



# JAMMU AND KASHMIR PUBLIC SERVICE COMMISSION

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**Subject: Written Examination for the post of Assistant Professor (Computer Applications) in Higher Education Department - Provisional Answer Key thereof.**

**Notification No. PSC/Exam/S/2024/49**

**Dated: 29.08.2024**

In pursuance of Rule 10(c) of the Jammu & Kashmir Public Service Commission (Conduct of Examination) Rules, 2022, as amended upto date, the Provisional Answer Key of Question Paper pertaining to the written examination for the post of **Assistant Professor (Computer Applications) in Higher Education Department held on 29.08.2024**, is hereby notified for seeking objections from candidates.

## Provisional Answer Key

### **Assistant Professor (Computer Applications)**

Test Booklet Question No. (Series A)	
Q1.	A
Q2.	B
Q3.	B
Q4.	A
Q5.	C
Q6.	B
Q7.	D
Q8.	B
Q9.	B
Q10.	C
Q11.	A
Q12.	A
Q13.	D
Q14.	B
Q15.	D

Test Booklet Question No. (Series A)	
Q16.	B
Q17.	A
Q18.	C
Q19.	B
Q20.	B
Q21.	D
Q22.	C
Q23.	B
Q24.	D
Q25.	B
Q26.	D
Q27.	A
Q28.	C
Q29.	C
Q30.	B

Test Booklet Question No. (Series A)	
Q31.	B
Q32.	D
Q33.	A
Q34.	C
Q35.	C
Q36.	A
Q37.	B
Q38.	B
Q39.	A
Q40.	B
Q41.	D
Q42.	A
Q43.	B
Q44.	C
Q45.	D

Test Booklet Question No. (Series A)	
Q46.	D
Q47.	C
Q48.	B
Q49.	B
Q50.	A
Q51.	B
Q52.	A
Q53.	B
Q54.	B
Q55.	C
Q56.	C
Q57.	B
Q58.	B
Q59.	A
Q60.	C
Q61.	B
Q62.	A
Q63.	A
Q64.	B
Q65.	C
Q66.	A
Q67.	D
Q68.	C
Q69.	C
Q70.	B

Test Booklet Question No. (Series A)	
Q71.	B
Q72.	A
Q73.	A
Q74.	A
Q75.	C
Q76.	A
Q77.	D
Q78.	A
Q79.	A
Q80.	D
Q81.	A
Q82.	A
Q83.	A
Q84.	C
Q85.	A
Q86.	A
Q87.	A
Q88.	A
Q89.	B
Q90.	B
Q91.	B
Q92.	B
Q93.	B
Q94.	B
Q95.	B

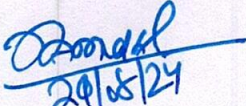
Test Booklet Question No. (Series A)	
Q96.	D
Q97.	A
Q98.	A
Q99.	D
Q100.	D
Q101.	A
Q102.	A
Q103.	B
Q104.	D
Q105.	B
Q106.	A
Q107.	A
Q108.	B
Q109.	A
Q110.	D
Q111.	D
Q112.	C
Q113.	B
Q114.	A
Q115.	B
Q116.	B
Q117.	C
Q118.	B
Q119.	C
Q120.	A

The candidates are advised to refer to **Question Booklet (Series A)** to match the corresponding question(s) in their respective Question Booklet Series and if any candidate feels that the key to any of the question(s) is/are wrong, he/she may represent on prescribed format/proforma annexed as **Annexure-A** along with the documentary proof/evidence (**hard copies only**) and fee of Rs.500/- per question in the form of Demand Draft drawn in favour of **COE, J&K PSC** (refundable in case of genuine/correct representation) to the Controller of Examinations, Jammu & Kashmir Public Service Commission, from 30.08.2024 to 03.09.2024. **The candidates are further advised to clearly mention the question(s) objected to with reference to its serial number as it appears in the Question Booklet of Series A of the provisional answer key.**

Further, any objection/application not accompanied by the requisite Demand Draft of Rs.500/- as prescribed, shall not be considered/entertained under any circumstances. Candidates are, in their own interest, advised to adhere to these instructions and not submit any objection unaccompanied by the Demand Draft as required under extant rules.

The Commission shall not entertain any such representation(s) after the expiry of the stipulated period i.e. **after 03.09.2024 (Tuesday), 05.00 pm.**

The provisional answer key(s) are available on the website of the Commission <http://www.jkpsc.nic.in>.

  
29/08/24

**(Sachin Jamwal) JKAS**

Controller of Examinations

J&K Public Service Commission



Dated: 29.08.2024

No. PSC/Ex-Secy/2024/09

Copy to the: -

1. Director, Information and Public Relations, J&K for publication of the notice in all leading newspapers published from Jammu/Srinagar.
2. P.S. to Hon'ble Chairman, J&K Public Service Commission for information of the Hon'ble Chairman.
3. P.S. to Hon'ble Member, Shri \_\_\_\_\_ for information of the Hon'ble Member.
4. P. A. to Secretary, J&K Public Service Commission for information of the Secretary.
5. Main file/Stock file/Notice Board.

**Annexure-A**

Representation regarding objection(s) to any Question/Answer pertaining to the Written Test conducted for the post of Assistant Professor (Computer Applications) in Higher Education Department on 29.08.2024

**(NOTE: USE SEPARATE FORMS FOR SEPARATE QUESTIONS)**

Discipline : \_\_\_\_\_ Computer Applications \_\_\_\_\_

Name of the Applicant : \_\_\_\_\_

Roll No. : \_\_\_\_\_

Correspondence Address : \_\_\_\_\_

Contact/Mobile No. : \_\_\_\_\_

Date of Application: \_\_\_\_\_ .2024 \_\_\_\_\_

Demand Draft No. date : \_\_\_\_\_

Candidates Account No.(16 digit) & IFSC Code : \_\_\_\_\_

Question No. in Series A	Details of the Objection	Resource Material (copy to be enclosed)	Details of the Website (if any)
<b><u>Correct Answer/Option as per candidate :</u></b>			

**Signature of the Candidate**

Note : Application for each question/answer shall be made on separate page in the given format, otherwise the first question entered in the format shall only be considered.

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DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

Booklet Serial No. **222005**

Test Booklet Series

**TEST BOOKLET**  
**ASSISTANT PROFESSOR COMPUTER APPLICATIONS**

**Written Test - 2024**  
**(36)**

**A**

*Time Allowed: Three Hours*

*Maximum Marks: 120*

**INSTRUCTIONS**

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside.   
**DO NOT write anything else** on the Test Booklet.
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*
6. *All* items carry equal marks.
7. Before you proceed to mark in the Answer /Response Sheet, the response to various items in the Test Booklet, you have to fill in some particulars in the Answer /Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer /Response Sheet**. You are permitted to take away with you the Test Booklet and **Candidate's Copy of the Response Sheet**.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. While writing Centre, Subject and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use "**ONLY BALL POINT PEN**".
11. **Penalty for wrong answers:**  
**THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTIONS PAPERS).**
  - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(0.25)** of the marks assigned to that question will be deducted as penalty.
  - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
  - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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(36)(A)/2024

[P.T.O.]

(36)(A)

(2)

1. Which rule is used in the following argument?

“All students in this science class have taken a course in physics” and “Marry is a student in this class” imply the conclusion “Marry has taken a course in physics.”

- A) Universal instantiation
- B) Universal generalization
- C) Existential instantiation
- D) Existential generalization

2. Let P: ‘This is a great website’ and Q: ‘You should not come back here’. Then ‘This is a great website and you should come back here’ is best represented by\_\_\_\_\_.

- A)  $\sim P \vee \sim Q$
- B)  $P \wedge \sim Q$
- C)  $P \vee Q$
- D)  $P \wedge Q$

3. A complete undirected graph of  $n$  nodes can have maximum \_\_\_\_\_ spanning trees.

- A)  $n^{n+1}$
- B)  $n^{n-2}$
- C)  $n(n+1)^2$
- D)  $n$

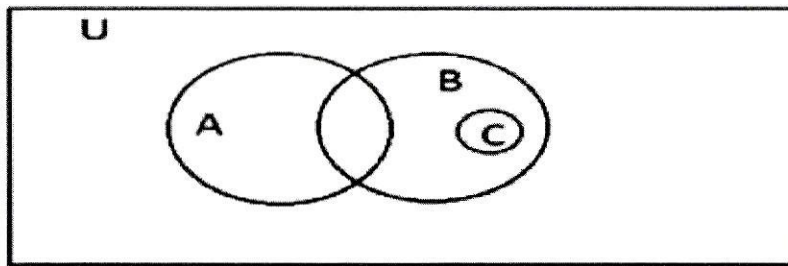
4. What is the postfix expression of  $(A+B)-C*(D/E))+F$ ?

- A)  $AB+CDE/*-F+$
- B)  $ABCDE+/*F-+$
- C)  $ABC+*DE/F+-$
- D)  $AB+C-*DE/F+$

5. What is the number of vertices in an undirected connected graph with 39 edges, 7 vertices of degree 2, 2 vertices of degree 5 and remaining of degree 6?
- A) 11  
 B) 14  
 C) 18  
 D) 19
6. According to the principle of Mathematical Induction, if  $P(k+1) = m^{(k+1)} + 5$  is true then \_\_\_\_\_ must be true.
- A)  $P(k) = 3m^{(k)}$   
 B)  $P(k) = m^{(k)} + 5$   
 C)  $P(k) = m^{(k+2)} + 5$   
 D)  $P(k) = m^{(k)}$
7. If  $G$  is a simple graph with  $n$  vertices and  $n \geq 3$ , the condition for  $G$  to have a Hamiltonian circuit is \_\_\_\_\_.
- A) the degree of each vertex is at most  $n/2$   
 B) the degree of each vertex is equal to  $n$   
 C) the degree of every vertex is at least  $n+1/2$   
 D) the degree of every vertex in  $G$  is at least  $n/2$
8. The number of edges in a complete graph of order 9 is \_\_\_\_\_.
- A) 35  
 B) 36  
 C) 45  
 D) 19
9. In a complete bipartite graph, the intersection of two sub-graphs is \_\_\_\_\_.
- A) 1  
 B) null  
 C)  $2^{10}$   
 D) 412



10. Consider a set  $A = \{1, 2, 3\}$ . The binary relation defined on  $A$  is  $\{(1,1), (2,1), (2,2), (2,3), (3,1), (3,2)\}$ . Accordingly,  $A$  can be regarded as \_\_\_\_\_.
- A) Reflexive, symmetric and transitive  
 B) Irreflexive, symmetric and transitive  
 C) Neither reflexive, symmetric and transitive  
 D) Irreflexive and antisymmetric
11. If  $f(x) = (x^3 - 1) / (3x + 1)$  then complexity of  $f(x)$  is \_\_\_\_\_.
- A)  $O(x^2)$   
 B)  $O(x)$   
 C)  $O(x^2 / 3)$   
 D)  $O(1)$
12. In the given figure, if  $n(A) = 20$ ,  $n(U) = 50$ ,  $n(C) = 10$  and  $n(A \cap B) = 5$  then find  $n(B)$ .



- A) 35  
 B) 20  
 C) 30  
 D) 10
13. Which of the following sets is not empty?
- A)  $\{x : x \text{ is an even prime greater than } 3\}$   
 B)  $\{x : x \text{ is a multiple of } 2 \text{ and is odd}\}$   
 C)  $\{x : x \text{ is an even number and } x+3 \text{ is even}\}$   
 D)  $\{x : x \text{ is a prime number less than } 5 \text{ and is odd}\}$

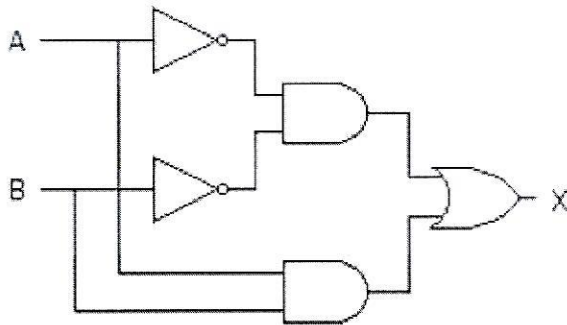
14. For an inverse to exist, a function must be \_\_\_\_\_.
- injective
  - bijjective
  - surjective
  - None of the above
15. "The product of two negative real numbers is not negative." This statement can be represented as:
- $\exists x \forall y ((x < 0) \wedge (y < 0) \rightarrow (xy > 0))$
  - $\exists x \exists y ((x < 0) \wedge (y < 0) \wedge (xy > 0))$
  - $\forall x \exists y ((x < 0) \wedge (y < 0) \wedge (xy > 0))$
  - $\forall x \forall y ((x < 0) \wedge (y < 0) \rightarrow (xy > 0))$
16. How many unique colours will be required for proper vertex colouring of an empty graph with  $n$  vertices?
- 0
  - 1
  - 2
  - $n$
17. A factory makes sports vehicles at an increasing rate. In the first month, only one vehicle is made. In the second month, two vehicles are made, and so on, with  $n$  vehicles made in the  $n^{\text{th}}$  month. Which of the following is the correct recurrence relation for the number of vehicles this factory produces in the first  $n$  months?
- $A_n = A_{n-1} + n$
  - $A_n = A_n + A_{n-1}$
  - $A_n = n \cdot A_n + A_{n-1}$
  - $A_n = A_{n-1} * A_n$
18. If  $G_1$  contains all the vertices of  $G$ , it is called a \_\_\_\_\_ subgraph of  $G$ .
- Isomorphic
  - Homeomorphic
  - Spanning
  - None of the above

19. The VLIW architecture follows \_\_\_\_\_ approach to achieve parallelism.
- A) SISD
  - B) MIMD
  - C) MISD
  - D) SIMD
20. The bus used to connect the monitor to the CPU is \_\_\_\_\_.
- A) PCI bus
  - B) SCSI bus
  - C) Memory bus
  - D) RAM bus
21. A computer uses a memory unit of 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an addressing mode field to specify one of the four addressing modes, an operation code, a register code part to specify one of the 128 registers and an address part. How many bits are needed to represent an operation code?
- A) 4
  - B) 7
  - C) 8
  - D) 5
22. Which of the following addressing modes are suitable for program relocation at run time?
- 1. Absolute Addressing
  - 2. Base Addressing
  - 3. Relative Addressing
  - 4. Indirect Addressing
- A) 1 and 4
  - B) 1 and 2
  - C) 2 and 3
  - D) 1, 2 and 4

23. \_\_\_\_\_ are capable of retaining their state as long as power is applied.

- A) Dynamic memory
- B) Static memory
- C) Register
- D) Cache

24. Which of the following logic expressions represents the logic diagram shown?



- A)  $X=AB'+A'B$
- B)  $X=(AB)'+AB$
- C)  $X=(AB)'+A'B'$
- D)  $X=A'B'+AB$

25. Which of the following combinations of logic gates can decode binary 1101?

- A) One 4-input AND gate
- B) One 4-input AND gate, one inverter
- C) One 4-input AND gate, one OR gate
- D) One 4-input NAND gate, one inverter

26. The fastest data access is provided using \_\_\_\_\_.

- A) Caches
- B) DRAM's
- C) SRAM's
- D) Registers

27. \_\_\_\_\_ is a computer system feature that allows hardware devices to transfer data between themselves and memory without involving the CPU.
- A) DMA
  - B) Arbitrator
  - C) User system programs
  - D) Kernel
28. In the zero-address instruction method, the operands are stored in \_\_\_\_\_.
- A) Registers
  - B) Accumulators
  - C) Push down stack
  - D) Cache
29. \_\_\_\_\_ is the method of synchronizing the processor with the I/O device in which the device sends a signal when it is ready.
- A) Exceptions
  - B) Signal handling
  - C) Interrupts
  - D) DMA
30. In IEEE 32-bit representations, the mantissa of the fraction occupy \_\_\_\_\_ bits.
- A) 24
  - B) 23
  - C) 20
  - D) 16

31. Which of the following architectures is power efficient?
- A) CISC
  - B) RISC
  - C) ISA
  - D) IANA
32. The \_\_\_\_\_ keyword is used to transfer control from a function back to the calling function.
- A) Switch
  - B) Goto
  - C) Go back
  - D) Return
33. In C++, how do structures and classes differ?
- A) In Structures, members are public by default whereas, in Classes, they are private by default.
  - B) In Structures, members are private by default whereas, in Classes, they are public by default.
  - C) Structures by default hide every member whereas classes do not.
  - D) Structures cannot have private members whereas classes can have.
34. Which of the following explains Polymorphism?
- A) `int func(int, int);`  
`float func1(float, float);`
  - B) `int func(int);`  
`int func(int);`
  - C) `int func(float);`  
`float func(int, int, char);`
  - D) `int func();`  
`int new_func();`
35. Which of the following shows multiple inheritance?
- A)  $A \rightarrow B \rightarrow C$
  - B)  $A \rightarrow B; A \rightarrow C$
  - C)  $A, B \rightarrow C$
  - D)  $B \rightarrow A$

36. Which of the following is not a type of Constructor?
- A) Friend constructor
  - B) Copy constructor
  - C) Default constructor
  - D) Parameterized constructor
37. Which of the following is correct?
- A) Base class pointer object cannot point to a derived class object
  - B) Derived class pointer object cannot point to a base class object
  - C) A derived class cannot have pointer objects
  - D) A base class cannot have pointer objects
38. Out of the following, which is not a member of the class?
- A) Static function
  - B) Friend function
  - C) Constant function
  - D) Virtual function
39. Which of the following is a correct identifier in C++?
- A) VAR\_1234
  - B) \$var\_name
  - C) 7VARNAME
  - D) 7var\_name
40. Which of the following provides a programmer with the facility of using the object of a class inside other classes?
- A) Inheritance
  - B) Composition
  - C) Abstraction
  - D) Encapsulation
41. Run-time polymorphism is implemented in C++ using \_\_\_\_\_.
- A) Using Inheritance
  - B) Using Virtual functions
  - C) Using Templates
  - D) Using Inheritance and Virtual functions

42. In which of the following mechanisms, does the calling function and the called function work on different copies of parameters passed?
- A) Call by value
  - B) Call by reference
  - C) Call by pointer
  - D) None of the above

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

```
#include <iostream>
using namespace std;
int main()
{
    try
    {
        try
        {
            throw 20;
        }
        catch (int n)
        {
            cout << "Inner Catch\n";
            throw;
        }
    }
    catch (int x)
    {
        cout << "Outer Catch\n";
    }
    return 0;
}
```

- A) Outer Catch
- B) Inner Catch  
Outer Catch
- C) Error
- D) Inner Catch



44. Which concept means adding new components to a program as it runs?

- A) Data hiding
- B) Dynamic binding
- C) Dynamic loading
- D) Dynamic typing

45. What is the value of p in the following C++ code snippet?

```
#include <iostream>
using namespace std;
int main()
{
    int p;
    bool a = true;
    bool b = false;
    int x = 10;
    int y = 5;
    p = ((x | y) + (a + b));
    cout << p;
    return 0;
}
```

- A) 12
- B) 0
- C) 2
- D) 16

46. Which one of the following given statements possibly contains the error?

- A) Select \* from emp where eid = 103;
- B) Select eid from emp where eid = 106;
- C) Select eid from emp;
- D) Select eid where eid = 109 and LName = 'Joe';

47. \_\_\_\_\_ commands can be used to delete a relation S from a database.

- A) Drop table S
- B) Drop relation S
- C) Drop S
- D) Delete Relation S

48. Which of the following refers to the collection of the information stored in a database at a specific time?
- A) Independence
  - B) Instance of the database
  - C) Schema
  - D) Data Domain
49. \_\_\_\_\_ operations do not preserve non-matched tuples in a relation.
- A) Left outer join
  - B) Inner join
  - C) Natural join
  - D) Right outer join
50. In the \_\_\_\_\_ normal form, a composite attribute is converted to individual attributes.
- A) First
  - B) Second
  - C) Third
  - D) Fourth
51. Materialised Views confirms that \_\_\_\_\_.
- A) View definition is kept stable
  - B) View definition is kept up-to-date
  - C) View definition is verified for error
  - D) View is deleted after a specified time
52. \_\_\_\_\_ states that only valid data will be written to the database.
- A) Consistency
  - B) Atomicity
  - C) Durability
  - D) Isolation
53. After groups have been recognized, SQL applies \_\_\_\_\_ predicates to allow aggregate functions.
- A) Where
  - B) Having
  - C) Group by
  - D) With
54. In SQL the statement `select * from P, Q` is equivalent to \_\_\_\_\_.
- A) `Select * from P natural join Q`
  - B) `Select * from P cross join Q`
  - C) `Select * from P union join Q`
  - D) `Select * from P inner join Q`

55. Triggers are not supported for \_\_\_\_\_.
- A) Delete
  - B) Update
  - C) Views
  - D) Insert
56. For like predicate in SQL, which of the following is true?
- i) % matches zero or more characters.
  - ii) \_ matches exactly one character.
- A) i only
  - B) ii only
  - C) i & ii
  - D) None of the mentioned
57. Select \_\_\_\_\_  
from faculty  
where DeptName= 'Computer Science';  
Which of the following should be used to find the mean salary?
- A) Mean(salary)
  - B) Avg(salary)
  - C) Sum(salary)
  - D) Count(salary)
58. \_\_\_\_\_ key is the one which is the primary key of one relation and is referenced in another relation.
- A) Foreign key
  - B) Primary key
  - C) References
  - D) Check constraint
59. Where is the operating system placed in the main memory?
- A) Either low or high memory (depending on the location of the interrupt vector)
  - B) In the low-memory
  - C) In the high-memory
  - D) None of the above
60. In a timeshare operating system, when the time slot assigned to a process is completed, the process switches from the current state to \_\_\_\_\_.
- A) Suspended state
  - B) Terminated state
  - C) Ready state
  - D) Blocked state

61. \_\_\_\_\_ option can be explicitly used in the NICE command to reduce the priority of any process.
- A) -a
  - B) -n
  - C) -o
  - D) -q
62. Cascade termination refers to the termination of all child processes if the parent process terminates \_\_\_\_\_.
- A) Normally or abnormally
  - B) Abnormally
  - C) Normally
  - D) None of the mentioned
63. Swapping \_\_\_\_\_ be done when a process has pending I/O, or has to execute I/O operations only into operating system buffers.
- A) must never
  - B) may be
  - C) can
  - D) must
64. For real-time operating systems, interrupt latency should be \_\_\_\_\_.
- A) zero
  - B) minimal
  - C) maximum
  - D) dependent on the scheduling
65. Thrashing \_\_\_\_\_ the CPU utilization.
- A) increases
  - B) keeps constant
  - C) decreases
  - D) None of the mentioned
66. If the semaphore value is negative, then \_\_\_\_\_.
- A) its magnitude is the number of processes waiting on that semaphore
  - B) it is invalid
  - C) no operation can be further performed on it until the signal operation is performed on it
  - D) None of the above

67. Two processes,  $P1$  and  $P2$ , need to access a critical section of code where  $w1$  and  $w2$  have shared variables (initialized to false). Consider the following synchronization construct used by the processes.

**Process P1 :**

```
while(true)
{
w1 = true;
while(w2 == true);
Critical section
w1 = false;
}
Remainder Section
```

**Process P2 :**

```
while(true)
{
w2 = true;
while(w1 == true);
Critical section
w2 = false;
}
Remainder Section
```

Which one of the following statements is TRUE about the above construct?

- A) It does not ensure mutual exclusion.
  - B) It does not ensure bounded waiting.
  - C) It requires that processes enter the critical section in strict alternation.
  - D) It does not prevent deadlocks but ensures mutual exclusion.
68. Segment replacement algorithms are more complex than page replacement algorithms because \_\_\_\_\_.
- A) Segments are better than pages.
  - B) Pages are better than segments.
  - C) Segments have variable sizes.
  - D) Segments have fixed sizes.

69. On storage media that use Constant Linear Velocity (CLV), the \_\_\_\_\_ is uniform.
- A) Density of bits on the disk
  - B) Density of bits per sector
  - C) Density of bits per track
  - D) None of the above
70. In the \_\_\_\_\_ algorithm, the disk arm starts at one end of the disk and moves toward the other end, servicing requests till the other end of the disk. At the other end, the direction is reversed and servicing continues.
- A) LOOK
  - B) SCAN
  - C) C-SCAN
  - D) C-LOOK
71. An \_\_\_\_\_ uniquely identifies processes and provides address space protection for that process.
- A) Address space locator
  - B) Address space identifier
  - C) Address process identifier
  - D) Process identifier
72. In multilevel feedback CPU scheduling algorithm, \_\_\_\_\_
- A) A process can move to a different classified Ready queue.
  - B) Classification of the Ready queue is permanent.
  - C) Processes are not classified into groups.
  - D) None of the above.
73. In UNIX, the return value for the fork system call is \_\_\_\_\_ for the child process and \_\_\_\_\_ for the parent process.
- A) A Negative integer, Zero
  - B) Zero, A Negative integer
  - C) Zero, A nonzero integer
  - D) A nonzero integer, Zero

74. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).

**Assertions (A):** Every general-purpose computer must have an operating system installed on it.

**Reason (R):** User and Computer can not communicate directly. In the light of the above statements, choose the correct answer from the options given below:

- A) Both A and R are true and R is the correct explanation for A.
- B) Both A and R are true and R is NOT the correct explanation for A.
- C) A is true but R is false.
- D) A is false but R is true

75. A process executes the following code:

```
fork ( ) ;
```

```
fork ( ) ;
```

```
fork ( ) ;
```

How many child processes will be created?

- A) 3
- B) 4
- C) 7
- D) 8

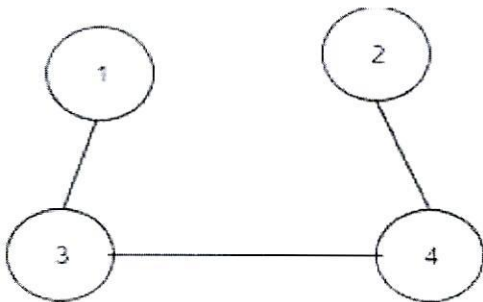
76. Which of the following is the most widely used external memory data structure?

- A) B-tree
- B) Red-black tree
- C) AVL tree
- D) Both AVL tree and Red-black tree

77. What is the most optimal and efficient data structure for solving the Tower of Hanoi problem?

- A) Tree
- B) Heap
- C) Priority queue
- D) Stack

78. Level order traversal of a tree can be done using \_\_\_\_\_.
- Breadth-first search
  - Depth-first search
  - Dijkstra's algorithm
  - Prims algorithm
79. What may be the pseudo-code for finding the number of nodes in a tree where `find_size` is a recursive function that returns the number of nodes in a subtree?
- `find_size(root_node -> left_node) + 1 + find_size(root_node -> right_node).`
  - `find_size(root_node -> left_node) + find_size(root_node -> right_node)`
  - `find_size(root_node -> right_node) - 1`
  - `find_size(root_node -> left_node) + 1`
80. The number of elements in the adjacency matrix of a graph having 7 vertices is \_\_\_\_\_.
- 7
  - 14
  - 36
  - 49
81. What would be the number of zeros in the adjacency matrix of the given graph?



- 10
- 6
- 16
- 0



82. The number of character comparisons done by the Knuth-Morris-Pratt Pattern Matching Algorithm is (where  $n$  is the length of the Text and  $m$  is the length of the pattern):
- A) atmost  $2*n$
  - B) atmost  $m+n$
  - C) atmost  $m*n$
  - D) atmost  $2*m$
83. What is the time complexity of the balancing parentheses algorithm?
- A)  $O(N)$
  - B)  $O(N \log N)$
  - C)  $O(M \log N)$
  - D)  $O(N^2)$
84. \_\_\_\_\_ is a state when several elements are competing for the same bucket in the hash table.
- A) Diffusion
  - B) Replication
  - C) Collision
  - D) Duplication
85. What is the relation between Sparsity and Density of a matrix?
- A) Sparsity =  $1 - \text{Density}$
  - B) Sparsity =  $1 + \text{Density}$
  - C) Sparsity =  $\text{Density} * \text{Total number of elements}$
  - D) Sparsity =  $\text{Density} / \text{Total number of elements}$
86. In the Linked List implementation of a queue, the important condition for a queue to be empty is \_\_\_\_\_.
- A) Both FRONT and REAR are null.
  - B) REAR is null but FRONT is not null.
  - C) FRONT is not null but REAR is null.
  - D) All of the above

87. What is the special property regarding the Root node in Red Black Tree?
- A) Root must be black in colour.
  - B) Root must be red in colour.
  - C) Root can be either red or black in colour.
  - D) None of the above
88. In case of a B Tree, which of the following is true?
- A) Greater the order of B-tree, the less frequently the split occurs.
  - B) Greater the order of B-tree, the more frequently the split occurs.
  - C) Smaller the order of B-tree, the more frequently the split occurs.
  - D) Smaller the order of B-tree, the less frequently the split occurs.
89. In a B\* tree, all nodes except the root node are required to be at least \_\_\_\_ full.
- A) one-third
  - B) two-third
  - C) one-fourth
  - D) three-fourth
90. In *randomized* version of Quick Sort, the pivot element selected is equally likely to be any one of the \_\_\_\_\_ elements in the subarray under consideration where  $p$  is the index number of the first and  $r$  is the index number of the last element of the subarray under consideration.
- A)  $r-p$
  - B)  $r-p+1$
  - C)  $r-p-1$
  - D) None of the above

91. Problems solvable in polynomial time are classified as \_\_\_\_\_.
- A) intractable
  - B) tractable
  - C) decision
  - D) complete
92. The sub-routine member function inside Radix Sort must possess which of the following properties for it to work correctly?
- A) In-place in nature
  - B) Quadratic running time
  - C) Stable in nature
  - D) All of the above
93. LEFT-ROTATE and RIGHT-ROTATE operations on Red-Black Trees may change \_\_\_\_\_.
- A) Only values inside nodes
  - B) Only pointers of the nodes
  - C) Both values and pointers
  - D) Neither values nor pointers
94. Which layer of the OSI reference model confirms the error-free transmission of data?
- A) Physical Layer
  - B) Data Link Layer
  - C) Network Layer
  - D) Transport Layer
95. If a link transmits 4000 frames per second, and each slot has 8 bits, what is the transmission rate of the circuit using TDM?
- A) 500kbps
  - B) 32kbps
  - C) 32bps
  - D) 500bps

96. Which of the following is the Network layer protocol?
- A) Hypertext transfer protocol
  - B) File transfer protocol
  - C) Ethernet
  - D) Internet protocol
97. What is the purpose of the Address Resolution Protocol?
- A) To map IP addresses to MAC addresses
  - B) To discover the default gateway
  - C) To resolve domain names to IP addresses
  - D) To establish a secure connection
98. \_\_\_\_\_ is a network routing method that quickly passes data packets from one node to another, even if the path isn't the shortest or most efficient.
- A) Hot potato routing
  - B) Flooding
  - C) Static routing
  - D) Delta routing
99. XYZ company has established a Local Area Network (LAN) in their downtown office and another LAN in their suburban manufacturing plant. To facilitate data sharing and resource access between the two separate LANs, what type of device(s) is required to establish a connection between them? Choose the most correct answer.
- A) Modem
  - B) Cable
  - C) Hub
  - D) Router

100. Sam has a class A network address 10.0.0.0 with 40 subnets and is required to add 60 new subnets very soon. He still wants to allow the largest possible host IDs per subnet. Which subnet mask should he assign?
- A) 255.240.0.0
  - B) 255.248.0.0
  - C) 255.252.0.0
  - D) 255.254.0.0
101. What is the Hamming distance between the words 1010101, and 1100110?
- A) 4
  - B) 5
  - C) 8
  - D) 3
102. For a 10Mbps Ethernet link, if the length of the packet is 32 bits, the transmission delay is \_\_\_\_\_ microseconds.
- A) 3.2
  - B) 32
  - C) 0.32
  - D) 320
103. In \_\_\_\_\_, the chance of collision can be reduced if a station senses the medium before trying to use it.
- A) MA
  - B) CSMA
  - C) FDMA
  - D) CDMA

104. Which one of the following is not a function of the Network layer?

- A) Routing
- B) Inter-networking
- C) Congestion control
- D) Error control

105. Which multiplexing technique is used to transmit digital signals?

- A) FDM
- B) TDM
- C) WDM
- D) FDM & WDM

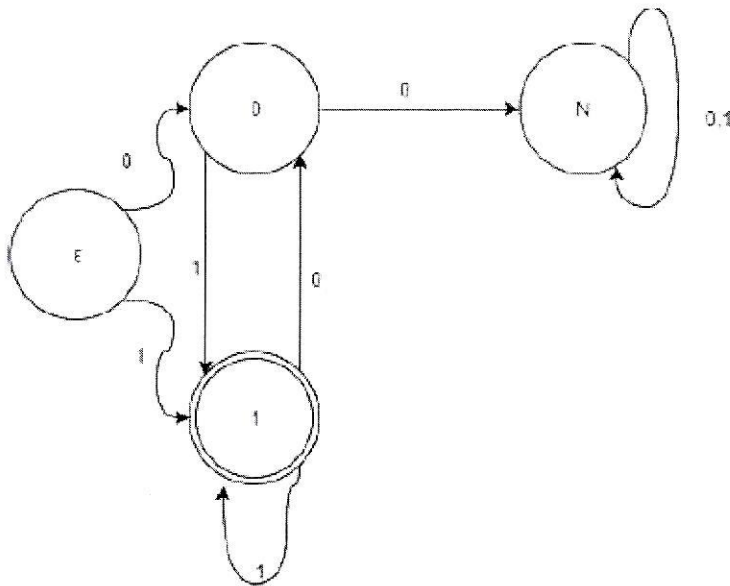
106. User Datagram Protocol is called connectionless because \_\_\_\_\_.

- A) All UDP packets are treated independently by the transport layer
- B) It sends data as a stream of related packets
- C) It is received in the same order as the sent order
- D) It sends data very quickly

107. Automatic Repeat Request error management mechanism is provided by \_\_\_\_\_.

- A) logical link control sublayer
- B) media access control sublayer
- C) network interface control sublayer
- D) application access control sublayer

108. Which of the following is the corresponding Language to the given DFA?



- A)  $L = \{x \in \{0, 1\}^* \mid x \text{ ends in } 1 \text{ and does not contain substring } 01\}$
- B)  $L = \{x \in \{0, 1\}^* \mid x \text{ ends in } 1 \text{ and does not contain substring } 00\}$
- C)  $L = \{x \in \{0, 1\}^* \mid x \text{ ends in } 1 \text{ and does not contain substring } 10\}$
- D)  $L = \{x \in \{0, 1\}^* \mid x \text{ ends in } 1 \text{ and does not contain substring } 11\}$

109. Given  $L = \{w \mid w \text{ ends with } 00\}$ , find the number of transitions required to automate  $L$  using only 3 states.

- A) 3
- B) 2
- C) 4
- D) Cannot be determined

110. For a given Turing Machine M, which of the following statements is undecidable?

- A) Does M halt on an empty input tape.
- B) Does M halt for any inputs at all?
- C) Is  $L(M)$  regular? Context free? Turing decidable?
- D) All of the above.

111. Given a Language  $L = \{x \in \{0,1\} \mid x \text{ is of length 4 or less}\}$ . Which among the following expressions does it correspond to?

- A)  $(0+1+0+1+0+1+0+1)^4$
- B)  $(0+1)^4$
- C)  $(01)^4$
- D)  $(0+1+\varepsilon)^4$

112. \_\_\_\_\_ is the most suitable data structure used to represent the derivations in the compiler.

- A) Queue
- B) Linked List
- C) Parse Tree
- D) Hash Tables

113. Which of the following does not have left recursions?

- A) Chomsky Normal Form
- B) Greibach Normal Form
- C) Backus Naur Form
- D) All of the mentioned



114. If T1 and T2 are two Turing machines. The composite can be represented using the expression:

- A)  $T_1T_2$
- B)  $T_1 \cup T_2$
- C)  $T_1 \times T_2$
- D) None of the above

115. An LALR(1) parser for a grammar G can have shift-reduce (S-R) conflicts if and only if \_\_\_\_\_.

- A) The SLR(1) parser for G has S-R conflicts
- B) The LR(1) parser for G has S-R conflicts
- C) The LR(0) parser for G has S-R conflicts
- D) The LALR(1) parser for G has reduce-reduce conflicts

116.  $(a+b)^*$  is equivalent to

- A)  $b^*a^*$
- B)  $(a^*b^*)^*$
- C)  $a^*b^*$
- D) None of the above

117. Consider the following two statements:

- P: Every regular grammar is LL(1)
- Q: Every regular set has a LR(1) grammar

Which of the following is TRUE?

- A) Both P and Q are true
- B) P is true and Q is false
- C) P is false and Q is true
- D) Both P and Q are false

118. Consider the grammar  $S \rightarrow (S) | a$

Let the number of states in SLR (1), LR (1) and LALR (1) parsers for the grammar be  $n_1$ ,  $n_2$  and  $n_3$  respectively. Which of the following relationship holds good?

- A)  $n_1 = n_2 = n_3$
- B)  $n_1 = n_3 < n_2$
- C)  $n_1 < n_2 < n_3$
- D)  $n_1 \geq n_3 \geq n_2$

119. In a bottom-up evaluation of a syntax-directed definition, inherited attributes can \_\_\_\_\_.

- A) always be evaluated
- B) never be evaluated
- C) be evaluated only if the definition has synthesized attributes
- D) be evaluated only if the definition is L-attributed

120. Which of the following properties is essential for a heuristic function  $h(n)$  to be admissible in the context of search algorithms like A\*?

- A)  $h(n)$  must never overestimate the cost to reach the goal
- B)  $h(n)$  must be equal to the actual cost from  $n$  to the goal
- C)  $h(n)$  must be non-decreasing along a path
- D)  $h(n)$  must be consistent, also known as monotonic

# ROUGH WORK

(36)(A)

(31)

[P.T.O.]

# ROUGH WORK

(36)(A)

(32)