1. Database ________, which is the logical design of the database, and the database ________, which is a snapshot of the data in the database at a given instant in time.
   (a) Instance, Schema  
   (b) Relation, Schema  
   (c) Relation, Domain  
   (d) Schema, Instance

2. A domain is atomic if elements of the domain are considered to be ________ units.
   (a) Different  
   (b) Indivisible  
   (c) Constant  
   (d) Divisible

3. 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

4. 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

5. Which one of the following is a procedural language?
   (a) Domain relational calculus  
   (b) Tuple relational calculus  
   (c) Relational algebra  
   (d) Query language

6. Identify which of the following operation contains all pairs of tuples from the two relations, regardless of whether their attribute values match.
   (a) Join  
   (b) Cartesian product  
   (c) Intersection  
   (d) Set difference

7. The basic data type char(n) is a ________ length character string and varchar(n) is ________ length character.
   (a) Fixed, equal  
   (b) Equal, variable  
   (c) Fixed, variable  
   (d) Variable, equal

8. To remove a relation from an SQL database, we use the ________ command.
   (a) Delete  
   (b) Purge  
   (c) Remove  
   (d) Drop table
9. ________ clause is an additional filter that is applied to the result.
   (a) Select  (b) Group-by
   (c) Having  (d) Order by

10. Which of the following deletes all tuples in the instructor relation for those instructors associated with a department located in the MilleniumCenter building which is in department relation.
   (a) DELETE FROM instructor
      WHERE dept_name IN 'MilleniumCenter';
   (b) DELETE FROM department
      WHERE building='MilleniumCenter';
   (c) DELETE FROM instructor
      WHERE dept_name IN (SELECT dept_name
      FROM department
      WHERE building = 'MilleniumCenter');
   (d) None of these

11. In order to undo the work of transaction after last commit which one should be used?
   (a) View  (b) Commit
   (c) Rollback  (d) Flashback

12. To include integrity constraint in a existing relation use :
   (a) Create table  (b) Modify table
   (c) Alter table  (d) Drop table

13. An entity set that does not have sufficient attributes to form a primary key is termed a _________
   (a) Strong entity set  (b) Variant set
   (c) Weak entity set  (d) Variable set

14. In the ________ normal form, a composite attribute is converted to individual attributes.
   (a) First  (b) Second
   (c) Third  (d) Fourth

15. Empdt1(empcode, name, street, city, state,pincode).
    For any pincode, there is only one city and state. Also, for given street, city and state, there is just one pincode. In normalization terms, Empdt1 is a relation in
   (a) 1 NF only  (b) 2 NF and hence also in 1 NF
   (c) 3NF and hence also in 2NF and 1NF  (d) BCNF and hence also in 3NF, 2NF and 1NF

16. Each modification done in database transaction are first recorded into the
   (a) Hard drive  (b) Log
   (c) Disk  (d) Datamart

17. Which of the following is not a Armstrong’s Axiom?
   (a) Reflexivity rule  (b) Transitivity rule
   (c) Pseudotransitivity rule  (d) Augmentation rule

18. 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
19. Which one of the following is used to define the structure of the relation, deleting relations and relating schemas?
   (a) DML (Data Manipulation Language)           (b) DDL (Data Definition Language)
   (c) Query                                       (d) Relational Schema

20. An attribute A of datatype varchar(20) has the value “Avi”. The attribute B of datatype char(20) has value “Reed”. Here attribute A has ___________ spaces and attribute B has ___________ spaces.
   (a) 3, 20                                       (b) 20, 4
   (c) 20, 20                                      (d) 3, 4

21. ‘_ _ _’ matches any string of ___________ three characters. ‘_ _ _ %’ matches any string of at ___________ three characters.
   (a) Atleast, Exactly                           (b) Exactly, Atleast
   (c) Atleast, All                               (d) All, Exactly

22. In SQL the spaces at the end of the string are removed by ___________ function.
   (a) Upper                                       (b) String
   (c) Trim                                        (d) Lower

23. What type of join is needed when you wish to include rows that do not have matching values?
   (a) Equi-join                                    (b) Natural join
   (c) Outer join                                   (d) All of these

24. The attribute AGE is calculated from DATE_OF_BIRTH. The attribute AGE is
   (a) Single valued                                (b) Multi valued
   (c) Composite                                    (d) Derived

25. Updates that violate ___________ are disallowed.
   (a) Integrity constraints                       (b) Transaction control
   (c) Authorization                                (d) DDL constraints

26. Insert into instructor values (10211, ‘Smith’, ’Biology’, 66000);
    What type of statement is this?
   (a) DLL                                         (b) DML
   (c) Relational                                  (d) DDL

27. Fill in with correct keyword to update the instructor relation.
    UPDATE instructor ___________ salary= salary * 1.05;
   (a) Where                                        (b) Set
   (c) In                                           (d) Select

28. In relational algebra, for select operation the ___________ appear in the subscript and the ___________ argument appears in the parenthesis after the sigma.
   (a) Predicates, relation                        (b) Relation, Predicates
   (c) Operation, Predicates                      (d) Relation, Operation

29. DBMS periodically suspends all processing and synchronizes its files and journals through the use of
   (a) Checkpoint facility                         (b) Backup facility
   (c) Recovery manager                           (d) Database change log
30. Suppose relation R(A,B,C,D,E) has the following functional dependencies:

- A → B
- B → C
- BC → A
- A → D
- E → A
- D → E

Which of the following is not a key?
(a) A  (b) E
(c) B,C  (d) D

31. Which of the following is used to insert a tuple from another relation.
(a) `INSERT INTO course (courseid, title, deptname, credits)
VALUES ('CS-437', 'DATABASESystems', 'CompSci.', 4);`
(b) `INSERT INTO instructor
SELECT ID, name, deptname, 18000
FROM student
WHERE deptname = 'Music' AND totcred > 144;`
(c) `INSERT INTO course VALUES ('CS-437', 'DATABASESystems', 'CompSci.', 4);`
(d) None of these

32. Which of the following protocols ensures conflict serializability and safety from deadlocks?
(a) Two-phase locking protocol
(b) Time-stamp ordering protocol
(c) Graph based protocol
(d) None of these

33. If transaction T, gets an explicit lock on the file F, in exclusive mode, then it has an _________ on all the records belonging to that file.
(a) Explicit lock in exclusive mode
(b) Implicit lock in shared mode
(c) Explicit lock in shared mode
(d) Implicit lock in exclusive mode

34. A top to bottom relationship among the items in a database is established by a:
(a) Hierarchical Schema
(b) Relational Schema
(c) Network Schema
(d) Distributed Schema

35. The level of data abstraction which describes how the data is actually stored is:
(a) Physical level
(b) Conceptual level
(c) External level
(d) View level

36. Which layer is responsible for process to process delivery?
(a) network layer
(b) transport layer
(c) session layer
(d) data link layer

37. Which layers of the OSI model are host-to-host layers?
(a) Transport, Session, Presentation, Application
(b) Network, Transport, Session, Presentation
(c) Datalink, Network, Transport, Session
(d) Physical, Datalink, Network, Transport

38. In OSI network architecture, the routing is performed by
(a) session layer
(b) application layer
(c) Network layer
(d) Transport layer
39. Which multiplexing technique transmits digital signals?
   (a) FDM                 (b) TDM
   (c) WDM                (d) None of these

40. In ________ TDM, slots are dynamically allocated to improve bandwidth efficiency.
   (a) synchronous         (b) statistical
   (c) isochronous         (d) asynchronous

41. ASK, PSK, FSK, and QAM are examples of ________ encoding.
   (a) analog-to-digital   (b) analog-to-analog
   (c) digital-to-analog   (d) digital-to-digital

42. Phase shift keying (psk) method is used to modulate digital signals at 9600 bps using 16 levels. Find the line signaling speed (i.e., modulation rate)
   (a) 1200 bands         (b) 2400 bands
   (c) 3600 bands         (d) 4800 bands

43. How many bits are there in the Ethernet address?
   (a) 64 bits             (b) 32 bits
   (c) 16 bits             (d) 8 bits

44. FTP uses ________ parallel TCP connections to transfer a file
   (a) 1                   (b) 2
   (c) 3                   (d) 4

45. Typically the TCP port used by SMTP is
   (a) 25                  (b) 35
   (c) 50                  (d) 15

46. Connection establishment in TCP is done by which mechanism?
   (a) Flow control        (b) Three-Way Handshaking
   (c) Forwarding          (d) Synchronization

47. Which operating mode of telnet is full duplex?
   (a) default mode        (b) server mode
   (c) line mode           (d) client mode

48. Which error detection method consists of just one redundant bit per data unit?
   (a) CRC                 (b) Checksum
   (c) Simple parity check (d) Two-dimensional parity check

49. A ________ error means that two or more bits in the data unit have changed.
   (a) burst               (b) double-bit
   (c) single-bit          (d) none of these

50. Network in which every computer is capable of playing the role of client, server or both at the same time is called
   (a) peer-to-peer network (b) local area network
   (c) dedicated server network (d) wide area network

51. The ________ is the physical path over which a message travels
   (a) Path               (b) Medium
   (c) Protocol           (d) Route
52. A set of rules that governs data communication
   (a) Protocols   (b) Standards
   (c) RFCs       (d) None of these

53. When collection of various computers seems a single coherent system to its client, then it is called
   (a) computer network   (b) distributed system
   (c) networking system   (d) none of these

54. Two devices are in network if
   (a) a process in one device is able to exchange information with a process in another device
   (b) a process is running on both devices
   (c) PIDs of the processes running of different devices are same
   (d) none of these

55. Communication channel is shared by all the machines on the network in
   (a) broadcast network   (b) unicast network
   (c) multicast network   (d) none of these

56. Bluetooth is an example of
   (a) personal area network   (b) local area network
   (c) virtual private network   (d) none of these

57. A ________ is a device that forwards packets between networks by processing the routing information included in the packet.
   (a) bridge   (b) firewall
   (c) router   (d) all of these

58. A list of protocols used by a system, one protocol per layer, is called
   (a) protocol architecture   (b) protocol stack
   (c) protocol suit   (d) none of these

59. Which one of the following extends a private network across public networks?
   (a) local area network   (b) virtual private network
   (c) enterprise private network   (d) storage area network

60. The number of layers in Internet protocol stack
   (a) 5   (b) 7
   (c) 6   (d) None of these

61. Application layer is implemented in
   (a) End system   (b) NIC
   (c) Ethernet   (d) None of these

62. In the OSI model, as a data packet moves from the lower to the upper layers, headers are ________
   (a) Added   (b) Removed
   (c) Rearranged   (d) None of these

63. Identify the statement which cannot be associated with OSI model
   (a) A structured way to discuss and easier update system components
   (b) One layer may duplicate lower layer functionality
   (c) Functionality at one layer no way requires information from another layer
   (d) None of these
64. Which address identifies a process on a host?
   (a) physical address  (b) logical address
   (c) port address      (d) specific address

65. The physical layer concerns with
   (a) bit-by-bit delivery  (b) process to process delivery
   (c) application to application delivery (d) none of these

66. The physical layer provides
   (a) mechanical specifications of electrical connectors and cables
   (b) electrical specification of transmission line signal level
   (c) specification for IR over optical fiber
   (d) all of these

67. The physical layer translates logical communication requests from the _________ into hardware specific operations.
   (a) data link layer  (b) network layer
   (c) transport layer  (d) application layer

68. Wireless transmission can be done via
   (a) radio waves  (b) microwaves
   (c) infrared  (d) all of these

69. Which sublayer of the data link layer performs data link functions that depend upon the type of medium?
   (a) logical link control sublayer  (b) media access control sublayer
   (c) network interface control sublayer  (d) none of these

70. The Hamming distance between equal code words is __________.
    (a) 0  (b) 1
    (c) n  (d) 2n

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

72. 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

73. Choose an internal software quality from given below:
    (a) scalability  (b) usability
    (c) reusability  (d) reliability

74. Which one of the following is a requirement that fits in a developer’s module?
    (a) Availability  (b) Testability
    (c) Usability  (d) Flexibility
75. Coupling is a qualitative indication of the degree to which a module
   (a) can be written more compactly
   (b) focuses on just one thing
   (c) is able to complete its function in a timely manner
   (d) is connected to other modules and the outside world

76. In size oriented metrics, metrics are developed based on the __________
   (a) number of Functions
   (b) number of user inputs
   (c) number of lines of code
   (d) amount of memory usage

77. Which of the following risk is the failure of a purchased component to perform as expected?
   (a) Product risk
   (b) Project risk
   (c) Business risk
   (d) Programming risk

78. Which granularity level of testing checks the behavior of module cooperation?
   (a) Unit Testing
   (b) Integration Testing
   (c) Acceptance Testing
   (d) Regression Testing

79. If P is risk probability, L is loss, then Risk Exposure (RE) is computed as __________.
   (a) RE = P/L
   (b) RE = P + L
   (c) RE = P*L
   (d) RE = 2* P *L

80. If every requirement can be checked by a cost-effective process, then the SRS is __________.
   (a) Verifiable
   (b) Traceable
   (c) Modifiable
   (d) Complete

81. Which chart is a tool that depicts project as network diagram that is capable of graphically representing
   main events of project in both parallel and consecutive way?
   (a) PERT chart
   (b) Gantt chart
   (c) Pie Chart
   (d) Bar Chart

82. Which is the most important feature of spiral model?
   (a) Quality management
   (b) Risk management
   (c) Performance management
   (d) Efficiency management

83. The model in which the requirements are implemented by its category is __________.
   (a) Evolutionary Development Model
   (b) Waterfall Model
   (c) Prototyping
   (d) Iterative Enhancement Model

84. Identify the disadvantage of Spiral Model.
   (a) Doesn’t work well for smaller projects
   (b) High amount of risk analysis
   (c) Strong approval and documentation control
   (d) Additional Functionality can be added at a later date

85. In which test design each input is tested at both ends of its valid range and just outside its valid range?
   (a) Boundary value testing
   (b) Equivalence class partitioning
   (c) Boundary value testing AND Equivalence class partitioning
   (d) Decision tables
86. Which of the following is not defined in a good Software Requirement Specification (SRS) document?
   (a) Functional Requirement  (b) Nonfunctional Requirement
   (c) Goals of implementation  (d) Algorithm for software implementation

87. Which of the following is not a characteristic common to all design methods?
   (a) configuration management  (b) functional component
   (c) notation quality assessment  (d) guidelines refinement heuristics

88. Checking quality of software in both simulated and live environments is known as
   (a) Validity  (b) Usability
   (c) Checking  (d) Validation

89. Which may be estimated either in terms of KLOC (Kilo Line of Code) or by calculating number of
    function points in the software?
   (a) Time estimation  (b) Effort estimation
   (c) Cost estimation  (d) Software size estimation

90. Selection of a model is based on
   (a) Requirements  (b) Development team & Users
   (c) Project type and associated risk  (d) All of these

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

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

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

94. 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) i, ii, iii  (b) ii, i, iii
   (c) iii, ii, i  (d) iii, i, ii

95. Which is one of the most important stakeholder from the following?
   (a) Entry level personnel  (b) Middle level stakeholder
   (c) Managers  (d) Users of the software

96. Which is the first step in the software development life cycle?
   (a) Analysis  (b) Design
   (c) Problem/Opportunity Identification  (d) Development and Documentation
97. In Design phase, which is the primary area of concern?
   (a) Architecture  (b) Data
   (c) Interface  (d) All of these

98. Architectural Design Metrics are __________ in nature.
   (a) Black Box  (b) White Box
   (c) Gray Box  (d) Green Box

99. The amount of time that the software is available for use is known as
   (a) Reliability  (b) Usability
   (c) Efficiency  (d) Functionality

100. What are attributes of good software?
    (a) Software maintainability  (b) Software functionality
     (c) Software development  (d) Software maintainability & functionality