1. Which of the given number has its IEEE-754 32-bit floating-point representation as (0 10000000 110 0000 0000 0000 0000 0000)

(a) 2.5 (b) 3.0

(c) 3.5 (d) 4.5

2. The range of integers that can be represented by an n-bit 2's complement number system is

(a) -2^{n-1} to $(2^{n-1}-1)$ (b) $-2(2^{n-1}-1)$ to $(2^{-n-1}-1)$

(c) -2^{n-1} to 2^{n-1} (d) $-2(2^{n-1}+1)$ to $(2^{n-1}-1)$

3. How many 32 K × 1 RAM chips are needed to provide a memory capacity of 256 K-bytes?

(a) 8 (b) 32

(c) 64 (d) 128

4. A modulus-12 ring counter requires a minimum of

(a) 10 flip-flops (b) 12 flip-flops

(c) 8 flip-flops (d) 6 flip-flops

5. The complement of the Boolean expression $AB(\overline{B}C + AC)$ is

(a) $(\overline{A} + \overline{B}) + (B + \overline{C}) \cdot (\overline{A} + \overline{C})$ (b) $(\overline{A} \cdot \overline{B}) + (B\overline{C} + \overline{A}\ \overline{C})$

(c) $(\overline{A} + \overline{B}) \cdot (B + \overline{C}) + (A + \overline{C})$ (d) $(A + B) \cdot (\overline{B} + C)(A + C)$

6. The code which uses 7 bits to represent a character is

(a) ASCII (b) BCD

(c) EBCDIC (d) Gray

7. If half adders and full adders are implements using gates, then for the addition of two 17 bit numbers (using minimum gates) the number of half adders and full adders required will be

(a) 0, 17 (b) 16, 1

(c) 1, 16 (d) 8, 8

8. Minimum number of 2 × 1 multiplexers required to realize the following function, $f = \overline{A}\,\overline{B}C + \overline{A}\,\overline{B}\,\overline{C}$.
Assume that inputs are available only in true form and Boolean a constant 1 and 0 are available.

(a) 1 (b) 2

(c) 3 (d) 7

9. The number of 1s in the binary representation of $(3 * 4096 + 15 * 256 + 5 * 16 + 3)$ are

(a) 8 (b) 9

(c) 10 (d) 12

10. The boolean expression $AB + AB' + A'C + AC$ is independent of the boolean variable

(a) A (b) B

(c) C (d) None of these

11. If the 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

(a) 2, 2, 1, 1, 2 (b) 2, 2, 1, 2, 2

(c) 2, 1, 2, 2, 1 (d) 2, 1, 2, 2, 2

12. A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately

(a) 50.2 sec (b) 6.7 sec

(c) 72.7 sec (d) 11.2 sec

13. Six files F1, F2, F3, F4, F5 and F6 have 100, 200, 50, 80, 120, 150 records respectively. In what order should they be stored so as to optimize act. Assume each file is accessed with the same frequency

(a) F3, F4, F1, F5, F6, F2

(b) F2, F6, F5, F1, F4, F3

(c) F1, F2, F3, F4, F5, F6

(d) Ordering is immaterial as all files are accessed with the same frequency

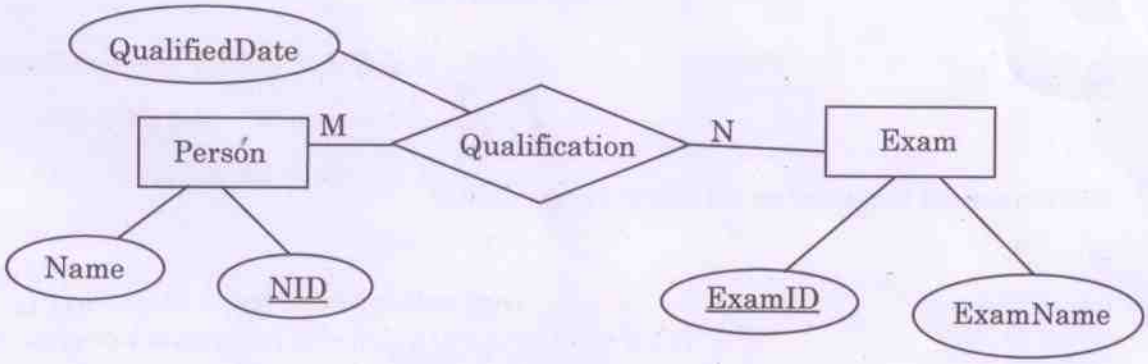
14. A hash table with 10 buckets with one slot per bucket is depicted in fig. The symbols, S1 and S7 are initially entered using a hashing function with linear probing. The maximum number of comparisons needed in searching an item that is not present is

0	S7
1	S1
2	
3	S4
4	S2
5	
6	S5
7	
8	S6
9	S3

(a) 4 (b) 5
(c) 6 (d) 3

15. The queue data structure is to be realized by using stack. The number of stacks needed would be
(a) It cannot be implemented (b) 2 stacks
(c) 4 stacks (d) 1 stack

16. Consider the following Entity Relationship Diagram (ERD)



Which of the following possible relations will not hold if the above ERD is mapped into a relation model?
(a) Person (NID, Name)
(b) Qualification (NID, ExamID, QualifiedDate)
(c) Exam (ExamID, NID, ExamName)
(d) Exam (ExamID, ExamName)

17. Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and, then apply a 5% interest

(i) T1 start

(ii) T1 B old = 12000 new = 10000

(iii) T1 M old = 0 new = 2000

(iv) T1 commit

(v) T2 start

(vi) T2 B old = 10000 new = 10500

(vii) T2 commit

Suppose the database system crashed just before log record 7 is written. When the system is restarted, which one statement is true of the recovery procedure?

(a) We must redo log record 6 set B to 10500

(b) We must undo log record 6 to set B to 10000 and then redo log record 2 and 3

(c) We need not redo log records 2 and 3 because transaction T1 has committed

(d) We can apply redo and undo operations in arbitrary order because they are idempotent

18. Given a block can hold either 3 records or 10 key pointers. A database contains n records, then how many blocks do we need to hold the data file and the dense index

(a) $\frac{13n}{30}$ (b) $n/3$

(c) $n/10$ (d) $n/30$

19. The maximum length of an attribute of type text is

(a) 127 (b) 255

(c) 256 (d) It is variable

20. Let $R = (A, B, C, D, E, F)$ be a relation scheme with the following dependencies $C \rightarrow F$, $E \rightarrow A, EC \rightarrow D, A \rightarrow B$. Which of the following is a key for R?

(a) CD (b) EC

(c) AE (d) AC

21. If $D_1, D_2, \ldots, D_n$ are domains in a relational model, then the relation is a table, which is a subset of

(a) $D_1 \oplus D_2 \oplus \ldots \oplus D_n$ (b) $D_1 \times D_2 \times \ldots \times D_n$

(c) $D_1 \cup D_2 \cup \ldots \cup D_n$ (d) $D_1 \cap D_2 \cap \ldots \cap D_n$

22. Consider the following relational query on the above database :

```
SELECT S.sname
FROM Suppliers S
WHERE S.sid NOT IN (SELECT C.sid
                    FROM Catalog C
                    WHERE C.pid NOT IN (SELECT P.pid
                                        FROM Parts P
                                        WHERE P.color < > 'blue'))
```

Assume that relations corresponding to the above schema are not empty. Which of the following is the correct interpretation of the above query?

(a) Find the names of all suppliers who have supplied a non-blue part

(b) Find the names of all suppliers who have not supplied a non-blue part

(c) Find the names of all suppliers who have supplied only non-blue parts

(d) Find the names of all suppliers who have not supplied only non-blue parts

23. Consider the following schema :

Emp (Empcode, Name, Sex, Salary, Deptt)

A simple SQL query is executed as follows :

```
SELECT Deptt FROM Emp
WHERE sex = 'M'
GROUP by Dept
Having avg (Salary) > { select avg (Salary) from Emp}
```

The output will be

(a) Average salary of male employee is the average salary of the organization

(b) Average salary of male employee is less than the average salary of the organization

(c) Average salary of male employee is equal to the average salary of the organization

(d) Average salary of male employees is more than the average salary of the organization

24. Given the following expression grammar :

$E \rightarrow E * F \mid F + E \mid F$

$F \rightarrow F - F \mid id$

Which of the following is true?

(a) * has higher precedence than +
(b) – has higher precedence than *
(c) + and – have same precedence
(d) + has higher precedence than *

25. The number of token the following C statement is

printf ("i = %d, &i =%x", i&i) ;

(a) 13
(b) 6
(c) 10
(d) 11

26. Which grammar rules violate the requirement of the operator grammar? A, B, C are variables and a, b, c are terminals

(i) $A \rightarrow BC$
(ii) $A \rightarrow CcBb$
(iii) $A \rightarrow BaC$
(iv) $A \rightarrow \varepsilon$

(a) (i) only
(b) (i) and (ii)
(c) (i) and (iii)
(d) (i) and (iv)

27. Which one of the following is a top-down parser?

(a) Recursive descent parser
(b) Shift left associative parser
(c) SLR (κ) parser
(d) LR (κ) parser

28. Yacc stands for

(a) yet accept compiler constructs
(b) yet accept compiler compiler
(c) yet another compiler constructs
(d) yet another compiler compiler

29. Which statement is true?

(a) LALR parser is most powerful and costly as compare to other parsers
(b) All CFG's are LP and not all grammars are uniquely defined
(c) Every SLR grammar is unambiguous but not every unambiguous grammar is SLR
(d) LR(K) is the most general back tracking shift reduce parsing method

30. Semaphores are used to solve the problem of

(i) race condition

(ii) process synchronization

(iii) mutual exclusion

(iv) none of the above

(a) (i) and (ii) (b) (ii) and (iii)

(c) All of the above (d) None of the above

31. If there are 32 segments, each size 1 k bytes, then the logical address should have

(a) 13 bits (b) 14 bits

(c) 15 bits (d) 16 bits

32. In a lottery scheduler with 40 tickets, how we will distribute the tickets among 4 processes P_1, P_2, P_3 and P_4 such that each process gets 10%, 5%, 60% and 25% respectively?

	P_1	P_2	P_3	P_4
(a)	12	4	70	30
(b)	7	5	20	10
(c)	4	2	24	10
(d)	8	5	40	30

33. Suppose a system contains n processes and system uses the round-robin algorithm for CPU scheduling then which data structure is best suited ready queue of the processes

(a) stack (b) queue

(c) circular queue (d) tree

34. A hard disk system has the following parameters :

Number of track = 500

Number of sectors/track = 100

Number of bytes/sector = 500

Time taken by the head to move from one track to adjacent track = 1 ms

Rotation speed = 600 rpm

What is the average time taken for transferring 250 bytes from the disk?

(a) 300.5 ms (b) 255.5 ms

(c) 255 ms (d) 300 ms

35. At a particular time of computation the value of a counting semaphore is 7. Then 20 P operations and 15 V operation were completed on this semaphore. The resulting value of the semaphore is

(a) 42 (b) 2

(c) 7 (d) 12

36. Increasing the RAM of a computer typically improves performance because

(a) Virtual memory increases

(b) Larger RAMs are faster

(c) Fewer page faults occur

(d) Fewer segmentation faults occur

37. Consider the following program

```
main( )
{
fork( ) ;
fork( ) ;
fork( ) ;
}
```

How many new processes will be created?

(a) 9 (b) 6

(c) 7 (d) 5

38. Suppose two jobs, each of which needs 10 min of CPU time, start simultaneously. Assume 50% I/O wait time.

How long will it take for both to complete if they run sequentially?

(a) 10 (b) 20

(c) 30 (d) 40

39. If a node has K children in B tree, then the node contains exactly ———— keys.

(a) K^2 (b) $K-1$

(c) $K+1$ (d) $\sqrt{K}$

40. The time complexity of the following C function is (assume n > 0):

```
int recursive (int n) {
if (n==1)
return (1);
else
return (recursive (n–1) + recursive (n–1));
}
```

(a) $O(n)$ (b) $O(n \log n)$

(c) $O(n^2)$ (d) $O(2^n)$

41. The number of spanning trees for a complete graph with seven vertices is

(a) 2^5 (b) 7^5

(c) 3^5 (d) $2^{2\times5}$

42. If one uses straight two-way merge sort algorithm to sort the following elements in ascending order : 20, 47, 25, 8, 9, 4, 40, 30, 12, 17, then the order of these elements after second pass of the algorithms is

(a) 8, 9, 15, 20, 47, 4, 12, 7, 30, 30

(b) 8, 15, 20, 47, 4, 9, 30, 40, 12, 17

(c) 15, 20, 47, 4, 8, 9, 12, 30, 40, 17

(d) 4, 8, 9, 15, 20, 47, 12, 17, 30, 40

43. Let R1 and R2 be regular sets defined over the alphabet, then

(a) $R_1 \cap R_2$ is not regular (b) $R_1 \cup R_2$ is not regular

(c) $\Sigma^* - R_1$ is regular (d) R_1^* is not regular

44. The DNS maps the IP addresses to

(a) A binary address as strings

(b) An alphanumeric address

(c) A hierarchy of domain names

(d) A hexadecimal address

45. To add a background color for all <h1> elements, which of the following HTML syntax is used

(a) h1 { background–color : #FFFFFF}

(b) {background–color : #FFFFFF} . h1

(c) {background–color : #FFFFFF} . h1(all)

(d) h1 . all{ bgcolor= #FFFFFF}

46. The correct syntax to write "Hi There" in Javascript is

(a) jscript.write ("Hi There")

(b) response.write ("Hi There")

(c) print ("Hi There")

(d) print.jscript ("Hi There")

47. To declare the version of XML, the correct syntax is

(a) <?xml version='1.0'/>

(b) <*xml version='1.0'/>

(c) <?xml version="1.0"/>

(d) </xml version='1.0'/>

48. A T-switch is used to

(a) Control how messages are passed between computers

(b) Echo every character that is received

(c) Transmit characters one at a time

(d) Rearrange the connections between computing equipments

49. What frequency range is used for microwave communications, satellite and radar?

(a) Low frequency: 30 kHz to 300 kHz

(b) Medium frequency: 300 kHz to 3 MHz

(c) Super high frequency: 3000 MHz to 30000 MHz

(d) Extremely high frequency: 30000 kHz

50. How many bits internet address is assigned to each host on a TCP/IP internet which is used in all communication with the host?

(a) 16 bits

(b) 32 bits

(c) 48 bits

(d) 64 bits

51. How many characters per sec (7 bits +1 parity) can be transmitted over a 2400 bps line if the transfer is synchronous (1 start and 1 stop bit)?

(a) 300 (b) 240

(c) 250 (d) 275

52. In CRC if the data unit is 100111001 and the divisor is 1011 then what is dividend at the receiver?

(a) 100111001101 (b) 100111001011

(c) 100111001 (d) 100111001110

53. An ACK number of 1000 in TCP always means that

(a) 999 bytes have been successfully received

(b) 1000 bytes have been successfully received

(c) 1001 bytes have been successfully received

(d) None of the above

54. In a class B subnet, we know the IP address of one host and the mask as given below :

IP address = 125.134.112.66

Mask = 255.255.224.0

What is the first address (Network address)?

(a) 125.134.96.0

(b) 125.134.112.0

(c) 125.134.112.66

(d) 125.134.0.0

55. A certain population of ALOHA users manages to generate 70 request/sec. If the time is slotted in units of 50 msec, then channel load would be

(a) 4.25 (b) 3.5

(c) 450 (d) 350

56. Which statement is false?

(a) PING is a TCP/IP application that sends datagrams once every second in the hope of an echo response from the machine being PINGED

(b) If the machine is connected and running a TCP/IP protocol stack, it should respond to the PING datagram with a datagram of its own

(c) If PING encounters an error condition, an ICMP message is not returned

(d) PING display the time of the return response in milliseconds or one of several error message

57. A router uses the following routing table :

Destination	Mask	Interface
144.16.0.0	255.255.0.0	eth0
144.16.64.0	255.255.224.0	eth1
144.16.68.0	255.255.255.0	eth2
144.16.68.64	255.255.255.224	eth3

A packet bearing a estimation address 144.16.68.117 arrives at the router. On which interface will it be forwarded?

(a) eth0 (b) eth1

(c) eth2 (d) eth3

58. Which layers of the OSI reference model are host-to-host layers?

(a) Transport, session, presentation, application

(b) Session, presentation, application

(c) Datalink, transport, presentation, application

(d) Physical, datalink, network, transport

59. Alpha and beta testing are forms of

(a) Acceptance testing (b) Integration testing

(c) System testing (d) Unit testing

60. If in a software project the number of user input, user output, enquiries, files and external interfaces are (15, 50, 24, 12, 8), respectively, with complexity average weighing factor. The productivity if effort = 70 person-month is

(a) 110.54
(b) 408.74
(c) 304.78
(d) 220.14

61. The contents of the flag register after execution of the following program by 8085 microprocessor will be

Program

SUB A

MVI B, $(01)_H$

DCR B

HLT

(a) $(54)_H$
(b) $(00)_H$
(c) $(01)_H$
(d) $(45)_H$

62. The minimum time delay between the initiation of two independent memory operations is called

(a) Access time
(b) Cycle time
(c) Rotational time
(d) Latency time

63. Which of the following compression algorithms is used to generate a .png file?

(a) LZ78
(b) Deflate
(c) LZW
(d) Huffman

64. 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 of these

65. Which of the following is not an image type used in MPEG?

(a) A frame (b) B frame

(c) D frame (d) P frame

66. Consider an uncompressed stereo audio signal of CD quality which is sampled at 44.1 kHz and quantized using 16 bits. What is required storage space if a compression ratio of 0.5 is achieved for 10 seconds of this audio?

(a) 172 KB (b) 430 KB

(c) 860 KB (d) 1720 KB

67. What is the compression ratio in typical *mp*3 audio file?

(a) 4 : 1 (b) 6 : 1

(c) 8 : 1 (d) 10 : 1

68. Consider the following program fragment

```
if (a > b)
if (b > c)
   s1;
else s2;
```

s2 will be executed if

(a) a <= b (b) b > c

(c) b >=c and a <= b (d) a > b and b <=c

69. If n has the value 3, then the statement a[++n] = n++;

(a) assigns 3 to a[5]

(b) assigns 4 to a[5]

(c) assigns 4 to a[4]

(d) what is assigned is compiler dependent

70. The following program

```
main( )
{
 inc( ) ; inc( ) ; inc( ) ;
}
inc( )
{
 static int x ;
 printf("%d", ++x) ;
}
```

(a) prints 012

(b) prints 123

(c) prints 3 consecutive, but unpredictable numbers

(d) prints 111

71. Consider the following program fragment

```
i=6720; j=4;
while((i%j)==0)
  {
    i = i/j;
    j = j+1;
  }
```

on termination j will have the value

(a) 4 (b) 8

(c) 9 (d) 6720

72. Consider the following declaration,

int a, *b = &a, **c = &b;

the following program fragment

```
a=4;
**c=5;
```

(a) does not change the value of a (b) assigns address of c to a

(c) assigns the value of b to a (d) assigns 5 to a

73. The output of the following program is

```
main( )
  {
    static int x[ ] = {1, 2, 3, 4, 5, 6, 7, 8};
    int i;
    for (i=2; i<6; ++i)
      x[x[i]] = x[i];
    for (i=0; i<8; ++i)
      printf("%d", x[i]);
  }
```

(a) 1 2 3 3 5 5 7 8
(b) 1 2 3 4 5 6 7 8
(c) 8 7 6 5 4 3 2 1
(d) 1 2 3 5 4 6 7 8

74. Which of the following has the compilation error in C?

(a) int n = 17;
(b) char c = 99;
(c) float f = (float) 99.32;
(d) #include<stdio.h>

75. The for loop

```
for(i = 0; i < 10; ++i)
  printf(%d", i&1);
```

prints

(a) 0101010101
(b) 0111111111
(c) 0000000000
(d) 1111111111

76. Consider the following statements

```
# define hypotenuse (a, b) sqrt (a*a + b*b);
```

The macro call hypotenuse (a+2, b+3);

(a) Finds the hypotenuse of a triangle with sides a+2 and b+3
(b) Finds the square root of $(a+2)^2 + (b+3)^2$
(c) Is invalid
(d) Find the square root of 3 * 2 + 4 * b + 5

77. In X = (M + N × O)/(P × Q), how many one-address instructions are required to evaluate it?

(a) 4 (b) 6

(c) 8 (d) 10

78. A decimal number has 64 digits. The number of bits needed for its equivalent binary representation is

(a) 200 (b) 213

(c) 246 (d) 277

79. Consider the following C declaration

```
struct {
 short s[5];
 union {
   float y;
   long z;
  }u;
}t;
```

Assume that objects of type short, float and long occupy 2 bytes, 4 bytes and 8 bytes, respectively. The memory requirement for variable t, ignoring alignment considerations, is

(a) 22 bytes (b) 18 bytes

(c) 14 bytes (d) 10 bytes

80. Consider the following code segment

```
void foo(int x, int y)
 {
  x+=y;
  y+=x;
 }
main( )
  {
   int x=5.5;
   foo(x,x);
  }
```

What is the final value of x in both call by value and call by reference, respectively?

(a) 5 and 16 (b) 5 and 12

(c) 5 and 20 (d) 12 and 20