

# MIZORAM PUBLIC SERVICE COMMISSION

## TECHNICAL COMPETITIVE EXAMINATIONS FOR JUNIOR GRADE OF MIZORAM ENGINEERING SERVICE, P&E CADRE (ELECTRICAL WING) UNDER POWER & ELECTRICITY DEPARTMENT, GOVERNMENT OF MIZORAM, JULY-2023

### COMPUTER SCIENCE AND ENGINEERING PAPER-II

Time Allowed : 3 hours

FM : 200

#### **SECTION - A (Multiple Choice questions) (100 Marks)**

*All questions carry equal mark of 2 each. Attempt all questions.*

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

1. What is the most used computer operating system?  
(a) Linux (b) Windows  
(c) Chrome OS (d) Android
2. When was the first operating system built?  
(a) 1956 (b) 1950  
(c) 1952 (d) 1960
3. Which option represents an instance of a Real Time Operating System?  
(a) MAC (b) MS-DOS  
(c) Windows 10 (d) Process Control
4. What does an operating system do  
(a) An interface that regulates hardware and software programs  
(b) A hardware device  
(c) A program that operates the hardware devices  
(d) A program that operates the software devices
5. Which key do you need to press in order to access the system boot menu?  
(a) F4 (b) F7  
(c) F8 (d) F5
6. Identify the false statement  
(a) Deleted files can be located within the recycle bin.  
(b) If the need arises, you have the ability to restore any files from the recycle bin.  
(c) To clean the recycle bin in one go, you can simply right-click and select the option to empty it.  
(d) By sending files to the recycle bin, you can free up disk space.
7. Which specific function enables the provision of a communication facility between client programs?  
(a) Monolithic kernel (b) Microkernel  
(c) Hybrid Kernels (d) Nano Kernels

8. What occurs within the context of the producer-consumer cooperation problem?
- (a) The producer and consumer operate autonomously without utilizing a buffer for their interaction.
  - (b) The consumer is responsible for adding data to the buffer, while the producer takes on the task of removing it.
  - (c) The producer is responsible for adding data to the buffer, while the consumer undertakes the task of removing it.
  - (d) The producer and consumer processes run concurrently, given a shared buffer.
9. Semaphore functions as a \_\_\_\_\_ and aids in resolving the problem of \_\_\_\_\_.
- (a) integer variable, critical section
  - (b) atomic, critical section
  - (c) integer variable, memory error
  - (d) atomic, memory error
10. Which of the following statements is TRUE when it comes to executing a process using the Shortest Job First (SJF) algorithm?
- (a) That has been waiting from long time for processor
  - (b) That needs least I/O resources
  - (c) That needs least processor
  - (d) That needs more I/O resources
11. A process executes the code
- ```
fork ();  
fork ();  
fork ();  
fork ();
```
- The total number of child processes created is
- (a) 10
  - (b) 9
  - (c) 7
  - (d) 8
12. Which of the following are the states of process model?
- (i) Running
  - (ii) Ready
  - (iii) New
  - (iv) Exit
  - (v) Destroy
- (a) i, ii, iii and v only
  - (b) i, ii, iv and v only
  - (c) i, ii, iii, and iv only
  - (d) i, ii, iii, iv and v
13. The term used to describe the duration it takes for the disk arm to reach the desired cylinder is known as the
- (a) positioning time
  - (b) random access time
  - (c) seek time
  - (d) rotational latency
14. With deadlock detection, requested resources are granted to
- (a) resources
  - (b) processes
  - (c) programs
  - (d) users
15. In FIFO page replacement algorithm, when a page must be replaced
- (a) oldest page is chosen
  - (b) newest page is chosen
  - (c) random page is chosen
  - (d) none of the mentioned
16. Segment replacement algorithms are more complex than page replacement algorithms because
- (a) Segments are better than pages
  - (b) Pages are better than segments
  - (c) Segments have variable sizes
  - (d) Segments have fixed sizes

17. Consider the following page reference string.

1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

For LRU page replacement algorithm with 5 frames, the number of page faults is?

- (a) 10
- (b) 14
- (c) 8
- (d) 11

18. Which of the following features does not belong to describe pure OOP?

- (a) Classes must be used compulsorily
- (b) Inheritance
- (c) Function Overloading
- (d) Data may or may not be declared using object

19. What is true about a class and a structure?

- (a) A class contains both variables and functions but a structure can contain variables only.
- (b) The data items inside a structure are private by default but inside a class public by default.
- (c) A class and structure are not similar at all.
- (d) None of the above

20. In C++, what is the default return value of the functions?

- (a) float
- (b) int
- (c) char
- (d) void

21. After invoking the destructor of an object

- (a) The members of that object cannot be accessed
- (b) The members of that object can be accessed only if the object is const
- (c) The members of that object can be accessed without problem
- (d) All the previous answers are incorrect

22. What will be output if you will execute following c code?

```
int main(){  
    char arr[20]="MysticRiver";  
    cout<<sizeof(arr);  
    return 0;  
}
```

- (a) 20
- (b) 11
- (c) 12
- (d) 22

23. Which of the following is not a type of constructor?

- (a) Copy constructor
- (b) Friend constructor
- (c) Default constructor
- (d) Parameterized constructor

24. Why is reusability a desirable feature?

- (a) Reduces compilation time
- (b) Decreases testing time
- (c) Lower maintenance cost
- (d) none

25. What happens when we try to compile the class definition in following code snippet?

```
Class Vehicle {};  
    class Car : protected Vehicle {};
```

- (a) It will not compile because a class cannot be protectedly inherited from other class.
- (b) It will compile successfully.
- (c) It will not compile because class body of Car is not defined.
- (d) It will not compile because class body of Vehicle is not defined.

26. What is the output of the below program?

```
#include<iostream>
using namespace std;
int main()
{
    enum {red, blue=5, GREEN};
    cout<<red<<" "<<GREEN;
}
```

- (a) 0 3 (b) 0 8  
(c) 0 6 (d) 0 2

27. Which of the following is used to return the number of characters in a string?

- (a) size() (b) length()  
(c) length (d) both (a) & (b)

28. What is the output of the following program?

```
#include <iostream>
using namespace std;
class Increment1
{
    public:
    double add(double x) {return x+0.1;}
};
class Increment2 : public Increment1
{
    public:
    int add(int x) {return x+1;}
};
int main()
{
    Increment2 i;
    cout<<i.add(20) <<" "<<i.add(20.5)<<endl;
    return 0;
}
```

- (a) Compile Time Error (b) Run Time Error  
(c) 21 21 (d) 21 20.6

29. Which of the following operator is used by catch-all handlers?

- (a) Ternary operator (b) Ellipses operator  
(c) String operator (d) Unary operator

30. The keyword static is used

- (a) With declaration inside class and with definition outside the class  
(b) With declaration inside class and not with definition outside the class  
(c) With declaration and definition wherever done  
(d) With each call to the member function

31. Predict the output?

```
#include <iostream>
using namespace std;

class Test
{
    int x;
    Test() { x = 5;}
};

int main()
{
    Test *t = new Test;
    cout << t->x;
}
```

- (a) Compiler Error
- (b) 5
- (c) Garbage value
- (d) 0

32. Predict the output of following program.

```
#include <iostream>
using namespace std;

class A
{
protected:
    int x;
public:
    A() {x = 0;}
    friend void show();
};

class B: public A
{
public:
    B() : y (0) {}
private:
    int y;
};

void show()
{
    A a;
    B b;
    cout << "The default value of A::x = " << a.x << " ";
    cout << "The default value of B::y = " << b.y;
}
```

- (a) Compiler Error in show() because x is protected in class A
- (b) Compiler Error in show() because y is private in class b
- (c) The default value of A::x = 0 The default value of B::y = 0
- (d) Compiler Dependent

33. Converting a primitive type data into its corresponding wrapper class object instance is called

- (a) Boxing
- (b) Wrapping
- (c) Instantiation
- (d) Autoboxing

34. Identify the way to create a dynamic array of pointers (to integers) of size 10 in C++?  
(a) `int *arr = new int *[10];` (b) `int **arr = new int *[10];`  
(c) `int *arr = new int [10];` (d) Not Possible
35. Among the given scientists/inventor who is known as the father of Computer Graphics?  
(a) Nikola Tesla (b) Ivan Sutherland  
(c) Ada Lovelace (d) Marie Curie
36. Given two points P (3, 2) and Q (2, 6) in the coordinate plane, find out the equation of the line passing through both points.  
(a)  $-4x + 1y = -14$  (b)  $4x - 1y = -14$   
(c)  $4x + 1y = 14$  (d)  $-4x - 1y = 14$
37. The method which counts the number of times the polygon edges turn around a particular point in the counter clockwise direction  
(a) Odd parity rule (b) Even parity rule  
(c) Odd-Even Rule (d) Non-zero winding number rule
38. A rectangular clipping window whose lower left corner is at (-2, 1) and upper right corner is at (3, 5). If line segment has end coordinates (-3, 2) and (-1, 6). What will the end coordinates of clipped line  
(a) (-2,4) to (-1.5,5) (b) (-3,2) to (-1.5,5)  
(c) (-2,4) to (-1,6) (d) (-4,3) to (1,5)
39. \_\_\_\_\_ types of translation are present in computer graphics.  
(a) 5 (b) 3  
(c) 4 (d) 6
40. A point P(5,1) is rotated by 90 degree about a pivot point (2,2). What is the coordinate of new transformed point P'?  
(a) (3,5) (b) (5,3)  
(c) (2,4) (d) (1,5)
41. In normalization transformation for window to viewport, window is lower left corner (1,1) and upper right corner at (3,5) to a view point with lower left corner at (0,0) and upper right corner at(1,1). Find out the Scaling factor (Sx, Sy)  
(a) 0.5,0.5 (b) 0.25,0.5  
(c) 0.25,0.25 (d) 0.5,0.25
42. Which of the following statements is/are not correct with reference to curve generation?  
I. Hermite curves are generated using the concepts of interpolation  
II. Bezier curves are generated using the concepts of approximation  
III. The Bezier curve lies entirely within the convex hull of its control points  
IV. The degree of Bezier curve does not depend on the number of control points  
(a) I and IV only (b) II and III only  
(c) II and III only (d) IV only
43. If we want to resize a  $1024 \times 768$  pixels image to one that is 720 pixels wide with the same aspect ratio, what would be the height of the resized image?  
(a) 420 Pixels (b) 460 Pixels  
(c) 480 Pixels (d) 540 Pixels

44. Consider raster systems with resolutions,  $2560 \times 1024$ , What size frame buffer (in Kilo bytes) is needed for each of these systems to store 32 bits per pixel?
- (a) 10240 KB (b) 5120KB  
(c) 3840 KB (d) 20480 KB
45. Which of the following is true in case of Oblique Projections?
- I. Parallel projection rays are not perpendicular to the viewing plane.  
II. Parallel lines in space appear parallel on the final projected image.  
III. Used exclusively for pictorial purposes rather than formal working drawings.  
IV. Projectors are always perpendicular to the plane of projection.
- (a) I and IV only (b) I, II and III only  
(c) II and III only (d) IV only
46. In raster scan display, a special area of memory is dedicated to graphics only. This memory area is called \_\_\_\_\_ and it hold the set of \_\_\_\_\_ value for all screen points.
- (a) Frame Buffer, Intensity (b) LUT, Canvas  
(c) Canvas, Output (d) None of the above
47. The shape of the Bezier curve is controlled by.
- (a) Control points (b) Knots  
(c) End points (d) All of the mentioned
48. Which of the following is not a synthetic entity?
- (a) Hyperbola (b) Bezier curve  
(c) B-spline curve (d) Cubic spline curve
49. Which of these is false for Boundary-fill algorithm?
- (a) Recursive algorithm (b) Begins with a starting point called seed  
(c) It checks for any pixel to be boundary color (d) Works only for rectangles and circles
50. Which of the following is a Computer Graphics Curve?
- (a) Bezier Curves (b) Implicit Curves  
(c) Explicit Curves (d) All of the above

**SECTION - B (Short answer type question) (100 Marks)**

*All questions carry equal marks of 5 each.*

*This Section should be answered only on the **Answer Sheet** provided.*

1. If an operating system possesses N resources of identical type, and these resources are shared among four processes labeled as a, b, c, and d, with respective peak demands of 3, 5, 8, and 7, then what is the value of N that would prevent the occurrence of deadlock?
2. In a uniprocessor computer system, there exist three processes that alternate between 20ms CPU bursts and 80ms I/O bursts. These processes were created around the same time, and their I/O operations can be executed concurrently. Given a Round Robin scheduling algorithm with a time quantum of 10ms, what would be the CPU utilization over an extended duration for this system?
3. Consider the scenario where disk requests arrive in the order of 82, 170, 43, 140, 24, 16, and 190, with the current head position pointing at 50, determine the total seek time using the SCAN Disk scheduling algorithm.

4. In a system containing three user processes, namely P1, P2, and P3, with resource requirements of 21 units, 31 units, and 41 units of resource R, respectively, the minimum number of units of resource R required to prevent deadlock is \_\_\_\_\_.
5. What is a thread? Why is it that threads are faster to create than processes?
6. What are the Structures used in File-System Implementation?
7. Suppose the time to service a page fault is on the average 10 milliseconds, while a memory access takes 1 microsecond. Then a 99.99% hit ratio results in average memory access time
8. Compare new and malloc().
9. How pure virtual functions are differ from virtual function?
10. What is the data type of void pointer?
11. Discuss briefly about the functions to manipulate file pointers.
12. Explain the mechanism of exception handling in object-oriented programming.
13. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
int main(int argc, char const *argv[])
{
    string str;
    cin>>str;
    cout<<str;
    return 0;
}
```
14. Write the C++ Program to Compare Two Strings using Overloading
15. Write the Digital Differential Analyzer Line generation Algorithm
16. Short notes an Functions for Segmenting the display
17. Mentioned the Characteristic of Perspective Projection
18. Explain the Types of hidden surface detection algorithms.
19. What are the advantages of B spline over Bezier curve?
20. How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280 X 1024 and a refresh rate of 60 frames per second?

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