MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO
JUNIOR GRADE OF MIZORAM ENGINEERING SERVICE
UNDER POWER & ELECTRICITY DEPARTMENT, NOVEMBER, 2015

COMPUTER SCIENCE & ENGINEERING
PAPER - III

Time Allowed : 3 hours   Full Marks : 200

Attempt all questions.

Part A - Objective Type Questions (100 Marks)

All questions carry equal marks of 2 each.

*This Part should be answered only on the **OMR Response Sheet** provided.*

1. The tuples of the relations can be of _____ order.
    - (a) Any
    - (b) Same
    - (c) Sorted
    - (d) Constant

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

3. In SQL the statement *select * from R, S* is equivalent to
    - (a) Select * from R natural join S
    - (b) Select * from R cross join S
    - (c) Select * from R union join S
    - (d) Select * from R inner join S

4. Functional Dependencies are the types of constraints that are based on
    - (a) Key
    - (b) Key revisited
    - (c) Superset Key
    - (d) None of these

5. A query in the tuple relational calculus is expressed as
    - (a) {t | P() | t}
    - (b) {P(t) | t}
    - (c) {t | P(t)}
    - (d) All of these

6. The total participation by entities is represented in E-R diagram as
    - (a) Dashed line
    - (b) Double line
    - (c) Double rectangle
    - (d) Circle

7. A primary key combined with a foreign key creates
    - (a) Parent-Child relationship 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 these

8. If the state of the database no longer reflects a real state of the world that the database is supposed to capture, then such a state is called
   (a) Consistent state
   (b) Parallel state
   (c) Atomic state
   (d) Inconsistent state

9. The _____ scheme uses a page table containing pointers to all pages; the page table itself and all updated pages are copied to a new location.
   (a) Shadow copy
   (b) Shadow paging
   (c) Update log records
   (d) All of these

10. DML is provided for
    (a) Description of logical structure of database
    (b) Addition of new structures in the database system
    (c) Manipulation & processing of database
    (d) Definition of physical structure of database system

11. 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

12. Which of the following is the process of increasing redundancy in the database either for convenience or to improve performance?
    (a) Normalisation
    (b) Optimisation
    (c) Dependency
    (d) Denormalisation

13. Which of the following is a top-down process?
    (a) Specialisation
    (b) Categorisation
    (c) Generalisation
    (d) None of these

14. What defines how and where data are organised in physical data storage?
    (a) Internal schema
    (b) Conceptual schema
    (c) External schema
    (d) None of these

15. What is a disjoint less constraint?
    (a) It requires that an entity belongs to no more than one level entity set.
    (b) The same entity may belong to more than one level.
    (c) The database must contain an unmatched foreign key value.
    (d) An entity can be joined with another entity in the same level entity set.

16. When $R \cap S = \Phi$, then the cost of computing   is
    (a) the same as $R \times S$
    (b) greater the $R \times S$
    (c) less than $R \times S$
    (d) cannot say anything

17. A transaction is in _____ state after the final statement has been executed.
    (a) partially committed
    (b) active
    (c) committed
    (d) None of these

18. Which of the following ensures the atomicity of the transaction?
    (a) Transaction management component of DBMS
    (b) Application Programmer
    (c) Concurrency control component of DBMS
    (d) Recovery management component of DBMS

19. Wait-for graph is used for

    (a) detecting view serializability   (b) detecting conflict serializability

    (c) deadlock prevention   (d) deadlock detection

20. A single channel is shared by multiple signals by

    (a) Analog modulation   (b) Digital modulation

    (c) Multiplexing   (d) Demultiplexing

21. When 2 or more bits in a data unit has been changed during the transmission, the error is called

    (a) Burst error   (b) Random error

    (c) Bit error   (d) Inverted error

22. This topology requires multipoint connection

    (a) Bus   (b) Ring

    (c) Star   (d) Mesh

23. In computer network, nodes are

    (a) the computer that originates the data   (b) the computer that routes the data

    (c) the computer that terminates the data   (d) All of these

24. A _____ is a device that forwards packets between networks by processing the routing information included in the packet.

    (a) Bridge   (b) Router

    (c) Firewall   (d) Switch

25. In _____ transmission, the channel capacity is shared by both communicating devices at all times.

    (a) Simplex   (b) Half-duplex

    (c) Full-duplex   (d) Half-simplex

26. Frequency of failure and network recovery time after a failure are measures of the _____ of a network.

    (a) Performance   (b) Reliability

    (c) Security   (d) None of these

27. The _____ is the physical path over which a message travels.

    (a) Protocol   (b) Signal

    (c) Medium   (d) None of these

28. A TCP/IP application service that converts user-friendly names to IP addresses is

    (a) Browser   (b) Web-server

    (c) Domain name system   (d) Domain name suit

29. A computer that connect two networks is

    (a) Gateway   (b) Link

    (c) Hub   (d) None of these

30. In OSI model dialogue control and token management are responsibilities of

    (a) Session Layer   (b) Network layer

    (c) Transport layer   (d) Data link layer

31. A complex low pass signal has a bandwidth of 100kHz. What is the minimum sampling rate for this signal?

    (a) 100,000   (b) 200,000

    (c) 400,000   (d) 800,000

32. In CSMA/CD the transmission is deferred for a period of time called

    (a) Interpacket Space   (b) Interframe Space

    (c) Intermessage space   (d) Transmission delay

33. In a _____ topology, if there are n devices in a network, each device has n-1 ports for cables.

    (a) Star   (b) Bus

    (c) Mesh   (d) Ring

34. The name of the protocol which provides virtual terminal in TCP/IP model is.

    (a) SMTP   (b) Telnet

    (c) HTTP   (d) None of these

35. 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.

36. Which of the following is a project scheduling method that can be applied to software development?

    (a) PERT   (b) CMM

    (c) CPM   (d) Both (a) and (c)

37. Statement and branch coverage metrics are part of

    (a) Analysis Model   (b) Testing

    (c) Design Model   (d) Source code

38. In DFDs, user interactions with the system is denoted by

    (a) Circle   (b) Arrow

    (c) Rectangle   (d) Triangle

39. What is normally considered as an adjunct to the coding step?

    (a) Integration Testing   (b) Unit Testing

    (c) Completion of Testing   (d) Regression Testing

40. Which one is not a size measure for software product?

    (a) LOC   (b) Halstead's program length

    (c) Function Count   (d) Cyclomatic Complexity

41. The aim of software engineering is to produce software that is

    (a) Fault-free   (b) Delivered on time, Delivered within budget

    (c) Satisfies users' needs   (d) All of these

42. What would be investigated during Requirements analysis?

    (a) System performance, Test Scheduling, Organisational Structure

    (b) Languages, Platforms, Competition

    (c) System Context, User Populations, User Tasks

    (d) Verification, Formal Methods, Accuracy

43. _____ is a black box testing method

    (a) Boundary value analysis   (b) Basic path testing

    (c) Code path analysis   (d) None of these

44. In the system concepts, the 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 computer system depends on one another

    (d) Refers to the holism of systems

45. A quantitative measure of the degree to which a system, component, or process posses a given attribute

    (a) Measure   (b) Measurement

    (c) Metric   (d) None of these

46. 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) $RE = 2* P *L$

47. FP-based estimation techniques require problem decomposition based on

    (a) information domain values   (b) project schedule

    (c) software functions   (d) process activities

48. In the spiral model 'risk analysis' is performed

    (a) in the first loop   (b) in the first and second loop

    (c) before using spiral model   (d) in every loop

49. The model in which the requirements are implemented by category is

    (a) Evolutionary Development Model   (b) Waterfall Model

    (c) Prototyping   (d) Iterative Enhancement Model

50. 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

Part B - Short Answer Questions (100 Marks)

All questions carry equal marks of 5 each.

*This Part should be answered only on the **Answer Booklet** provided.*

1. What is a recoverable schedule? Give an example of a recoverable schedule.

2. Differentiate between entity integrity constraint and referential integrity constraint.

3. Explain the state diagram of a transaction.

4. Discuss about Hierarchical and Network model.

5. What do you mean by Normalization? Explain 1NF and 2NF with example.

6. Write short notes on

    i.) Two Phase Locking protocol

    ii.) Query By Example

7. Consider the following relations with key underlined

      Customer (C#, Cname, Address)

      Item (I#, Iname, Price, Weight)

      Order (O#, C#, I#, Quantity)

    Write SQL queries for the following:

    i.) Create a view called "orders" that has the total cost of every order.

    ii.) List the names of customers who have ordered at least one item priced over Rs.500.

8. What is error detection and error correction? What is the minimum no. of bits required for error detection and error correction?

9. What are the different merits of ISDN?

10. State the functions of network layer in OSI model.

11. Differentiate FDM,TDM,WDM.

12. Calculate the CRC if the data to be sent is 100100. The generating polynomial is $G(x)= x^3+x^2+1$

13. For an 8 PSK system operating at an information bit rate of 24 kbps, determine

    i.) Baud

    ii.) Minimum bandwidth

    iii.) Bandwidth efficiency

14. What are the characteristics of good software design?

15. Design a black box test suite for a function that checks whether a character string (upto 25 characters) is a palindrome.

16. Briefly discuss the activities of different phases in Waterfall model.

17. What do you mean by McCabe's Cyclomatic Complexity? What are the methods to measure the cyclomatic complexity? **(2+3=5)**

18. Define Cohesion and Coupling. Write the difference between structural design and object oriented design approach.

19. Explain throw-away prototyping and evolutionary prototyping. Discuss the differences between the two.

20. Explain the concept of bottom-up, top-down and hybrid design.

* * * * * * *