

MIZORAM PUBLIC SERVICE  
COMMISSION

*Technical Competitive Examinations for  
Recruitment to the post of  
Inspector of Legal Metrology  
under Food, Civil Supplies & Consumer  
Affairs Department*

Time Allowed : 2 hours  
Full Marks : 150

**Computer Science & Engineering Paper-I**

INVIGILATOR

CENTRE SUPERINTENDENT

Date of Exam. : 26/03/2010

**Instructions to candidates:**

- Enter your Roll No. in the box provided on the front page.
- Attempt all the questions.
- Each question is followed by probable answers. Choose the appropriate answer and mark it by putting '✓' mark on the corresponding box.
- If more than one answer boxes are marked for a question, the answer will be treated as wrong.
- On completion, you are to submit the booklet to the Invigilator.

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Examiner

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1. The Thevenin-Norton equivalent of a network can be found

- (a) if it contains voltage sources only .....
- (b) if it contains current sources only .....
- (c) if it contains voltage/current sources but not dependent sources .....
- (d) even if it contains voltage/current sources and/or dependent sources .....

2. The Thevenin/Norton equivalent of a network cannot be found if

- (a) it contains voltage sources .....
- (b) it contains current sources .....
- (c) it contains dependent sources (independent/dependent current /voltage are both within the network) .....
- (d) any of its currents/voltages depend upon the current/voltage in another network. ....

3. For the two-port network of Fig. 1, the parameters  $y_{11}$  and  $y_{22}$  are, respectively,

- (a) 2, 4 .....  (b) 6, 8 .....
- (c) 4, 2 .....  (d) 8, 6 .....

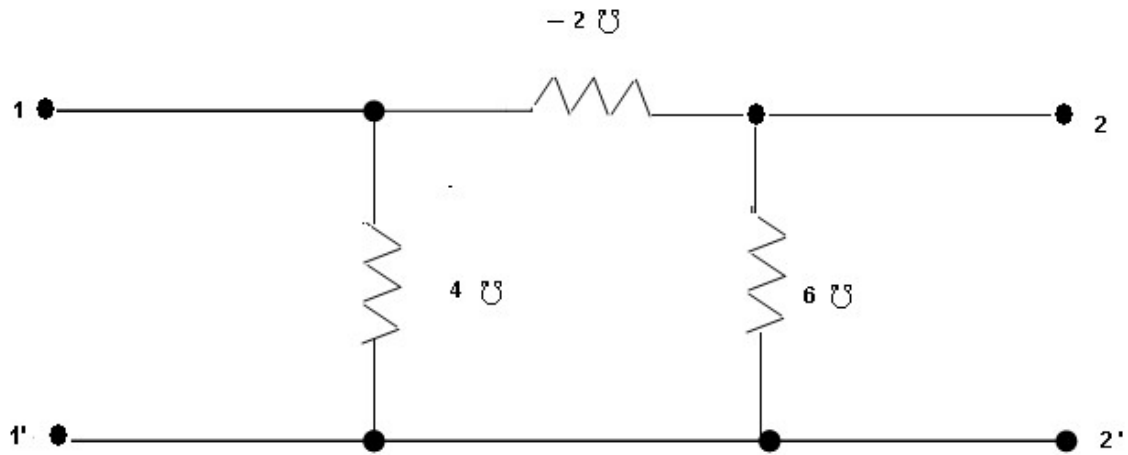


Fig. 1

4. For the two-port network of Fig. 1, the parameters  $z_{11}$  and  $z_{21}$  are, respectively,

- (a) 1, - 2 .....  (b)  $-\frac{1}{2}$ , 1 .....
- (c) 1,  $-\frac{1}{2}$  .....  (d) -2, 1 .....

5. For the two-port network of Fig. 1, the parameters  $h_{11}$  and  $h_{21}$  are, respectively,

- (a) 1  $\Omega$ , 2  $\Omega$  .....  (b) 2  $\Omega$ , 1 .....
- (c) 1,  $\frac{1}{2} \Omega$  .....  (d)  $\frac{1}{2} \Omega$ , 1 .....

6. In a critically damped RLC series circuit, the time constant of the response on sudden constant excitation is

- (a)  $1/LC$  .....  (b)  $L/2R$  .....   
(c)  $1/(2RC)$  .....  (d)  $2RC$  .....

7. For a parallel RLC circuit, the damped resonant frequency is

- (a)  $\sqrt{(2RC)-1/LC}$  .....  (b)  $\sqrt{\left(\frac{1}{2RC}\right)^2 - 1/LC}$  .....   
(c)  $\sqrt{(2RC)^2 - 1/LC}$  .....  (d)  $\sqrt{(2RC)-LC}$  .....

8. In an underdamped parallel RLC network, the time constant associated with the decaying sinusoidal oscillation is

- (a)  $1/(2RC)$  .....  (b)  $2RC$  .....   
(c)  $1/LC$  .....  (d)  $L/C$  .....

9. An active network is a combination of

- (a) resistors .....   
(b) inductors .....   
(c) capacitors .....   
(d) voltage or/and current sources .....   
(e) all of the above governed by certain laws .....

10. The input to a network is given by

- (a) stimulus .....  (b) excitation .....   
(c) response .....  (d) either (a) or (b) .....

11. In a linear network when the input is tripled, the output is

- (a) reduced to one-third .....  (b) doubled .....   
(c) halved .....  (d) none of these .....

12. The function  $\frac{dy}{di}$  is called incremental

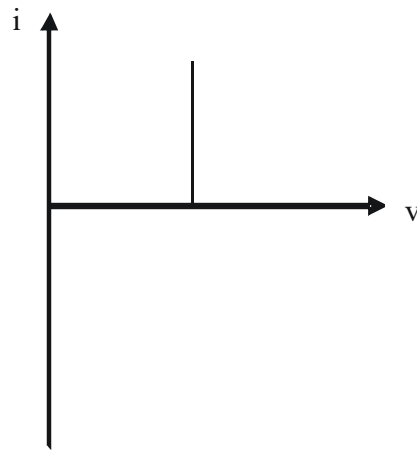
- (a) resistance .....  (b) inductance .....   
(c) capacitance .....  (d) none of these .....

13. The function  $\frac{dq}{dv}$  is called incremental

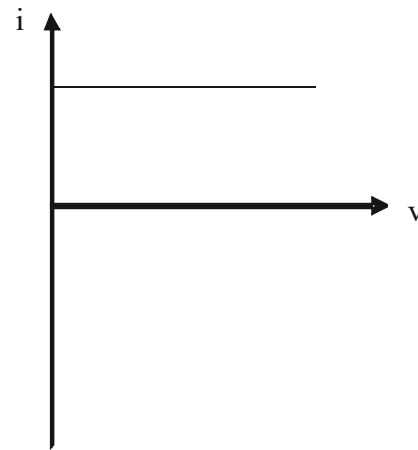
- (a) inductance .....  (b) resistance .....   
(c) capacitance .....  (d) none of these .....

14. Two graphs depicted here represented ideal sources. Identify the two graphs.

- (a) Both represent current sources .....  (b) Both represent voltage sources .....   
(c) (i) Current source (ii) Voltage source  (d) (i) Voltage source (ii) Current source



(i)



(ii)

15. To transfer maximum power, the load impedance should be proportional to source impedance as

- (a) exponentially .....  (b) indirectly .....   
(c) directly .....  (d) conjugately .....

16. Kirchhoff's laws fail when the circuit parameters are

- (a) lumped .....  (b) distributed .....   
(c) nonlinear .....  (d) linear .....

17. A network will be nonlinear if it does not satisfy

- (a) superposition condition .....  (b) homogeneity condition .....   
(c) associative condition .....  (d) both (a) and (b) .....

18. Kirchhoff's laws is valid for

- (a) dc circuits only .....  (b) ac circuits only .....   
(c) both (a) and (b) .....  (d) none of these .....

19. If the connected load to the source is capacitive in nature, the impedance should be

- (a) inductive .....
- (b) capacitive .....
- (c) resistive .....
- (d) none of these .....

20. During steady-state condition, inductor and capacitor behave, respectively, as

- (a) short circuit, open circuit .....
- (b) open circuit, short circuit .....
- (c) both short circuit .....
- (d) both open circuit .....

21. During resonance of a series circuit

- (a) current and voltage are in phase .....
- (b) current and voltage are in opposite phase .....
- (c) current leads the voltage .....
- (d) voltage leads the current .....

22. The impedance of a series circuit during resonance is

- (a) minimum .....
- (b) maximum .....
- (c) medium .....
- (d) None of these .....

23. The impedance and admittance of a series and parallel resonance circuit is

- (a) maximum .....
- (b) minimum .....
- (c) in between medium and maximum .....
- (d) None of these .....

24. In an *RL* circuit with an ac source, find the valid statement.

- (a) Current leads the voltage .....
- (b) Current lags the voltage .....
- (c) Current is in phase with the voltage ...
- (d) None of these .....

25. A low-pass filter

- (a) passes all low frequencies .....
- (b) attenuates all high frequencies .....
- (c) does not allow to pass any frequency through it .....
- (d) passes all frequencies up to the cut-off frequency and attenuates all other frequencies. ...

26. A high-pass filter

- (a) attenuates all frequencies below a designated cut-off frequency and passes all other frequencies above the cut-off frequency .....
- (b) attenuates all low frequencies .....
- (c) passes all high frequencies .....
- (d) passes frequencies intermittently .....

27. A band-pass filter

- (a) passes all high frequencies .....
- (b) attenuates frequencies between two designated cut-off frequencies and passes all other frequencies. ....
- (c) passes frequencies between two designated cut-off frequencies and attenuates all other frequencies. ....
- (d) none of these. ....

28. A band-stop filter

- (a) attenuates frequencies lying between two cut-off frequencies  $f_1$  and  $f_2$  and passes all other frequencies .....
- (b) attenuates all frequencies less than the lower cut-off frequency  $f_1$  .....
- (c) attenuates all frequencies above the higher cut-off frequency  $f_2$  .....
- (d) passes frequencies between the two cut-off frequencies  $f_1$  and  $f_2$  .....

29. An ideal filter must have

- (a) zero attenuation in attenuation band...
- (b) zero attenuation in pass band .....
- (c) infinite attenuation in the pass band ...
- (d) None of these. ....

30. For a prototype filter, the  $Z_0$  value is

- (a) resistive in pass band .....
- (b) inductive in pass band .....
- (c) capacitive in pass band .....
- (d) complex impedance in pass band .....

31. A pass band high-pass filter is

- (a) above 5 kHz .....
- (b) between 6-12 kHz .....
- (c) below 4 kHz .....
- (d) none of these .....

32. The minimum number of edges in a connected graph with  $n$  vertices

- (a)  $n - 1$  .....
- (b)  $n$  .....
- (c)  $n + 1$  .....
- (d) None of these .....

33. The number of distinct simple graphs with up to three nodes is

- (a) 15 .....
- (b) 10 .....
- (c) 7 .....
- (d) 9 .....

34. A graph is planer if and only if it does not contain

- (a) subgraphs homeomorphic to  $k_3$  and  $k_{3,3}$  .....
- (b) subgraphs isomorphic to  $k_5$  or  $k_{3,3}$  .....
- (c) subgraphs isomorphic to  $k_3$  and  $k_{3,3}$  .....
- (d) subgraphs homeomorphic to  $k_5$  or  $k_{3,3}$  .....

35. The total number of edges in a complete graph of  $n$  vertices is

- (a)  $n$  .....
- (b)  $n/2$  .....
- (c)  $n^2 - 1$  .....
- (d)  $\frac{n(n-1)}{2}$  .....

36. The minimum number of colors are required to color the vertices of a cycle with  $n$  nodes in such a way that no two adjacent nodes have the same color as

- (a) 2 .....
- (b) 3 .....
- (c) 4 .....
- (d)  $n - 2 \left[ \frac{n}{2} \right] + 2$  .....

37. Simplifying Boolean expression  $y = \overline{A}BCD + \overline{A}B\overline{C}D$

- (a)  $ABC$  .....
- (b)  $\overline{A}B\overline{C}$  .....
- (c)  $A + BCD$  .....
- (d)  $AB + CD$  .....

38. How many truth tables can be made from one function table?

- (a) 1 .....
- (b) 2 .....
- (c) 3 .....
- (d) 8 .....

39. The term sum-of-product in Boolean algebra means

- (a) AND function of several OR functions .....
- (b) OR function of several AND functions .....
- (c) AND function of several AND functions .....
- (d) OR function of several OR functions .....

40. After minimization of Boolean expression,  $y = \overline{A}C + \overline{A}B + A\overline{B}C + BC$

We get

- (a)  $\overline{A} . B + C$  .....
- (b)  $A . B + C$  .....
- (c)  $A \overline{B} + BC$  .....
- (d) None of the above .....

41. The boolean function  $\bar{x}\bar{y} + x y + \bar{x} y$  is equivalent to

- (a)  $\bar{x} + \bar{y}$  .....  (b)  $x + y$  .....   
(c)  $x + \bar{y}$  .....  (d)  $\bar{x} + y$  .....

42. The recurrence  $T(n) = 2 T(n - 1) + n$  for  $n \geq 2$  and  $T(1) = 1$  evaluates to

- (a)  $2^{n+1} - n - 2$  .....  (b)  $2^n - n$  .....   
(c)  $2^n + n$  .....  (d)  $2^{n+1} - 2n - 2$  .....

43. Find a recurrence relation for the number of  $n$ - digit ternary sequences that have an even number of 0's

- (a)  $a_n = a_{n-1} + 3^{n-1}$  .....  (b)  $a_n = a_{n-1} + 3^n$  .....   
(c)  $a_n = a_n + 3^n$  .....  (d) None of these .....

44. The less than relation,  $<$ , on real is

- (a) A partial ordering since it is asymmetric and reflexive .....   
(b) A partial ordering since it is anti-symmetric and reflexive .....   
(c) Not a partial ordering because it is not asymmetric and not reflexive .....   
(d) Not a partial ordering because it is not anti-symmetric and not reflexive .....

45. A self-complemented, distributive lattice is called

- (a) Boolean Algebra .....  (b) Modular Lattice .....   
(c) Complete Lattice .....  (d) Self Dual Lattice .....

46. Every finite subset of a lattice has

- (a) A LUB and GLB .....  (b) Many LUBs and a GLB .....   
(c) Many LUBs and many GLBs .....  (d) Either some LUBs or some GLBs .....

47.  $G \{e, a, b, c\}$  is an abelian group with 'e' as identity element. The order of the other elements are

- (a) 2, 2, 3 .....  (b) 3, 3, 3 .....   
(c) 2, 2, 4 .....  (d) 2, 3, 4 .....

48. Which of the following statement is FALSE ?

- (a) The set of rational numbers is an abelian group under addition .....   
(b) The set of rational integers is an abelian group under addition .....   
(c) The set of rational numbers form an abelian group under multiplication .....   
(d) None of these .....



49. Which of the following statement is TRUE?

- (a) The set of all rational negative numbers forms a group under multiplication .....
- (b) The set of all non-singular matrices forms a group under multiplication .....
- (c) The set of all matrices forms a group under multiplication .....
- (d) Both (b) and (c) are true .....

50. If  $a$  and  $b$  are positive integers, define  $a * b = a$  where  $a.b \equiv \alpha$  (modulo 7), with this  $*$  operation, the inverse of 3 in group  $G \{ 1, 2, 3, 4, 5, 6 \}$  is

- (a) 3 .....
- (b) 1 .....
- (c) 5 .....
- (d) 4 .....

51. Which of the following propositions is tautology?

- (a)  $(p \vee q) \rightarrow$  .....
- (b)  $p \vee (q \rightarrow p)$  .....
- (c)  $p \vee (p \rightarrow q)$  .....
- (d)  $p \rightarrow (q \rightarrow p)$  .....

52. The proposition is  $p \wedge (\neg p \vee q)$  is

- (a) a tautology .....
- (b) a contradiction .....
- (c) logically equivalent to  $p \wedge q$  .....
- (d) none of these .....

53. Let  $p$  and  $q$  be propositions. Using only the truth table decide whether  $p \Leftrightarrow q$  does not imply  $p \rightarrow \neg q$  is

- (a) True .....
- (b) False .....

54. The number of functions from an  $m$  element set to an  $n$  element set is

- (a)  $m + n$  .....
- (b)  $m^n$  .....
- (c)  $n^m$  .....
- (d)  $m * n$  .....

55. Suppose  $A$  is a finite set with  $n$  elements. The number of elements in the largest equivalence relation of  $A$  is

- (a) 1 .....
- (b)  $n$  .....
- (c)  $n + 1$  .....
- (d)  $n^2$  .....

56. The number of equivalence relations of the set  $\{1, 2, 3, 4\}$  is

- (a) 4 .....
- (b) 15 .....
- (c) 16 .....
- (d) 24 .....

57. Let  $R$  be a symmetric and transitive relation on a set  $A$ , then
- (a)  $R$  is reflexive and hence an equivalence relation .....
  - (b)  $R$  is reflexive and hence a partial order .....
  - (c)  $R$  is not reflexive and hence not an equivalence relation .....
  - (d) None of these .....
58. The 'Subset' relation on a set of sets is
- (a) A partial ordering .....
  - (b) An equivalence relation .....
  - (c) Transitive and symmetric only .....
  - (d) Transitive and anti-symmetric only ...
59. Let  $A$  be a finite set of size  $n$ , the number of elements in the power set of  $A \times A$  is
- (a)  $2^{2^n}$  .....
  - (b)  $2^{n^2}$  .....
  - (c)  $(2^n)^2$  .....
  - (d) None of these .....
60. \_\_\_\_\_ is an unordered collection of elements where an element can occur as a member more than once.
- (a) Multiset .....
  - (b) Ordered set .....
  - (c) Set .....
  - (d) None of the above .....
61. The number of substrings of all lengths that can be formed from a character string of length  $n =$  \_\_\_\_\_
- (a)  $n$  .....
  - (b)  $n^2$  .....
  - (c)  $n(n - 1)/2$  .....
  - (d)  $n ( n + 1)/2$  .....
62. A finite automata is a model of computer with
- (a) No storage capability .....
  - (b) Finite and fixed storage capability .....
  - (c) Expandable storage .....
  - (d) None of the above .....
63. Class of languages recognized by finite automata is called as
- (a) Context-sensitive languages .....
  - (b) Recursive languages .....
  - (c) Regular languages .....
  - (d) Context-free languages .....
64. Pumping lemma for regular sets is used to prove that
- (a) A given language is regular .....
  - (b) A given language is non-regular .....
  - (c) A given language is regular as well as a given language is non-regular .....
  - (d) None of the above .....

65. Every infinite language is

- (a) Always non-regular .....
- (b) Always regular .....
- (c) May be regular or may be non-regular .....
- (d) None of the above. ....

66. Intersection of two regular languages is

- (a) Always regular .....
- (b) Always non-regular .....
- (c) May be regular or may be non-regular .....
- (d) None of the above .....

67. Regular sets are not closed under

- (a) Union .....
- (b) Intersection .....
- (c) Subset .....
- (d) Complement .....

68. The regular expression  $0^*(10)^*$  denotes the same set as

- (a)  $(1^*0)^*1^*$  .....
- (b)  $0 + (0 + 10)^*$  .....
- (c)  $(0 + 1)^*10(0 + 1)^*$  .....
- (d) None of the above .....

69. The language  $L = \{a^n b^{2n} \mid n \geq 1\}$  is

- (a) Regular language .....
- (b) Context-free language .....
- (c) Non context free language .....
- (d) None of the above .....

70. The language  $L = \{a^{2i} \mid i \geq 0\}$  is

- (a) Regular language .....
- (b) Non regular language .....
- (c) Non context free language .....
- (d) None of the above .....

71. The language  $L = \{a^i b^i c^i d^i \mid i \geq 1\}$  is

- (a) Regular language .....
- (b) Recursively enumerable language .....
- (c) Context free language .....
- (d) None of the above .....

72. If a CFG  $G$ , is in CNF, then the length of derivation of a string  $w$  of length  $n$ , belonging to  $L(G)$  is

- (a)  $n$  .....
- (b)  $(2n - 1)$  .....
- (c)  $2n$  .....
- (d)  $2^n$  .....

73. For an inherently ambiguous CFL

- (a) There exist at least one CFG, which is ambiguous .....
- (b) There exist at least one CFG, which is unambiguous .....
- (c) There exist no CFG .....
- (d) There exist no CFG, which is unambiguous .....

74. If G is a context-sensitive grammar, then L(G) is

- (a) Always Recursive .....
- (b) Recursively enumerable but non-recursive .....
- (c) May be recursive .....
- (d) None of the above .....

75. The class of type (1) grammars corresponds to

- (a) Linear bounded automata .....
- (b) Pushdown automata .....
- (c) Finite automata .....
- (d) Turing machine .....

76. Turing machine has

- (a) Finite and read only tape .....
- (b) Infinite and read only tape .....
- (c) Infinite and read-write tape .....
- (d) Finite and read-write tape .....

77.  $L = \{a^n b^n c^n \mid n \geq 1\}$ , is

- (a) Recursive .....
- (b) Recursively enumerable but non-recursive .....
- (c) Non-recursively enumerable .....
- (d) None of the above. ....

78. If L1 is a context-free language, and L2 and L3 are regular languages then  $L1 \cap L2 \cap L3$  is

- (a) Context-free language .....
- (b) Regular language .....
- (c) Non context-free language .....
- (d) None of the above .....

79. If L1 is a context-free language, and L2 is a regular set, then  $L1 \cup L2$  is

- (a) Context-free language .....
- (b) Regular language .....
- (c) Non context-free language .....
- (d) None of the above .....

80. Consider a relation  $R = \{(1, 1), (2, 2), (2, 3), (3, 2), (3, 4), (4, 3)\}$ , on a set  $A = \{1, 2, 3, 4\}$ . The relation R is:

- (a) Reflexive .....
- (b) Transitive .....
- (c) Symmetric .....
- (d) Equivalence .....

81. Transitive closure of the union of two equivalence relation is

- |                                |                          |                             |                          |
|--------------------------------|--------------------------|-----------------------------|--------------------------|
| (a) Partial order .....        | <input type="checkbox"/> | (b) Total order .....       | <input type="checkbox"/> |
| (c) Equivalence relation ..... | <input type="checkbox"/> | (d) None of the above ..... | <input type="checkbox"/> |

82. Any given Transition graph has an equivalent

- |                              |                          |                            |                          |
|------------------------------|--------------------------|----------------------------|--------------------------|
| (a) regular expression ..... | <input type="checkbox"/> | (b) DFSM .....             | <input type="checkbox"/> |
| (c) NDFSM .....              | <input type="checkbox"/> | (d) All of the above ..... | <input type="checkbox"/> |

83. The intersection of a CFL and a regular language

- |                             |                          |                                  |                          |
|-----------------------------|--------------------------|----------------------------------|--------------------------|
| (a) is always regular ..... | <input type="checkbox"/> | (b) is always context free ..... | <input type="checkbox"/> |
| (c) both (a) and (b) .....  | <input type="checkbox"/> | (d) need not be regular .....    | <input type="checkbox"/> |

84. A Push Down Machine (PDM) behaves like a Turing Machine (TM) when the number of auxiliary memory it has, is

- |             |                          |             |                          |
|-------------|--------------------------|-------------|--------------------------|
| (a) 2 ..... | <input type="checkbox"/> | (b) 1 ..... | <input type="checkbox"/> |
| (c) 0 ..... | <input type="checkbox"/> | (d) 4 ..... | <input type="checkbox"/> |

85. The number of circuits in a tree with  $n$  nodes is

- |                 |                          |                 |                          |
|-----------------|--------------------------|-----------------|--------------------------|
| (a) zero .....  | <input type="checkbox"/> | (b) 1 .....     | <input type="checkbox"/> |
| (c) $n-1$ ..... | <input type="checkbox"/> | (d) $n/2$ ..... | <input type="checkbox"/> |

86. A graph is a tree if and only if it

- |                                   |                          |                                  |                          |
|-----------------------------------|--------------------------|----------------------------------|--------------------------|
| (a) is completely connected ..... | <input type="checkbox"/> | (b) is minimally connected ..... | <input type="checkbox"/> |
| (c) contains a circuit .....      | <input type="checkbox"/> | (d) is planar .....              | <input type="checkbox"/> |

87. The minimum number of spanning trees in a connected graph with  $n$  nodes is

- |                 |                          |                 |                          |
|-----------------|--------------------------|-----------------|--------------------------|
| (a) zero .....  | <input type="checkbox"/> | (b) 1 .....     | <input type="checkbox"/> |
| (c) $n-1$ ..... | <input type="checkbox"/> | (d) $n/2$ ..... | <input type="checkbox"/> |

88. The rank of a graph with  $n$  vertices,  $e$  edges and  $k$  components is

- |                 |                          |                   |                          |
|-----------------|--------------------------|-------------------|--------------------------|
| (a) $n$ .....   | <input type="checkbox"/> | (b) $e-n+k$ ..... | <input type="checkbox"/> |
| (c) $n-k$ ..... | <input type="checkbox"/> | (d) $n+k$ .....   | <input type="checkbox"/> |

89. The nullity of a graph with  $n$  vertices,  $e$  edges and  $k$  components is

- |                 |                          |                   |                          |
|-----------------|--------------------------|-------------------|--------------------------|
| (a) $n$ .....   | <input type="checkbox"/> | (b) $e-n+k$ ..... | <input type="checkbox"/> |
| (c) $n-1$ ..... | <input type="checkbox"/> | (d) $n+k$ .....   | <input type="checkbox"/> |

90. The number of paths between any pair of nodes in a tree on  $n$  nodes is

- |                 |                          |               |                          |
|-----------------|--------------------------|---------------|--------------------------|
| (a) 0 .....     | <input type="checkbox"/> | (b) 1 .....   | <input type="checkbox"/> |
| (c) $n-1$ ..... | <input type="checkbox"/> | (d) $n$ ..... | <input type="checkbox"/> |

91. What is the edge connectivity of a complete graph with  $n$  vertices?

- (a) 1 .....  (b)  $n-1$  .....   
(c)  $n+1$  .....  (d)  $n(n+1)/2$  .....

92. A circuit in a connected graph which includes every vertex of the graph is known as

- (a) Euler .....  (b) Unicursal .....   
(c) Hamiltonian .....  (d) Clique .....

93. The length of a Hamiltonian path (if exists) in a connected graph of  $n$  vertices is

- (a)  $n-1$  .....  (b)  $n$  .....   
(c)  $n + 1$  .....  (d)  $n/2$  .....

94. A given connected graph  $G$  is a Euler graph if and only if all vertices of  $G$  are of

- (a) same degree .....  (b) even degree .....   
(c) odd degree .....  (d) different degree .....

95. If  $A(G)$  is an incident matrix of a connected graph  $G$  with  $n$  vertices the rank of  $A(G)$  is

- (a) 1 .....  (b) 2 .....   
(c)  $n-1$  .....  (d)  $n$  .....

96. If a graph requires  $k$  different colors for its proper coloring then the chromatic number of the graph is

- (a)  $k/2$  .....  (b)  $k-1$  .....   
(c)  $k$  .....  (d) 1 .....

97. A graph consisting of only isolated  $n$  vertices is

- (a) 1-chromatic .....  (b) 2-chromatic .....   
(c) 3-chromatic .....  (d)  $n$ -chromatic .....

98. A graph with one or more edges (without self loop) is at least

- (a) 1-chromatic .....  (b) 2- chromatic .....   
(c) 3-chromatic .....  (d)  $n$ - chromatic .....

99. A complete graph with  $n$  vertices is

- (a) 2-chromatic .....  (b)  $n/2$  chromatic .....   
(c)  $n-1$  chromatic .....  (d)  $n$ -chromatic .....

100. The number of colors required to properly color the vertices of every planar graph is

- (a) 2 .....  (b) 3 .....   
(c) 4 .....  (d) 5 .....

101. Can a DFA simulate NFA?

- (a) No .....  (b) Yes .....   
(c) Some times .....  (d) depends on NFA .....

102. Regular expression  $(a|b)(a|b)$  denotes the set

- (a)  $\{a, b, ab, aa\}$  .....  (b)  $\{a, b, ba, bb\}$  .....   
(c)  $\{a, b\}$  .....  (d)  $\{aa, ab, ba, bb\}$  .....

103. Which of the following regular expressions denote zero or more instances of an  $a$  and  $b$ ?

- (a)  $a|b$  .....  (b)  $(a|b)^*$  .....   
(c)  $(a|b)^*$  .....  (d)  $a^*|b$  .....

104. Which of the following regular expressions denote a language comprising all possible strings of even length over the alphabet  $(0, 1)$ ?

- (a)  $(0|1)^*$  .....  (b)  $0|1(0|1)^*$  .....   
(c)  $(00|0111|10)^*$  .....  (d)  $(0|1)(0|1)(0|1)^*$  .....

105. Which of the following regular expressions denotes a language comprising all possible strings over the alphabet  $\{a, b\}$ ?

- (a)  $a^*b^*$  .....  (b)  $(a|b)$  .....   
(c)  $(ab)^+$  .....  (d)  $(a|b)^*$  .....

106. An FSM (Finite State Machine) can be considered to be a TM (Turing Machine)

- (a) of finite tape length, without rewinding capability and unidirectional tape movement .....   
(b) of finite tape length, rewinding capability and unidirectional tape movement .....   
(c) of finite tape length, without rewinding capability and bidirectional tape movement .....   
(d) of finite tape length, rewinding capability and bi-directional tape movement .....

107. Turing machine (TM) is more powerful than FSM (Finite State Machine) because

- (a) tape movement is confined to one direction .....   
(b) it has no finite state .....   
(c) it has the capability to remember arbitrarily long sequences of input symbols .....   
(d) none of above .....

108. Context Sensitive Grammar can be recognized by a

- (a) Deterministic Push Down Machine (DPDM) .....   
(b) Non Deterministic Push Down Machine (NDPDM) .....   
(c) Finite State Machine (FSM) .....   
(d) Linearly bounded memory machine .....

109. Context Free Grammar is not closed under

- (a) product .....  (b) union .....   
(c) complementation .....  (d) Kleen star .....

110. Which of the following is not accepted by Deterministic Push Down Machine (DPDM) but accepted by Non Deterministic Push Down Machine (NDPDM)?

- (a) strings ending with a particular alphabet .....   
(b) all strings in which a given symbol is present at least twice .....   
(c) even palindromes .....   
(d) None of the above .....

111. Three resistances of value  $R$  ohms each are connected in star. Its equivalent delta will comprise three resistances of value

- (a)  $R/3$  each .....  (b)  $3R$  each .....   
(c)  $R$  each .....  (d)  $3R, R, R/3$  .....

112. Three impedances of  $Z$  each are connected in delta. Their equivalent star impedance/phase will be

- (a)  $Z/\sqrt{3}$  .....  (b)  $\sqrt{3}Z$  .....   
(c)  $Z/3$  .....  (d)  $3Z$  .....

113. The sum of instantaneous powers in a balanced three-phase system is a

- (a) constant .....   
(b) constant plus a second harmonic oscillating component .....   
(c) constant plus a fundamental oscillating component .....   
(d) constant plus a third harmonic oscillating component .....

114. The two-wattmeter method is used to find power in a balanced three-phase circuit. If the two-wattmeter are found to have equal readings the circuit power factor will be

- (a)  $\sqrt{3}/2$  .....  (b) 1 .....   
(c)  $1/2$  .....  (d)  $1/\sqrt{2}$  .....

115. In the two-wattmeter method of measuring power in a balanced three-phase circuit, the readings of the two-wattmeters are in the ratio of 1:2. The circuit power factor is

- (a)  $1/\sqrt{2}$  .....  (b)  $1/2$  .....   
(c)  $\sqrt{3}/2$  .....  (d) 1 .....



116. For a balanced delta-connected load, the phase angle between current in delta leg and its voltage is  $\phi$ . The angle between a line current and its equivalent star-phase voltage will therefore be
- (a)  $\phi$  .....  (b)  $\phi + 30^\circ$  .....   
(c)  $\phi + 60^\circ$  .....  (d)  $\phi + 90^\circ$  .....
117. The simplified form of the Boolean expression  $(X + Y + XY)(X + Z)$  is
- (a)  $X + Y + Z$  .....  (b)  $XY + YZ$  .....   
(c)  $X + YZ$  .....  (d)  $XZ + Y$  .....
118. Which of the following Boolean algebra statements represent commutative law?
- (a)  $(A + B) + CA + (B + C)$  .....  (b)  $A \cdot (B + C) (A \cdot B) + (A \cdot C)$  .....   
(c)  $A + BB + A$  .....  (d)  $A + AA$  .....
119. Which of the following logic expression is incorrect?
- (a)  $1 \cdot 0 = 1$  .....  (b)  $1 \cdot 1 \cdot 0 = 1$  .....   
(c)  $1 \cdot 1 \cdot 1 = 1$  .....  (d)  $1 \cdot 1 = 0$  .....
120. The language that the computer can understand and execute is called
- (a) Machine language .....  (b) Application software .....   
(c) System program .....  (d) None of the above .....
121. Which of the following is used as a primary storage device?
- (a) Magnetic tape .....  (b) PROM .....   
(c) Floppy disk .....  (d) None of the above .....
122. Typical data transfer rate in LAN are of the order of
- (a) Bits per sec .....  (b) Kilo bits per sec .....   
(c) Mega bits per sec .....  (d) None of the above .....
123. Ethernet uses
- (a) Bus topology .....  (b) Ring topology .....   
(c) Mesh topology .....  (d) None of the above .....
124. Wide area networks (WANs) always require
- (a) High bandwidth communication source link .....   
(b) High speed processors .....   
(c) Same type .....   
(d) None of the above .....

125. Typical bandwidth of optical fibers is

- (a) Order of GHz .....
- (b) Order of KHz .....
- (c) Order of Hz .....
- (d) None of the above .....

126. A large number of computers in a wide geographical area can be efficiently connected by

- (a) Twisted pair lines .....
- (b) Coaxial cables .....
- (c) Communications satellites .....
- (d) None of the above .....

127. Which of the following topologies is not of broadcast type?

- (a) Star .....
- (b) Bus .....
- (c) Ring .....
- (d) None of the above .....

128. A file is corrected immediately after the input of a transaction. This is an example of

- (a) sorting .....
- (b) batching .....
- (c) on-line updating .....
- (d) off-line updating .....

129. Magnetic tapes are good storage media for

- (a) backup and low volume data .....
- (b) backup and high volume data .....
- (c) storing original but low volume data ..
- (d) storing original but high volume data .

130. In half adder EX-OR gate O/P is

- (a) Carry .....
- (b) Remainder .....
- (c) Sum .....
- (d) None of these .....

131. In half adder AND gate O/P is

- (a) Carry .....
- (b) Remainder .....
- (c) Sum .....
- (d) None of these .....

132. Subtract  $(1010)_2$  from  $(1101)_2$  using 1<sup>st</sup> complement

- (a)  $(1100)_2$  .....
- (b)  $(0011)_2$  .....
- (c)  $(1001)_2$  .....
- (d)  $(0101)_2$  .....

133. In 1<sup>st</sup> Complement a number to be subtracted is known as

- (a) Subtrahend .....
- (b) Minuend .....
- (c) Carry .....
- (d) None of these .....

134. In a 2<sup>nd</sup> Complement a number which is subtracted from other number is known as

- (a) Carry .....
- (b) Subtrahend .....
- (c) Minuend .....
- (d) None of these .....

135. The full adder CKT adds \_\_\_\_\_ digit(s) at a time

- (a) 1 .....  (b) 2 .....   
(c) 3 .....  (d) 4 .....

136. Full adder is constructed by using

- (a) Two Half Adder & one OR gate .....  (b) two OR gate & one HA .....   
(c) One HA & two OR gate .....  (d) One OR gate & one HA .....

137. \_\_\_\_\_ are used for converting one type of number system into other form

- (a) Encoder .....  (b) Logic gate .....   
(c) Half adder .....  (d) FA .....

138. Multiplexer means

- (a) one in to many .....  (b) many in to one .....   
(c) many in to many .....  (d) None of these .....

139. ASCII code is a/an \_\_\_\_\_ bit code

- (a) 1 .....  (b) 2 .....   
(c) 7 .....  (d) 8 .....

140. 8421 codes is also called as

- (a) Gray code .....  (b) ASCII code .....   
(c) excess 3-code .....  (d) BCD code .....

141. Karnaugh map (K-map) technique provides a systematic method for simplifying

- (a) multiplexers .....  (b) logic gates .....   
(c) Boolean expressions .....  (d) None of these .....

142. In Boolean algebra  $A + AB =$  \_\_\_\_\_

- (a) B .....  (b) A .....   
(c) AB .....  (d) A+B .....

143. Which of the following is a 8 bit Microprocessor?

- (a) Intel 4040 .....  (b) Pentium – I .....   
(c) 8088 .....  (d) Motorola MC-6801 .....

144. The 8085 Microprocessor uses \_\_\_\_\_ power supply

- (a) +5V .....  (b) -5V .....   
(c) +12V .....  (d) -12V .....

145. The Stack pointer holds

- |                          |                          |                       |                          |
|--------------------------|--------------------------|-----------------------|--------------------------|
| (a) 16 bit address ..... | <input type="checkbox"/> | (b) 16 bit data ..... | <input type="checkbox"/> |
| (c) 8 bit address .....  | <input type="checkbox"/> | (d) 8 bit data .....  | <input type="checkbox"/> |

146. The Second Generation of computers used

- |                        |                          |                               |                          |
|------------------------|--------------------------|-------------------------------|--------------------------|
| (a) IC-Chip .....      | <input type="checkbox"/> | (b) Transistors .....         | <input type="checkbox"/> |
| (c) Vacuum tubes ..... | <input type="checkbox"/> | (d) Microprocessor chip ..... | <input type="checkbox"/> |

147. Flip flop is also called as

- |                      |                          |                      |                          |
|----------------------|--------------------------|----------------------|--------------------------|
| (a) stable .....     | <input type="checkbox"/> | (b) bistable .....   | <input type="checkbox"/> |
| (c) tri stable ..... | <input type="checkbox"/> | (d) not stable ..... | <input type="checkbox"/> |

148. The number system that we use in our day to day life is called the \_\_\_\_\_ Number System

- |                       |                          |                   |                          |
|-----------------------|--------------------------|-------------------|--------------------------|
| (a) Octal .....       | <input type="checkbox"/> | (b) Binary .....  | <input type="checkbox"/> |
| (c) Hexadecimal ..... | <input type="checkbox"/> | (d) Decimal ..... | <input type="checkbox"/> |

149. The Binary system has base \_\_\_\_\_

- |              |                          |              |                          |
|--------------|--------------------------|--------------|--------------------------|
| (a) 8 .....  | <input type="checkbox"/> | (b) 2 .....  | <input type="checkbox"/> |
| (c) 10 ..... | <input type="checkbox"/> | (d) 16 ..... | <input type="checkbox"/> |

150.  $11010011_2 = ?_{16}$

- |                     |                          |                     |                          |
|---------------------|--------------------------|---------------------|--------------------------|
| (a) $D3_{16}$ ..... | <input type="checkbox"/> | (b) $A3_{16}$ ..... | <input type="checkbox"/> |
| (c) $B3_{16}$ ..... | <input type="checkbox"/> | (d) $D2_{16}$ ..... | <input type="checkbox"/> |

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