

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**  
**TEST BOOKLET SERIES**

**TEST BOOKLET**  
**LECT (I.T.) T.E.-2016**

**D**

Time Allowed : 2 Hours]

[Maximum Marks : 100

All questions carry equal marks.

**INSTRUCTIONS**

1. Immediately after the commencement of the examination, you should check that 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. **Encode clearly the test booklet series A, B, C or D as the case may be in the appropriate place in the answer-sheet.**
3. Write your Roll Number only in the box provided alongside.   
Do not write anything else on the Test Booklet.
4. This Test Booklet contains **100** items (questions). Each item comprises four responses (answers). Choose only one response for each item which you consider the best.
5. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with Black or Blue ball pen. In the following example, response "C" is so marked :



6. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled. After the response has been marked in the ANSWER SHEET, no erasing/fluid is allowed.
7. You have to mark all your responses **ONLY** on the ANSWER SHEET separately given according to 'INSTRUCTIONS FOR CANDIDATES' already supplied to you. *Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.*
8. All items carry equal marks. Attempt all items. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. There will be no negative marking.
9. Before you proceed to mark responses in the Answer Sheet fill in the particulars in the front portion of the Answer Sheet as per the instructions sent to you.
10. 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.
11. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. In which region of H.P. were chakli copper coins in circulation around the tenth century A.D. ?  
(A) Bilaspur (B) Kangra  
(C) Chamba (D) Kullu
2. In which District of H.P. is Dera Sidh Baba Rudru ?  
(A) Hamirpur (B) Una  
(C) Bilaspur (D) Kangra
3. Which district of H.P. recorded the highest increase in the density of population between 2001 and 2011 A.D. ?  
(A) Hamirpur (B) Solan  
(C) Bilaspur (D) Una
4. Roughly how older is the Vikram Samvat as compared to the Saka Samvat ?  
(A) 105 years (B) 115 years  
(C) 125 years (D) 135 years
5. When was the sovereignty of region between the Beas and the Satluj transferred to the British Government ?  
(A) 1815 AD (B) 1839 AD  
(C) 1846 AD (D) 1849 AD

6. In which District of H.P. is Sukhsar lake ?
- (A) Kangra (B) Mandi  
(C) Bilaspur (D) Chamba
7. In which god's praise is Birsu song sung in the upper Shimla region ?
- (A) Banasur (B) Nag Deota  
(C) Mahasu Deota (D) Narsingh Deota
8. At which place in Kumarsain region is the HPMC upgrading its packing house ?
- (A) Oddi (B) Khadralla  
(C) Tikkar (D) Khaneti
9. Appoximately how much area is being covered under the Swan River Integrated Watershed Management Project in Una District of H.P. ?
- (A) 732 sq.kms (B) 715 sq.kms  
(C) 672 sq.kms (D) 619 sq.kms
10. In which river basin is Chaba hydel project ?
- (A) Beas (B) Ravi  
(C) Satluj (D) Chenab



11. With which of the following was Ashok Singhal, who died recently, associated ?
- (A) Shiv Sena (B) Bajrang Dal  
(C) Vishwa Hindu Parishad (D) Hindu Mahasabha
12. Who was appointed India's permanent representative to the United Nations in November, 2015 ?
- (A) Ajit Doval (B) Syed Akbaruddin  
(C) Hurushikesh Senapati (D) Kamla Luxman
13. What was the venue of 2016 Ardh Kumbh ?
- (A) Allahabad (B) Nasik  
(C) Haridwar (D) Puri
14. With which sport is Apurvi Chandela associated ?
- (A) Hockey (B) Archery  
(C) Basketball (D) Shooting
15. By what popular name is Dr. Guna Ram Khanikar called ?
- (A) Patanjali of Meghalaya (B) Charak of Assam  
(C) Vaid of the North-East (D) Yogagura of Arunachal Pradesh

16. Who was crowned Miss Universe, 2015 ?
- (A) Pia Alonzo Wurtzbach                      (B) Ariadana Gutierrez  
(C) Liesl Laurie                                      (D) Lisa Punch
17. Which country is at number one in the 2015 Human Development Index ?
- (A) Australia                                      (B) Denmark  
(C) Netherlands                                      (D) Norway
18. What was the venue of 2015 WTO summit ?
- (A) New York                                      (B) Nairobi  
(C) Sinai    (D) Washington
19. Women of which age attended the 'Coming of Age' Day held in Japan in January, 2016 ?
- (A) 18    (B) 19  
(C) 20    (D) 21
20. Who is Tsai Ing-wen ?
- (A) President of Korea                                      (B) President of Taiwan  
(C) President of Vietnam                                      (D) President of South Korea

21. The minimum number of temporary variables needed to swap the contents of two variables is :

(A) 1

(B) 2

(C) 3

(D) 0

22. What will be the output of the following C program segment ?

```
int k = -7;
```

```
printf("%d", 0 < !k);
```

(A) prints 0

(B) Prints a non-zero value

(C) is illegal

(D) Unpredictable value

23. cb is a :

(A) C code beautifying tool

(B) C interpreter

(C) C compiler

(D) None of these

24. In a certain machine, the sum of an integer and its 1's complement is  $2^{20} - 1$ . Then size of (int), in bits will be :

(A) 16

(B) 32

(C) unpredictable

(D) none of these

25. Assume that the random number generating function `rand()`, returns an integer between 0 and 10000 (both inclusive). If you want to simulate the throwing of a die using this random function, use the expression :

- (A) `rand() % 6` (B) `rand() % 6 + 1`  
(C) `rand() % 5 + 1` (D) none of these

26. In C++ the statement :

```
int a = 5;
```

```
cout <<"FIRST" <<(a << 2) << "SECOND";
```

outputs-

- (A) FIRST52SECOND (B) FIRST20SECOND  
(C) SECOND25FIRST (D) None of these

27. The statement in Java :

```
byte var = ~ 9;
```

```
System.out.println(var);
```

- (A) prints - 9 (B) prints - 10  
(C) prints - 119 (D) prints - 118

28. Which of the following is *not* a primitive data type in Java ?

- (A) boolean (B) byte  
(C) string (D) double





34. The order of binary search algorithm is :
- (A)  $n$  (B)  $n^2$   
(C)  $n \log(n)$  (D)  $\log(n)$
35. 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 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
36. The number of possible binary trees with 3 nodes is :
- (A) 12 (B) 13  
(C) 5 (D) 15
37. Which of the following traversal technique lists the nodes of a binary search tree in ascending order ?
- (A) post-order (B) in-order  
(C) pre-order (D) none of these
38. The preorder traversal sequence of a binary search tree is 30, 20, 10, 15, 25, 23, 39, 35, 42. Which one of the following is the postorder traversal sequence of the same tree ?
- (A) 10, 20, 15, 23, 25, 35, 42, 39, 30  
(B) 15, 10, 25, 23, 20, 42, 35, 39, 30  
(C) 15, 20, 10, 23, 25, 42, 35, 39, 30  
(D) 15, 10, 23, 25, 20, 35, 42, 39, 30

39. A hash table of length 10 uses open addressing with hash function  $h(k) = k \bmod 10$ , and linear probing :

0	
1	
2	42
3	23
4	34
5	52
6	46
7	33
8	
9	

After inserting 6 values into an empty hash table, the table is as shown above.

Which one of the following choices gives a possible order in which the key values could have been inserted in the table ?

- (A) 46, 42, 34, 52, 23, 33                      (B) 34, 42, 23, 52, 33, 46
- (C) 46, 34, 42, 23, 52, 33                      (D) 42, 46, 33, 23, 34, 52

40. If  $G$  is a forest with  $n$  vertices and  $k$  connected components, how many edges does  $G$  have ?
- (A)  $\lfloor n/k \rfloor$  (B)  $n$   
(C)  $n - k$  (D)  $n - k + 1$
41. Pixel phasing is a technique for :
- (A) shading (B) anti-aliasing  
(C) hidden line removal (D) none of these
42. Assuming that one allows 256 depth value levels to be used, how much memory would a  $512 \times 512$  pixel display require to store the Z-buffer ?
- (A) 512 K (B) 256 K  
(C) 1024 K (D) 128 K
43. Reflection of a point about  $x$ -axis, followed by a counter-clockwise rotation of 90 degrees, is equivalent to reflection about a line :
- (A)  $x = -y$  (B)  $y = -x$   
(C)  $x = y$  (D)  $x + y = 1$

44.  $X = at^2; y = 2at$ , is the parametric equation of a :
- (A) circle (B) rectangular hyperbola  
(C) parabola (D) ellipse
45. Which of the following devices has relative origin ?
- (A) Joystick (B) Trackball  
(C) Mouse (D) None of these
46. How many characters per sec (7 bits + 1 parity) can be transmitted over a 2400 bps line if the transfer is synchronous (1 start + 1 stop bit) ?
- (A) 300 (B) 240  
(C) 250 (D) 275
47. The number of cross points needed for 10 lines in a cross point switch which is full duplex in nature and there are no self connection is :
- (A) 100 (B) 45  
(C) 50 (D) 90
48. The Hamming distance between 001111 and 010011 is :
- (A) 1 (B) 2  
(C) 3 (D) 4



49. Maximum data rate of a channel for a noiseless 3-kHz binary channel is :
- (A) 3000 bps (B) 6000 bps  
(C) 1500 bps (D) none of these
50. In time division switches if each memory access takes 100 ns and one frame period is 125  $\mu$ s, then the maximum number of lines that can be supported is :
- (A) 625 (B) 1250  
(C) 2300 (D) 318
51. Unmodulated signal coming from a transmitter is known as :
- (A) carrier signal (B) baseband signal  
(C) primary signal (D) none of these
52. In the following pairs of OSI protocol layer/sub-layer and its functionality, the *incorrect* pair is :
- (A) Network layer and Routing  
(B) Data Link Layer and Bit synchronization  
(C) Transport layer and End-to-end process communication  
(D) Medium Access Control sub-layer and Channel sharing

53. The protocol data unit (PDU) for the application layer in the Internet stack is :
- (A) Segment (B) Datagram  
(C) Message (D) Frame
54. A terminal multiplexer has six 1200 bps terminals and 'n' 300 bps terminals connected to it. The outgoing line is 9600 bps. What is the maximum value of n ?
- (A) 4 (B) 16  
(C) 8 (D) 28
55. Which of the following is *not* a standard RS-232 C signal ?
- (A) RTS (B) CTS  
(C) DSR (D) VDR
56. If  $w$  is a string of terminals and  $A, B$  are two non-terminals, then which of the following are right linear grammars :
- (A)  $A \rightarrow Bw$  (B)  $A \rightarrow Bw|w$   
(C)  $A \rightarrow wB|w$  (D) None of these

57. The grammar  $E \rightarrow E + E | E * E | a$ , is :
- (A) ambiguous (B) unambiguous  
 (C) not depends on given sentence (D) none of these
58. Synthesized attribute can easily be simulated by :
- (A) LL grammar (B) ambiguous grammar  
 (C) LR grammar (D) none of these
59. The graph depicting the inter-dependencies of the attributes of different nodes in a parse tree is called a :
- (A) flow graph (B) dependency graph  
 (C) Karnaugh's Map (D) Steffi graph
60. A shift reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of grammar :
- $S \rightarrow xxW$  {print "1"}  
 $S \rightarrow Y$  {print "2"}  
 $S \rightarrow Sz$  {print "3"}
- What is the translation of xxxxyzz using the syntax directed translations scheme described by the above rules ?
- (A) 23131 (B) 11233  
 (C) 11231 (D) 33211

61. The number of columns in a state table for a sequential circuit with 'm' flip-flops and 'n' input is :
- (A)  $m + n$  (B)  $m + 2n$   
(C)  $2m + n$  (D)  $2m + 2n$
62. The minimum time delay between the initiation of two independent memory operations is called :
- (A) access time (B) cycle time  
(C) transfer time (D) latency time
63. How many 2-input multiplexers are required to construct a  $2^{10}$ -input multiplexer ?
- (A) 1023 (B) 31  
(C) 10 (D) 127
64. A decimal number has 25 digits. The bits needed for its equivalent binary representation is, approximately :
- (A) 50 (B) 60  
(C) 70 (D) 75



65. A RAM chip has a capacity of 1024 words of 8 bits each ( $1\text{ K} \times 8$ ). The number of  $2 \times 4$  decoders with enable line needed to construct a  $16\text{ K} \times 16$  RAM from  $1\text{ K} \times 8$  RAM is :

(A) 4 (B) 5

(C) 6 (D) 7

66. Consider the following sequence of micro-operations :

$\text{MBR} \leftarrow \text{PC}$

$\text{MAR} \leftarrow \text{X}$

$\text{PC} \leftarrow \text{Y}$

$\text{Memory} \leftarrow \text{MBR}$

Which one of the following is a possible operation performed by this sequence ?

(A) Instruction fetch (B) Operand fetch

(C) Conditional branch (D) Initiation of interrupt service

67. The cost of storing a bit is minimum in :

(A) Cache (B) Register

(C) RAM (D) Magnetic tape

68. The truth table

$x$	$y$	$f(x, y)$
0	0	0
0	1	0
1	0	1
1	1	1

represents the Boolean function :

- (A)  $X$  (B)  $X + Y$   
(C)  $X \oplus Y$  (D)  $Y$

69. According to Brooks, if  $n$  is the number of programmers in a project team, then the number of communication path is :

- (A)  $n(n-1)/2$  (B)  $n \log n$   
(C)  $n$  (D)  $n(n+1)/2$

70. If the number of conditions in a decision table is  $n$ , the maximum number of rules possible is :

- (A)  $n$  (B)  $2n$   
(C)  $2^n$  (D) None of these

71. Let  $M$  be a node that represents a if-then-else node in a program graph. Let the number of paths from its if part to end node is  $y$ , and from the else part to the end node is  $z$ . If the number of paths from the start node to the node  $M$  is  $x$ , then the total number of paths through  $M$  is :
- (A)  $xy + z$  (B)  $xz + y$   
(C)  $x + y + z$  (D)  $x(y + z)$
72. Which of the following is a desirable property of a module ?
- (A) Independency (B) Low cohesiveness  
(C) High coupling (D) Multi-functional
73. The probability of success of two modules in unit testing is 0.9 each. The probability of success of integration testing is 0.9. The joint probability of success is :
- (A) 0.9 (B) 0.81  
(C) 0.729 (D) 0.1
74. The extent to which computer can continue to operate correctly despite the introduction of invalid input is called as :
- (A) reliability (B) robustness  
(C) portability (D) none of these

75. Consider the relation :

Employee(Emp\_no, Emp\_name, Salary, Project\_no, Due\_date)

(Assuming a 1 – 1 relationship between project and employees)

Project\_no is functionally dependent on :

(A) Emp\_name

(B) Emp\_no

(C) Due\_date

(D) None of these

76. Consider the following set of functional dependencies on the scheme (A, B, C)

$A \rightarrow BC$

$B \rightarrow C$

$A \rightarrow B$

$AB \rightarrow C$

The canonical cover for this set is :

(A)  $A \rightarrow BC$  and  $B \rightarrow C$

(B)  $A \rightarrow BC$  and  $AB \rightarrow C$

(C)  $A \rightarrow BC$  and  $A \rightarrow B$

(D)  $A \rightarrow B$  and  $B \rightarrow C$

77. Which of the normal form is considered adequate for relation database design ?

(A) 2NF

(B) 3NF

(C) 4NF

(D) BCNF



78. A script file that is executed by the SQL \* Plus cannot contain :
- (A) SQL \* Plus commands                      (B) SQL Statements  
(C) PL/SQL block                                (D) None of these
79. SGA stands for :
- (A) Show global area                            (B) Start global area  
(C) System global area                        (D) Shut global area
80. Consider the following relation schema pertaining to a student database :

Student : (rollno, name, address)

Enroll : (rollno, courseno, coursename)

Where the primary keys are shown underlined. The number of tuples in the Student and the Enroll tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in (student \* Enroll), where \* denotes natural join.

- (A) 8, 8    (B) 120, 8  
(C) 960, 8                                        (D) 960, 120

81. A prime attribute of a relation scheme  $R$  is an attribute that appears :
- (A) in all candidate keys of  $R$       (B) in some candidate keys of  $R$   
(C) in a foreign key of  $R$       (D) only in the primary key of  $R$
82. Table employee has 10 records. It has a non-Null SALARY column which is also UNIQUE the SQL statement :
- SELECT COUNT (\*) from EMPLOYEE WHERE SALARY > ANY (SELECT SALARY FROM EMPLOYEE); prints
- (A) 10      (B) 9  
(C) 5      (D) 0
83. A process executes the code :
- ```
fork ();  
  
fork ();  
  
fork ();
```
- The total number of child processes created is :
- (A) 3      (B) 4  
(C) 7      (D) 8



86. Which of the following scheduling algorithm gives minimum average waiting time ?
- (A) FCFS (B) SJF  
(C) Round Robin (D) Priority
87. Suppose that a process is in 'BLOCKED' state waiting for some I/O service. When the service is completed, it goes to the :
- (A) RUNNING (B) READY  
(C) SUSPENDED (D) TERMINATED
88. The size of virtual memory depends on the size of the :
- (A) Data bus (B) Main memory  
(C) Address bus (D) None of these
89. Consider a paging hardware with a TLB. Assume that the entire page table and all the pages are in the physical memory. It takes 10 milliseconds to search the TLB and 80 milliseconds to access the physical memory. If the TLB hit ratio is 0.6, the effective memory access time (in milliseconds) is :
- (A) 122 (B) 112  
(C) 110 (D) 131

90. A system has 3 process sharing 4 resources. If each process needs a maximum of 2 units, then deadlock :

- (A) can never occur (B) may occur  
(C) has to occur (D) none of these

91. Consider the grammar :

$$S \rightarrow PQ|SQ|PS$$

$$P \rightarrow X$$

$$Q \rightarrow Y$$

To get the string of  $n$  terminals, the number of productions to be used is :

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

92. CFG is not closed under :

- (A) Union (B) Kleene star  
(C) Complementation (D) Product

93. The recognizing capability of NDFSM and DFSM :

- (A) may be different (B) must be different  
(C) must be the same (D) none of these

94. FSM can recognize :
- (A) any grammar (B) only CFG  
(C) only unambiguous (D) only regular grammar
95. Assuming  $P \neq NP$  which of the following is true ?
- (A) NP-complete = NP (B) NP-complete  $\cap$  P =  $\emptyset$   
(C) NP-hard = NP (D) P = NP-complete
96. Given the language  $L = \{ab, aa, baa\}$ , which of the following strings are in  $L^*$  ?
- (1) abaabaaabaa  
(2) aaaabaaaa  
(3) baaaaabaaaab  
(4) baaaaabaa
- (A) (1), (2) and (3) (B) (2), (3) and (4)  
(C) (1), (2) and (4) (D) (1), (3) and (4)



97. A CFG is said to be in Chomsky Normal Form (CNF), if all the productions are of the form  $A \rightarrow BC$  or  $A \rightarrow a$ . Let  $G$  be a CFG in CNF. To derive a string of terminals of length  $x$ , the number of productions to be used is :
- (A)  $2x - 1$  (B)  $2x$   
(C)  $2x + 1$  (D) none of these
98. An FSM can be used to add two given integers. This remark is :
- (A) true (B) false  
(C) may be true (D) none of these
99. Let  $A = \{0, 1\}$  and  $L = A^*$ . Let  $R = \{0^n 1^n, n > 0\}$  the languages  $LUR$  and  $R$  are respectively :
- (A) regular, regular (B) not regular, regular  
(C) regular, not regular (D) not regular, not regular
100. The number of symbols necessary to simulate a TM with  $m$  symbols and  $n$  states is :
- (A)  $m + n$  (B)  $8mn + 4m$   
(C)  $mn$  (D)  $4mn + m$