

MIZORAM PUBLIC SERVICE COMMISSION

GENERAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF PROGRAMMER UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT, JULY, 2018

TECHNICAL PAPER - II

Time Allowed : 2 hours

Full Marks : 200

All questions carry equal marks of 2 each.

Attempt all questions.

- Which of the following contains overloaded insertion operator?
(a) iostream (b) ostream
(c) fstream (d) bufferstream
- In C++, a process by which a class contains object of another class is called
(a) Nesting (b) Friend
(c) Data Abstraction (d) Encapsulation
- In a class definition in C++, the access specifier used by default is:
(a) Public (b) Private
(c) Protected (d) Structure
- How many objects can be created from an abstract class?
(a) Zero (b) One
(c) Two (d) As much as we need
- Identify which of the following statement is the technical difference between structures and classes in C++?
(a) Member function and data are by default protected in structures but private in classes.
(b) Member function and data are by default private in structures but public in classes.
(c) When deriving a structure from a class/structure, default access-specifier for a base class/structure is public. And when deriving a class, default access specifier is private.
(d) Member function and data are by default public in structures but protected in classes.
- Identify which of the following statement will be correct if the function has three arguments passed to it?
(a) The trailing argument will be the default argument.
(b) The first argument will be the default argument.
(c) The middle argument will be the default argument.
(d) All the argument will be the default argument.
- Which of the following type of data member can be shared by all instances of its class?
(a) Public (b) Inherited
(c) Static (d) Friend

8. A function prototype is used for which of the following reason:
- (a) To make a function call faster.
 - (b) To tell compiler the return type of the data, the number of arguments passed to the function and data types of the each of the passed arguments.
 - (c) To achieve run-time polymorphism.
 - (d) To utilized pointer and perform the execution of the program effectively.
9. Which of the following statements are correct for a static member function?
- (i) It can access only other static members of its class.
 - (ii) It can be called using the class name, instead of objects.
- (a) Only (i) is correct
 - (b) Only (ii) is correct
 - (c) Both (i) and (ii) are correct
 - (d) Both (i) and (ii) are incorrect
10. Copy constructor must receive its arguments by _____ .
- (a) either pass-by-value or pass-by-reference
 - (b) only pass-by-value
 - (c) only pass-by-reference
 - (d) only pass by object
11. Which of the following is used in class to basic type conversion?
- (a) Constructor
 - (b) Inline
 - (c) Pointer
 - (d) Casting operator
12. Operator overloading is desirable for _____ .
- (a) changing the precedence of inbuilt operators for user-defined classes
 - (b) making user-defined classes act more like inbuilt classes
 - (c) improving the performance of operations between inbuilt types
 - (d) None of the above
13. When a binary operator is overloaded as a non-member function, how many parameters will it require?
- (a) Binary operators can't be overloaded as global functions, only as member functions of a class.
 - (b) One, to pass the first operand. The second operand will be a member of the first.
 - (c) Two, to pass the first and second operands.
 - (d) None of the above.

14. What would result for the following code:

```
Class Test{
    public:
    ~Test() {
        cout<<"\nDestructor called"; }
};
int main() {
    Test t;
    t.~Test();
    return 0;
}
```

- (a) Compile time error
- (b) Run time error
- (c) Destructor called
- (d) None of the above

15. Identify which of the following is a legal way to access a class data member using this pointer?
(a) `this.x` (b) `*this.x`
(c) `*(this.x)` (d) `(*this).x`
16. Which of the following function can never have a body/definition:
(a) Friend (b) Abstract
(c) Inline (d) Pure virtual
17. Consider inheritance: B and C inherit from A and D inherits from B and then from C. A happens to be an abstract base class. When you make an object of type D, what would be the order of execution of a constructor:
(a) A,B,C,D (b) A,C,D,B
(c) C,D,B,A (d) D,C,B,A
18. Implementation of virtual functions implies
(a) Overloading (b) `fstream`
(c) Static binding (d) Dynamic binding
19. When we create a file by 'ifstream', then the default mode of the file is _____ .
(a) `ios :: out` (b) `ios :: in`
(c) `ios :: app` (d) `ios :: binary`
20. File is always associated with the following pointers:
(a) Fetch and place pointers (b) In and out pointers
(c) Get and put pointers (d) None of the above
21. If an end of file is reached in C++, the `eof()` function returns which of the following value.
(a) Non-zero (b) Zero
(c) Pointer pointing to beginning of file (d) None of the above
22. How many parameters are there in `getline` function?
(a) 1 (b) 2
(c) 3 (d) 4
23. In exception handling mechanism, we have to put which of the following statement inside a try block.
(a) Catch statement (b) Statement that may generate an exception.
(c) Statement that contains compile time error (d) None of the above
24. Which of the following catches exception of 'any type'?
(a) `Catch(std::exception)` (b) `Catch(std::any_exception)`
(c) `Catch (...)` (d) `Catch()`
25. `cin` stops extraction of data _____ .
(a) By seeing a blank space (b) By seeing ()
(c) Both (a) and (b) (d) None of the above
26. To implement virtual function, we need to have _____ .
(a) Pointer and `getline` (b) Pointer and inheritance
(c) Inheritance and encapsulation (d) Only pointer

27. In inheritance, which of the following statement is true?
(a) Base class pointer can point to base object as well as derived objects
(b) Derived class pointer can point to derived object as well as base object
(c) Both (a) and (b)
(d) None of the above
28. In a group of nested loops, which loop is executed the most number of times?
(a) The outermost loop
(b) The innermost loop
(c) All loops are executed the same number of times
(d) Cannot be determined without knowing the size of the loops
29. Size of an array can be allocated dynamically by using _____ .
(a) New operator (b) Create operator
(c) Assign operator (d) Sizeof operator
30. Which of the following is done by compiler for templates?
(a) Type-safe (b) Portability
(c) Code elimination (d) All of the above
31. What is meant by template parameter?
(a) It can be used to pass a type as argument (b) It can be used to evaluate a type
(c) It can of no return type (d) None of the above
32. Which of the following is used when accessing a member function through a pointer?
(a) ? (b) :
(c) -> (d) .
33. What would be the output for the program:

```
int main()
{
    int a=90;
    int b=a++;
    cout<<a<<"\t"<<b;
    return 0;
}
```

- (a) 91 90 (b) 90 90
(c) 90 91 (d) 90 92

34. What would be the output for the program:

```
int main()
{
    int a = 5, b = 6, c;
    c = (a > b) ? a : b;
    cout << c;
    return 0;
}
```

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

35. Identify from the following variable whose life time is during the entire program?
- (a) Local variable (b) Static variable
(c) Integer variable (d) Long variable
36. Which of the following schema is a high level description of the whole database?
- (a) Internal schema (b) Conceptual schema
(c) External schema (d) View schema
37. _____ is used for specifying database retrievals and updates
- (a) DDL (b) SDL
(c) VDL (d) DML
38. The capacity to change the conceptual schema without having to change external schemas is called:
- (a) Logical data independence (b) Physical data independence
(c) Multi level data independence (d) None of the above
39. Consider two attributes namely, age and birth_date. Identify which one of the attributes will be classified as derived attribute and the other as stored attribute.
- (a) Age as stored attribute and birth_date as derived attribute.
(b) Age as derived attribute and birth_date as stored attribute.
(c) Both age and birth_date as stored attribute.
(d) Both age and birth_date as derived attribute.
40. Which of the following specifies the set of values that may be assigned to each attribute for each individual entity?
- (a) Domain of attribute (b) Weak attribute
(c) Key attribute (d) Schema attribute
41. Degree of a relationship type is the number of participating _____
- (a) Intension type (b) Extension type
(c) Entity type (d) Composite type
42. With respect to its identifying relationship, a weak entity always has _____
- (a) Total participation constraint (b) Partial participation constraint
(c) Strong entity type (d) None of the above
43. For binary relationships, which of the following specifies the maximum number of relationship instances that an entity can participate in?
- (a) Role Name (b) Multi valued
(c) Identifying entity (d) Cardinality ratios
44. An entity in A is associated with at most one entity in B, and an entity in B is associated with at most one entity in A. This is called as _____
- (a) One-to-many (b) One-to-one
(c) Many-to-many (d) Many-to-one
45. 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

46. Which of the following is used to denote the selection operation in relational algebra ?
- (a) Ω (Omega) (b) σ (Sigma)
(c) π (pi) (d) Σ (Summation)
47. When performing a join operation and to get rid of the superfluous attribute in the join result, which of the following operation is used (considering the relation A and B has one attribute name in common):
- (a) $A * B$ (b) $A \times B$
(c) $A \Omega B$ (d) $A \pi B$
48. Identify the expression:
{t.Fname,t.address | Employee (t) AND ($\exists d$) (Department (d) AND d.Dnames= "Research")}
- (a) Equijoin (b) Natural join
(c) Universal quantifier (d) Existential quantifier
49. What is the result of the Delete statement in SQL:
DELETE FROM EMPLOYEE
- (a) Delete all the tuples in a relation EMPLOYEE including the table.
(b) Delete the first tuple
(c) Delete the last tuple
(d) Delete all the tuples in a relation, but the table remains in the database.
50. Which statement in SQL allows us to change the definition of a table is?
- (a) ALTER (b) UPDATE
(c) CREATE (d) SELECT
51. Consider the following schema -
LOCATIONS (subject_code, department_name, location_id, city);
Which code snippet will alter the table LOCATIONS and add a column named Address, with datatype VARCHAR2(100)?
- (a) ALTER TABLE locations ADD (address varchar2(100));
(b) ALTER TABLE locations ADD COLUMN(address varchar2(100));
(c) MODIFY TABLE locations ADD COLUMN (address varchar2(100));
(d) None of the above.
52. Which statement is used for allocating system privileges to the users?
- (a) CREATE (b) GRANT
(c) REVOKE (d) ROLE
53. Consider the following schema -
STUDENTS (student_code, first_name, last_name, email, phone_no, date_of_birth,);
Which of the following query would display all the students whose first name starts with the character 'A'?
- (a) select first_name from students where first_name like 'A%';
(b) select first_name from students where first_name like '%A';
(c) select first_name from students where first_name like '%A%';
(d) select first_name from students where first_name like 'A';

54. A view is which of the following?
- (a) A virtual table that can be accessed via SQL commands
 - (b) A virtual table that cannot be accessed via SQL commands
 - (c) A base table that can be accessed via SQL commands
 - (d) A base table that cannot be accessed via SQL commands
55. Which one of the following sorts rows in SQL?
- (a) SORT BY
 - (b) ALIGN BY
 - (c) ORDER BY
 - (d) GROUP BY
56. Identify a tuple relational calculus query from the following expressions:
- (a) $\{t \mid P() \mid t\}$
 - (b) $\{P(t) \mid t\}$
 - (c) $\{t \mid P(t)\}$
 - (d) All of the above
57. Functional Dependencies are the types of constraints that are based on _____
- (a) Key
 - (b) Key revisited
 - (c) Superset key
 - (d) None of the above.
58. Which of the following Normal Forms check that there should be no transitive dependency of a non-key attribute on the primary key?
- (a) First Normal Form
 - (b) Second Normal Form
 - (c) Third Normal Form
 - (d) Fourth Normal Form
59. Which of the following statement is true?
- (a) A relation in BCNF is always in 3NF.
 - (b) A relation in 3NF is always in BCNF
 - (c) 3NF and BCNF are exactly same
 - (d) A relation in BCNF is not in 3NF.
60. The property which ensures that each functional dependency is represented in some individual relation resulting after decomposition:
- (a) Lossless join
 - (b) Dependency preservation
 - (c) Both (a) and (b)
 - (d) None of the above
61. The lost update problem in Concurrency control occurs when:
- (a) Transaction updates a database item and then the transaction fails for some reason, then the updated item is accessed by another transaction before it changed back to its original value.
 - (b) Transaction is calculating an aggregate function while other transaction are updating.
 - (c) Two transactions that access the same database items have their operations interleaved in a way that makes the value of some database items incorrect.
 - (d) None of the above.
62. Which of the following scenarios may lead to an irrecoverable error in a database system?
- (a) A transaction reads a data item after it is written by an uncommitted transaction
 - (b) A transaction writes a data item after it is read by an uncommitted transaction
 - (c) A transaction reads a data item after it is read by an uncommitted transaction
 - (d) A transaction reads a data item after it is written by a committed transaction
63. Which one of the following is not a part of the ACID properties of database transactions?
- (a) Atomicity
 - (b) Consistency
 - (c) Isolation
 - (d) Deadlock

64. Which of the following statement is/are incorrect?
A: A schedule following strict two phase locking protocol is conflict serializable as well as recoverable.
B: Checkpoint in schedules are inserted to ensure recoverability.
- (a) Only A (b) Only B
(c) Both A and B (d) None of the above.
65. If the wait for graph contains a cycle :
- (a) then a deadlock does not exist (b) then a deadlock exists
(c) then the system is in a safe state (d) None of the above
66. Which of the following is a procedure for acquiring the necessary locks for a transaction where all necessary locks are acquired before any are released?
- (a) Record controller (b) Exclusive locking
(c) Authorization rule (d) Two phase locking
67. When transaction $TS(T_i) < TS(T_j)$, then (T_i older than T_j) T_i is allowed to wait; otherwise (T_i younger than T_j) abort T_i (T_i dies) and restart with a different timestamp (TS). This is
- (a) Wait – die (b) Wait – wound
(c) Wound – wait (d) Wait
68. Which of the following is the preferred way to recover a database after a transaction in progress terminates abnormally?
- (a) Roll forward (b) Rollback
(c) Locking (d) Switching
69. The transaction log includes which of the following?
- (a) The before-image of a record (b) The after-image of a record
(c) The before and after-image of a record (d) The essential data of the record
70. Backward recovery is which of the following?
- (a) Where the before-images are applied to the database
(b) Where the after-images are applied to the database
(c) Where the after-images and before-images are applied to the database
(d) Switching to an existing copy of the database
71. From the following phases of software life cycle, which phase consumes the maximum effort?
- (a) Design (b) Maintenance
(c) Testing (d) Coding
72. Which of the following Software life cycle model is suitable for products that are vulnerable to large number of risks?
- (a) Classical waterfall model (b) Iterative waterfall model
(c) Spiral model (d) None of the above
73. A module is said to have logical cohesion, if
- (a) It performs a set of tasks that relate to each other very loosely.
(b) All the functions of the module are executed within the same time span.
(c) All elements of the module perform similar operations, e.g. error handling, data input, data output etc.
(d) None of the above.

74. A module is said to be functionally independent of other modules when a module has
- (a) High cohesion and high coupling
 - (b) Low cohesion and low coupling
 - (c) Low cohesion and high coupling
 - (d) High cohesion and low coupling
75. Two modules are said to have stamp coupling, if
- (a) They communicate using an elementary data item
 - (b) They communicate using a composite data item
 - (c) Their code is shared.
 - (d) All of the above.
76. The most important desirable characteristics of good software design is
- (a) Correctness
 - (b) Understandability
 - (c) Efficiency
 - (d) Maintainability
77. The purpose of structured analysis is
- (a) To capture the detailed structure of the system as perceived by the user
 - (b) To define the structure of the solution directly
 - (c) To implement the structured design
 - (d) All of the above
78. The context diagram of a DFD is also known as
- (a) level 0 DFD
 - (b) level 1 DFD
 - (c) level 2 DFD
 - (d) none of the above
79. In software design phase, decomposition of a bubble should be carried on
- (a) till the atomic program instructions are reached
 - (b) upto two levels
 - (c) until a level is reached at which the function of the bubble can be collected
 - (d) described using a simple algorithm
80. The input portion in the DFD that transform input data from physical to logical form is called
- (a) central transform
 - (b) efferent branch
 - (c) afferent branch
 - (d) none of the above
81. Which of the following view captured by UML diagrams can be considered as black box model of a system?
- (a) structural view
 - (b) behavioral view
 - (c) user's view
 - (d) environmental view
82. A class diagram describes
- (a) The static structure of the system
 - (b) How the system behaves
 - (c) How an object changes its state during its lifetime
 - (d) None of the above
83. Which of the following estimation is carried out first by a project manager during project planning?
- (a) estimation of cost
 - (b) estimation of the project risk
 - (c) project staff estimation
 - (d) estimation of abatement plan

84. Sliding Window Planning involves
- (a) planning a project before development starts
 - (b) planning progressively as development proceeds
 - (c) planning a project after development starts
 - (d) none of the above
85. A project estimation technique based on making an educated guess of the project parameters (such as project size, effort required to develop the software, project duration, cost etc.) is
- (a) analytical estimation technique
 - (b) heuristic estimation technique
 - (c) empirical estimation technique
 - (d) none of the above
86. An example of single variable heuristic cost estimation model is
- (a) Halstead's software science
 - (b) basic COCOMO model
 - (c) intermediate COCOMO model
 - (d) complete COCOMO model
87. Critical path in Activity network of Software project management is
- (a) The longest path from start to finish (The maximum time required to complete the project)
 - (b) The shortest path from start to finish (The minimum time required to complete the project)
 - (c) The mean time required to complete the project
 - (d) None of the above.
88. During project scheduling, resource allocation to different activities is done using which of the following representations?
- (a) PERT chart
 - (b) activity network representation
 - (c) work breakdown structure
 - (d) Gantt chart
89. Job specialization is one of the main advantages in case of which organization structure?
- (a) project format
 - (b) function format
 - (c) Parameter format
 - (d) both of project format and function format
90. In which type of team organization a single point failure of development is susceptible?
- (a) chief programmer team structure
 - (b) democratic team structure
 - (c) mixed control team structure
 - (d) none of the above
91. The first activity in risk management is
- (a) risk containment
 - (b) risk assessment
 - (c) risk identification
 - (d) None of the above.
92. A development team's insufficient knowledge of the product being developed is one of the main factors contributing to
- (a) business risk
 - (b) project risk
 - (c) technical risk
 - (d) none of the above
93. Repeatable software development implies which of the following?
- (a) software development process is person-dependent
 - (b) software development process is person-independent
 - (c) either software development process is person-dependent or person-independent
 - (d) None of the above

94. A reverse engineering cycle during maintenance phase is required for which type of software products?
(a) well documented software products (b) well structured software products
(c) legacy software products (d) both well documented and well structured software products
95. An integration testing approach, where all the modules making up a system are integrated in a single step is known as
(a) top-down integration testing (b) bottom-up integration testing
(c) big-bang integration testing (d) mixed integration testing
96. Which of the following system testing is performed by a select group of friendly customers?
(a) Alpha (b) Beta
(c) Acceptance (d) None of the above
97. In which type of testing do we require driver and stub modules.
(a) Unit testing (b) System testing
(c) Both a and b (d) Top-down testing
98. Identify from the following debugging technique where the program is loaded with the print statements to print intermediate values with the hope that some of the printed values will help to identify the error.
(a) Backtracking (b) Brute force
(c) Cause elimination (d) None of the above
99. Improving and enhancing the functionality of the system is called as _____
(a) Corrective maintenance (b) Perfective maintenance
(c) Adaptive maintenance (d) All of the above
100. The principle of detecting errors as close to their point of introduction as possible is known as _____
(a) Phase containment of errors (b) Early detection of errors
(c) Boundary detection of errors (d) Equivalence detection of errors

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