5500+
Objective Solved Questions

Volume-9
Data Base Management System
Software Engineering
Data and Computer Networks

RSSB

RAJASTHAN STAFF SELECTION BOARD

SENIOR COMPUTER INSTRUCTOR

Subjectwise, Chapterwise Objective Solved Questions

Key Features

- **Topic-wise Bifurcation of Questions**
- Most of the Questions having Either Solution or Explanations.
- **Also Useful for IA, NIC, BCI & other Computer Exams**

National Board Helpline Number: + 91 809 444 1777

EA-Publications
ENGINEERS ACADEMY PUBLICATIONS

W www.engineersacademy.org E info@engineersacademy.org

Publisher and Distributor

Engineers Academy Publications

100-102, Ram Nagar, Bambala Puliya, Toll Tax,
Tonk Road, Pratap Nagar, Jaipur (Rajasthan)-302033
E-Mail : engineers.academy.india@gmail.com

ISBN : 978-93-93531-76-6

First Edition	:	**2023**
Second Edition	:	**2026**

Price : ₹ 580.00

DIRECTOR'S *Message*

To reach heights one must start climbing and if the journey is difficult then perseverance is the key to success. As a teacher we have realized over past years that success in any competitive exam requires hard work and proper guidance. **Engineers Academy** with its unique teaching methodologies has always proved that we meet the expectations of thousands of students and parents to make their dreams come true. With changing patterns, we have adapted ourselves to deliver the best and ensure better results.

This book has been organized and executed with a lot of care, dedication and passion for lucidity. A conscious attempt has been made to simplify the concepts to facilitate better understanding of the subject.

Engineers Academy has many successful stories of students who secured All India Rank in ESE, GATE, PSUs and JEn. Now we invite you to become a part of Engineers Academy to explore and achieve ultimate goal of your life. We promise to provide you quality guidance with competitive environment which is far advanced and ahead than the reach of other institution.

We would feel satisfied if the book meets the needs of the students for whom it is meant.

Lastly, we are thankful to all the engineers, authors whose work has been the source of enlightenment, inspiration and guidance in presenting this book.

It is hoped that the book in its new form will enjoy its ever increasing popularity.

Regards

Dr. Pankaj Goyal

Preface

This book has been written to meet the growing requirements of candidates appearing for Senior Computer Instructor and other competitive Examinations. Though every candidate has ability to succeed but competitive environment, in-depth knowledge, quality guidance, time management and good source of study is required to achieve goals.

This book includes Multiple Choice Questions (MCQ's) which works as a mock exam practice for the reader. Questions of all the subject have been organized in systematic, concepts oriented and error less manner so that it become easy and interesting for even a beginner to understand. It is a very convenient book and must be solved by candidate aiming for competitive exams.

After solving this booklet students can feel encouraged and develop confidence to attempt each and every type of numerical as well as theoretical problems. Each problems explains solving approach so that at the end, so the reader is well equipped to be able to apply any type of problem solving requirement and distinctly choose one strategy or type from the other.

We hope this book will be proved an important tool to succeed in Basic and Senior Computer Instructor and other competitive Examinations.

Even though, enough readings were given for correcting the error and printing mistakes, due to human tendency there could be some minor typos in the book. If any such typos found, they will be highly appreciated and in corporated in the next edition. Also, please provide your valuable suggestions at :engineers.academy.india@gmail.com

Wish you all the best. Have a nice reading.

Team of
Engineers Academy Publications

Contents

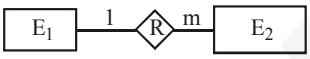
Volume 9

1 Database Management System

OBJECTIVE QUESTION

ER-Model

1. Consider the following entity relationship diagram (ERD), where two entities E_1 and E_2 have a relation R of cardinality 1:m.



The attributes of E_1 are A_{11}, A_{12} and A_{13} where A_{11} is the key attribute. The attribute of E_2 are A_{21}, A_{22} and A_{23} where A_{21} is the key attribute and A_{23} is a multi-valued attribute. Relation R does not have any attribute. A relational database containing minimum number of tables with each table satisfying the requirements of the third normal form (3NF) is designed from the above ERD. The number of tables in the database is.

(a) 2 (b) 3 (c) 5 (d) 4

2. Consider the entities 'hotel room', and 'person' with a many to many relationship 'lodging'

If we wish to store information about the rent payment to be made by person(s) occupying different hotel rooms, then this information should appear as an attribute of

(a) person (b) Hotel Room

(c) Lodging (d) None of these

3. An entity set that does not have sufficient attributes to form a primary key is a

(a) strong entity set (b) weak entity set

(c) simple entity set (d) primary entity set

4. A logical schema

(a) is the entire database.

(b) is a standard way of organizing information into accessible parts.

(c) describes how data is actually stored on disk.

(d) both (a) and (c)

5. Tree structures are used to store data in ?

(a) Network model (b) Relational model

(c) Hierarchical model (d) File based system

6. The rule that a value of a foreign key must appear as a value of some specific table is called a ?

(a) Referential constraint (b) Index

(c) Integrity constraint (d) Functional dependency

7. According to the levels of abstraction, the schema at the intermediate level is called ?

(a) View schema. (b) Physical schema.

(c) Subschema. (d) conceptual schema

8. It is an abstraction through which relationships are treated as higher level entities ?

(a) Generalization (b) Specialization

(c) Aggregation (d) Inheritance

9. What are the desirable properties of a decomposition ?

(a) Partition constraint (b) Dependency preservation

(c) Redundancy (d) Security

10. Consider the following assumptions for the relation employee (eid, ename, depth, grade, sal, age, address) and find the candidate key of the relation.

I. Each employee has unique id

II. An employee can work on one depth only

III. Employees salary depends on his age and grade

IV. Each employee has unique age and address

V. More than one employee can have the same salary or can be of same age

(a) eid only (b) eid, (age, address)

(c) (grade, age) (d) eid dept

11. Which of the following statements is True ?

(a) The Entity-Relationship data model is an example of implementation data models

(b) A conceptual schema can be defined using an E-R model

(c) E-R model is used in a phase called physical database design

(d) E-R model is used in a phase called conceptual database design

12. Match the following with most appropriate types of attributes.

List-I

P. Name of the dependent **Q.** Degree of a person

R. Telephone number **S.** Date of birth

List-II

1. Stored attribute **2.** Composite attribute

3. Multi-valued attribute **4.** Discriminator attribute

Codes :

(a) P-4, Q-3, R-2, S-1 (b) P-4, Q-2, R-3, S-1

(c) P-4, Q-1, R-2, S-3 (d) P-4, Q-1, R-3, S-2

13. The collection of information stored in a database of a particular moment is_____

(a) view (b) schema

(c) instance (d) subschema

14. The number of rows in a table is known as

(a) attribute

(b) tuple

(c) cardinality

(d) doesn't describe anything

15. Match the following

List-I

A. A database schema is

B. A data model is

C. A database instance is

D. A database extension is

List-II

1. The state of the database

2. The collection of data stored.

3. A set of concepts used to describe database

4. A description of database using a specific data model.

Codes :

(a) P-3, Q-1, R-4, S-2 (b) P-1, Q-3, R-3, S-3

(c) P-2, Q-2, R-2, S-1 (d) P-4, Q-4, R-1, S-4

16. Descriptive attributes are used to

(a) Record information about participating entities

(b) Record information about relationships

(c) Record information about data

(d) Record information about aggregation

17. A minimum cardinality of zero specifies

(a) No participation (b) Partial participation

(c) Total participation (d) Zero participation

18. The way a particular application views the data from the database that the application uses is a

(a) module (b) relational model

(c) schema (d) sub schema

19. Conceptual design

(a) is a documentation technique

(b) needs data volume and processing frequencies to determine the size of the database

(c) involves modelling independent of the DBMS

(d) is designing the relational model

20. A subschema expresses

(a) the logical view

(b) the physical view

(c) the external view

(d) all of the above

21. Which one of the following statements is false?

(a) The data dictionary is normally maintained by the database administrator.

(b) Data elements in the database can be modified by changing the data dictionary.

(c) The data dictionary contains the name and description of each data element.

(d) The data dictionary is a tool used exclusively by the database administrator.

22. An advantage of the database management approach is ?

(a) data is dependent on programs.

(b) data redundancy increases.

(c) data is integrated and can be accessed by multiple programs.

(d) none of the above.

23. Which one of the following is not true for a view:

(a) View is derived from other tables.

(b) View is a virtual table.

(c) A view definition is permanently stored as part of the database.

(d) View never contains derived columns.

24. An advantage of views is ?

(a) Data security

(b) Derived columns

(c) Hiding of complex queries

(d) All of the above

25. An abstract data type is used to:

(a) link data from remote databases

(b) prevent users from getting to database security information

(c) provide a conceptual view of the data so it is easier to understand

(d) store complex data structure to represent the properties of objects

26. Which of the following items is not the advantage of a DBMS?

(a) Improved ability to enforce standards

(b) Improved data consistency

(c) Local control over the data

(d) Minimal data redundancy

27. The property (or set of properties) that uniquely defines each row in a table is called the:

(a) identifier (b) index

(c) primary key (d) symmetric key

28. A domain is atomic if elements of the domain are considered to be _____ units.

(a) Different (b) Indivisible

(c) Constant (d) Divisible

29. Consider a business rule such as "an employee supervises" other employees.

What kind of relationship exist in the above scenario?

(a) Mandatory relationship

(b) Identifying relationship

(c) Non-identifying relationship

(d) Recursive relationship

30. A prime attribute of a relation schema R is an attribute that appears

(a) In all candidate keys of R

(b) In some candidate keys of R

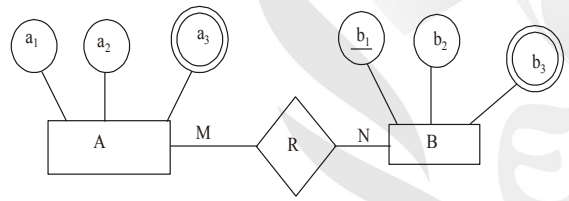
(c) In a foreign key of R

(d) Only in the primary key of R

31. Let the relation R(A, B, C, D, E, F) and candidate keys are {AB, AE}, than number of superkeys are _____.

(a) 20 (b) 21 (c) 22 (d) 24

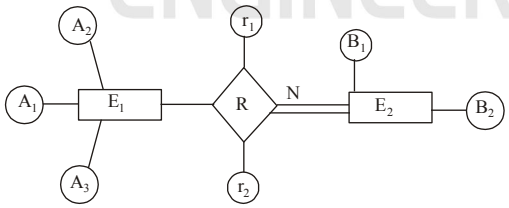
32. Conside the following E-R model :



The minimum number of relations in the relational model for the given E-R model is _____

(a) 5 (b) 6 (c) 7 (d) 8

33. In an enitity-relationship (ER) model, suppose R is one to one relationship from entity. E_1 to entity E_2 as following.



Which one of the following is true about R when relational model will be formed ?

(a) Every attribute of E_1 will be associated with E_2.

(b) Every attribute of E_2 will be associated with E_2.

(c) Only primary key of E_1 will be associated with E_2.

(d) Both primary key of E_1 and all attributes (r_1, r_2) of R will be associated with E_2.

34. All one to many (1–N) relationships in E-R model is implemented in relational model as

(a) Relation corresponding to '1' side is modified to include foreign key of the relation on the 'N' side.

(b) Relation corresponding to 'N' side is modified to include foreign key of the relation on the '1' side.

(c) Primary keys are added on both sides.

(d) Foreign keys are added on both sides.

35. It is desired to design an object-oriented employee record system for a company. Each employee has a name, unique id and salary. Employee belong to different categories and their salary is determined by their category. The functions getName, getId and computerSalary are required. Given the class hierarchy below, possible location for these functions are

(i) getId is implemented in the superclass

(ii) getId is implemented in the subclass

(iii) getName is an abstract function in the superclass

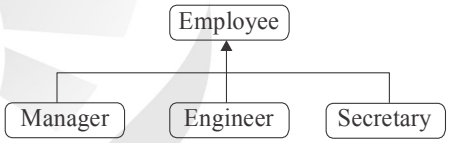
(iv) getName is implemented in the superclass

(v) getName is implemented in the subclass

(vi) getSalary is an abstract function in the superclass

(vii) getSalary is implemented in the superclass

(viii) getSalary is an implemented in the subclass



Choose the best design

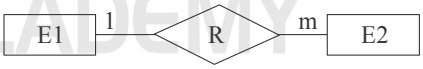
(a) (i), (iv), (vi), (viii)

(b) (i), (iv), (vii)

(c) (i), (iii), (v), (vi), (viii)

(d) (ii), (v), (viii)

36. Consider the following entity relationship diagram (ERD), where two entities E1 and E2 have a relation R of cardinality 1: m



The attributes of E1 are A11, A12 and A13 where A11 is the key attribute. The attributes of E2 are A21, A22, A23 where A21 is the key attribute and A23 is a multi-valued attribute. Relation R does not have any attribute. A relational database containing minimum number of tables with each table satisfying the requirements of the third normal from (3NF) is designed form the above ERD. The number of tables in the database is

(a) 2 (b) 3 (c) 5 (d) 4

37. Let E_1 and E_2 be two entities in an E/R diagram with simple single-valued attributes. R_1 and R_2 are two relationship between E_1 and E_2, where R_1 is one-to many and R_2 is many-to-many. R_1 and R_2 do not have any

attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?

(a) 2 (b) 3

(c) 4 (d) 4

38. The following table has two attributes A and C where A is the primary key and C is the foreign key referencing A with on-delete cascade.

A	C
2	4
3	4
4	3
5	2
7	2
9	5
6	4

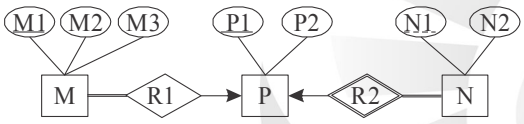
The set of all tuples that must be additionally deleted to preserve referential intergrity when the tuple (2,4) is deleted is:

(a) (3,4) and (6,4) (b) (5,2) and (7,2)

(c) (5,2) (7,2) and (9,5) (d) 1

Common Data for (Questions 39 and 40)

Consider the following ER diagram



39. The minimum number of tables needed to represent M, N, P, R1, R2 is

(a) 2 (b) 3 (c) 4 (d) 5

40. Which of the following is a correct attribute set for one of the table for the correct answer to the above question?

(a) {M1, M2, M3, P1} (b) {M1, P1, N1, N2}

(c) {M1, P1, N1} (d) {M1, P1}

41. 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

42. Consider an Entity-Relationship (ER) model in which entity sets E_1 and E_2 are connected by an m: n relationship R_{12}. E_1 and E_3 are connected by a 1: n (1 on the side of $E_1$and n on the side of E_3) relationship R_{13}.

E_1has two single-valued attributes a_{11} and a_{12} of which a_{11} is the key attribute. E_2 has two single-valued attributes a_{21} and a_{22} of which a_{21} is the key attribute. E_3 has two single-value attributes a_{31} and a_{32} of which a_{31} is the key attribute. The relationship do not have any attributes.

If a relational model is derived from the above ER model, then the minimum number of relations that would be generated if all the relations are in 3NF is

(a) 1 (b) 2 (c) 3 (d) 4

43. An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of A?

(a) Relationship R is one-to-many and the participation of A in R is total.

(b) Relationship R is one-to-many and the participation of A in R is partial.

(c) Relationship R is many-to-one and the participation of A in R is total.

(d) Relationship R is many-to-one and the participation of A in R is partial.

44. In an Entity -relationship (ER) model, suppose R is a many -to one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater that the cardinality of E2.

Which one of the following is true about R ?

(a) Every entity in E1 is associated with exactly one entity in E2.

(b) Some entity in E1 is associated with more than one entity in E2.

(c) every entity in E2 is associated with exactly one entity in E1.

(d) Every entity in E2 is associated with at most one entity in E1.

45. Which one of the following is used to represent the supporting many-one relationships of a weak entiry set in an entity-relationship diagram?

(a) Ovals that contain underlined identifiers

(b) Diamonds with double/bold border

(c) Ovals with double/bold border

(d) Rectangles with double/bold border

46. Consider the following statements S_1 and S_2 about the relational data model:

S_1: A relation scheme can have at most one foreign key.

S_2: A foreign key in a relation scheme R cannot be used to refer to tuples of R.

Which one of the following choices is correct?

(a) Both S_1 and S_2 are true

(b) S_1 is true and S_2 is false

(c) S_1 is false and S_2 is true

(d) Both S_1 and S_2 are false

47. Which one of the following NULL values can not be used in the relational model ?

(a) To fill a column in tipple when that column does not really exist for that particular tuple.

(b) To leave columns in a tuple marked as 'unknown' when the actual value is unknown.

(c) To allow duplicate tuples in the table by filling the primary key column(S) with NULL.

(d) To opt a tuple out of enforcement of a foreign key.

48. A weak entity_____.

(a) is an entity with no attributes beside its key.

(b) inherits part of its key from the 'parent' entities to which it is related.

(c) is an entity with no key.

(d) None of these.

49. In the relational Model, the number of attributes and number of tuples in a relation are termed as___and_____respectively.

(a) Cardinality, domain (b) Degree, cardinality

(c) Domain, degree (d) Cardinality, degree

50. Making a change to the conceptual schema of a database but not affecting the existing external schemas is an example of

(a) Physical data independence

(b) Logical data independence

(c) Concurrency control

(d) Integrity control

51. The data base administrator is, in effect, the coordinator between the___and the____.

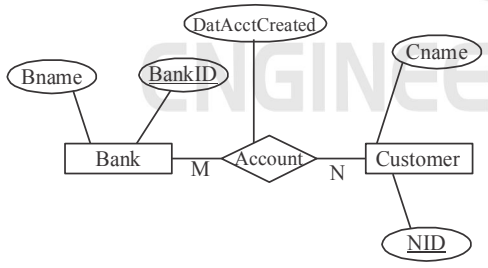
(a) DBMS, data base

(b) application program, data base

(c) data base, users

(d) application programs, users.

52. Consider the following ERD diagram illustrating the relationship of customers and banks.



Select from among the following, candidates for relations, if the above ERD is mapped in to relational model.

1. Customer (NID CName)

2. Account (DateAcctCreated, BName, CName)

3. Bank (BankID, NID, BName)

4. Bank (BankID, BName)

5. Account (BankID, NID, DateAcctCreated)

(a) 1, 2 and 4 (b) 1, 4 and 5

(c) 1, 3 and 5 (d) 1, 2 and 4

53. Choose the incorrect statements.

1. In network model, data is represented by a collection of records, and relationship among data are represented by links.

2. In hierarchical model, data and relationships among data are represented by records and links respectively.

3. In hierarchical model, the records are organized as a collection of arbitrary graphs.

4. In network model, the records are organized as a collection of trees.

(a) 1 and 3 only (b) 2 and 3 only

(c) 3 and 4 only (d) All are correct

54. Manager's salary details are hidden form the employee. This is

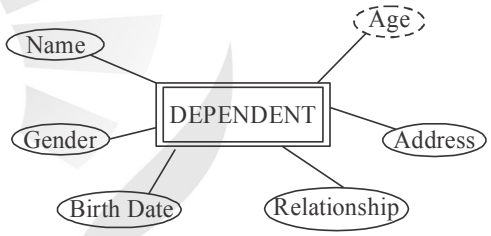
(a) conceptual level data hiding

(b) physical level data hiding

(c) external level data hiding

(d) none of the above

55. The following diagram represents the dependent entity from an Entity Relationship Diagram.



Select the characteristics which are not represented by the above diagram.

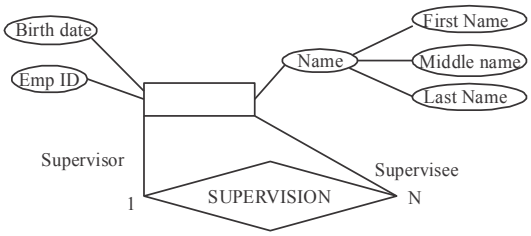
(a) Birth date is a derived attribute.

(b) Gender is an atomic attribute

(c) Address is a multivalued attribute

(d) Name is a key attribute.

56. Consider the following ERD diagram depicting the relationship of an employee and supervisor.



Which is the possible relations if the above ERD is mapped into a relational model ?

(a) Employee (EmpID, BirthDate, Salary,) Name(FirstName, Middle Name, LastName))

(b) Supervision (EmpID, BirthDate, Salary, Name(FirstName, MiddleName, Last Name) Empld).

135. Consider the sequence of operations given below on the relation

Employee (EmpNo, Name, Address, Bdate, Gender, Salary, SuperNo, DNo).

1. DEP5_EMPS $\leftarrow (\sigma_{DNo = 5}$ (Employee))
2. RESULT1_EMPS $\leftarrow \pi_{EmpNo}$(DEP5_EMPS))
3. RESULT2(EmpNo)$\leftarrow\pi_{SuperNo}$(DEP5_EMPS)
4. RESULT$\leftarrow$ RESULT1 $\cup$ RESULT2

What will the above sequence of operations performed on the given relation produce ?

(a) Emp NO of the DNo 5 who work either as an employee or a supervisor.

(b) EmpNo of the employees who work in DNo5 alongwith the employees of DNo5 who work as supervisors.

(c) Emp No of the DNo 5 employees who work as supervisor.

(d) EmpNo of the employees who either work in DNo5 or supervise an employee who works in DNo5

136. Consider the relations Branch (Branch No, Street, City) and Property (PropertyNo, Address, City). Which of the following relational algebra expression would list all cities where there is both a branch office and at least one property ?

(a) π_{city}(Branch) $\cup$ π_{city}(Property)

(b) π_{city}(Branch) $-\pi_{city}$(Property)

(c) π_{city}(Branch) $\div$ π_{city}(Property)

(d) π_{city}(Branch) $-$ (π_{city}(Branch)$-\pi_{city}$(Property))

137. Assume table R has two attributes A and B. Similarly table S has two attributes A and B. Which of the following relational algebra expressions are not equivalent to $R \cap S$?

(a) $R \bowtie S$

(b) $(R \cup S) - ((R - S) \cup (S - R))$

(c) S–(S–R)

(d) R–(S–R)

138. Find the number of tupels returned by the following query? [ρ is used to rename]

$\pi_{AD}(R \times S) - \rho_{A \leftarrow B}(\pi_{BD}(R \bowtie_{B = C} S'))$

(a) 4 (b) 5 (c) 6 (d) 7

139. Member (Mid, Name, Designation, Age)

Books (Bid, Btitle, Bauthor, Bprice))

Reserves (Mid, Bid, Date)

Which of the following option will retrieve the titles of books reserved by lecturers ?

(a) $P_{Name,Btitle}((Member \bowtie_{(Member.Mid = reserve.Mid)AND (Designation = 'Lecturer')} Reserve) \bowtie_{reds.bid = Books.bid} Books)$

(b) $P_{Name,Btitle}((Member_{(Member.Mid = reserve.Mid)AND (Designation = 'Lecturer')} Reserve) \bowtie_{reds.bid = Books.bid} Books)$

(c) $P_{Name,Btitle}((Member \bowtie_{(Member.Mid = reserve.Mid)AND(Designation = 'Lecturer')} Reserve) \bowtie_{reds.tect.bid = Books.bid} Books)$

(d) None of these

140. Let R and S be two relations with the following schema R(P Q R_1 R_2 R_3) and S(P Q S_1S_2)

Where {P,Q} is the key for both schemas. Which of the following queries are equivalent ?

I. $\Pi_P(R \bowtie S)$

II. $\Pi_P(R) \bowtie \Pi_P(S)$

III. $\Pi_P(RP,Q(R) \bowtie \Pi_{P,Q}S))$

IV. $\Pi_P(\Pi_{P,Q}(R)-(\Pi_{P,Q}(R)-\Pi_{P,Q}(S)))$

(a) Only I and II (b) Only I and III

(c) Only I, II and III (d) Only I, III and IV

141. Consider the following relations :

R_1 (ABC) and R_2 (ADE)

R_1 has 1000 records and R_2 has 2000 records. The non-Null attribute 'A' in R_2 is referencing attribute 'A' in R_1. Let X Be minimum number of records in $R_1 \bowtie R_2$ and Y be the maximum number of recodes in $R_1 \bowtie R_2$. the sum of (X + Y) is

(a) 4000 (b) 3000 (c) 2000 (d) 1000

142. Consider a join (relation alzebra) between relation r(R) with 'n' blocks with each block contain 'R_n' records and s(S) with 'm' blocks with each block contain 'R_m' records using block nested loop over nested lop join if at any time only 2 block present in main memory. Which of the followign is true ?

(a) If r(R) is outer loop then access cost is $n + n \times m$.

(b) If r(R) is outer loop then access cost is $m + R_m \times n$.

(c) If s(S) is outer loop then access cost is $n + R_n \times m$.

(d) None of the above

143. Consider the relations P(A, B) and Q(A, B) where P Has foreign key referencing Q via B and Q has foreign key referencing P via A. Which of the following is guaranteed to produce Fewer than or at most the same number of tuples as any of the other tables ?

(a) $P \bowtie \pi_B(Q)$ (b) $\pi_A(P) \bowtie Q$

(c) $P \bowtie Q$ (d) None of these

144. Consider the following relations R and S

R

A	B	C
1	2	3
4	5	6
6	7	8
7	8	9

S

B	C	D
2	3	10
2	3	11
6	7	12
7	8	10

The number of tuples in $R \bowtie\sqsubset S$ [right outer join are___.]

(a) 1 (b) 4

(c) 2 (d) 3

145. Consider a selection query : $\sigma_{A \le 15}(R)$, where R is a relation with 400 tuples. Assume that the attribute values (integers) for A among the tuples are uniformly distributed i the interval [1,25]. How many tuples would the given selection query returns ?

(a) 245 (b) 230 (c) 240 (d) 270

146. Consider the followign relation schema;

Student (Sid, Sname)

Course (Cid, Cname, Dname)

Takes (Sid, Cid, Dname)

"Find the name of all the students who have taken all the course of the department "'CS".

Which of the following will represents the above query ?

(a) {t |∃r∈ Student (r[Sid] = t[Sid]) ^ (∀ u∈ Course (u[Dname] = "CS" ⇒ ∃S∈ Takes (t [Sid] = s[Sid ∧ s[cid] = u [cid])))

(b) {t |∃r∈ Student (r[Sid] = t[Sid]) ∧ (∀ u∈ Course (u[Dname] # "CS" ∧ ∃S∈ Takes (t [Sid] = s[Sid ∧ s[cid] = u [cid])))

(c) Both (a) and (b)

(d) None of the above

147. Consider two relations R(A1, A2, A3,.....Am) and S(A1, A2, A3,...., An)where m > n. Find the number of attributes that appears in R/S.

(a) $\left\lfloor \frac{n}{m} \right\rfloor$ (b) $\left\lfloor \frac{m}{n} \right\rfloor$

(c) m – n (d) m + n

148. Assume R(A, B) and S (C, D) relations have the following instances

R

A	B
1	2
2	1
3	3

S

C	D
1	2
3	4
3	5

Find number of tuples returned by the following query (r is used to rename the attribute)

$\pi_{AD}(R \times S) - \rho_{A \leftarrow B}(\pi_{BD}(R \bowtie_{B=C} S))$

(a) 4 (b) 5

(c) 3 (d) 6

149. Consider the relation P(A, B, C), Q(C, D, E) and R (E, F) having tuples 200, 300 and 100 respectively. Estimate the number of tuples in relation P ⋈Q ⋈R.

(a) 400 (b) 100 (c) 300 (d) 200

150. Consider two relations enrolled and course as shown below

Enrolled

Sid	Cid	Fees
S1	C1	10
S1	C2	20
S2	C3	30
S3	C4	40

Course

Cid	Cname	Dept
C1	ALGO	CS
C2	DS	CS
S3	TOC	CS
S4	Thermo	ME

$\pi_{Sid..Cid}(Enrolled) / \pi_{Cid}(\sigma_{Dept = 'EE'}(Course))$.

If above relational algebra query executes over above data base table, then how many tuples are there in the result of query ?

(a) 3 (b) 4 (c) 5 (d) 6

Database Design : Functional Dependencies and Normalization

151. In a schema with attributes A, B, C, D and E following set of functional dependencies are given.

A → B

A → C

CD → E

B → D

E → A

Which of the following functional dependencies is NOT implied by the above set?

(a) CD → AC (b) BD → CD

(c) BC → CD (d) AC → BC

152. Consider a relation R with five attributes V, W, X, Y and Z. The following functional dependencies hold.

VY → W, WX → Z, and ZY → V, Which of the following is a candidate key for R?

(a) VXZ (b) VXY

(c) VWXY (d) VWXYZ

153. R(abcd) f{a→ bc, b→ cd, c→ da}. The number of candidate keys are?

(a) 1 (b) 2 (c) 3 (d) 4

154. R(abcd) f{a→b,b→c, c→a} . The number of candidate keys are?

(a) 1 (b) 2 (c) 3 (d) 4

155. R(abcd) with set of fds{ab→c, c→d, d→a}. List all candidate keys of R?

(a) ab, bc, bd (b) ab,b c,ad

(c) ab,bc,ad (d) none

156. R(abcd) f{a→b,b→c,c→d,d→a} List all candidate keys of R ?

(a) a,b,c (b) a,b,c,d (c) ab,bc,cd (d) none

157. {empno→ ename,bdate,address,deptno) {deptno→dname,mgrno} The fds which cannot be inferred (implied)

(a) {empno→dname,mgrno}

(b) {ename→deptno}

(c) {empno→dname}

(d) {ename,deptno→mgrno}

T1	T2	T3
		R(C)
	R(A)	
	W(A)	
	W(B)	
		W(A)
R(A)		
R(B)		
W(A)		
W(B)		
		W(C)

S2 is conflict serializable.

T2→ T3→ T1

S1 is conflict equivalent to S2.

(iii) Schedule S3: 2RA, 3RC, 3WA, 2WA, 3WB, 3WC, 1RA, 1RB, 1WA, 1WB.

T1	T2	T3
	R(A)	
		R(C)
		W(A)
	W(A)	
	W(B)	
R(A)		W(C)
R(B)		
W(A)		
W(B)		

S3 is not conflict serializable.

Therefore S1 and S2 are conflict cycle equivalent schedules but S3 is not equivalent to S1 and S3.

492. ***Ans. (b)***

Schedule S2

T1	T2
R[X]	
	R[X]
	R[Y]
W[X]	
	W[Y]
W[Y]	

dependency Graph 

S2 have no cycles.

Schedule S3

Tl	T2
R[X]	
W[X]	
	R[X]
W[Y]	
	R[Y]
	W[Y]

dependency graph 

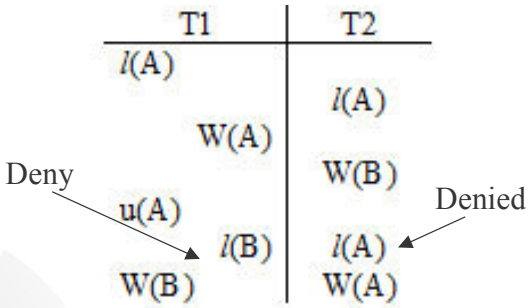
S3 also have no cycles.

So S2 & S3 are conflict-serializable.

493. ***Ans. (b)***

In 2-phase locking concurrency control protocol

It ensures the conflict serializable schedule but it may not free from deadlock. Ex.



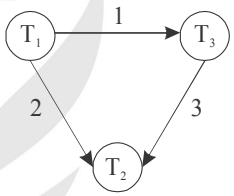
T_1 in wating

T_2 for unlock

In time stap ordering protocol it ensure conflict serializability and free from dead lock.

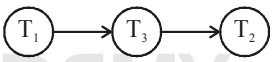
494. ***Ans. (a)***

By using the precedence graph we solve thus problem



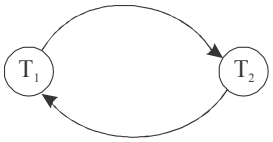
1. Read (x) in T_1 is followed by write (x) in T_2
2. Read (x) in T_1 is followed by write (x) in T_3
3. Read (y) in $T_3$is followed by write (x) in T_2

So it in clear form precedence graph



495. ***Ans. (b)***

T_1	T_2
$r_1(P)r_2(Q)$	
$r_4(Q)$	$r_2(P)$
$w_1(Q)$	$w_2(P)$



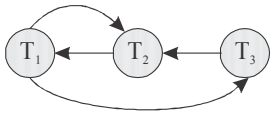
Cycle present so not conflict serializable.

496. ***Ans. (c)***

Clustered index sort the data in the table based on their key values of the column on which clustered index is created.

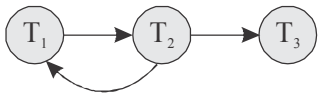
497. ***Ans. (d)***

(a) $r_1(x)$; $r_2(x)$; $w_1(x)$; $r_3(x)$; $w_2(x)$



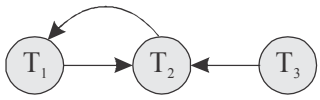
Contains cycle; Not conflict serializable

(b) $r_2(x)$; $r_1(x)$; $w_2(x)$; $r_3(x)$; $w_1(x)$



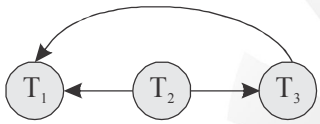
Contains cycle; Not conflict serializable

(c) $r_3(x)$; $r_2(x)$; $r_1(x)$; $w_2(x)$; $w_1(x)$



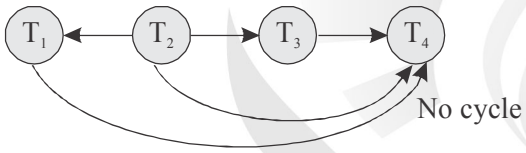
Contains cycle; Not conflict serializable

(d) $r_2(x)$; $w_2(x)$; $r_3(x)$; $r_1(x)$; $w_1(x)$



Not contains cycle; conflict serializable

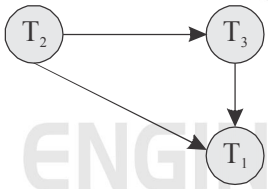
498. ***Ans. (c)***



$\therefore$ conflict serializable and it is also recoverable.

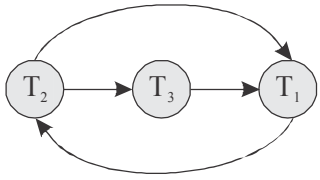
499. ***Ans. (a)***

S1: r1(X); r3(Y); r3(X); r2(Y); r2(Z); w2(Y); w2(Z); r1(Z); w1(X); w1(Z)



No cycle$\Rightarrow$ S1 is conflict serializable.

S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z); r2(Z); w3(Y); w1(X); w2(Z); w1(Z)



cycle$\Rightarrow$ S2 is not conflict serializable.

500. ***Ans. (b)***

Consistency ensures the given constraint.

501. ***Ans. (a)***

The transactions that committed before checkpoint can be ignored as their updations are retained in data base.

Those transactions that are committed after checkpoint can be repeated (REDO). The transactions that are not committed after checkpoint have to be UNDONE UNDO : T3, T1.

// T1 and T3 are not committed after checkpoint

REDO : T2 // T2 committed after checkpoint

502. ***Ans. (b)***

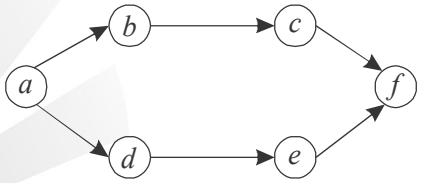
T_1 writes on A.

T_2 is performing read operation on A, and T_2 commits before T_1.

Hence it's DIRTY Read or Uncommitted Read. Hence it's non-recoverable as T_2 is committed before T_1 commit.

It can not ensure transaction atomicity.

503. ***Ans. (c)***



Number of topological order: 6

a b c d e f

a b d e c f

a d b c e f

a d b c e f

a d e b c f

a d b e c f

504. ***Ans. (d)***

ACID stands for

A: Atomicity

C: Consistency

I: Isolation

D: Durability

So, deadlock-freedoom is not the ACID property.

505. ***Ans. (a)***

2PL over object $O_1,....O_k$

Step-1: T acquires exclusive lock to $O_1,....O_k$ in increasing order of their address.

Step-2: The required operations are performed.

Step-3: All locks are released.

Because of 2PL it guarantee serializablity and objects locks in increasing order of address and all objects locks before read/write which avoids deadlock.

506. ***Ans. (a)***

For acyclic precedence graph of conflict serializable schedule equal serial schedule is topological order of acyclic precedence graph.

507. ***Ans. (c)***

No uncommitted reads so that its casecadeless rollback recoverable because T_1 $w_1(x)$ before T_1 comnmit/ Rollback T_2 $w_2(x)$.

So not strict recoverable.

T_1	T_2
	$r_2(x)$
$r_1(x)$	
	$r_2(y)$
$w_1(x)$	
$r_1(y)$	
	$w_2(x)$
a_1	
	a_2

508. ***Ans. (a)***

The algorithm is wound-wait deadlock prevention strategy, hence deadlock free. As the killed transaction restarting with same time stamp, it is starvation free.

509. ***Ans. (d)***

There is only one conflict serializable schedule as $T_1 \rightarrow T_2$, because last operation of T_1 and first operation of T_2 conflicts each other.

Number of schedules that are conflict serializable to $T_2 \rightarrow T_1$ is 53.

Proof: The operations of T_1 is _ $R_1(x)$ _ $W_1(x)$ _ $R_1(y)$ _$W_1(y)$

The first operation of T_2 that conflicts with operation of T_1 is $W_2(y)$ but not $R_2(z)$, $W_2(z)$.

The number of places where $W_2(y)$ can appear is

Case 1 : $\underline{W_2(y)}$ $R_1(x)$ $W_1(x)$ $R_1(y)$ $W_1(y)$

Case 2: $R_1(x)$ $\underline{W_2(y)}$ $W_1(x)$ $R_1(y)$ $W_1(y)$

Case 3: $R_1(x)$ $W_1(x)$ $\underline{W_2(y)}$ $R_1(y)$ $W_1(y)$

Case 1: The number of positions that $R_2(z)$ $W_2(z)$ can come before $W_2(y)$ is ${}^5C_1 + {}^5C_2 = 15$ (either both can take same space or two different spaces). $R_2(y)$ can come before $W_2(y)$ therefore one position, therefore total possible schedules are = 15 × 1 = 15.

Case 2: The number of positions that $R_2(z)$ $W_2(z)$ can come before $W_2(y)$ is ${}^4C_1 + {}^4C_2 = 10$

For each of these 10 positions $R_2(y)$ can take 2 positions before $W_2(y)$ therefore total possible schedules are 10 × 2 = 20

Case 3: The number of positions that $R_2(z)$ $W_2(z)$ can come before $W_2(y)$ is ${}^3C_1 + {}^3C_2 = 6$

For each of these 6 positions R_2 (y) can take 3 positions before $W_2(y)$ therefore total possible schedules are 6 × 3 = 18.

The total conflict serializable schedules as $T_2 \rightarrow T_1$ = 15 + 20 + 18 = 53

∴ Total conflict serializable schedules

= 1 + 53 = 54

510. ***Ans. (a)***

I. Strict 2 PL requires that al the executive mode locks taken by the transactions must be held untial it commits, so that strict 2PL schedules are cascadeless an also recoverable.

II. Time stamp ordering protocols can generate conflict serializable schedules but time stamp ordering protocol with Thomas write rule can generate view serializable schedules.

511. ***Ans. (a)***

The two schedule are said to be conflict equivalent, if all the conflict operations in both the schedule are executed in the same order.

Given schedule in question

T_1	RA			RC		WD		WB	Commit	
T_2		RB	WB		RD		WC			Commit

T_1	T_2
R(A)	
	R(B)
	W(B)
R(C)	
	R(D)
W(D)	
	W(C)
W(B)	
Commit	
	Commit

Conflict	Operation
$R(B) \rightarrow W(B)$	$T_2 \rightarrow T_1$
$W(B) \rightarrow W(B)$	$T_2 \rightarrow T_1$
$R(C) \rightarrow W(C)$	$T_1 \rightarrow T_2$
$R(D) \rightarrow W(D)$	$T_2 \rightarrow T_1$

(a)

T_1				RA	RC	WD	WB		Commit	
T_2	RB	WB	RD					WC		Commit

T_1	T_2
	R(B)
	W(B)
	R(D)
R(A)	
R(C)	
W(D)	
W(B)	
	W(C)
Commit	
	Commit

3 Computer Network

OBJECTIVE QUESTION

Physical Layer

1. Match the following groups based on layer of OSI model.

Group-1		Group-2	
(A)	Hub	1.	Physical layer
(B)	Bridge	2.	Data layer
(C)	Router	3.	Network layer
(D)	Server	4.	Application layer

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	2	3	3
(c)	2	3	3	3
(d)	1	3	3	4

2. Match the following groups

Group-1		Group-2	
(A)	Link	1.	Message
(B)	Network	2.	Segment
(C)	Application	3.	Datagram
(D)	Transport	4.	Frame

Codes:

	A	B	C	D
(a)	3	4	2	1
(b)	4	3	2	1
(c)	4	3	1	2
(d)	3	4	1	2

3. A device which connects dissimilar LANs of different topologies using different sets of communication protocols so that information can flow from one to another is called

(a) Router (b) Bridge

(c) Gateway (d) Switch

4. Which of the following device is used to connect multiple devices to a network and does not stop broadcast traffic?

(a) Switch (b) Hub

(c) Modem (d) Repeater

5. Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I		List-II	
(A)	Route Determination	1.	Data link and transport layer
(B)	Flow Control	2.	Network layer
(C)	Interface to transmission media	3.	Application layer
(D)	Access for the end user	4.	Physical layer

Codes:

	A	B	C	D
	A	**B**	**C**	**D**
(a)	1	2	3	4
(b)	1	2	4	3
(c)	2	1	3	4
(d)	2	1	4	3

6. Which of the following is not true?

(a) Ring topology of N-devices contains (N-1) dropline and N-Ring cables.

(b) Bus topology of N-devices needs 1 dropline and N-Backbone cables.

(c) Star topology of N-devices contains N+1 links and N-ports.

(d) All of these

7. Match the following:

List-I		List-II	
(A)	Protocol converter	1.	Gateway
(B)	Passive device	2.	Brouter
(C)	It is a pure electronic device with no software	3.	Router
(D)	Retransmits the data with high signal without interpreting	4.	Bridge
(E)	Pure electronic device but associated with software	5.	Switch
(F)	Active device used to connect multiple LANS with filtering and forwarding as main design criteria	6.	Repeater
(G)	Combination of bridge and router	7.	Hub

8. Consider the following statements regarding OSI model
(i) It divides the network communication into smaller and simpler components, aiding component development, design and troubleshooting.
(ii) It allows multiple-vendor development through standardization of network components.
(iii) It prevents the changes in one layer from affecting the other layers, allowing for quicker development.
(iv) It usually do not correspond exactly to the protocol stack running on an actual system.
Which of the above are true?
(a) (i) & (iv) only
(b) (ii) and (iii) only
(c) (i), (ii) & (iv) only
(d) All of these

9. The best effort delivery services such as an IP does not include
(a) error checking
(b) datagram acknowledgment
(c) error correction
(d) All of the above

10. The efficiency of Ethernet
(a) increases when propagation delay and transmission delays are low.
(b) increases when propagation delay is low and transmission delay is high.
(c) increases when propagation delay is high and transmission delay is low.
(d) increases when propagation delay and transmission delays are high.

11. Protocols are
(a) agreements on how communication components and DTE's are to communicate
(b) logical communication channels used for transferring data
(c) physical communication channels used for transferring data
(d) none of the above

12. The method of communication in which transmission takes place in both directions, but only in one direction at a time is called
(a) simplex (b) four wire circuit
(c) full duplex (d) half duplex

13. Error detection at the data link level is achieved by
(a) bit stuffing (b) cyclic redundancy codes
(c) hamming codes (d) equalization

14. Which of the following is a wrong example of a network layer?
(a) Internet Protocol (IP) - ARPANET
(b) X.25 Packet Level Protocol (PLP)-ISO
(c) Source routing and domain naming-USENET
(d) X.25 level 2-ISO

15. The topology with highest reliability is
(a) bus topology (b) star topology
(c) ring topology (d) mesh topology

16. Baud means
(a) the number of bits transmitted per unit time
(b) the number of bytes transmitted per unit time
(c) the rate at which the signal changes
(d) none of the above

17. Start and stop bits are used in serial communication for
(a) error detection
(b) error correction
(c) synchronization
(d) slowing down the communication

18. Unmodulated signal coming from a transmitter is known as
(a) carrier signal (b) baseband signal
(c) primary signal (d) none of the above

19. Manchester code is a
(a) bipolar code
(b) non return to zero code
(c) unipolar code (d) none of the above

20. Pick the incorrect statements.
(a) Another name for primary secondary protocol is master slave
(b) Peer to peer protocol provides equal status to all sites on the channel
(c) Priority, non-priority types come under master slave protocol
(d) TDM is a primary/secondary non-priority system.

21. Pick the correct statements.
(a) A switched circuit is a dial-up circuit that may encounter blockage (busy signal).
(b) Non switched leased line supports higher data volume and quality than switched lines.
(c) Non switched lines are expensive for high volume data
(d) Switched circuit provides faster response time.

22. The number of cross point needed for 10 lines in a cross point switch which is full duplex in nature and there are no self-connection is
(a) 100 (b) 45 (c) 50 (d) 90

23. The difference between a multiplexer and a statistical multiplexer is:
(a) Multiplexers use TDM (time division multiplexing), while statistical multiplexer uses FDM (frequency division multiplexing).
(b) Multiplexers often waste the output link capacity, while statistical multiplexers optimize its use.
(c) Statistical multiplexers need buffers while multiplexers of not need buffers.
(d) Multiplexers use the X.25 protocol, while statistical multiplexers use the ALOHA protocol.

24. A modem constellation diagram has data points at (0, 1) and (0, 2). What type of modulation does the modem use?
(a) Phase modulation
(b) Amplitude modulation
(c) Both (a) and (b)
(d) None of the above

25. The network topology that supports bi-directional links between each possible node is
(a) ring (b) star (c) tree (d) mesh

26. In a broad sense, a railway track is an example of
(a) simplex (b) half-duplex
(c) full-duplex (d) all of these

27. The frequency range at which the land coaxial cables will be used is
(a) 10^6 to 10^8 Hz (b) 10^{10} to 10^{11} Hz
(c) 10^3 to 10^4 Hz (d) 10^{14} to 10^{15} Hz

28. If the data rate of ring is 20 Mbps. signal propagation speed is 200 m/μs, then the number of bits that can be placed on the channel of 200 km is
(a) 2000 bits (b) 20,000 bits
(c) 1,000 bits (d) none of the above

29. ICI (interface control information) is
(a) used to transfer user data from layer to layer
(b) used to exchange information by peer entities at different sites on the network to instruct an entity to perform a service function
(c) a combination of service data unit (SDU) and protocol control information (PCI)
(d) a temporary parameter passed between N and N-1 layers to involve service functions between two layers

30. A terminal multiplexer has six 1200 bps terminals and 'n' 300 Mbps terminals connected to it. The outgoing line is 9600 bps. What is the maximum value of n?
(a) 4 (b) 16 (c) 8 (d) 28

31. What is the mean time delay T for a channel capacity of 10 Mbps with an arrival rate of 500 frames/sec and mean frame length of 1000 bits?
(a) 1000 μs (b) 2000 μs
(c) 3000 μs (d) None of these

32. Match the following:

List-1		List-2	
P.	Data Link Layer	1.	The lowest layer whose function is to activate, de-active and maintain the circuit between DTE and DCE.
Q.	Physical Layer	2.	Performs routing and communication
R.	Presentation Layer	3.	Detection and recovery from errors in transmitted data
S.	Network Layer	4.	Provides for syntax of the data.

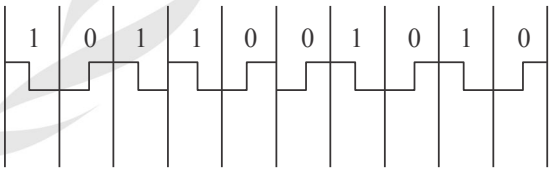
(a) P-(ii), Q-(i), R-(iv), S-(iii)
(a) P-(iii), Q-(i), R-(iv), S-(ii)
(a) P-(iv), Q-(i), R-(ii), S-(iii)
(a) P-(ii), Q-(i), R-(iii), S-(iv)

33. Which of the following statements is/are true regarding a hub?
(i) Hubs work at transport layer
(ii) Hub is aware of the source and destination address of data passing through it.
(iii) Hubs simple receive incoming packets and broadcast these packets out to all devices on the network including the one that originally sends the packet
(a) (i) and (iii) only (b) (i) and (ii) only
(c) (iii) only (d) (ii) and (iii) only

34. One of the following topology cannot be used for larger networks?
(a) 
(b) 
(c) 
(d) Both (b) and (c)

35. A subnet under mesh topology has 6 nodes where one of the line connecting two nodes whose capacity is 20 kbps and the mean packet size is 800 bits. If mean delay for that line is 91 msec. (Delay includes both queuing and service time). The mean flow in that line in terms of packets/sec is
(a) 14 (b) 12 (c) 11 (d) None of these

36. Consider the following encoding scheme of the binary bit stream.



Which one of the following is correct about the above encoding?
(a) It is normal binary encoding scheme
(b) It is differential Manchester encoding scheme
(c) It is Manchester encoding scheme
(d) None of these

37. Which one of the following statement (s) is/ are true?
S_1: The OSI model is an actual software Library that must be installed on a PC for it to connect to the internet
S_2: SNMP model is similar in natural to the OSI model
S_3: The OSI model is the only model that describes how internet based applications should work.
(a) Only S_3 (b) Only S_1 & S_3
(c) S_1, S_2, S_3 (d) None of these

38. In a TDM medium access control bus LAN, each station is assigned one time slot per cycle for transmission. Assume that the length of each time slot is the time to transmit 100 bitsplus the end-to-end propagation delay. Assume a propagation speed of 2×10^8 m/sec . The length of the LAN is 1 km with a bandwidth of 10 Mbps.

The maximum number of stations that can be allowed in the LAN so that the throughput of each station can be 2/3 Mbps is

(a) 3 (b) 5 (c) 10 (d) 20

39. What addressing system has topological significance?

(a) Logical (b) Physical

(c) Port (d) None of these

40. Match the following:

List-I	List-II
(1) Repeater	(a) Transport layer
(2) Hub	(b) Data link layer
(3) Bridge	(c) Physical layer
(4) Switch	(d) Network layer
(5) Router	(e) Application layer
(6) Transport gateway	
(7) Application gateway	

Codes:

(a) 1-b, 2-c, 3-b, 4-b, 5-b, 6-a, 7-e

(b) 1-c, 2-c, 3-b, 4-b, 5-d, 6-a, 7-e

(c) 1-c, 2-b, 3-b, 4-b, 5-d, 6-d, 7-e

(d) 1-c, 2-c, 3-b, 4-c, 5-d, 6-a, 7-a

41. _____ address on headers changes as a packet moves from one network to another.

(a) Logical

(b) Physical

(c) Logical or Physical

(d) Neither Logical nor Physical

42. The following devices are used between/across different networks.

(P) Switch (Q) Bridge

(R) Router (S) Gateway

Then devices that their operation based on logical addresses are:

(a) both [P]&[R] (b) both [Q]&[R]

(c) both [P]&[S] (d) both [R]&[S]

43. In Wireless communication which of the following is preferred

(a) Error correction (b) Error Detection

(c) Both (a) & (b) (d) None of these

44. Basic Data Transfer, Reliability, Flow Control, Multiplexing, Connections, Precedence and Security are functions of which layer.

(a) Data link layer (b) Application layer

(c) Network layer (d) Transport layer

Data Link Layer

45. Which of the following statement is FALSE?

(a) In Ethernet, each node's physical address is guaranteed to be globally unique.

(b) The single parity check can detect any odd number of bit errors in a transmitted codeword.

(c) In Ethernet, a node wishing to transmit might never be allowed to access the channel.

(d) None of these

46. Which of the following statement is incorrect?

(a) A reliable data transfer protocol may send multiple packets without waiting for acknowledgements, rather than operating in a stop and wait manner. This technique is called "pipelining.

(b) A process sends/ receives massages to/from the network through a software interface called a "Socket".

(c) Because an HTTP server maintains no information about the clients, an HTTP server said to be "Statefull"

(d) The "Traceroute" can be used to determine the number of hops to destination and the round trip time for each hop.

47. Find the link utilization in stop and wait protocol if the bandwidth of the line is 2×10^3 bps, round trip time is 40 second and the packet size is 1000 bytes.

(a) 0 (b) 5 (c) 10 (d) 15

48. Consider a token bucket with maximum rate R = 20 Mbps. Suppose we want to make sure that the maximum rate can only be sent for atmost 5 seconds at a time, and atmost 150 Mb can be sent over any 10 second window. Compute the required value for the token refresh rate (r) in Mbps.

(a) 5 (b) 10 (c) 15 (d) 20

49. Consider a link of length 1000 km with 10^9 bps rate connecting a sender and receiver. Assume a fixed packet length of 1250 bytes and sender always has packets to send. Packets are never lost or corrupted in the connection. What is the necessary window size to achieve 100% utilization for a sliding window protocol? Assume signal propagation is 5 ms per km (approximately).

(a) 100 (b) 1000

(c) 110 (d) 1100

50. Given a message "1010001101" and CRC error detecting code uses the polynomial $x^5 + x^4 + x^2 + 1$. Find the transmitted message using CRC?

(a) 101000110101011

(b) 101000110101101

(c) 101000110101110

(d) 101000110111111

662. The protocol(s) that uses a connectionless UDP.
(a) SNMP (b) POP3
(c) FTP (d) DNS

663. Which protocol is connection oriented asynchronous protocol?
(a) FTP (b) SMTP
(c) HTTP (d) DNS

664. Match the following:

1. HTTP	**i.** Uses both TCP and UDP
2. FTP	**ii.** Uses two ports for its operation
3. DNS	**iii.** MIME to deal with non ASCII data
4. SMTP	**iv.** Used to get the mail
5. POP3	**v.** TRACE method loop back request message

(a) 1-i, 2-ii, 3-iii, 4-iv, 5-v
(b) 1-i, 2-iii, 3-ii, 4-v, 5-iv
(c) 1-iv, 2-ii, 3-iii, 4-i, 5-v
(d) 1-v, 2-ii, 3-i, 4-iii, 5-iv

665. At which three layers of the OSI model does telnet primarily work:
(a) Application layer, Session layer, Transport layer.
(b) Presentation layer, Session layer, Transport layer.
(c) Datalink layer, Transport layer, Presentation layer.
(d) Presentation layer, Application layer, Session layer.

666. Which of the method allows the client to determine requirements associated with a resource, or the capabilities of a server without implying a resource action or initiating resource retrieval?
(a) POST
(b) Delete
(c) Options
(d) Trace

667. Match the following:

List 1: (Protocols)	**List2: (Port number)**
(P) DNS	(1) 23
(Q)DHCP	(2) 53
(R)IMAP	(3) 67
(S) POP3	(4) 68
	(5) 110
	(6) 143

Codes:
(a) P - 3, Q - 4, R - 5, S - 6
(b) P - 2, Q - 3, R - 5, S - 6
(c) P - 2, Q - 4, R - 6, S - 5
(d) P - l, Q - 3, R - 6, S - 5

Network Security

668. Consider a secured environment making use of symmetric key Cryptography. Every host connects every other host. Calculate the number of unique keys required (Symmetric Keys) if there are 5 hosts in the network.
(a) 10 (b) 11
(c) 12 (d) 13

669. Which of the following is the key sizes of DES and 3-DES respectively?
1. 64, 128 **2.** 56, 112
3. 56, 168
(a) Only 1 (b) Only 2
(c) Only 3 (d) Both 2 and 3

670. Symmetric encryption algorithm is same as
(a) RSA algorithm
(b) Secure Hash Algorithm
(c) Secret key encryption algorithm
(d) Public key encryption algorithm

671. Which of the following is true regarding message digest?
(a) It converts small data into large fixed-length string
(b) Given P, No one can find P such that MD(P) = MD (P) where P and P are small numbers.
(c) It is used to provide Confidentiality.
(d) None of the above

672. Which of the following attack endangers the security of Diffie Hellman method if two parties are not authenticated to each other.
(a) Man in the middle
(b) Cipher text attack
(c) Plain text attack
(d) None of these

673. Consider private key cryptosystem has 2 keys, 3 plain texts and 4 ciphertexts.
$K = \{k_1, k_2\}$
$M = \{m_1, m_2, m_3\}$
$C = \{C_1, C_2, C_3, C_4\}$
Which of the following encryption table for (K, M, C) is valid?

(a)

	m_1	m_2	m_3
k_1	c_1	c_2	c_4
k_2	c_2	c_4	c_2

(b)

	m_1	m_2	m_3
k_1	c_1	c_2	c_4
k_2	c_2	c_4	c_1

(c)

	m_1	m_2
k_1	c_1	c_3
k_2	c_2	c_4

(d)

	m_1	m_2
k_1	c_1	c_1
k_2	c_2	c_2