ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

SCHOOL OF ELECTRICAL ENGINEERING AND COMPUTING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

2015 E.C. Practice Exit Examination Questions of Computer Science and Engineering Department

Date: April 17, 2023

Total Courses: Five

Total Question: 500

Information:

- In this model exam, there are five courses and 100 multiple choice questions for each of a total of 500 questions.
- Choose the Appropriate Answer for each Questions

No	Courses	Credit Hr.
1	Object Oriented Programming	3
2	Data Structure and Algorithms	3
3	Fundamentals of software Engineering	3
4	Operating System	4
5	Data Communication and Computer Networking	4

Object Oriented Programming

1. What is the implicit return type of constructor?
   A. Void
   B. Public
   C. Void
   D. Protected
2. When is the object created with a new keyword?
   A. Compile time
   B. Run time
   C. Depend o the java virtual machine
   D. none of the above
3. Which of is not the feature of oop?
   A. Data encapsulation
   B. Data abstraction
   C. Inheritance
   D. None of the above
4. Which features of OOP are extensively used in implementing inheritance?
   A. Dynamic binding
   B. Abstraction
   C. Operator overloading
   D. Polymorphism
5. Member variables are initialized to zero when the first object of its class is created?
   A. Static
   B. Local
   C. Global
   D. External
6. A static member function can be called using the ____ name.
   A. Class name
   B. Object name
   C. Constructors
   D. Main method

7. When an object is created an initialization needs to be done which is automatically done by the ____ function?
   A. Constructor
   B. Destructor
   C. Main method
   D. Member
8. Which of these is a super class of all exceptional type classes?
   A. String
   B. RuntimeExceptions
   C. Throwable
   D. Cachable
9. Which of these class is related to all the exceptions that can be caught by using catch?
   A. Error
   B. Exception
   C. RuntimeExecption
   D. All of the mentioned
10. Which of these keywords is used to generate an exception explicitly?
   A. try
   B. finally
   C. throw
   D. catch

11. What will be the output of the following program?

```
public class MyFirst {
    public static void main(String[] args) {
      MyFirst obj = new MyFirst(n);
    }
    static int a = 10;
    static int n;
    int b = 5;
    int c;
    public MyFirst(int m) {
        System.out.println(a + ", " + b + ", " + c + ", " + n + ", " + m);
```

```
 }
{
  b = 30;
  n = 20;  }
static
{  a = 60;
  }  }
```

A. 10, 5, 0, 20, 0
B. 10, 30, 20
C. 60, 5, 0, 20
D. 60, 30, 0, 20, 0

12. Which of the following tool is used to generate API documentation in HTML format from doc comments in source code?
    A. javap tool
    B. javaw command
    C. Javadoc tool
    D. javah command
13. Which option is false about the *final* keyword?
    A. A *final* method cannot be overridden in its subclasses.
    B. A *final* class cannot be extended.
    C. A *final* class cannot extend other classes.
    D. A *final* method can be inherited.
14. Which of these classes are the direct subclasses of the Throwable class?
    A. RuntimeException and Error class
    B. Exception and VirtualMachineError class
    C. Error and Exception class
    D. IOException and VirtualMachineError class

15. Which keyword is used for accessing the features of a package?
    A. package
    B. import
    C. extends
    D. export

16. Which of these access specifiers can be used for an interface?
    A. Public
    B. Protected
    C. Private
    D. All of the mentioned
17. Which of the following is the correct way of implementing an interface salary by class manager?
    A. class manager extends salary {}
    B. class manager implements salary {}
    C. class manager imports salary {}
    D. none of the mentioned
18. Which of this keyword must be used to inherit a class?
    A. Super
    B. This
    C. Extent
    D. extends
19. Package in java contents set of classes for implementing graphical user interface, which includes classes for windows, buttons, lists, menus and so on.
    A. java.util
    B. java.awt
    C. java.net
    D. java.lang
20. Which of these methods can be used to know which key is pressed?
    A. getActionEvent()
    B. getActionKey()
    C. getModifier()
    D. getKey()
21. JFrame myFrame = new JFrame (); Any command (such as the one listed above) which creates a new object of a specific class (in this case a new JFrame object called myFrame) is generally called a ...
    A. Constructor
    B. Layout manager

C. Parameterized Parameter

D. AWT

22. In Java, what do you call an area on the screen that has nice borders and various buttons along the top border?

A. Window

B. A screen

C. Border layout

D. A frame

23. Suppose you are developing a Java Swing application and want to toggle between various views of the design area. Which of the views given below are present for the users to toggle?

A. Design View

B. Requirements View

C. Source View

D. Management View

24. The size of a frame on the screen is measured in:

A. Inches

B. Nits

C. Dots

D. Pixels

25. Thread priority in Java is?

A. Integer

B. Float

C. Double

D. long

26. What is the name of the method used to start a thread execution?

A. resume();

B. run();

C. start();

D. init();

27. What is the valid range of priority of a thread in Java multi-threading?

A. 1 to 10

B. 0 to 10

C. 0 to 9

D. 1 to 9

28. Which class cannot create its instance?

A. Parent class

B. Nested class

C. Anonymous class

D. Abstract class

29. Which of these statements is incorrect?

A. Two thread in Java can have same priority

B. A thread can exist only in two states, running and blocked

C. By multitasking CPU idle time is minimized, and we can take maximum use of it

D. By multitasking CPU idle time is minimized, and we can take maximum use of it

30. Which of the following method is not used to suspend the execution of a thread?

A. sleep()

B. wait()

C. yield()

D. join()

31. Which of the following is the correct way of importing an entire package 'pkg'?

A. Import pkg.

B. Import pkg.

C. import pkg.*

D. Import pkg.*

32. Which of the following is incorrect statement about packages?

A. Interfaces are specified public if they are to be accessed by any code in the program.

B. Interfaces specifies what class must do but not how it does.

C. All variables in interface are implicitly final and static.

D. All variables are static and methods are public if interface is defined pubic.

33. Which of the following packages is used to include classes to create user interface like Button and Checkbox?

A. java.io

B. java.awt

C. java.net

D. java.lang

34. Java Source Code is compiled into _____.

A. Obj

B. Exe

C. Sourcecode

D. Bytecode

35. Which of the tool is used to compile java code?

A. Java

B. Jar

C. Javac

D. Javadoc

36. How to compile java code in command prompt?

A. java filename

B. javac filename

C. java filename.java

D. javac filename.java

37. Automatic type conversion in Java takes place when

A. Two type are compatible and size of destination type is equal of source type.

B. Two type are compatible and size of destination type is larger than source type.

C. Two type are compatible and size of destination type is shorter than source type.

D. All of the above

38. Which of these cannot be used for a variable name in Java?

A. identifier & keyword

B. Keyword

C. Identifier

D. none of the mentioned

39. Which of the following is a type of polymorphism in Java?

A. Multiple polymorphism

B. Compile time polymorphism

C. Multilevel polymorphism

D. Execution time polymorphism

40. Runtime polymorphism feature in java is

A. method overriding

B. method overloading

C. operator overloading

D. constructor overloading

41. Encapsulation concept in java is

A. method hiding

B. Hiding constructor

C. Hiding complexity

D. None of the above

42. Which of the below is invalid identifier with the main method?

A. final

B. static

C. private

D. public

43. Which system property stores installation directory of JRE?

A. user.home

B. java.home

C. user.dir

D. java.class.path

44. How to use environment properties in the class?

A. @Variable

B. @Property

C. @Autowired

D. @Environment

45. Which of these keywords is used to refer to member of base class from a sub class?

A. super

B. final

C. this

D. D. None of the mentioned

46. Inheritance relationship in Java language is

A. A. Is-A

B. Has-A

C. Association

D. None

47. What would be the result if a class extends two interfaces and both have a method with same name and signature? Let's assume that the class is not implementing that method.

A. Runtime error

B. Compile time error

C. Code runs successfully

D. First called method is executed successfully

48. Which of these packages contains abstract keyword?

A. java.lang

B. java.util

C. java.io

D. java.system

49. All classes in Java are inherited from which class?

A. java.lang.class

B. java.class.inherited

C. java.class.object

D. java.lang.Object

50. Which of these is correct way of calling a constructor having no parameters, of superclass A by subclass B?

A. super(void);

B. superclass.();

C. super.A();

D. super();

51. What is the output of the below Java program on the references of Superclass and Subclass?

```
class Food
{
void show()
{
System.out.print("FOOD ");
}
```

```
}
class Bread extends Food
{
void toast()
{
System.out.print("TOASTED ");
}
}
public class Inheritance5
{
public static void main(String[] args)
{
Food foo = new Food();
foo.show();
Food foo2 = new Bread();
foo2.show();
Bread br = new Bread();
br.toast();
br.show();
}
}
```

A. FOOD FOOD FOOD FOOD

B. FOOD FOOD TOASTED FOOD

C. FOOD TOASTED FOOD FOOD

D. Compiler error

52. What will be the output of the following Java program?

```
class A
{
int i;
}
class B extends A
```

```
{
int j;
void display()
{
super.i = j + 1;
System.out.println(j + " " + i);
}
}
class inheritance
{
public static void main(String args[])
{
B obj = new B();
obj.i=1;
obj.j=2;
obj.display();
}
}
```

A. 2 2

B. 3 3

C. 2 3

D. 3 2

Answer: C

53. What will be the output of the following Java program?

```
class A
{
public int i;
public int j;
A()
{
i = 1;
j = 2;
```

```
}
}
class B extends A
{
int a;
B()
{
super();
}
}
class super_use
{
public static void main(String args[])
{
B obj = new B();
System.out.println(obj.i + " " + obj.j)
}
}
```

A. 1 2
B. 2 1
C. Runtime Error
D. Compilation Error

54. Which of these method of class String is used to compare two String objects for their equality?
    A. equals()
    B. Equals()
    C. isequal()
    D. Isequal()
55. Java String object cannot be changed after creation as it is marked _____
    A. final
    B. Constant
    C. transient

D. volatile

56. Method are used to register a keyboard event listener.

A. KeyListener()

B. addKistener()

C. addKeyListener()

D. eventKeyboardListener()

57. Which of these methods are used to register a mouse motion listener?

A. addMouse()

B. addMouseListener()

C. addMouseMotionListner()

D. eventMouseMotionListener()

58. Which of these events is generated when a button is pressed?

A. KeyEvent

B. ActionEvent

C. WindowEvent

D. AdjustmentEvent

59. Which of these events is generated when the window is closed?

A. TextEvent

B. FocusEvent

C. MouseEvent

D. WindowEvent

60. Which method can be defined only once in a program?

A. static method

B. main method

C. finalize method

D. private method

61. The main method should be static for what reason?

A. It can be accessed easily by the class loader.

B. It can be executed without creating any instance of the class.

C. It can be accessed by every method or variable without any hindrance.

D. None of the above

62. Use this code to the answer the given questions

```
class Boo
{
Boo(String s) { }
Boo() { }
}
class Bar extends Boo
{
Bar() { }
Bar(String s) {super(s);}
void zoo()
{
// insert code here
}
}
```

which one create an anonymous inner class from within class Bar?

A. Boo f = new Bar() { };
B. Boo f = new Boo(24) { };
C. Bar f = new Boo(String s) { };
D. Boo f = new Boo.Bar(String s) { };

63. When the operators are having the same priority, they are evaluated from …….. In the order they appear in the expression.

A.) left to right
B.) right to left
C.) any of the above
D.) none of the above

64. Which one of the following is the **feature of java** that its programs will not crash because of its exception handling and memory management?

A. Distributed
B. Simple
C. Robust
D. Portable

65. Which of the following feature interacts one object with another object?

A. Message reading

B. Message passing

C. Data transfer

D. Data binding

66. Which one of the following is a types of modifier that is visible in all classes in the same package and sub class in another package?

A. Public

B. Private

C. Protected

D. default (none)

67. In inheritance, which is the most significant feature that OOP used?

A. Code efficiency

B. Code reusability

C. Code readability

D. Flexibility

68. Which one of the following does not have a body?

A. Abstract method

B. Constructor method

C. Class

D. Interface

69. Which of these access specifiers can be used for an interface?

A. Public

B. Protected

C. Private

D. default (none)

70. One of the following keywords is used by a class to use an interface?

A. extends

B. imports

C. implements

D. Uses

71. One of the following statement is not true?

A. No method bodies in Interface

B. no method body's in abstract class

C. Multiple "parent" interfaces

D. Only one "parent" class

72. Which one of the following is OOP concepts that the same method has ability to take more than one form to perform several tasks?

A. Inheritance

B. Polymorphism

C. Dynamic Binding

D. Data abstraction

73. The 'super' keyword in java is used to ___.

A. Access instance of child class

B. Access instance of the parent class

C. Access instance of friend class

D. Access instance of the same class

74. Which feature of OOPS described the reusability of code?

A. Abstraction

B. Encapsulation

C. Polymorphism

D. Inheritance

75. Which of the following is valid Identifiers in java?

A. 3hour

B. Hour3

C. Hour@wage

D. cast

76. Which one of the following is the feature of java that "*Write once, run anywhere*"?

A. Platform independent

B. Simple

C. Robust

D. Distributed

77. One of the following is false for abstract class?

A. We cannot create objects directly.

B. All abstract method must be implemented by sub classes.

C. All the method in abstract class should be abstract method.

D. We cannot declare abstract constructors.

78. Which Java method is used to convert an object to string?

A. createString()

B. object.string()

C. toString()

D. string()

79. Which of the following class is known as the generic class?

A. Final class

B. Abstract class

C. Template class

D. Anonymous class

80. Which of the following OOP concept binds the code and data together and keeps them secure from the outside world?

A. Polymorphism

B. Inheritance

C. Abstraction

D. Encapsulation

81. Which member of the superclass is never accessible to the subclass?

A. Public member

B. Protected member

C. Private member

D. Friendly member

82. Which class cannot create its instance?

A. Parent class

B. Anonymous class

C. Generic class

D. Abstract class

83. In which type of inheritance, the child or derived class inherits the features of the superclass and simultaneously this child class acts as a superclass for another derived class?

A. Hybrid inheritance

B. Multiple inheritances

C. Hierarchical inheritance

D. Multilevel inheritance

84. Consider the following strings

String str1=”ethics”

String str2=”Ethics”

What is the output of?

System.out.println (str1.compareTo (str2));

A. Any positive number

B. Any negative number

C. 0

D. Nothing

85. What is the value of A[1] after execution of the following program.

```
int[] A = {0,2,4,1,3};
for(int i = 0; i < a.length; i++){
   a[i] = a[(a[i] + 3) % a.length];
}
```

A. 1

B. 2

C. 0

D. 3

86. What are the contents of arr after the following code has been executed?

```
int [][] arr = { {3,2,1},{1,2,3} };
int value = 0;
for (int row = 1; row < arr.length; row++) {
  for (int col = 1; col < arr[0].length; col++) {
    if (arr[row][col] % 2 == 1)
    {
       arr[row][col] = arr[row][col] + 1;
    }
    if (arr[row][col] % 2 == 0)
    {
       arr[row][col] = arr[row][col] * 2;
    }
  }
```

```
}
```

A. { {6, 4, 2}, {2, 4, 6} }

B. { {3, 2, 1}, {1, 4, 6} }

C. { {3, 2, 1}, {1, 4, 8} }

D. { {4, 4, 2}, {2, 4, 4} }

E. { {3, 2, 1}, {2, 4, 4} }

87. What will be the output of the following code?

```
class Main
{
 public static void main(String args[])
        {
                char array_variable [] = new char[10];
                for (int i = 0; i < 10; ++i)
                {
                        array_variable[i] = 'i';
                        System.out.print(array_variable[i] + " ");
                }
        }
}
```

A. 1 2 3 4 5 6 7 8 9 10

B. 0 1 2 3 4 5 6 7 8 9 10

C. i j k l m n o p q r

D. i i i i i i i i i i

88. What is the output of the following code?

```
class Test extends Exception { }

class Main {
  public static void main(String args[]) {
    try {
      throw new Test();
    }
    catch(Test t) {
      System.out.println("Got the Test Exception");
    }
    finally {
      System.out.println("Inside finally block ");
    }
```

```
  }
}
```

A. Got the Test Exception Inside finally block

B. Got the Test Exception

C. Compiler Error

D. Inside finally block

89. What is the output of this program?

```
class Main
{
public static void main(String args[])
  {
   try
   {
    int i, sum;
    sum = 10;
    for (i = -1; i < 3 ;++i)
    {
     sum = (sum / i);
     System.out.print(i);
    }
   }
   catch(ArithmeticException e)
   {
    System.out.print("0");
   }
  }
}
```

A. -1

B. 0

C. -10

D. -101

90. Which of the following statements are true about finalize() method?

A. It can be called Zero or one times.

B. It can be called Zero or more times.

C. It can be called exactly onces.

D. It can be called one or more times.

91. What will be output for the following code? Note: file is made in c drive

```
import java.io.*;
   class files
   {
      public static void main(String args[])
      {
         File obj = new File(""/java/system"");
         System.out.print(obj.canWrite());
         System.out.print("" "" + obj.canRead());
      }
}
```

A. true false

B. false true

C. true true

D. false false

92. What will be the output of the following code?

```
import java.io.*;
class files
{
   public static void main(String args[])
   {
      File obj = new File(""/java/system"");
      System.out.print(obj.getName());
   }
}
```

A. java

B. system

C. java/system

D. /java/system

93. Which method is used to write a byte to the current output stream?

A. public void flush()throws IOException

B. public void close()throws IOException

C. public void write(int)throws IOException

D. public void write(byte[])throws IOException

94. Which of these class is used to read from a file?

A. FileInputStream

B. InputStream

C. BufferedInputStream

D. BufferedFileInputStream

95. What is the priority of the thread in the following Java Program?

```
class newthread extends Thread
{
Thread t;
String name;
newthread(String threadname)
{
name = threadname;
t = new Thread(this,name);
t.start();
}
public void run()
{ }
}
class multithreaded_programing
{
public static void main(String args[])
{
newthread obj1 = new newthread("one");
newthread obj2 = new newthread("two");
try {
obj1.t.wait();
System.out.print(obj1.t.isAlive());
}
catch(Exception e)
{
System.out.print("Main thread interrupted");
}
}
}
```

A. True

B. False

C. Main thread interrupted

D. None of the mentioned

96. What is an event in delegation event model used by Java programming language?

A. An event is a class used for defining object, to create events

B. An event is an object that describes a state change in a source

C. An event is an object that describes a state change in processing

D. An event is an object that describes any change by the user and system

97. Assume the following method is properly synchronized and called from a thread A on an object B: wait(2000); After calling this method, when will the thread A become a candidate to get another turn at the CPU?

A. Two seconds after thread A is notified

B. Two seconds after lock B is released

C. After thread A is notified or after two seconds.

D. After the lock on B is released or after two seconds.

98. Which one of the following is incorrect?

A. start() method is used to begin execution of the thread

B. A thread can be formed by a class that extends thread class

C. A thread can be formed by implementing Runnable interface only

D. run() method is used to begin execution of a thread before start() method in special case

99. Which one of the following statement incorrect?

A. String objects are immutable, they cannot be changed

B. StringBuffer class is used to store string in a buffer for later use

C. String object can point to some other reference of String variable

D. None of the mentioned

100. Which one of the following statement incorrect?

A. replace() method replaces all the characters in invoking string with another character.

B. replace() method replaces all occurrences of one character in invoking string with another character.

C. replace() method replaces only first occurances of a character in invoking string with another character.

D. replace() replace() method replaces last occurrence of a character in invoking string with another character.

Data Structure and Algorithms

1. Algorithm Analysis is a theoretical study of computer-program performance and resource usage. Which of the following is/are more important than performance.

   A. Correctness
   B. Maintainability
   C. Functionality
   D. All

2. You are sorting the following array in ascending order using Insertion Sort.

6	2	7	1	3

What will be the content of the the array after 3rd iteration?

A.

6		2	7	1	3

B.

1	2	6	7	3

C.

1	2	3	6	7

D.

2	3	1	6	7

3. The worst-case running time of **binary search** is_____.

   A. O(n)
   B. O(log n)
   C. O(n log n)
   D. None of the above

4. Suppose that an algorithm has time complexity $T(n) = n^2$, and that executing an implementation of it on a particular machine takes *t* seconds for *n* inputs. Now suppose that we are presented with a machine that is 64 times as fast. How many inputs could we process on the new machine in *t* seconds?

   A. 8n
   B. n^2
   C. 2n
   D. n^4

5. How many binary trees are possible with three nodes?

   A. 8

B. 12

C. 16

D. 24

6. Which of the following statement holds true about abstract data types?

A. It specifies the operations on specific data type

B. It specifies the implementations of specific data type

C. It specifies the properties of specific data type

D. A and C

7. Type of data structure in which elements are arranged hierarchically not sequentially is called _____.

A. Linear data structure

B. List data structure

C. Non-linear data structure

D. Array

8. To be an algorithm one should fulfil the following except ____.

A. Must be finite

B. Must be Effective

C. Must be correct

D. Must have one or more input.

9. Which of the following recursion cannot be solved using Master's theorem.

A. T(n)=3T(n/2) + n2

B. T(n)=log8 T(n/4) +n

C. T(n)=2n T(n) + 3n2

D. T(n)= T(n) + n3

10. What is the output if we put the following functions by increasing order of growth/complexity : $nlogn,\ n^{logn},\ (logn)^n,\ 2^{logn/2},\ n^2$

A. $(\log n)^n$, $n^{\log n}$, $2^{\log n/2}$, $n \log n$, n^2

B. $n \log n$, n^2, $n^{\log n}$, $2^{\log n/2}$, $(\log n)^n$

C. n^2, $2^{\log n/2}$, $n^{\log n}$, $(\log n)^n$, $n \log n$

D. none

11. The solution for the following recurrence is

$$T(n)= 16T(n/4) + n^3$$

A. $O(n^2)$

B. $O(n^3)$

C. O(n)

D. O(n!)

12. Which one of the following shows two main measures for the efficiency of an algorithm?

A. Processor and memory

B. Complexity and capacity

C. Time and space

D. Data and space

13. In a worst case scenario, the complexity of linear search algorithm is

A. O(n)

B. O(log n)

C. $O(n^2)$

D. O(n log n)

14. Which of the following statement is not correct.

A. if $f(n)=\theta(g(n))$ and $g(n)=\theta(h(n))$, then $f(n)=\theta(h(n))$

B. $f(n)=\theta(g(n))$ if and only if $g(n)=\theta(f(n))$

C. $f(n)=O(g(n))$ if and only if $g(n)=\Omega(f(n))$

D. if $f(n)= O(g(n))$ and $g(n)=O(h(n))$, then $h(n) \neq \Omega(f(n))$

15. If $f(n)=\Omega(g(n))$ and $g(n)= \Omega(h(n))$ then $h(n)=\Omega (f(n))$.

A. True

B. False

16. Suppose that an algorithm has time complexity $T(n) = n^2$, and that executing an implementation of it on a particular machine takes t seconds for n inputs. Now suppose that we are presented with another machine that is 100 times as fast. How many inputs could we process on the new machine in t seconds?

A. n^2

B. 10 n

C. n^{100}

D. none

17. What will be the equivalent asymptotic notation for the following function

$$T(n)= n(n^2+n^3)^2$$

A. A.O(n)

B. B.$O(n^2)$

C. C.$O(n^6)$

D. D.$O(n^3)$

18. For which of the following functions can $O(n^2)$ be an equivalent asymptotic notation?
    A. $T(n)= (n^4 + n^2 + \log n)^{1/2}$
    B. $T(n)= n/4(n^2+n^3)^2$
    C. $T(n)= 16T(n/4) + n^3$
    D. $T(n)= 32T(n) + n!$
19. Given: Function "maximum( )" takes $\boldsymbol{n^2}$ time do its task and function "calculate( )" takes $\boldsymbol{log\ n}$ time. Find the running time function of the following code segment and what is the running time in Big-Oh?

```
for (i=0; i<n; i++) {
        for (j=0; j<n; j++) {
            A[j] = maximum(n);
             }
         calculate(A, n);
}
```

    A. $O(n^2 + \log n)$
    B. $O(n^4)$
    C. $O(n^3 \log n)$
    D. $O(n^4 \log n)$
20. Stack is used for
    A. CPU Resource Allocation
    B. Breadth First Traversal
    C. Recursion
    D. None of the above
21. How many swaps are required to sort the given array using bubble sort - { 2, 5, 1, 3, 4}
    A. 4
    B. 5
    C. 6
    D. 7
22. If queue is implemented using arrays, what would be the worst run time complexity of queue and dequeue operations?
    A. O(n), O(n)
    B. O(n), O(1)
    C. O(1), O(1)
    D. O(1), O(n)
23. Which data structure allows deleting data elements from front and inserting at rear?

A. Stacks
B. Queues
C. Deques
D. Binary search tree

24. Which of the following data structure is non-linear type?
A. Strings
B. Lists
C. Stacks
D. None of the above

25. To represent hierarchical relationship between elements, which structure is suitable?
A. Dequeue
B. Tree
C. Priority
D. All of the above

26. Which of the following sorting algorithm is of divide- and- conquer type?
A. Bubble sort
B. Insertion sort
C. Quick sort
D. All of the above

27. The amount of memory needs to run to completion is known as _____.
A. Worst case
B. Best case
C. Time complexity
D. Space complexity

28. ____is a diagram that depicts the flow of a program.
A. Graph
B. Flow chart
C. Symbols
D. Algorithm

29. Which of the following is/are False about Sequential Search?
A. The list or array is traversed sequentially and every element is checked.
B. Search will stop when search has examined all records without success.
C. Given array is sorted from smallest to largest.
D. All of the above.

30. What is wrong with Array and Why Lists?

A. Slow searching in unordered array
B. Slow insertion in ordered array
C. Fixed size
D. All of the above

31. What is the postfix expression for the given infix (2+3)*(4+5) notation?

A. 23+45+*
B. 234*+5+
C. 2+3*4+5
D. 2+34*+5

32. The postfix expression of 6 5 2 3 + 8 * + 3 + * is evaluated as ____numeric stack value.

A. 215
B. 288
C. 218
D. 213

33. Which of the following information is stored in a doubly-linked list's nodes?

A. Value of node
B. Address of next node
C. Address of next node
D. All of the above

34. What is the optimal time complexity to count the number of nodes in a linked list?

A. O(n)
B. O(1)
C. O(log n)
D. None of the above

35. In a circular linked list

A. Components are all linked together in some sequential manner.
B. There is no beginning and no end.
C. Components are arranged hierarchically.
D. Forward and backward traversal within the list is permitted.

36. Consider an implementation of unsorted singly linked list. Suppose it has its representation with a head and tail pointer. Given the representation, which of the following operation can be implemented in O(1) time?

    i) Insertion at the front of the linked list
    ii) Insertion at the end of the linked list
    iii) Deletion of the front node of the linked list
    iv) Deletion of the last node of the linked list

    A. I and II

    B. I and III

    C. I,II and III

    D. I, II and IV

37. What would be the asymptotic time complexity to add a node at the end of singly linked list, if the pointer is initially pointing to the head of the list?

    A. O(1)

    B. O(n)

    C. θ (n)

    D. θ (1)

38. In doubly linked lists, traversal can be performed?

    A. Only in forward direction

    B. Only in reverse direction

    C. In both directions

    D. None of the above

39. Which of the following statements about linked list data structure is/are TRUE?

    A. Addition and deletion of an item to/ from the linked list require modification of the existing pointers

    B. The linked list pointers do not provide an efficient way to search an item in the linked list

    C. Linked list pointers always maintain the list in ascending order

    D. The linked list data structure provides an efficient way to find kth element in the list

40. Consider the function f defined here:

```
struct item
{
int data;
struct item * next;
};
int f (struct item *p)
{
return((p==NULL) ||((p->next==NULL)||(p->data<=p->next->data) && (p->next)));
}
```

For a given linked list p, the function f returns 1 if and only if

A. the list is empty or has exactly one element

B. the element in the list are sorted in non-decreasing order of data value

C. the element in the list are sorted in non-increasing order of data value

D. not all element in the list have the same data value

41. Which of the following are applications of linked lists?

A. Implementing file systems

B. Chaining in hash tables

C. Binary trees implementations

D. All of the above

42. Insertion of an element at the middle of a linked list requires the modification of how many pointers?

A. 3
B. 2
C. 1
D. 4

43. Which of the following algorithms is not feasible to implement in a linked list?

A. Linear search

B. Merge search

C. Insertion search

D. Binary search

44. What will be the value of “sum” after the following code snippet terminates?

```
void solve(ListNode* root) {
    /*
    The LinkedList is defined as:
    root-> val = value of the node
    root-> next = address of next element from the node
    The List is 1 -> 2 -> 3 -> 4 -> 5
    */
    int sum = 0;
    while (root != NULL) {
        sum += root -> val;
        root = root -> next;
    }
    cout << sum << endl;
```

A. 20

B. 15

C. 5

D. 1

45. Which of the following statements are true?

A. Random access of elements at a Linked list is not possible

B. Arrays have better cache locality than Linked list

C. The size of linked list is dynamic and can be changed as needed

D. All of the above

46. What will be the output of the following code snippet for 1->2->3->4->5?

```
void solve (ListNode* head) {
    while(head != NULL) {
        cout << head -> data << " ";
        head = head -> next;
  }
}
```

A. 1 2 3 4 5

B. 5 4 3 2 1

C. 1 3 5 2 4

D. 2 4 1 3 5

47. Polynomial addition is implemented using which data structure?

A. Linked List
B. Queue
C. Trees
D. Stack

48. Which of the following data structure works on the principles of First Come First Services principles?

A. Stack

B. Queue

C. Heap

D. All of the above

49. Best case time complexity of Binary Search is_____?

E. O(n)

F. O(log n)

G. O(n log n)

H. None of the above

50. Given a binary search tree, which traversal type would print the values in the nodes in sorted order?

A. Preorder

B. Postorder

C. Inorder

D. None of the above

51. What is the running time of the following code fragment?

```
for(int i=0; 1<10; i++)
for(int j=0;j<N; j++)
```

```
for(int k=N-2; k<N+2;k++)
cout<<i << " " << j << endl;
```

A. O(log N)

B. O(N log N)

C. O(N)

D. $O(N^2)$

52. What is the infix version of the following postfix expression?

```
x 12 + z 17 y + 42 * / +
```

A. (x + 12 + z) / (17 + y * 42)

B. x + 12 + z / ((17 + y) * 42)

C. x + (12 + z) / (17 + y * 42)

D. x + 12 + z / 17 + y * 42

53. Which of the following statements about binary trees is NOT true?

A. Every binary tree has at least one node.

B. Every non-empty tree has exactly one root node.

C. Every node has at most two children.

D. Every non-root node has exactly one parent.

54. The two key measures to find efficiency of an algorithm are:

A. Time and space

B. Capacity and Complexity

C. Data and space

D. Processor and memory

55. You have to sort a list L consisting of a sorted list followed by a few ‘random’ elements. Which of the following sorting methods would be especially suitable for such a task?

A. Bubble sort

B. Selection sort

C. Quick Sort

D. Insertion Sort

56. The data structure required for breadth first traversal on a graph is:

A. Queue

B. Stack

C. Array

D. Tree

57. The quick sort algorithm exploit ……design technique.

A. Greedy

B. Dynamic programming

C. Backtracking

D. Divide and conquer

58. Preorder is also known as____.

A. Depth first order

B. Breadth first order

C. Topological order

D. Linear order

59. .If a sequence of operations- push(1), push(2), pop, push(1),push(2),pop, pop , pop, push(2),pop are performed on a stack , the sequence of popped out values are_____.

A. 2,2,1,1,2

B. 2,2,1,2,2

C. 2,1,2,2,1

D. 2,1,2,2,2

60. In ....., the elements must be in sorted order

A. Linear search

B. Quick sort

C. binary search

D. selection sort

61. ..... is the process of arranging the elements of a particular data structure in some logical order.

A. Merging

B. Insertion

C. traversing

D. Sorting

62. Which of the following require extra memory for storage:

A. Linked list

B. Array

C. Both (a) & (b)

D. None of the above

63. Which of the following is false?

A. Tree is a non-linear data structure

B. A tree contains a cycle

C. A tree with n modes contains (n-1) edges

D. A tree is a connected graph

64. The operation of processing each element in the list is known as:

A. Sorting

B. Traversal

C. Merging

D. Inserting

65. Given a sorted list of elements, which searching algorithm is efficient to implement.

A. Linear search

B. Sequential search
C. Binary Search
D. None

66. One of the following is the situation in which sequential search algorithm takes the worst-case complexity
    A. If the element is found at first and last positions.
    B. If the element is found at last and middle positions
    C. If the element is found at last position or not found
    D. none
67. What will be the last mid-point while searching for 19 in the following list of numbers? 15

    20 25 29 34 35 60

    A. 29
    B. 35
    C. 15
    D. 20
68. How many stacks are needed to implement a queue. Consider the situation where no other data structure like arrays, linked list is available to you.
    A. 1
    B. 2
    C. 3
    D. 4
69. A program P reads in 500 integers in the range [0..100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies?
    A. An array of 50 numbers
    B. An array of 100 numbers
    C. An array of 500 numbers
    D. A dynamically allocated array of 550 numbers
70. When will bubble sort take worst-case time complexity to sort numbers in increasing order?
    A. The array is sorted in ascending order.
    B. The array is sorted in descending order.
    C. Only the first half of the array is sorted.
    D. Only the second half of the array is sorted.

71. If the following array is sorted using selection sort, how many swapping will occur until the end of sorting?

30 20 15 44 1 29

A. 5 swaps
B. 6 swaps
C. 3 swaps
D. 4 swaps

72. Which of the following sorting algorithms provide the best time complexity in the worst-case scenario?
A. Merge Sort
B. Quick Sort
C. Bubble Sort
D. Selection Sort

73. Which of the following algorithm uses a Divide and Conquer approach?
A. Bubble Sort
B. Selection Sort
C. Heap Sort
D. Merge Sort

74. Which of the following statement is true about the comparision in Quick sort algorithm?
A. Compares elements to determine the position of an element in an array
B. Compare elements to partition the unsorted array into two different half around the pivot.
C. Compares elements of two sorted halves to merge them into the final sorted array.
D. Compares the minimum element and place it to the sorted list.

75. Which of the following code segment is used to identify an empty stack?
A. top = = NULL
B. top = = top->next
C. top = = top-1
D. None of the above

76. The worst time complexity for a heap sort algorithm is_____.
A. $O(n^2)$
B. O(nlog n)
C. O(n)
D. $O(2^n)$

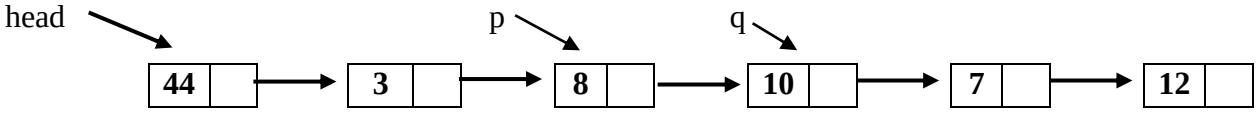
77. In many cases Linked lists are advantageous than Array, but in which case can Array be preferable than Linked list implementations?
    A. For dynamic allocation
    B. For space utilization
    C. For in-place operations
    D. none
78. Unlike the other data structures a node in a linked list must contain ____.
    A. Items
    B. Value
    C. Pointer
    D. None
79. We are about to register unknown number of students to the system. Which of the following data structure is more advantageous to implement with?
    A. Array
    B. Linked List
    C. String
    D. None
80. In a Singly linked list how can we know that the element is the last element?
    A. The head will point to that element and it will point to the next element
    B. It will point to the Null.
    C. The head will point to that element, and if head-> next is pointing to Null.
    D. B and C
81. Which of the following code will create an empty doubly linked list structure of students with their names and ID number?
    A.
```
struct node{
        int id;
        float gpa;
        string s_name;
        node *next;
};
node *head = NULL;
```
    B.
```
struct node{
        int id;
        float gpa;
```

```
    char sex;
};
```

C.
```
struct node{
    int id;
    float gpa;
    char sex;
    node *next;
    node *prev;
};
```

D.
```
struct node{
    int id;
    float gpa;
    string s_name;
    node *next;
    node *prev;
};
node *head = NULL;
```

Use the following Linked list to answer Question 32 and 33



A.

82. What will be the output if we execute the following code

```
head->next->next->data = p->next->data;
p->next=p->next->next->next;
delete q->next;
delete q;
```

A. 44 3 10 7 12

B. 44 3 8 10 7

C. 44 3 10 12

D. none

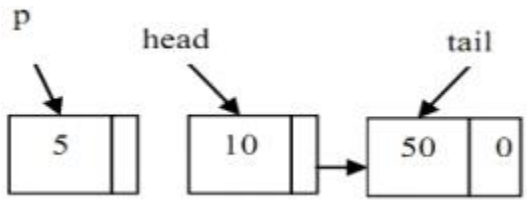
83. What will be the output if we execute the following code

```
node *temp;
while(q->next != NULL)
```

```
{
      temp = p;
      P = p->next;
      q = p->next;
      delete temp;
}
head->next->next = p->next;
head->next->data = q->data * 3;
delete p;
```

A. 44 3 10 7
B. 44 21 10
C. 44 36 12
D. none

84. Given the following linked list structure, which of the following statement is correct?



A. The statement *p->next = head;* will cause the link between the node p and the head node.

B. The statement *p->next = head;* and *head = p;* makes the node p as the head node.
C. The link list is created using p = new node; p->info = data; statements.
D. The statement *tail->next=0;* caused **tail** to be last node.
E. All of the above

85. Which of the following statement holds true?
A. LIFO is for stack and FIFO is for Queue
B. FIFO is for stack and LIFO is for Queue
C. Both LIFO and FIFO can be applied for Stack
D. None

86. Consider the following stack of characters, where STACK is allocated N = 7 memory cells STACK : A,C,D,F,_,_,_,_. (_ means empty allocated cell). What will the stack be the following operations takes place:

(a) POP(STACK, ITEM)

(b) POP(STACK, ITEM)

(c) POP(STACK, ITEM)

(d) PUSH(STACK, S)

(e) PUSH(STACK,T)

(f) PUSH(STACK, U)

(g) PUSH(STACK,C)

(h) PUSH(STACK,S)

(i) PUSH(STACK,E)

(j) TOP(STACK, ITEM)

A. A C D F S T U

B. A S T U C S

C. A C S T U S

D. A S T U C S E

87. Evaluate the following prefix expression " ++ 2 6 + - 13 2 4"

A. 12

B. 17

C. 23

D. none

88. Evaluation of the following postfix expression will be _____.

6 5 2 3 + 8 ∗ +3 + ∗

A. 220

B. 117

C. 260

D. 288

89. What is the corresponding prefix expression for the given infix expression? **x+(y*z(p/q ^ r)*s)*t)**

A. +** x y*z / p ^q r s t

B. +x**y*z/p ^ q r s t

C. x**y*z/p ^ q r s t +

D. none

90. Consider the following arithmetic expression P, written in postfix notation:

P: 12, 7, 3, -, /, 2, 1, 5, +, *, +

Translate P, into its equivalent infix expression.

A. 12 + 7 – 3 /2 + 1* 5

B. ((12 -7) + 5) * 2 / 3 + 1

C. ((7-3) / 12) + ((1+5) *2)

D. none

91. In which data structure, elements can be added or removed at either end, but not in the middle?

A. Array

B. Queue

C. List

D. Tree

92. Minimum number of queues needed to implement the priority queue?

A. One

B. Two

C. Three

D. None

93. What will be the final content of a character Queue if the following operations are performed on an initially empty Queue.

enqueue(“B”), dequeue(), enqueue(“A”), enqueue(“F”), dequeue(),enqueue (“Z”).

A. F,Z

B. B,A

C. A,F

D. B,Z

94. Which one of the following operation costs O(1) in the worst case.

A. The “Insert” operation on doubly linked list.

B. The “Append” operation on circularly linked list.

C. The “Search” operation on singly linked list.

D. The “Delete” operation on doubly linked list.

95. Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

A. Deleting a node whose location is given

B. Searching in an unsorted list for a given item

C. Inserting a node after the node with given location

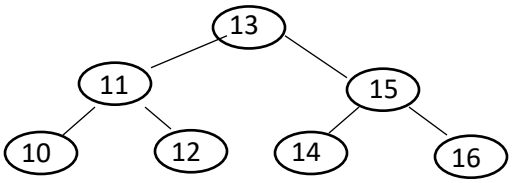
D. A and C

96. Suppose we have a circular array implementation of the queue, with ten items in the queue stored at **data[2]** through **data[11]**. The current capacity is ***12***. Where does the insert method place the new entry in the array?
    A. data[0]
    B. data[1]
    C. data[11]
    D. data[12]

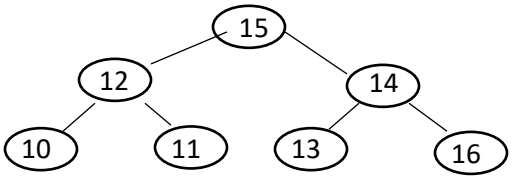
97. For a given a pre-order =[13,11,10,12,14,15,16] and In-order=[10,11,12,13,14,15,16].

Which of the following can be an equivalent binary tree?

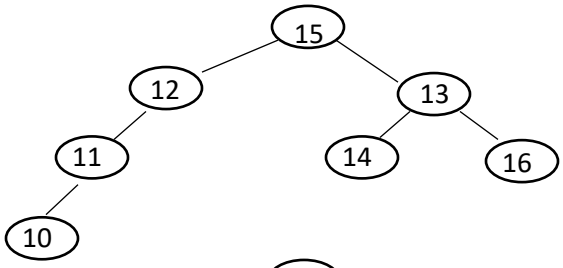
A.



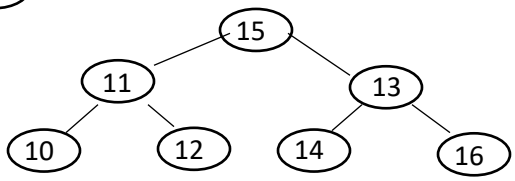
B.



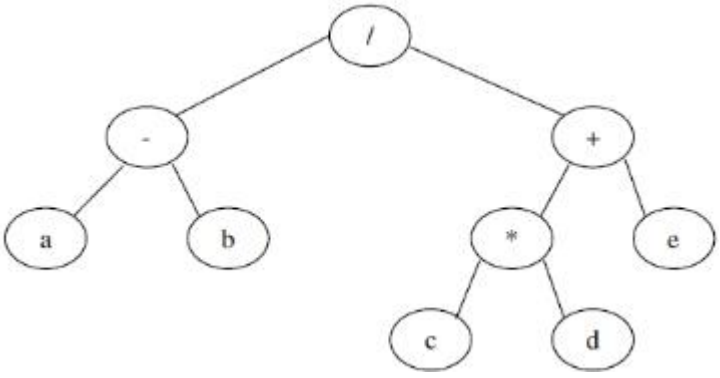
C.



D.



98. Consider the following expression tree for the expression: (a-b)-((c*d)+e))



Which one of the followings is the equivalent postfix notation for the above expression tree?

A. /-ab+*cde

B. /-ab*cd+e
C. a-b/c*d+e
D. ab-cd*e+/

99. Which of the following represents the Postorder Traversal of a Binary Tree?
A. Left -> Right -> Root
B. Left -> Root -> Right
C. Right -> Left -> Root
D. Right -> Root -> Left

100. What is the maximum number of children a node can have in an n-ary tree?
A. 2
B. 0
C. 1
D. n

Fundamentals of software Engineering

1. ___is one type of architectural design which is based on the division of responsibilities of an application or system into objects, each containing the data and the behaviour relevant to the object.
   A. Service–Oriented Architecture (SOA)
   B. Component based
   C. Object oriented
   D. Layered
2. Which one of the following UML classes can be categorize under <<entity>> stereotype?
   A. Card reader and customer
   B. Receipt printer and cash dispenser
   C. Customer and Account
   D. Account and cash dispenser
   E. All
3. Which elicitation activity you are going to use for cataloguing system to understand a requirement ‘how a particular library categorizes its collection’?
   A. Application domain understanding
   B. Problem understanding
   C. Business understanding

D. Understanding the needs and constraints of system stakeholders

4. Which one of the following is intended to the behaviour of the system?
   A. Functional requirements
   B. Non-Functional requirements
   C. Product requirements
   D. Organizational requirements
5. _____ is a process of describing and transforming a problem into a solution?
   A. Requirement
   B. Analysis
   C. Design
   D. Specification
6. "Consider a system provide for the user shall be able to search either the entire database of a patient records or select a subset from it." What kind of a requirement the system is providing?
   A. Functional Requirement
   B. Non-Functional Requirement
   C. Product Requirement
   D. All
7. 'Suppose you are requesting to build a new facility on top of existing systems and the system must have multi-level security', which architectural style is suitable for your design?
   A. Layered Architecture Style
   B. Pipeline Architecture Style
   C. Client/Server Architecture Style
   D. Model-View-Controller Style
8. What is the Unified Modelling Language?
   A. A programming language for describing object-oriented models.
   B. A diagramming tool for drawing object-oriented models.
   C. A graphical language for describing object-oriented models.
   D. A standardized graphical language and notation for describing object-oriented models.

9. What is a software architecture?
    A. The software inside a building.
    B. The structure of a client/server system.
    C. The overall structure of a software system.
    D. The software classes and their relationships.
10. What are the two kinds of UML interaction diagrams?
    A. Class diagram and sequence diagram
    B. Sequence diagram and communication diagram
    C. Class diagram and communication diagram
    D. State chart and communication diagram
11. What does an interaction diagram depict?
    A. Objects and links
    B. Classes and relationships
    C. Objects and messages
    D. States and events
12. What is a UML package?
    A. A box
    B. A grouping of classes
    C. A grouping of use cases
    D. A grouping of model elements
13. What is a use case?
    A. A case study involving users
    B. A sequence of interactions between the user and the system
    C. A sequence of interactions between the user and the objects in the system
    D. A sequence of user inputs to the system
14. How can a non-functional requirement be described in a use case model?
    A. In a separate section of the use case description
    B. As a use case precondition

C. As a use case postcondition

D. In a separate document

15. What is a composition hierarchy?

A. A weak form of a generalization/ specialization hierarchy

B. A strong form of a generalization/ specialization hierarchy

C. A weak form of a whole/part relationship D. A strong form of a whole/part relationship

16. What is a boundary object?

A. An external object

B. An object that stores data

C. An object that communicates with an external object

D. An object that controls other objects

17. A producer sends a message to a consumer. Which one of the following is asynchronous message communication?

A. The producer waits for a response from the consumer.

B. The producer does not wait for a response from the consumer.

C. The producer goes to sleep.

D. The producer waits for a timeout.

18. What is a service-oriented architecture (SOA)?

A. A distributed software architecture consisting of multiple related services

B. A distributed software architecture consisting of multiple autonomous services

C. A distributed client/service architecture

D. A distributed software architecture

19. What do software quality attributes address?

A. Software functional requirements
B. Software non-functional requirements
C. Software performance requirement
D. Software availability requirements

20. During static modelling, which one of the following classes are a conceptual data intensive?

A. External Class

B. Entity Class

C. Boundary Class

D. Object Class

21. What is a software design strategy?

A. A graphical or textual description of the software.

B. A fundamental idea that can be applied to designing a system.

C. A systematic approach for producing a design.

D. An overall plan and direction for developing a design.

22. What is a platform-independent model (PIM)?

A. A software platform before a commitment is made to a specific hardware platform.

B. A precise model of the software architecture before a commitment is made to a specific platform.

C. A precise model of the software architecture mapped to a specific platform

D. A graphical or textual description of the software.

23. What does a deployment diagram depict?

A. The physical configuration of the system in terms of physical classes and physical connections between the classes

B. The physical configuration of the system in terms of physical objects and physical connections between the objects

C. The physical configuration of the system in terms of physical nodes and physical connections between the nodes

D. The physical configuration of the system in terms of physical computers and physical networks between the computers

24. In a system in which a client object executes a state machine and communicates with a service, which of the following is true?

A. The client has a state-dependent control object but the service does not.

B. The service has a state-dependent control object but the client does not.

C. Both the client and the service have state-dependent control objects.

D. Neither the client nor the service has a state-dependent control object.

25. What is a dynamic view of a software architecture?

A. A view in terms of a module hierarchy
B. A view in terms of components and connectors
C. A view of the physical configuration in terms of nodes and interconnections
D. A view in terms of objects and messages

26. Which of the following is or are not key principles when designing your architecture

A. Consider change over time to address new requirements and challenges.

B. Use design tools such as Unified Modeling Language (UML).

C. Use models and visualizations as a communication and collaboration tool.

D. None

27. The risks exposed by poor architecture include?

A. Software that is unstable

B. Software unable to support existing or future business requirements,

C. Software that is difficult to deploy or manage in a production environment

D. All

28. Which of the following are object-oriented concepts?

A. Modules and interfaces

B. Modules and information hiding

C. Classes, information hiding, and inheritance.

D. Concurrency and information hiding

29. What is carried out during requirements modelling?

A. Functional requirements of the system are described in terms of functions, inputs, and outputs.

B. Functional requirements of the system are described in terms of actors and use cases.

C. Functional requirements of the system are described textually.

D. Functional requirements of the system are determined by interviewing users.

30. What does the system context class diagram define?

A. The entity classes in the system

B. How the system interfaces to other systems

C. The boundary between the system and the external environment

D. The context classes in the system

31. ___ is a software product developed for a single customer according to their specification.

A. Bespoke

B. stand alone

C. Generic

D. open-market product

32. Software Development Life Cycle, or software process is the systematic development of software by following every stage in the development process namely, Requirement Gathering, System Analysis, Design, Coding, Testing, Maintenance and Documentation in that order.

A. True

B. False

33. Which of the following is not most likely to cause software crisis?

A. being expensive.

B. failing to meet user requirements.

C. being deliver lately.

D. Using resources optimally

34. What makes software engineering more important?

A. The emerging of new programming languages

B. Need for new methods to manage complex software

C. The current technology and tools

D. None

35. One of the customer myths about software that can cause a serious problem for development is

A. General Description of objectives is enough to start coding

B. Adding more programmers if behind the schedule

C. The task is accomplished if the code works

D. Believing requirements are unchangeable

36. It is known that we may have different software process models, which of the following activities are common to all software process models?

A. Coding, Testing, Maintenance

B. Risk assessment, validation, maintenance

C. Specification, development, validation, evolution

D. Requirement gathering, analysis and validation

37. Computer aided software engineering tools used in early activities is known as___

A. Integrated CASE

B. Upper CASE

C. Lower CASE

D. Intermediate CASE

38. A Software process presented from the work-flow perspective should represent the following activities.

A. the roles of the people involved

B. the activities of each involved stakeholder

C. Data transformation activities

D. inputs, outputs and dependencies

39. Software engineers mostly used version control tools e.g git, this tool can be considered as,

A. Integrated CASE

B. Upper CASE

C. Lower CASE

D. Management CASE

40. One of the following is not characteristics of a good software?

A. Software must be trustworthy

B. Software should make wasteful use of system resources

C. Software must be usable by the users for which it was designed

D. Software must evolve to meet changing needs

41. What makes agile methodology more preferable

A. rapid development and delivery

B. requirements are being rigid

C. stakeholders are not involved

D. focus is given to the design than the code

42. What is the most important feature of spiral model?

A. Performance management

B. Risk management

C. Efficiency management

D. Quality management

43. From the following software process models, which process model is chosen if the development team has less experience on similar projects.

A. Spiral

B. Waterfall

C. RAD

D. Agile

44. One of the following cannot be considered as a Key challenge of software engineering

A. Having many tools to for development

B. Coding with increasing diversity

C. Demand for reduced delivery time

D. Developing trustworthy software

45. What are the disadvantages of Evolutionary prototyping model

A. Unexpected requirements accommodation

B. Being difficult to maintain

C. Flexibility of design and development

D. Having steady, visible signs of progress produced

46. You are requested to develop a virtual reality system to support software maintenance, which software methodology can best suit the system?

A. Incremental Development

B. waterfall methodology

C. Spiral methodology

D. Unified processing methodology

47. One of the following is the goal of software engineering

A. High maintenance

B. On time delivery

C. High production cost

D. User involvement

48. Often, a customer defines a set of general objectives for software but does not identify detailed input, processing, or output requirements. In other cases, the developer may be unsure of the efficiency of an algorithm, the adaptability of an operating system, or the form that human/machine interaction should take, which software methodology would you suggest?

A. waterfall

B. Prototyping

C. Incremental Development

D. None

49. What makes iterative models different from incremental models?

A. It focuses on staging and scheduling

B. Repeats the process on the same section of work

C. Parts of the system are being developed differently

D. Repeats the process on a new section of work.

50. One of the following does not describe the principles of agile methodology

A. Customer involvement
B. incremental delivery
C. process not people
D. maintain simplicity

51. The intent of software project metrics is ____.

A. Analysis of the architectural design

B. Quantify cost, schedule and productivity

C. Hide software defects

D. Maximization of the development schedule

52. Which software process model should be applied to develop a web-based system for a new business where requirements are not determined at the beginning of the project.

A. Spiral

B. Prototyping

C. Waterfall

D. RAD

53. You are requested to develop attendance management system for HR department within 20 days. Which software methodology would you use?

A. Spiral
B. RUP
C. Waterfall
D. RAD

54. ASTU's space science technology institute wants to develop a software to manage a rocket that carries two scientists to the moon, which software methodology would you recommend to the institute?

A. Spiral model

B. RUP model

C. V-shape model

D. Waterfall model

55. A company sign an agreement with XYZ Software Company that automate finance, human resource, customer service, purchasing process in the company and every year expected to deploy a working system, which software development methodology can best suite?

A. RAD model

B. Incremental development model

C. Spiral model

D. V-shape model

56. You are requested to develop an application that will test the sugar level, heartbeat and oxygen level using portable device like mobile and tab. Which software methodology would you use?

A. Incremental Development model

B. Prototyping model

C. Waterfall model

D. V-shaped model

57. To develop a mobile application of an existing financial website system, which software methodology should be used?

A. Waterfall model

B. Evolutionary prototyping model

C. Incremental model

D. Unified processing model

58. Which of the following software process model can be hard to work with legacy systems?

A. Incremental Model

B. Waterfall model

C. RAD model

D. Spiral model

59. What are the advantages of providing static and dynamic views of the software process as in the Rational Unified Process?

A. To support incremental development

B. To manage specific workflow

C. To address both technical and business perspectives

D. To focus only in development

60. Although it has many strengths, which of the following is considered as a weakness in Agile methodology?

A. Customer satisfaction

B. Flexibility

C. Constant Interaction

D. Issue of workflow coordination.

61. What is maintainability?

A. The extent to which software is capable of being changed before deployment

B. The extent to which software is capable of being changed after deployment

C. The extent to which software is capable of being changed during development

D. The extent to which software is capable of being changed after develop

62. In which project monitoring activity, every project is divided into multiple phases where major tasks are performed (milestones) based on the phases of SDLC.

A. Milestones Checklist

B. Status report

C. Delphi Technique

D. None

63. What is a software design concept?

A. A graphical or textual description of the software.

B. Documentation of the software.

C. A fundamental idea that can be applied to designing a system.

D. A systematic approach for producing a design.

64. What is an information hiding object?

A. An active object that encapsulates data
B. A passive object that encapsulates data
C. A class that encapsulates data
D. A task that encapsulates data

65. What is a class interface?

A. Specifies the internals of the operations of a class

B. Specifies the externally visible operations of a class

C. Specifies the parameters of a class operation.

D. Specifies the signature of a class operation

66. Which of the following is NOT an object-oriented concept?

A. Information hiding

B. Class

C. Subclass

D. Subroutine

67. What does a state-dependent interaction involve?

A. A control object

B. A state-dependent entity object

C. A state-dependent control object

D. A state-dependent user interaction object

68. Which kind of object executes a state machine

A. Any software object

B. An entity object

C. A state-dependent control object

D. A state chart

69. What kind of object would be the first object to receive an input from an external object?

A. A user interaction object

B. A proxy object

C. An entity object

D. A boundary object

70. What is testability?

A. The extent to which software is capable of being developed

B. The extent to which software is capable of being tested before deployment

C. The extent to which software is capable of being tested after deployment

D. The extent which the software is understood

71. Traceability is the extent to which a product:

A. Can be traced back to products of previous phases
B. Traced back to the requirements
C. Traced forward to implementation
D. Deployed to a hardware configuration

72. With a Negotiation pattern, which of the following is NOT true?

A. The client agent can propose a service.

B. The service agent can offer a service in response to a client agent proposal.
C. The client agent can request a service.
D. The service agent can offer a service in response to a client agent request.

73. What do software quality attributes address?

A. Software functional requirements

B. Software non-functional requirements

C. Software performance requirement

D. Software availability requirements

74. What is maintainability?

A. The extent to which software is capable of being changed before deployment

B. The extent to which software is capable of being changed after deployment

C. The extent to which software is capable of being changed during development

D. The extent to which software is capable of being changed after develop

75. What is modifiability?

A. The extent to which software is capable of being modified after deployment

B. The extent to which software is capable of being modified after initial development

C. The extent to which software is capable of being modified during and after initial development

D. The extent to which software is capable of being changed before deployment

76. What is a primary actor?

A. The actor who goes on stage first

B. The actor that starts the use case

C. An actor that participates in the use case

D. An object inside the system

77. What is an alternative sequence in a use case?

A. A sequence that describes an error case

B. A sequence that is different from the main sequence
C. A sequence that describes interactions with a secondary actor
D. A sequence that describes interactions with a primary actor

78. What is carried out during design modelling?

A. Developing use case models

B. Developing data flow and entity relationship diagrams

C. Developing static and dynamic models

D. Developing software architectures

79. Which of the following are object-oriented concepts?

A. Modules and interfaces

B. Modules and information hiding

C. Classes, information hiding, and inheritance

D. Concurrency and information hiding

80. Which of the following is a characteristic of an object?

A. A function or subroutine

B. A module

C. Groups data and procedures that operate on the data

D. Groups a function and an algorithm

81. Which of the following is an entity class?

A. An information hiding class

B. A subclass

C. A control class

D. A data abstraction class

82. What does a state machine class encapsulate?

A. A state transition table

B. A state chart

C. The current state of the machine

D. A state transition table and the current state of the machine

83. Which of the following is unlikely to be a graphical user interface class?

A. A menu

B. A window

C. A button

D. A pin

84. What is an information hiding object?

A. An active object that encapsulates data

B. A passive object that encapsulates data
C. A class that encapsulates data
D. A task that encapsulates data

85. What is a timer object?

A. An external clock

B. An internal clock
C. An object that is awakened by an external timer
D. An object that interacts with a clock

86. What is a class?

A. A course

B. An object instances
C. A client or server in the system
D. A collection of objects with the same characteristics

87. What is a use case package?

A. A package describing the actors in the system

B. A package describing the use cases in the system

C. A group of related use cases

D. The package of objects that participate in the use case

88. What is a secondary actor?

A. The actor who goes on stage second

B. The actor that starts the use case

C. An actor that participates in the use case

D. An object inside the system

89. What is inheritance?

A. A mechanism for inheriting characteristics from a parent

B. A mechanism for sharing and reusing code between classes

C. A mechanism for sharing data between classes

D. A mechanism for hiding information between classes

90. What is an attribute?

A. description of a class
B. An internal property of a class
C. A data item held by a class
D. A parameter of a class

91. What is the goal of software verification?

A. Building the system
B. Building the right system
C. Building the system right
D. Testing the system

92. What approach does the spiral model emphasize?

A. Phased software development
B. Throwaway prototyping
C. Risk-driven development
D. Incremental development

93. What is the goal of software validation?

A. Building the system
B. Building the right system
C. Building the system right
D. Testing the system

94. Which of the following approaches can overcome the limitation in the previous question?

A. Phased software development
B. Throwaway prototyping
C. Evolutionary prototyping
D. Incremental development

95. What is evolutionary prototyping?

A. Phased software development
B. Throwaway prototyping
C. Risk-driven development

D. Incremental development

96. What is a software life cycle?

A. The life of the software
B. A cyclic approach to developing software
C. A phased approach to developing software
D. The life of software developed in cycles

97. What are software structuring criteria?

A. Fundamental ideas that can be applied to designing a system.

B. Systematic approaches for producing a design.

C. Guidelines used to help in structuring a software system into its components.

D. Overall plans for developing a design.

98. What is a software design method?

A. A systematic approach for producing a design.

B. Guidelines used to help in structuring a software system into its components.

C. An overall plan for developing a design.

D. A graphical or textual description of the software.

99. What is a software design strategy?

A. A graphical or textual description of the software.

B. A fundamental idea that can be applied to designing a system.

C. A systematic approach for producing a design.

D. An overall plan and direction for developing a design.

100. Software Design documentation contain__?

A. High-level software architecture

B. Software design details

C. Data flow diagrams

D. Database design

E. All

Operating System

1. A scheduling algorithm assigns priority proportional to the waiting time of a process. Every process starts with priority zero (the lowest priority). The scheduler re-evaluates the process priorities every T time units and decides the next process to schedule. Which one of the following is true if the processes have no I/0 operations and all arrive at time zero?
   A. The algorithm is equivalent to the first cum first serve algorithm
   B. The algorithm is equivalent to the round-robin algorithm
   C. The algorithm is equivalent to the shortest job first algorithm
   D. The algorithm is equivalent to the shortest remaining job first algorithm
2. Three concurrent processes X,Y,Z executes three different code segments that access and update certain shared variables. Process X executes the P operation (i.e., wait) on semaphores a, b, and c; process Y executes the P operation on semaphores b, c, and d; process z executes P operation on c, d and a before entering the respective code segments. After completing the execution of its code segment, each process invokes the V operation (i.e., signal) on its three semaphores. All semaphores are binary semaphores initialised to one. Which one of the following represents dead-lock free order of invoking the P operations by the processes?
   A. X:P(a),P(b),P(c), Y:P(b), P(c), P(d), Z:P(c),P(d),P(a)
   B. X:P(b),P(a),P(c), Y:P(b), P(c), P(d), Z:P(c),P(d),P(a)
   C. X:P (b),P(a),P(c), Y:P(c), P(b), P(d), Z:P(a), P(c),P(d)
   D. X:P(a),P(b),P(c), Y:P(c), P(b), P(d), Z:P(c),P(d),P(a)
3. Consider a hard disk with 16 recording surfaces (0-15) having 16384 cylinders (0-16383) and each cylinder contains 64 sectors (0-63). Data storage capacity in each sector is 512 bytes. Data are organised cylinder-wise and the addressing format <cylinder no, surface no., sector no>. A file of capacity 42797KB is stored in the disk and the starting disk location of the file <1200,9,40>. What is the cylinder number of the last sector of the file, if it is stored in a contiguous manner?

   A. 1281 B. 1282 C. 1283 D. 1284

4. Unix commands indicate successful completion by returning

   A. 0 B. 1 C. -1 D. None
5. Exit status of a command in Unix is available in

   A. Shell variable B. The program name itself C. $$ D. $?
6. The scheduling policy used in real-time systems

A. FCFS B. Deadline C. SJF D. Round robin

7. In multiple queue scheduling

   A. Any scheduling policy can be used in each queue
   B. Time slice value may increase as it goes down-words to down queue
   C. Is used in Unix
   D. All

8. Dirty bit for a page in a page table

   A. Helps avoid unnecessary writes on a paging device
   B. Helps maintain LRU information
   C. Allows only read on a page
   D. None

9. When an interrupt occurs, an OS

   A. Ignores the interrupt
   B. Always changes state of interrupted process to be blocked and schedules another process
   C. Always resumes execution of interrupted process after processing the interrupt
   D. May change state of interrupted process to be blocked and schedule another process

10. I/O redirection

    A. Implies changing the name of a file
    B. Can be employed to use an existing file as input file for a program
    C. Implies connecting two programs through a pipe
    D. None

11. 524. If increasing the block size of a cache improves performance it is primarily because programs

    A. Exhibit spatial locality B. Exhibit temporal locality
    C. Usually have small working sets D. Read data much more frequently than write data
    E. Can generate addresses that collide in the cache

Explanation: Increased block size means that more words are fetched when filling a cache line after a miss on a particular location. If this leads to increased performance, then the nearby words in the block must have been accessed by the program later on, i.e., the program is exhibiting spatial locality.

12. Which of the following is not done when an interrupt occurs:

    A. Save the starting address of the executing procedure
    B. Save the address of the current instruction
    C. Detect the cause of the interrupt
    D. Save the values of the registers
    E. Make a call to the kernel

13. An overlay is

    A. A part of OS B. A single memory location
    C. Swapping D. Overloading the system with many user files

14. In round robin algorithm if time quantum is increased then the average turn around time

    A. Increases B. Decreases C. Remains constant D. None

15. The difference between the time you get results and to the time of submission is

A. Elapsed B. System C. Turnaround D. None

16. Zombie

A. State of a process B. Game C. Virus D. None

17. Number of bits used for PID in Unix is _

A. 8 B. 16 C. 32 D. None

18. What is the average time required to read or write 512-byte sector for a disk with 5400 RPM with an average seek time of 12ms, transfer rate of 5MB/sec.?

Assume controller overhead is 2ms and disk is idle initially.

A. 10ms B. 12ms C. 19.7ms D. 19.2ms E. None

19. Disk performance can be improved by

A. Overlapped seeks on disks which are connected to same controller
B. Connecting disks to separate controllers
C. Storing files among multiple disks
D. All

20. Batching

A. Is an arm scheduling algorithm
B. Can be used to stop indefinite postponement.
C. Is variant of Elevator algorithm
D. None

21. File pointers in most Unix systems

A. 4 bytes B. 32 bits C. 4 bytes D. B&C E. None

22. Hit time and miss penality

A. All same B. Hit time is lower than miss penality
C. Hit time is greater than miss penality D. Not appropriate to compare

23. Race condition

A. A can occur if two processes are running parallel to each other
B. Can occur if there exists some sort of communication across two processes such as shared memory
C. A & B
D. None

24. In producer & consumer problems buffering is needed

A. To take care of bursty producer
B. To take care of bursty consumer
C. Both A & B
D. None

25. A paging system is equipped with a TLB and page fault rate is 20% and hit rate of TLB is 80%. TLB access takes 10ns and RAM access takes 100ns. Calculate average time required to access page address. Assume service time required to load page and making a entry in page & LB when page fault occurs is 10ms.

A. 10.5 ms B. 11.3 ms C. 12.1 ms D. None

26. The context switching of process in a multi tasking OS is done by

A. Round robin scheduler B. Time quantum
C. Dispatcher D. Medium term scheduler

27. 'The main goal of multiprogramming

A. Maximise device utilisation B. Minimise response time
C. Increase CPU throughput D. None

28. Smaller time slice and round robin results in the maximisation of

A. Throughput B. Efficiency C. Fairnes D. Context switching

29. A CPU has two modes, privileged and non-privileged. In order to change the mode from privileged to non-privileged

A. An HW interrupt is needed B. An SW interrupt is needed
C. A privileged instruction is needed D. A non-privileged instruction is needed

30. Non-Preemptive

A. SRTF B. FCFS C. Round-robin D. None

31. Where does the swap space reside?

A. RAM B. ROM C. Disk D. On-chip cache

32. Consider a VM system with FIFO page replacement policy. For an arbitrary page access pattern increasing the number of page frames in main memory will

A. Always decrease the number of page faults
B. Always increase the number of page faults
C. Sometime increase the number of page faults
D. Never affect the number of page faults

33. Block address trace

A. required in FIFO page replacement B. required in optimal page replacement
C. is sequence of virtual block address D. B&C E.None

34. A controller that must monitor data in real time or near realtime may prefer mode transfer with DMA

A. transparent mode B. burst mode C. cycle stealing mode D. None

35. When interrupt occurs

A. Current instruction is completed B. Context switching may take place
C. Service routine is executed D. All

36. When miss occurs then_____ procedure can respond quickly to CPU

A. look-aside B. look-through C. can't say D. None

37. If hit ratio reduces from 99% to 95%

A. access time increases B. cache hit falls down
C. access time increases by about 23% D. None

38. Not a stack algorithm

A. LRU B. NRU C. OPTIMAL D. FIFO

39. Sticky bit

A. can be used for an executable file in unix for performance reasons
B. when set to a Unix directory any one can write into it
C. used in rounding algorithms
D. All

40. Reentrant programs

A. code that can not be changed while in use
B. code can be used or shared by several processes simultaneously
C. code is not serially reusable
D. may not contain static or locale data
E. All

41. Total bits required for direct mapped cache with 64KB of data and one-word blocks if addresses are 32 bits is

A. 16 KB B. 98KB C. 100KB D. None

42. In a paging system with TLB it is observed that for every 10 memory accesses 9 accesses are successfully found in TLB. Find out effective access time if memory access is 200 ms and cache access is 10ms while finding page base address

A. 20ms B. 30ms C. 40ms D. None

43. A given computer has a maximum of 3 page frames which are allocated to a process. Page reference string (FIFO order)is 2 3 2 1 5 2 4 5 3 2 5 2, then how many page faults occurred if LRU is employed and initially all the three frames are free.

A. 10 B. 11 C. 13 D. None of the above

44. From the following data find out when process 3 is completed if the shortest job next is employed.

Process	Arrival Time	Expected CPU Time
1	0	14
2	3	12
3	5	7
4	7	4
5	19	7

A.7 B. 21 C. 25 D. None

45. Given the following data and for time slice value of 2 find out turnaround time for process 3.

Process	Arrival	Service time	Priority
1	1	8	2
2	2	2	4
3	3	1	3
4	4	2	4
5	5	5	1

A. 9 B. 3 C. 10 D. None

46. When very few disk accesses are occurring every disk scheduling algorithm tends to approximate which specific disk scheduling algorithm?

A. FCFS B. SCAN C. C-SCAN D. SSTF

47. In single-user, single tasking environment the following disk scheduling algorithm is adequate

A. FCFS B. SCAN C. C-SCAN D. SSTF

48. When a process is created

A. A free PCB is obtained
B. PCS is initialised
C. Obtains necessary resources such as memory, I/O devices
D. All

49. Which of the following need not be saved during context switching.

A. General purpose registers
B. TLB's
C. PC
D. All

50. Locality of reference implies that the page reference being made a process

A. Will always be the page referred earlier
B. Is likely to be to one of the pages used in the last few page reference
C. Will always be to one of the pages existing in memory
D. Will always lead to a page fault

51. Thrashing

A. Reduces page 1/0
B. Implies excessive page I/O
C. Decrease the degree of multiprogramming
D. Improve system performance

52. The address sequence generated by tracing a particular program execution in a pure demand paging with 100 records per page with 1 free main memory frame is recorded as follows. What is the number of page faults?

Page reference sequence: 1,0,2,3,1,3,4

A. 13 B. 5 C. 7 D. None

53. A CPU has 32-bit memory address, 256KB cache.The cache is organised as a 4-way set associative with block size of 16 bytes then the number of sets in the cache

A. 64K B. 128K C. 32K D. None

54. How long does it take to load a 64K program from disk whose average seek time is 30ms, whose rotation time is 20ms and track hold 32K, Page size or block size is 2K? Assume the blocks are spread randomly on the disk.

A. 640 ms B. 100 ms C. Information is not adequate D. None

55. A system has 3 page frames in main memory and usesLRU replacement policy with the following reference string. What is the state of the main memory (the pages existing) after the 5th-page fault?

1223413121

A. 321 B. 124 C. 234 D. None

56. 5 processes are in a queue. The times for completion of each are 6, 3, 4, 3 and 2 respectively. Find the minimum average turnaround time

A. 18/5 B. 9 C. 62/5 D. 63/5 E. 18

57. The CPU detects an interrupt

A. Using busy bit B. Using interrupt handler
C. Using interrupt request line D. None

58. Largest file size in FAT-32 file system

A. 2GB B. 4GB C. 2bytes less than 4GB D. None

59. _____ is the largest single file size on a unix file system with 1 KB block size and 4 byte block addresses

A. 128 GB B. 65 MB C. 16 GB D. None

60. If seek time approximates latency time which of the following scheduling algorithms preferable

A. SSTF B. CSCAN C. SSTF with SLTF D. None

61. Cylinder-oriented disk scheduling is

A. FCFS B. SSTF C. SLTF D. None

62. Dangling links occurs

A. symbolic links B. if the real file is deleted for which symbolic links are existing
C. A & B D. with hard links

63. Device driver

A. set of functions B. a program
C. developed exclusively using system calls D. None

64. A computer with 1K cache, 64K RAM with 8 bit word is employing direct mapping, then the size of cache word

A. 10 bits B. 16 bits C. 15 bits D. None

65. TLB does not contain

A. count B. dirty bit C. every entry of page table. D. All

66. An operating system uses the Shortest Remaining Time first (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes:

Process	Execution time	Arrival time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

What is the total waiting time for process P2?

A. 5 B. 15 C. 40 D. 55

67. Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence:

4, 34, 10, 7, 19, 73, 2, 15, 6, 20
Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1 ms to move from one cylinder to the adjacent one and the shortest seek time first policy is used?

A. 95ms B. 119ms C. 233ms D. 276ms

68. A process executes the code

```
fork();
fork();
fork0;
```

The total number of child processes created is

A. 3 B. 4 C. 7 D. 8

69. Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle?

A. 0% B. 10.6% C. 30.0% D. 89.4%

70. Which strategy is used in the Banker's algorithm for dealing with deadlocks?

A. Deadlock Ignorance B. Deadlock Detection

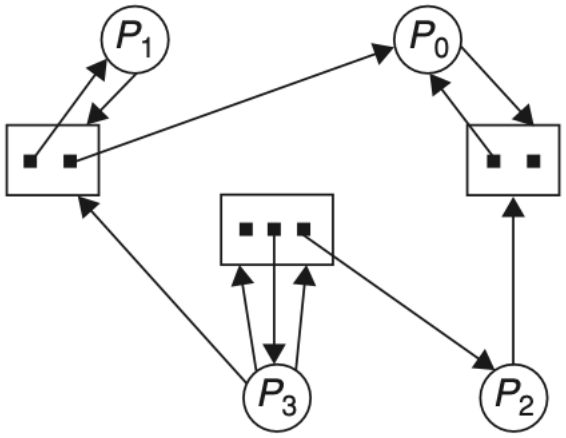
C. Deadlock Avoidance D. Deadlock Prevention

71. **Consider the following set of jobs (processes) along with their Arrival Time (AT), start time (ST) and Finish Time (FT). Find weighted turnaround time.**

Job no.	AT	ST	FT
1	10.0	10.0	10.3
2	10.2	10.3	10.8
3	10.4	10.8	10.9
4	10.5	10.9	11.3
5	10.8	11.3	11.4

A. 3.04 B. 2.04 C. 4.04 D. 0.56

72. Consider the following Resource Allocation Graph:



Which one is a safe sequence?

A. P_0, P_1, P_2, P_3 B. P_1, P_0, P_2, P_3

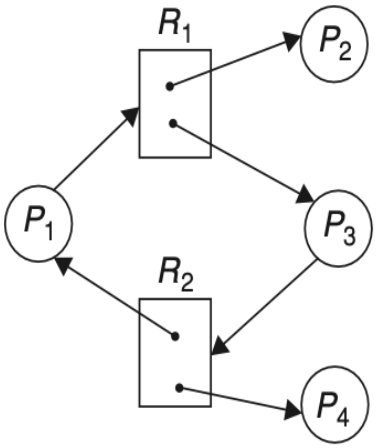
C. P_2, P_0, P_1, P_3 D. Both (A) and (C)

73. Starvation of longer jobs happens in one of the following scheduling algorithm?

A. Shortest run remaining time first B. Round Robin

C. Highest response ratio next D. First-come-first-served

74. Is the following resource allocation graph in a deadlock state?



A. Yes B. No C. Not predictable D. Insufficient data

75. Producer–consumer problem can be solved using

A. Semaphores B. Event counters C. Monitors D. All of the above

76. To avoid the race condition, the number of processes allowed in the critical section is

A. 0 B. 1 C. 2 D. 3

77. Semaphores are used to solve the problem of

A. Race condition B. Multitasking C. Mutual exclusion D. Both (A) and (C)

78. Consider the following code that shows the structure of a process in an algorithm to solve the critical section problem for two processes.

var flag[2] of Boolean; /* initialized to false */

repeat
flag[*i*] = true;
while flag[*j*] do no – op;
//critical section
flag[*i*] = false;
// remainder
until false

Then which of the following statements is true?

A. The algorithm satisfies all the requirements of critical section problem.
B. The algorithm satisfies only mutual exclusion and progress.
C. The algorithm only satisfies progress requirement.
D. The algorithm does not satisfy critical section problem requirements.

79. A process using a semaphore has a start value of 1 for its semaphore. Since the start of execution of the pro- gram, 12 signal operations were completed. How many wait operations have been completed so far if the current value of semaphore is 6?

A. 1 B. 5 C. 7 D. 11

80. Which of the following situation arises if a process omits the wait(S) or the signal(S) on a semaphore variable '*S*' (Initially *S* = 1).

(i) Mutual exclusion violated

(ii) Deadlock will occur

A. (i) only B. (ii) only C. both(i) and (ii) D. neither (i) and (ii)

81. Consider the following solution to the producer-consumer synchronization problem. The shared buffer size is N. Three semaphores empty, full and mutex are defined with respective initial values of 0, N and 1. Semaphore empty denotes the number of available slots in the buffer, for the consumer to read from. Semaphore full denotes the number of available slots in the buffer, for the producer to write to. The place-holder variables, denoted by P, Q, R, and S, in the code below can be assigned either empty or full. The valid semaphore operations are: wait () and signal ().

Which one of the following assignments to P, Q, Rand S will yield the correct solution?

A. P: full, Q: full, R: empty, S: empty
B. P: empty, Q: empty, R: full, S: full
C. P: full, Q: empty, R: empty, S: full
D. P: empty, Q: full, R: full, S: empty

82. Semaphore operations are atomic because they are implemented within the_____.

A. Kernel B. Shell C. User process D. Normal process space

83. The programming language construct that provides equivalent functionality of a semaphore and better control is

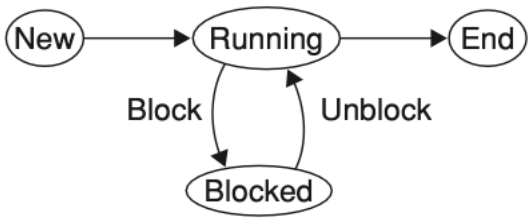
A. Signal B. Monitor C. Mutex D. Critical section

84. Which of the following is used to call an OS function?

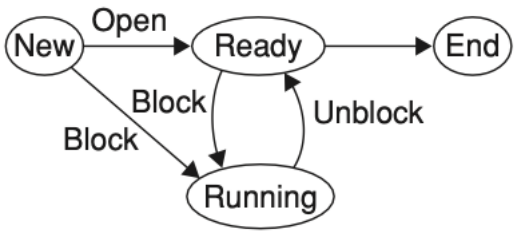
A. Interrupt B. Trap C. Supervisor call D. All of these

85. Which of the following is an appropriate four-state model for a process?

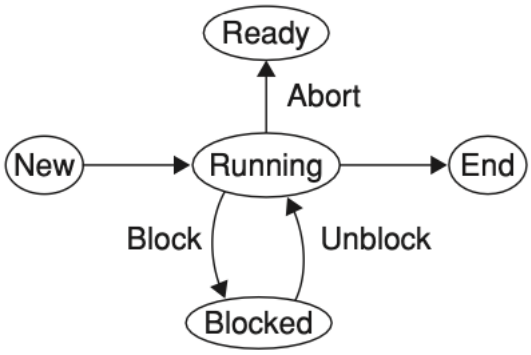
A.



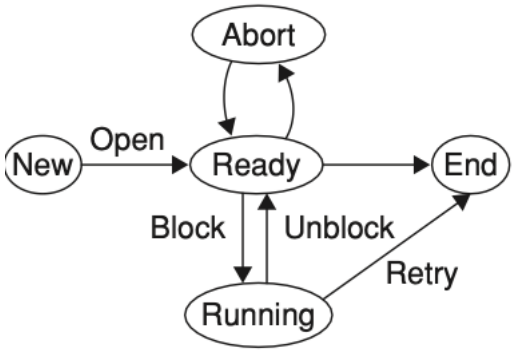
B.



C.



D.



86. Suppose that the OS uses variable-length partitions for memory management. At some particular time, the running process occupies a partition between physical addresses 20,000 and 40,000. The values of base and limit register are respectively

A. 20,000, 40,000 B. 20,000, 20,000 C. 0, 10,0000 D. 0, 40,000

87. Consider a logical address space of 32 pages of 2048 words mapped into memory of 64 frames. Then the number of bits required for logical address are
A.16-bits B. 17-bits C. 18-bits D. 20-bits

88. In which of the page table techniques the logical address space is broken into multiple page table?

A. Inverted Page Table B. Hierarchical Page Table
C. Hashed Page Table D. None of the above

89. Consider the following segment table:

Segment	Limit	Base
0	1000	1400
1	400	6300
2	400	4300
3	1100	3200
4	1000	4700

The physical address for a logical address which is in segment 2 with offset 253 is

A. 4553 B. 6353 C. 6253 D. 4453

90. A memory page containing a heavily used variable that was initialized very early and is in constant use is removed when _____ page replacement is used.

A. LRU B. FIFO C. LFU D. Optimal

91. Which of the following interprocess communication models are implemented using system calls?

A. Shared memory B. Message Passing
C. Both (A) and (B) D. Neither (A) nor (B)

92. Consider the methods used by processes P_1 and P_2 for accessing their critical sections whenever needed. The initial values of shared Boolean variables S_1 and S_2 are randomly assigned.

Method used by P_1
While (S_1 = = S_2); Critical section
S_1 = S_2;
Method used by P_2
While (S_1 ! = S_2); Critical section S_2 = !(S_1);
Which of the following statements describes the properties achieved?

A. Mutual exclusion but not progress
B. Progress only
C. Bounded waiting, progress
D. Mutual exclusion, progress, bounded waiting

93. The term thrashing is used to define

A. A reduce page I/O B. A decreased degree of multiprogramming
C. An excessive page I/O D. Improvement(s) in the system performance

94. Page fault occurs when

A. The page is not in cache memory.
B. The page is in the main memory.
C. The page is not in the main memory.
D. The page has an address, which cannot be loaded.

95. Mutual exclusion problem occurs

A. Between two disjoint processes that do not interact.
B. Among processes that share resources.
C. Among processes that do not use the same resource.
D. Between two processes that uses different resources of different machines.

96. Which scheduling algorithm gives a minimum average waiting time?

A. Round Robin
B. Shortest Job First
C. FCFS
D. Priority

97. Consider a process that has been allocated 3 page frames. Assume that system uses pure demand paging. While undergoing execution, the process makes the following sequence of page references

1,1,7,1,6,3,1,3,2,4,9,1.
If optimal page replacement policy is used, then the number of page faults for the above reference string is
A. 7 B. 6 C.8 D. None of these

98. Which of the following disk-scheduling strategies is likely to give the best throughput?

A. Farthest cylinder next
B. Nearest cylinder next
C. First come first serve
D. Elevator algorithm

99. A solution to the Dining Philosophers Problem which avoids deadlock is

A. Ensure that all philosophers pick up the left fork before the right fork
B. Ensure that all philosophers pick up the right fork before the left fork
C. Ensure that one particular philosopher picks up the left fork before the right fork, and that all other philosophers pick up the right fork before the left fork
D. None of these

100. Consider the disk drive with the following specification:

Eight surfaces, 1024 tracks/surface, 512 sectors/ track, 4KB/sector, rotation speed is 3000 rpm and the disk is operated in burst mode. The processor runs at 600 MHz and takes 300 and 900-clock cycle to initiate and complete DMA transfer, respectively, if the size of transferred data is 20KB.

What is the size of the hard disk?
A. 16 GB B. 8 GB C. 16 MB D. 8 MB

Data Communication and Computer Networking

1. When the nearby laptop, wireless mouse and keyboard, smartphone, and digital camera exchange data, a _____ standard can be used:
   A. MAN (metropolitan area network)
   B. NFC (near field communication)
   C. LAN (local area network)
   D. PAN (personal area network)
2. All layers of a standard architecture have their own protocol data unit (PDU) except the _____ layer.
   A. application
   B. transport
   C. internet
   D. physical
3. Assume a system uses five protocol layers. If the application program creates a message of 100 bytes and each layer (including the fifth and the first) adds a header of 10 bytes to the data unit, what is the efficiency of the system?
   A. 50%
   B. 67%
   C. 75%
   D. 40%
4. Which layer chooses and determines the availability of communicating partners along with the resources necessary to make the connection; coordinates partnering applications; and forms a consensus on procedures for controlling data integrity and error recovery?
   A. Application
   B. Transport
   C. Data Link
   D. Network

5. At which layer is routing implemented, enabling connections and path selection between two end systems?
   A. Transport
   B. Physical
   C. Data link
   D. Network
6. Which layer ensures the trustworthy transmission of data across a physical link and is primarily concerned with physical addressing, line discipline, network topology, error notification, ordered delivery of frames, and flow control?
   A. Data link
   B. Physical
   C. Transport
   D. Network
7. Which layer is responsible for packet encapsulation, fragmentation and reassembly.
   A. Data link
   B. Physical
   C. Transport
   D. Network
8. Which of the following statements is true about a hub networking device?
   A. It includes one collision domain and N broadcast domains
   B. It includes N collision domains and one broadcast domain
   C. It includes one collision domain and one broadcast domain
   D. It includes N collision domains and N broadcast domains
9. With respect to the OSI model, which of the following are correct statements about PDUs?
   A. A segment contains IP addresses.
   B. A packet contains IP addresses.
   C. A segment contains MAC addresses.
   D. A packet contains MAC addresses.
10. A data has a destination socket address of 71.116.36.87:23. What can you say about this data?
   A. It is going from a server to a client
   B. It is going from a client to a server

C. A web server is the source of this data

D. Unknown

11. You are the Network Administrator for your company. A new branch office is opening and you are selecting the necessary hardware to support the network. There will be two groups of computers, each organized by department. The Sales group computers will be assigned IP addresses ranging from 192.168.1.2 to 192.168.1.50. The Accounting group will be assigned IP addresses ranging from 10.0.0.2 to 10.0.0.50. What type of device should you select to connect the two groups of computers so that data communication can occur?

    A. Hub

    B. Switch

    C. Bridge

    D. Router

12. Which transmission media has the highest transmission speed in a network?

    A. Coaxial Cable

    B. Optical fiber

    C. Twisted pair cable

    D. Electrical cable

13. Signals with a frequency between 2MHZ and 30MHZ use_____ propagation.

    A. Ground

    B. Line of sight

    C. Sky

    D. None of the above

14. _____ Cable is used for voice and data communication.

    A. Coaxial Cable

    B. Twisted –Pair Cable

    C. Fiber Optics

    D. Data Cable

15. In a fiber Optics cable the signal is propagated along the inner core by_____

    A. Reflection

    B. Modulation

    C. Refraction

D. Deflection

16. Radio waves are_____.

A. Omni Directional

B. Unidirectional

C. Bidirectional

D. Multidirectional

17. Which one of the following primarily uses guided media?

A. Cellular Telephone system

B. Satellites communication

C. Local telephone system

D. Radio Broadcasting

18. Which of the following tasks is not done by data link layer?

A. Framing

B. flow control

C. error control

D. Channel coding

19. Which sub layer of the data link layer performs data link functions that depend upon the type of medium?

A. Logical link control sub layer

B. Network interface control sub layer

C. Media access control sub layer

D. Error control sub layer

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

A. Random error

B. Inverted error

C. Burst error

D. Double error

21. The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____.

A. Piggybacking

B. fletcher's checksum

C. cyclic redundancy check

D. parity check

22. Suppose we went to send message 11010111 using the standard CRC method. The generator polynomial X^3+X^2+1.Then what actual message should be transmitted?

A. 11010111000

B. 11010111110

C. 11010111001

D. 11010111010

23. What are the difference between flow control in transport layer and flow control in Data link layer?

A. Flow control in transport Layer is Hop to hop while in transport layer is end to end

B. Flow control is only the function of transport layer

C. In both case flow control required during push data exchange process

D. A&C are correct

24. Data Link layer is responsible for _____

A. Incoming bit stream & simple repeater to other devices connected

B. An error free communication across the physical link connecting primary & secondary stations within a network.

C. End-to-end integrity of the data message propagated through the network between two devices

D. Logical connection at application layer

25. What is a primary function of the trailer information added by the data link layer encapsulation?

A. Supports error detection

B. Identifies the devices on the local network

C. Ensures ordered arrival of data

D. Provides delivery to correct destination

26. HUB is a _____ device and Switch is a _____ device.

A. Unicast, Multicast

B. Broadcast, Unicast

C. Multicast, Unicast

D. None of Above

27. How do TCP and UDP differ in the way that they establish a connection between two endpoints?
    a. TCP uses synchronization packets, and UDP uses acknowledgment packets
    b. UDP uses SYN, SYN ACK and FIN bits in the frame header while TCP uses SYN, SYN ACK and ACK bits
    c. TCP uses the three-way handshake and UDP does not guarantee message delivery
    d. UDP provides reliable message transfer and TCP is a connectionless protocol

28. In mesh topology, devices are connected via
    A. Multipoint link
    B. No Link
    C. Point to point link
    D. None of the above

29. What are the disadvantages of hybrid topology?
    A. Designing is complex
    B. Require more time for installation
    C. Costliest process
    D. Both A and C

30. How many cables and ports are required for a star topology?
    A. 10 ports and 5 cables
    B. 30 ports and 5 cables
    C. 20 ports and 5 cables
    D. 50 ports and 5 cables

31. _____on an Ethernet network is the retransmission delay that's enforced when a collision occurs.
    A. Carrier sense
    B. Forward delay
    C. Jamming
    D. Backoff

32. In the accompanying graphic, what is the name for the section of the MAC address marked as unknown?

Example: 0000.0c12.3456

A. OUI

B. IOS

C. OSI

D. ISO

33. In the Ethernet frame shown here, what is the function of the section labeled "FCS"?

Preamble 7 bytes	SFD 1 byte	Destination 6 bytes	Source 6 bytes	Type 2 bytes	Data and Pad 46 – 1500 bytes	FCS 4 bytes

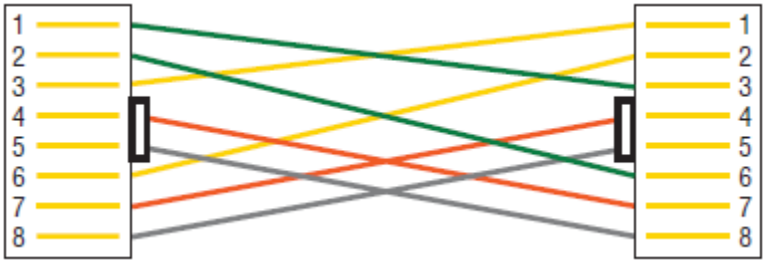
A. Allows the receiving devices to lock the incoming bit stream.

B. Error detection

C. Identifies the upper-layer protocol

D. Identifies the transmitting device

34. What type of cable uses the pinout shown here?



a.

b.

c.

a. Fiber optic

b. Straight-through FastEthernet

c. Crossover Gigabit Ethernet cable

d. Coaxial

35. Which of the following is not one of the actions taken in the operation of CSMA/CD when a collision occurs?

A. The collision invokes a random back off algorithm on the systems involved in the collision.
B. A jam signal informs all devices that a collision occurred.
C. Each device on the Ethernet segment stops transmitting for a short time until their back off timers expire.
D. All hosts have equal priority to transmit after the timers have expired.

36. The cable used to connect to the console port on a router or switch is called a _____ cable.
A. Crossover
B. Straight-through
C. Rollover
D. Full-duplex

37. Which of the following statements is not true with regard to layer 2 switching?
A. Layer 2 switches look at the frame's hardware addresses before deciding to either forward, flood, or drop the frame.
B. Layer 2 switches and bridges are faster than routers because they don't take up time looking at the Data Link layer header information.
C. Switches create private, dedicated collision domains and provide independent bandwidth on each port.
D. Switches use application-specific integrated circuits (ASICs) to build and maintain their MAC filter tables.

38. The conference room has a switch port available for use by the presenter during classes, and each presenter uses the same PC attached to the port. You would like to prevent other PCs from using that port. You have completely removed the former configuration in order to start anew. Which of the following steps is not required to prevent any other PCs from using that port?
A. Enable port security.
B. Make the port a trunk port.
C. Assign the MAC address of the PC to the port.
D. Make the port an access port.

39. Which statement is true regarding virtual local area networks (VLANs)?
A. VLANs are location dependent.
B. VLANs are limited to a single switch.
C. VLANs define collision domains.

D. None of the above

40. What must happen if a DHCP IP conflict occurs?
    A. The administrator must fix the conflict by hand at the DHCP server.
    B. Proxy ARP will fix the issue.
    C. The client uses a gratuitous ARP to fix the issue.
    D. The DHCP server will reassign new IP addresses to both computers.
41. Which of the following mechanisms is used by the client to avoid a duplicate IP address during the DHCP process?
    A. gratuitous arp
    B. ping
    C. traceroute
    D. pathping
42. Which of the following describe the DHCP Discover message?
    A. It uses FF:FF:FF:FF:FF:FF as a layer 2 broadcast.
    B. It uses UDP as the Transport layer protocol.
    C. It uses TCP as the Transport layer protocol.
    D. A and B
43. Which one of the following is private IP address?
    A. 12.0.0.1
    B. 168.172.19.39
    C. 172.20.14.36
    D. 172.33.194.30
44. Which statement is true regarding ICMP packets?
    A. ICMP is encapsulated within UDP datagrams.
    B. ICMP guarantees datagram delivery.
    C. ICMP can provide hosts with information about network problems.
    D. ICMP is encapsulated within TCP datagrams.
45. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?
    A. 30
    B. 16

C. 15

D. 14

46. You have a network that needs 29 subnets while maximizing the number of host addresses available on each subnet. How many bits must you borrow from the host field to provide the correct subnet mask?

A. 2

B. 5

C. 3

D. 4

47. Which of the following statement describe the IP address 10.16.3.65/23?

A. The lowest host address in the subnet is 10.16.2.1 255.255.254.0.

B. The last valid host address in the subnet is 10.16.2.254 255.255.254.0.

C. The broadcast address of the subnet is 10.16.3.255 255.255.254.0.

D. A and C

48. Which mask should you use on point-to-point WAN links in order to reduce the waste of IP addresses?

A. /27

B. /28

C. /29

D. /30

49. You have a network with a subnet of 172.16.17.0/22. Which is the valid host address?

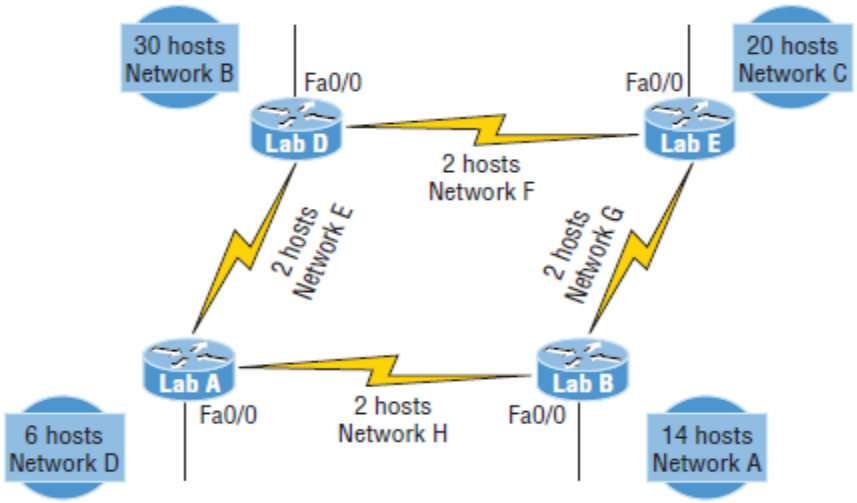
A. 172.16.0.1 255.255.240.0

B. 172.16.20.1 255.255.254.0

C. 172.16.18.255 255.255.252.0

D. 172.16.0.1 255.255.255.0

50. In the diagram below, in order to have as efficient IP addressing as possible, which network should use a /28 mask?



A. B

B. C

C. D

D. A

51. What summary address would cover all the following networks (172.16.1.0/24, 172.16.10.0/24, 172.16.5.0/24, 172.16.15.0/24, 172.16.7.0/24, 172.16.11.0/24, 172.16.6.0/24) and advertise a single, efficient route to other routers that won't advertise more networks than needed?

A. 172.16.0.0/20

B. 172.16.0.0/22

C. 172.16.1.0/21

D. 172.16.0.0/19

52. Suppose Host A is configured with an incorrect default gateway and all other computers and the router are known to be configured correctly, which of the following statements is true?

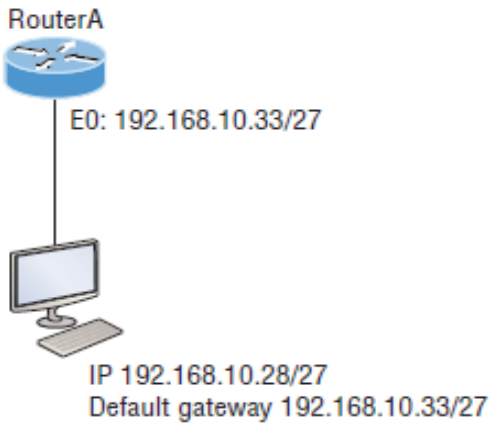
A. Host A cannot communicate with other hosts in the same subnet.

B. Host A can communicate with hosts in other subnets.

C. Host A cannot communicate with the router.

D. Host A can communicate with no other systems.

53. In the diagram below what is the most likely reason the station cannot ping outside of its network?



A. The IP address is incorrect on E0 of the router.
B. The default gateway address is incorrect on the station.
C. The router is malfunctioning.
D. The IP address on the station is incorrect.

54. Which of the following troubleshooting steps, if completed successfully, also confirms the other steps will succeed as well?

A. ping the loopback address
B. ping a remote computer
C. ping the NIC
D. ping the default gateway

55. Which of the following is the best summarization of the following networks: 192.168.128.0 through 192.168.159.0

A. 192.168.0.0/24
B. 192.168.128.0/19
C. 192.168.128.0/16
D. 192.168.128.0/20

56. Refer to the exhibit. The router has been configured with a supernet to accommodate the requirement for 380 users on a subnet. The requirement already considers 30% future growth. Which configuration verifies the IP subnet on router R4?

A. Subnet: 10.7.54.0
   Subnet mask: 255.255.254.0
   Broadcast address: 10.7.54.255
   Usable IP address range: 10.7.54.1 – 10.7.55.254

B. Subnet: 10.7.54.0
   Subnet mask: 255.255.128.0
   Broadcast address: 10.7.55.255
   Usable IP address range: 10.7.54.1 – 10.7.55.254

C. Subnet: 10.7.54.0
   Subnet mask: 255.255.255.0
   Broadcast address: 10.7.54.255
   Usable IP address range: 10.7.54.1 – 10.7.55.254

D. Subnet: 10.7.54.0
   Subnet mask: 255.255.254.0
   Broadcast address: 10.7.55.255
   Usable IP address range: 10.7.54.1 – 10.7.55.254

57. Which of the following is a disadvantage of using NAT?

A. NAT causes loss of end-to-end IP traceability.
B. NAT increases flexibility when connecting to the Internet.
C. NAT reduces address overlap occurrence.
D. None of the above

58. What is the difference in data transmission delivery and reliability between TCP and UDP?

A. TCP requires the connection to be established before transmitting data. UDP transmits data at a higher rate without ensuring packet delivery.

B. UDP sets up a connection between both devices before transmitting data. TCP uses the three-way handshake to transmit data with a reliable connection.

C. TCP transmits data at a higher rate and ensures packet delivery. UDP retransmits lost data to ensure applications receive the data on the remote end.

D. UDP is used for multicast and broadcast communication. TCP is used for unicast communication and transmits data at a higher rate with error checking.

59. Which protocol requires authentication to transfer a backup configuration file from a router to a remote server?

A. TFTP

B. FTP

C. DTP

D. SMTP

60. The following situations can not use full-duplex.

A. connection from a switch to a switch

B. connection from a router to a router

C. connection from a host to a host

D. a connection from a host to a hub

61. Which category UTP cable will transmit data up to 100 Mbps?

A. CAT 7

B. CAT 6

C. CAT 5

D. CAT 4

62. Which of the following devices modulates digital signals into analog signals that can be sent over traditional telephone lines?

A. Router

B. Switch

C. Gateway

D. Modem

63. Which action implements physical access control as part of the security program of an organization?

A. backing up syslogs at a remote location

B. configuring enable passwords on network devices
C. setting up IP cameras to monitor key infrastructure
D. configuring a password for the console port

64. What is the difference regarding reliability and communication type between TCP and UDP?
A. TCP is not reliable and is a connection-oriented protocol; UDP is reliable and is a connectionless protocol
B. TCP is reliable and is a connection-oriented protocol UDP is not reliable and is a connectionless protocol
C. TCP is not reliable and is a connectionless protocol; UDP is reliable and is a connection-oriented protocol
D. TCP is reliable and is a connectionless protocol; UDP is not reliable and is a connection-oriented protocol

65. Which characteristic differentiates the concept of authentication from authorization and accounting?
A. user-activity logging
B. service limitations
C. identity verification
D. consumption-based billing

66. An email message goes through encapsulations in the sequence of _____ before it is released to the network.
A. segment–frame–packet
B. frame–segment–packet
C. segment–packet–frame
D. packet–segment–packet

67. The _____ bit in the TCP header is used to request handshaking.
A. FIN
B. SYN
C. ACK
D. CON

68. The end-to-end error control and flow control are performed in the _____ layer.
A. application

B. transport
C. internet
D. session

69. How do TCP and UDP differ in the way they provide reliability for delivery of packets?
    A. TCP is a connectionless protocol that does not provide reliable delivery of data, UDP is a connection-oriented protocol that uses sequencing to provide reliable delivery
    B. TCP does not guarantee delivery or error checking to ensure that there is no corruption of data UDP provides message acknowledgement and retransmits data if lost
    C. TCP uses windowing to deliver packets reliably; UDP provides reliable message transfer between hosts by establishing a three-way handshake
    D. TCP provides flow control to avoid overwhelming a receiver by sending too many packets at once, UDP sends packets to the receiver in a continuous stream without checking for sequencing
70. How do TCP and UDP differ in the way they guarantee packet delivery?
    A. TCP uses two-dimensional parity checks, checksums, and cyclic redundancy checks and UDP uses retransmissions only.
    B. TCP uses checksum, acknowledgement, and retransmissions, and UDP uses checksums only.
    C. TCP uses checksum, parity checks, and retransmissions, and UDP uses acknowledgements only.
    D. TCP uses retransmissions, acknowledgement and parity checks and UDP uses cyclic redundancy checks only.
71. Which type of network attack overwhelms the target server by sending multiple packets to a port until the half-open TCP resources of the target are exhausted?
    A. reflection
    B. SYN flood
    C. teardrop
    D. amplification
72. When a client and server are not on the same physical network, which device is used to forward requests and replies between client and server for DHCP?
    A. DHCP server

B. DHCP relay agent
C. DHCPDISCOVER
D. DHCPOFFER

73. An implementer is preparing hardware for virtualization to create virtual machines on a host. What is needed to provide communication between hardware and virtual machines?
A. hypervisor
B. straight cable
C. router
D. switch

74. On workstations running Microsoft Windows, which protocol provides the default gateway for the device?
A. STP
B. DNS
C. DHCP
D. SNMP

75. What is a function of TFTP in network operations?
A. transfers a configuration files from a server to a router on a congested link
B. transfers a backup configuration file from a server to a switch using a username and password
C. transfers files between file systems on a router
D. transfers IOS images from a server to a router for firmware upgrades

76. Which condition must be met before an NMS handles an SNMP trap from an agent?
A. The NMS must be configured on the same router as the SNMP agent
B. The NMS must receive a trap and an inform message from the SNMP agent within a configured interval
C. The NMS software must be loaded with the MIB associated with the trap
D. The NMS must receive the same trap from two different SNMP agents to verify that it is reliable

77. In quality of service (QoS), which prioritization method is appropriate for interactive voice and video?
A. expedited forwarding

B. traffic policing
C. low-latency queuing
D. round-robin scheduling

78. What are two characteristics of a public cloud implementation?
A. It enables an organization to fully customize how it deploys network resources
B. It is a data center on the public Internet that maintains cloud services for only one company
C. It is owned and maintained by one party, but it is shared among multiple organizations
D. It supports network resources from a centralized third-party provider and privately-owned virtual resources

79. What is a capability of FTP in network management operations?
A. devices are directly connected and use UDP to pass file information
B. encrypts data before sending between data resources
C. offers proprietary support at the session layer when transferring data
D. uses separate control and data connections to move files between server and client

80. What is a DNS lookup operation?
A. serves requests over destination port 53
B. DNS server pings the destination to verify that it is available
C. DNS server forwards the client to an alternate IP address when the primary IP is down
D. responds to a request for IP address to domain name resolution to the DNS server

81. If a host computer develops a TCP segment with 80 as the source port and 54399 as the destination port, the host is most likely a _____.
A. client PC
B. DHCP server
C. DNS server
D. webserver

82. Choose a mismatch between a standard and its corresponding layer.
A. Ethernet = data link layer
B. Digital signal encoding = physical layer
C. Domain Name System (DNS) = application layer
D. Dynamic Host Configuration Protocol (DHCP) = internet layer

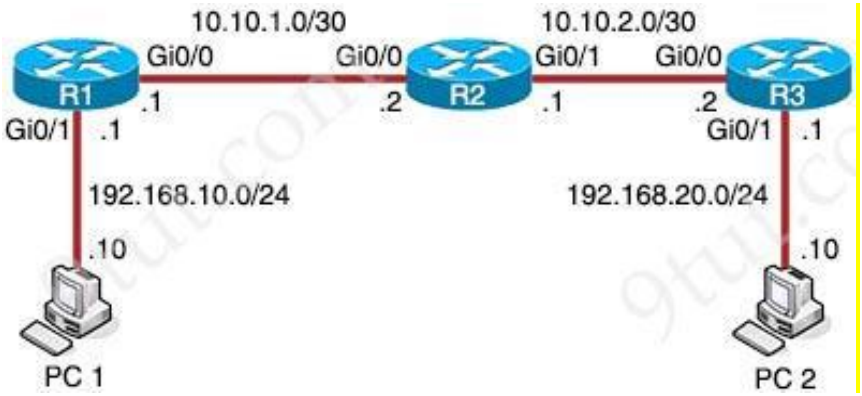
83. When the command “ping www.gmail.com” is issued, at least two protocols are necessary to obtain the intended information. What are they?
    A. DHCP and UDP
    B. HTTP and DHCP
    C. DNS and ICMP
    D. DNS and HTTP
84. Using direct sequence spread spectrum, which three 2.4-GHz channels are used to limit collisions?
    A. 1,6,11
    B. 1,5,10
    C. 1,2,3
    D. 5,6,7
85. What is a recommended approach to avoid co-channel congestion while installing access points that use the 2.4 GHz frequency?
    A. different non-overlapping channels
    B. one non-overlapping channel
    C. one overlapping channel
    D. different overlapping channels
86. Which interface mode must be configured to connect the lightweight APs in a centralized architecture?
    A. WLAN dynamic
    B. management
    C. trunk
    D. access
87. Which value is the unique identifier that an access point uses to establish and maintain wireless connectivity to wireless network devices?
    A. VLANID
    B. RFID
    C. SSID
    D. WLANID
88. Which application layer protocol uses the SSL?

A. HTTPS
B. HTTP
C. SSH
D. Telnet

89. An email user has been lured into clicking a link in an email sent by their company's security organization. The webpage that opens reports that it was safe but the link could have contained malicious code. Which type of security program is in place?
A. user awareness
B. Physical access control
C. Social engineering attack
D. brute force attack

90. When a site-to-site VPN is used, which protocol is responsible for the transport of user data?
A. IKEv2
B. IKEv1
C. MD5
D. IPsec

91. Refer to the exhibit. When PC 1 sends a packet to PC2, the packet has which source and destination IP address when it arrives at interface Gi0/0 on router R2?



A. source 192.168.10.10 and destination 10.10.2.2
B. source 192.168.20.10 and destination 192.168.20.1
C. source 192.168.10.10 and destination 192.168.20.10
D. source 10.10.1.1 and destination 10.10.2.2

92. Which attribute does a router use to select the best path when two or more different routes to the same destination exist from two different routing protocols?

A. dual algorithm
B. hop count
C. metric
D. administrative distance

93. A packet is destined for 10.10.1.22. Which static route does the router choose to forward the packet?
A. ip route 10.10.1.0 255.255.255.240 10.10.255.1
B. ip route 10.10.1.20 255.255.255.252 10.10.255.1
C. ip route 10.10.1.16 255.255.255.252 10.10.255.1
D. ip route 10.10.1.20 255.255.255.254 10.10.255.1

94. Which statement about the nature of NAT overload is true?
A. applies a one-to-one relationship to internal IP addresses
B. applies a many-to-many relationship to internal IP addresses
C. can be configured only on Gigabit interface
D. applies a one-to-many relationship to internal IP addresses

95. Which IPv6 address type provides communication between subnets and cannot route on the Internet?
A. unique local
B. global unicast
C. link-local
D. multicast

96. Which IPv6 address block forwards packets to a multicast address rather than a unicast address?
A. 2000::/3
B. FF00::/8
C. FC00::/7
D. FE80::/10

97. Which action must be taken to assign a global unicast IPv6 address on an interface that is derived from the MAC address of that interface?
A. configure a stateful DHCPv6 server on the network
B. enable SLAAC on an interface
C. disable the EUI-64 bit process

D. explicitly assign a link-local address

98. What is the expected outcome when an EUI-64 address is generated?

A. The interface ID is configured as a random 64-bit value

B. The characters FE80 are inserted at the beginning of the MAC address of the interface

C. The seventh bit of the original MAC address of the interface is inverted

D. The MAC address of the interface is used as the interface ID without modification

99. Which type of IPv6 address is publicly routable in the same way as IPv4 public addresses?

A. global unicast

B. multicast

C. unique local

D. link-local

100. The Organizationally Unique Identifier (OUI) is an element of _____.

A. public addresses

B. IP addresses

C. MAC addresses

D. global addresses