)   Number of combinations of actions is taken under varying sets of conditions
    (c)   No action is taken under varying sets of conditions
    (d)   None of the above

56   One weakness of boundary value analysis and equivalence partitioning is
    (a)   They are not effective
    (b)   They do not explore combinations of input circumstances
    (c)   They explore combinations of input circumstances
    (d)   None of the above

57   An independent path is
    (a)   Any path through the DD path graph that introduce at least one new set of processing statements or new conditions
    (b)   Any path through the DD path graph that introduce at most one new set of processing statements or new conditions
    (c)   Any path through the DD path graph that introduce at one and only one new set of processing statements or new conditions
    (d)   None of the above

58   The overhead code required to be written for unit testing is called
    (a)   Drivers
    (b)   Stubs
    (c)   Scaffolding
    (d)   None of the above

59   Thread testing is used for testing
    (a)   Real time systems
    (b)   Object oriented systems
    (c)   Event driven systems
    (d)   All of the above

60   The final form of testing COTS software is _____ testing.
    (a)   Unit
    (b)   Integration
    (c)   Alpha
    (d)   Module
    (e)   Beta.

Ans.   (1)(c), (2)(a), (3)(d), (4)(d), (5)(a), (6)(c), (7)(b), (8)(a), (9)(c), (10)(a), (11)(a), (12)(b), (13)(a), (14)(b), (15)(c), (16)(b), (17)(b), (18)(b), (19)(d), (20)(a), (21)(d), (22)(b), (23)(c), (24)(a), (25)(d), (26)(d), (27)(c), (28)(d), (29)(b), (30)(a), (31)(b), (32)(b),

(33)(c), (34)(d), (35)(b), (36)(a), (37)(d), (38)(c), (39)(b),(40)(d), (41)(b), (42)(a), (43)(c), (44)(b), (45)(b), (46)(b), (47)(d), (48)(e), (49)(b), (50)(c), (51)(d), (51)(a), (52)(b), (53)(b), (54)(a), (55)(d), (56)(b), (57)(a), (58)(c), (59)(b), (60)(e)

(c)   Fill in the Blanks:

1   Beta testing is carried out by_____.
2   For a function of two variables ____test cases will be generated by robustness testing.
3   Worst case testing for a function of n variables generates ____test cases.
4   The decision tables in which all entries are binary are called _____decision tables.
5   Testing tools can be classified as _____and _____testing   tools.
6   The process of transforming a model into source code is known as _____
7   The process by which existing processes and methods are replaced by new techniques is known as_____
8   The maintenance initiated by defects in the software is called _____

Ans.   (1)(Users),   (2)(13),   (3)(3. 5^n),(4)(limited   entry),   (5)(dynamic/stati(c),   (6)(forward engineering), (7)(business process re-engineering), (8)(corrective maintenance)

II   Short Answer Type Questions:

1   When the role of software testing start in software life cycle? When can planning for software testing start?
2   Differentiate between validation and verification.
3   Will exhaustive testing guarantee that the program is 100% correct? Justify.
4   Why does software testing need extensive planning?
5   Who could test well, developer or independent tester? Justify your answer.
6   White Box testing is complementary to black box testing, not alternative why? Give an example to prove this statement.
7   Why does software fail after it has passes from acceptances testing? Explain.
8   Illustrate the motivation for software maintenance.
9   Differentiate between preventive and perfective maintenance.
10   What are the components of software maintenance?
11   Is software crisis related to software maintenance? Justify your answer.
12   Discuss reverse engineering and re-engineering.
13   Discuss the suggestions that may be useful for the modification of legacy code.
14   Differentiate between re-engineering and development.
15   Explain usefulness of decision table during testing.
16   What are configuration management activities? Explain.
17   Difference between alpha and beta testing.
18   Differentiate between static and dynamic testing tools.
19   Differentiate between test case, test suit and test be(d).
20   Describe what all tests are performed under system testing?
21   What are 5 SCM tasks? Define and discuss each of them briefly.

22   Write a short note on Baledy and Lehman model for the calculation of maintenance effort.
23   Define Scaffolding.
24   Why does software testing need extensive planning? Explain
25   What is reverse engineering? Discuss reverse engineering and re-engineering?
26   Discuss the problems during the software maintenance. How the maintenance cost can be reduced.
27   What is software re-engineering.
28   What is regression testing.

III   Long Answer Type Questions:

1   Explain Boundary Value Analysis method as applied to determine black box test cases.
2   Compare Functional and Glass Box testing.
3   Describe the equivalence class testing method in detail.
4   Explain the usefulness of decision table during testing. Is it really effective? Justify.
5   Discuss cause effect graphing technique with an example.
6   What are the various levels of testing? Explain.
7   Explain mutation testing in detail.
8   Explain data flow testing with the help of an example.
9   What are various debugging approaches? Discuss them with the help of examples.
10   Discuss the importance of path testing during structural testing.
11   Explain the steps of software maintenance with help of a diagram.
12   What is ripple effect? Discuss the various aspects of ripple effect and how does it affect the stability of a program?
13   Explain the Boehm's maintenance model with the help of a diagram.
14   Describe Taute maintenance model. What are various phases of this model?
15   What is reverse engineering? Discuss levels of reverse engineering.
16   What tools and techniques are available for software maintenance? Discuss any two of them.
17   What are configuration management activities? Draw the Performa of change request form.
18   Discuss various problems during maintenance. Describe some solutions to these problems.
19   How iterative enhancement model is helpful during maintenance? Explain the   various stage cycles of this model.
20   Describe various maintenance cost estimation models.
21   Write a short note on Baledy and Lehman model for calculation of maintenance effort.
22   Do you agree with the statement: "System testing can be considered a pure black-box test? Justify your answer.
23   Discuss the importance of structural testing over functional testing
24   What are the various debugging approaches? Discuss them with the help of an example.
25   Differentiate between stubs and drivers. Where are they used? Differentiate between unit and integration testing.

26   What are the various categories of Maintenance? Which category consumes maximum effort and why?

27   Consider the example of grading the students in academic institution. The grading is done according to the following rules.

Marks Obtained	Grade
75-100	Distinction
60-74	First Division
50-59	Second Division
30-49	Third Division
0-29	Fail

Generate the test cases using the equivalence class testing techniques.

28   What is the difference between the "Known Risks" and Predictable Risks" ?

29   What are the Features supported by SCM?

30   write the flow diagram of debugging?

31   what is the difference between alpha and beta testing?

IV   Practical Questions:

1   Consider a program to determine whether a number is 'odd' or 'even' and print   the Message

        NUMBER IS EVEN
            Or
        NUMBER IS ODD

The number may be any valid integer.
Design boundary value and equivalence class test cases.

2   A program reads three integer values. The three values are interpreted as representing the lengths of the sides of a triangle. The program prints a message that states whether the triangle is scalene, isosceles or equilateral. Develop a set of test cases that you feel will adequately test this program.

3   Draw the flow graph for program of largest of three numbers. Find out all independent paths that will guarantee that all statements in the program have been teste(d)

4   Let us consider an example of grading the students in an academic institution. The grading is done according to the following rules:

Marks obtained	Grade
80-100	Distinction
60-79	First division
50-59	Second division
40-49	Third division
0-39	Fail

Generate test cases using decision table testing technique.

5   Consider a program that computes grade of students. The grading is done as:

Marks obtained	Grade
80-100	A
60-79	B
50-59	C
40-49	D
0-39	E

Generate test cases using robust testing and decision table based testing.

6   Consider the program for the determination of previous date in a calendar. Its input is a triple of day, month and year with the following range

$1 \leq month \leq 12$
$1 \leq day \leq 31$
$1801 \leq year \leq 2009$

The possible outputs would be previous date or invalid date. Design boundary   value, robust and worst test cases for this program

7   Consider the following points based faculty appraisal and development system of a university:-

Points earned	University View
1-6	Work hard to improve
6-8	Satisfactory
8-10	Good
10-12	Very Good
12-15	Outstanding

Generate test cases using equivalence class testing.

8   What are limitations of boundary value analysis? Discuss the situations in which it is not effective.

9   Consider the program to find the median of three numbers. Its input is a triple of three positive integers(x,y,z) and values from interval[100,500].Generate boundary, robust and worst case test cases.

10   There are two limitations in software testing
i) Input domain is too large to test
ii)Too many paths in the program
Justify these limitations with the help of suitable examples.

11   Annual change traffic (ACT) in a software system is 25% per year. The initial development cost was 20 lacs. Total life time for software is 10 years. What is the total cost of the software system.

12   Design a black box test suite for a function that checks whether a character string (of up to 25 characters in length) is a palindrome.

13   Consider a number to divide two numbers. The input may be two valid integers(say a and b) in the range of [0,-100].Create equivalence classes and generate test cases.

14   Consider the function 'Next Date'. Given a month, day, year, NextDate returns the date of the day after. The month, date and year have intefer values subject to these conditions.
C1: 1<-month<-12
C2: 1<-day<-31
C3: 1775<-year<-2012.
Develop the robust value and equivalence class test cases.