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

Booklet Serial No. : 0319

TEST BOOKLET

AE (IT) MPPP

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. There are three parts of Question Paper and the candidate holding degree either in Information & Technology and Computer Science Engineering may opt Part-A (Question Nos. 1 to 80) and the candidate holding degree Electronics & Communication Engineering may opt Part-B (Question Nos. 1 to 80). Whereas Part-C comprising question Nos. 81 to 100 are compulsory and common for all the candidates. Therefore, the candidate may opt either Part-A *or* Part-B of the Question Paper and encode the relevant part (opted) in place of 'BOOKLET SERIES' 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 :

   (A) (B) ● (D)

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.
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. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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P.T.O.

Important Note :—

There are three parts of Question Paper and the candidate holding degree either in Information & Technology and Computer Science Engineering may opt Part-A (Question Nos. **1** to **80**) and the candidate holding degree Electronics & Communication Engineering may opt Part-B (Question Nos. **1** to **80**), whereas Part-C comprising question Nos. **81** to **100** are compulsory and common for all the candidates. Therefore, the candidate may opt either Part-A or Part-B of the Question Paper and encode the relevant part (opted) in place of 'BOOKLET SERIES' in the answer-sheet.

PART A

INFORMATION & TECHNOLOGY AND

COMPUTER SCIENCE ENGINEERING

1. What is the smallest possible cardinality of a matching in a bipartite graph G = (L, R, E) with N vertices in each vertex set L and R and at least N edges ?

(A) 1 (B) 0

(C) N/2 (D) N – 1

2. Cleanroom Software Engineering involves :

(A) Formal design (B) Statistical testing

(C) Correctness verification (D) All of these

3. Which one is the most appropriate data type in C language for the variable AvgSalary which is used to compute the average salary of employees in a program ?

(A) int
(B) char
(C) float
(D) All of these

4. Suppose you are given :

```
try
{  int x = Integer.parseInt("four");
}
```

then which could be used to create an appropriate catch block ?

(A) NumberFormatException
(B) IllegalArgumentException
(C) ClassCastException
(D) ExceptionInInitializerError

5. Which one of the following sentence that can be generated by grammar

$$G \rightarrow aG,\ G \rightarrow bA,\ A \rightarrow d,\ A \rightarrow ccA$$

(A) ababccd
(B) abbbd
(C) bccddd
(D) aabccd

6. Consider below statements and answer which one of the following is *correct* ?

```
int x = 22;

int *y;

y = &x;
```

(A) x = y;

(B) y = x;

(C) *y = 45;

(D) All of these

7. In C language, which one may be the *correct* declaration of a string named HpSc to store a string constant "HPSC Selection Exam" ?

(A) char HpSc[19]

(B) char HpSc[13]

(C) char HpSc[25];

(D) char HpSc[17]

8. What will be the output of the following, when user enters the text "Appearing Exam@Selection.@HP"

```
main( )
{   char text[60];
    scanf("%[^@]s",text);
    printf("%s",text);
}
```

(A) Appearing Exam

(B) Appearing Exam @ Selection.@HP

(C) Selection.

(D) HP

9. In C language an array X[ ], then i^{th} element can be accessed by :

(A) *(X + i)

(B) *(i + X)

(C) X[i]

(D) All of these

10. How many number of 1's present in binary representation of 15 × 128 + 5 × 16 + 5 ?

(A) 10

(B) 9

(C) 6

(D) None of these

11. Consider the following :

```
import java.io.*;

class Vehicle{ }

class Wheels{ }

class Car extends Vehicle implements Serializable{ }

class Ford extends Car{ }

class Dodge extends Car{

    Wheels w = new Wheels( );

}
```

Instances of which class(es) can be serialized ?

(A) Wheels

(B) Vehicle

(C) Dodge

(D) Ford

12. Which is *true* about client server architecture ?

(A) The front-end task and back-end task have fundamentally different requirements

(B) The Client & Server's environment is typically heterogeneous and multivendor

(C) Client Server architecture is scalable

(D) All of the above

13. In Domain Name System which record is responsible for mapping a domain name to an IP address ?

(A) NS record

(B) A record

(C) PTR record

(D) AAA record

14. An IP Network subnet has been assigned a subnet mask of 255.255.255.192. What is the maximum number of hosts that can be possibly belong to this subnet ?

(A) 62

(B) 14

(C) 30

(D) 126

15. Which data structure may be used in RDBMS ?

(A) Tree

(B) Graph

(C) Array

(D) All of these

6. Which one is the *correct* binary representation of the gray code 111110 ?

(A) 111111 (B) 101011

(C) 010100 (D) 000001

7. The total number of comparisons binary search algorithm does to search an item *key* that does not exist, in the array S which contains 1024 items is :

(A) 11 (B) 10

(C) 512 (D) None of these

8. Which of the following parameter(s) are negotiated during the TCP's three-way handshake process ?

(A) Initial sequence number (B) Maximum segment size

(C) Window scale option (D) All of these

9. A serious problem can arise in the sliding window operation when either the sending application program creates data slowly or the receiving application program consumes data slowly, or both. This problem is called the :

(A) silly window syndrome (B) bug

(C) unexpected syndrome window (D) none of these

20. Rapid Development is possible with ..... of Software Engineering.

(A) Waterfall Model (B) Spiral Model

(C) Prototyping Model (D) Incremental Model

21. When the new node inserted in the right subtree of the left subtree of the critical node then which rotation may apply ?

(A) LL (B) LR

(C) RR (D) RL

22. Pre-order traversal of Binary tree also corresponds to which of the following ?

(A) In order traversal (B) Depth First traversal

(C) Breadth First traversal (D) None of these

23. What will be the balance factor when the left sub-tree of the tree is on level lower than that of the right sub tree ?

(A) 2 (B) 0

(C) 1 (D) –1

24. When any fragment of an IP datagram is lost, what does the destination host do to the other fragments ?

(A) they are accepted (B) they are discarded

(C) they are buffered (D) None of these

25. Every internal node of a multiway search tree of order M consists of pointers to M sub-trees and contains ..... key fields where M > 2.

(A) M – 1 (B) M + 1

(C) M (D) All of these

26. Hamming distance between 1001 0010 1101 and 1010 0010 0010 is :

(A) 1 (B) 12

(C) 5 (D) None of these

27. How many articulation vertices a biconnected graph may contain ?

(A) 1 (B) 0

(C) 2 (D) infinite vertices

28. Number of bits in a memory having 12 bit address register and 8 bit data register is :

(A) 32768 (B) 256

(C) 4096 (D) 2048

29. Which one of the open addressing technique is free from clustering problems ?

(A) double hashing (B) linear probing

(C) quadratic probing (D) All of these

30. Which of the files used by the system and can't be removed or altered from the disk ?

(A) Archived file
(B) Hidden file
(C) System file
(D) All of these

31. Which one of the following is used to connect a WAN with a LAN ?

(A) Switch
(B) Bridge
(C) Router
(D) Hub

32. The number of addresses assigned to an organization in classless addressing :

(A) must be a multiple of 256
(B) must be a power of 2
(C) any number
(D) all of these

33. Suppose that the total rows in relation R(A, B, C) is 200 and in relation S(A, D, E) is 100. Attribute A in relation R is a foreign key referencing relation S and attribute A is the primary key of S, then the estimated size of resultant table when cross-product between relation R and S performed in a SQL query is :

(A) 200
(B) 100
(C) 20000
(D) 10000

34. Which sorting technique is stable sorting ?

(A) Insertion Sort (B) Heap Sort

(C) Quick Sort (D) Radix Sort

35. If an algorithm is composed of two modules M1 and M2. If order M1 is f(n) and order of M2 is g(n), then what will be the order of algorithm ?

(A) f(n) + g(n) (B) f(n) × g(n)

(C) max(f(n), g(n)) (D) min(f(n), g(n))

36. The source port and destination port in a TCP header is :

(A) used to identify the source and destination host on the network

(B) used to identify the source protocol and destination protocol

(C) used to identify the application of the source protocol and the application of the destination protocol.

(D) All of the above

37. Output of the following C code is :

```
main( ) {  char ch = 's'
           while(ch < 'w')
           printf("%c", ch++);
           printf("%c", ch);
         }
```

(A) stuvw (B) stuv

(C) tuvw (D) None of these

38. What will be the value of the following expression according to C language rules ?

10%3*2+(7%9/4)*5.0/4+(10&&0)

(A) 3.25

(B) 3

(C) 3.3

(D) 4

39. A code for A, B, C, D, E is given by A : 00, B : 01, C : 101, D : x10, E : yz1 where x, y, z are in 0, 1; then x, y and z will have which one of the following values so that the given codes become prefix code ?

(A) x = 1, y = 1, z = 1

(B) x = 0, y = 0, z = 0

(C) x = 1, y = 0, z = 0

(D) x = 0, y = 0, z = 1

40. Which of the following is *correct* if C and C′ be distinct strongly connected components in a directed graph G(V, E) and there is an edge (u, v) ∈ E, where u ∈ C and v ∈ C′ ?

(A) f(C) < f(C′)

(B) f(C) > f(C′)

(C) f(C) = f(C′)

(D) All of these

41. Which one of the following algorithms finds augmenting path with breadth first search ?

(A) Ford-Fulkerson

(B) Edmonds-Karp

(C) Both (A) and (B)

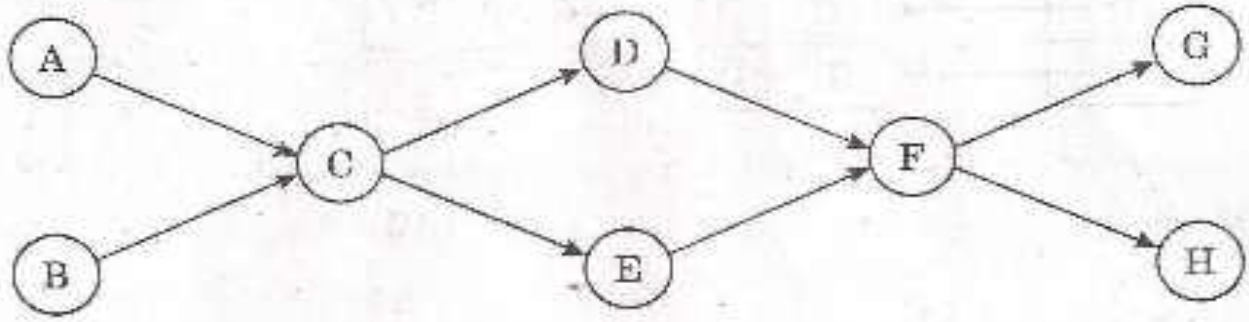
(D) None of these

42. What will be the value of base Y when $(135)_Y + (144)_Y = (323)_Y$?

(A) 3 (B) 5

(C) 6 (D) None of these

43. How many number of topological orderings does below given graph may be possible ?



(A) 1 (B) 2

(C) 4 (D) more than 5

44. Which minimum spanning tree algorithm will be preferable for a given weighted graph G having fifty vertices and two hundred edges ?

(A) Kruskal's algorithm (B) Prim's algorithm

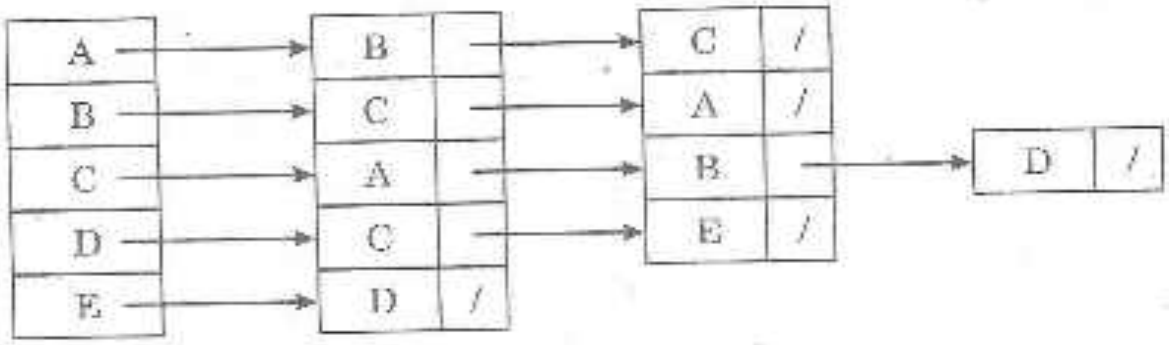
(C) Both (A) and (B) (D) None of these

45. At a particular time of computation the value of a counting semaphore is 7. Then 20 P operation and 'x' V operation were completed on this semaphore. If the final value of the semaphore is 5, x will be :

(A) 13 (B) 15

(C) 22 (D) 18

46. How many articulation points and bridges respectively are in the below given graph G ?



(A) 2, 2

(B) 1, 2

(C) 2, 1

(D) 4, 5

47. In Selective Repeat ARQ, if 5 is the number of bits for the sequence number, then the maximum size of the receive window must be :

(A) 1

(B) 15

(C) 31

(D) 16

48. What does the following conditional expression statement determine ?

(a < b) ? ((a < c) ? a : c) : ((b < c) ? b : c)

(A) Largest of a, b, c

(B) Smallest of a, b, c

(C) Equality of a, b, c

(D) None of these

49. Let consider :

m = "Juan is a math major,"

c = "Juan is a computer science major,"

g = "Juan's girlfriend is a literature major,"

h = "Juan's girlfriend has read Hamlet," and

t = "Juan's girlfriend has read The Tempest."

Which of the following expresses the statement "Juan is a computer science major and a math major, but his girlfriend is a literature major who hasn't read both The Tempest and Hamlet ?"

(A) $c \wedge m \wedge (g \vee (\sim h \vee \sim t))$ (B) $c \wedge m \wedge g \wedge (\sim h \wedge \sim t))$

(C) $c \wedge m \wedge g \wedge (\sim h \vee \sim t))$ (D) $c \wedge m \wedge g \vee (\sim h \wedge \sim t))$

50. Consider the statement form $p \rightarrow q$, where p = "If Tom is Jane's father then Jane is Bill's niece" and q = "Bill is Tom's brother." Which of the following statements is equivalent to this statement ?

(A) If Bill is Tom's Brother, then Tom is Jane's father and Jane is not Bill's niece

(B) If Bill is not Tom's Brother, then Tom is Jane's father and Jane is not Bill's niece

(C) If Bill is not Tom's Brother, then Tom is Jane's father or Jane is Bill's niece

(D) If Bill is Tom's Brother, then Tom is Jane's father and Jane is Bill's niece

51. Which one is *correct* asymptotic order from smallest to largest ?

$$n \log n,\ 2^4,\ n + n^2 + n^3,\ n^{0.5},\ e^4,\ n^{1/\lg n}$$

(A) $n^{1/\lg n}$, $n \log n$, $n + n^2 + n^3$, 2^4, e^4

(B) $n \log n$, $n^{1/\lg n}$, $n + n^2 + n^3$, e^4, 2^4

(C) $n^{1/\lg n}$, $n \log n$, $n + n^2 + n^3$, e^4, 2^4

(D) $n^{1/\lg n}$, $n \log n$, 2^4, $n + n^2 + n^3$, e^4

52. Which one operates up to the Application layers ?

(A) Routers

(B) Switches

(C) Gateways

(D) All of these

53. The Q output of a J-K flip flop is 0 which changes to 1 when a clock pulse is applied. The input J and K are respectively (X-denotes don't care state) :

(A) 0 and X

(B) X and 0

(C) 1 and X

(D) X and 1

54. Suppose a relation R(A, B, C, D, E) have the following FD's $AB \rightarrow C$, $BC \rightarrow D$, $CD \rightarrow E$, then the primary key of relation R is :

(A) AB

(B) BC

(C) CD

(D) BE

55. How many minimum number of NAND gates are required to implement the Boolean function A + AB′ + AB′C ?

(A) 7 (B) 1

(C) 4 (D) 0

56. Consider the sliding window Go-Back-N ARQ system in which S sends packets 0, 1, 2, 3, 4, 5 and 6. Packet 3 received at R corrupted, then what do S and R send to each other next ?

(A) R sends ACK-3, S then sends just packet 3

(B) R sends ACK-2, S then sends just packet 3

(C) R sends ACK-3, S then sends packets 3, 4, 5, 6, 7, 0 and 1

(D) R sends ACK-2, S then sends packets 3, 4, 5, 6, 7, 0 and 1

57. How many times will the program given below print HPSC ?

```
#include<stdio.h>
int main( )
{  fork( );
   fork( );
   fork( );
   printf("HPSC\n");
}
```

(A) 7 (B) 6

(C) 4 (D) 8

58. Which is *correct* about data scrubbing ?

(A) A process to upgrade the quality of data after it is moved into a data warehouse.

(B) A process to reject data from the data warehouse and to create the necessary indexes.

(C) A process to upgrade the quality of data before it is moved into a data warehouse.

(D) A process to load the data in the data warehouse and to create the necessary indexes.

59. Let R and S be binary relations on a set A. Suppose that R is reflexive, symmetric, and transitive and that S is symmetric, and transitive but is not reflexive. Which statement is always *true* for any such R and S ?

(A) $R \cup S$ is symmetric but not reflexive and not transitive

(B) $R \cup S$ is symmetric but not reflexive

(C) $R \cup S$ is transitive and symmetric but not reflexive

(D) $R \cup S$ is reflexive and symmetric

60. Given the cardinality of table Players, Match, Bating and Bowling (each to be 100), which one is the true number of rows in the fact table ?

(A) 100

(B) 100000000

(C) 10000

(D) 1000000

61. Errors recovery mechanism of TCP is suitably categorized as :

(A) Stop-Wait protocol

(B) Selective Repeat protocol

(C) Go-Back-N protocol

(D) Hybrid of Go-Back-N and Selective Repeat protocols

62. Let A = {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16} and consider the divides relation on A. Let C denote the length of the maximal chain, M the number of maximal elements, and m the number of minimal elements. Which is *true* ?

(A) C = 3, M = 8, m = 6

(B) C = 4, M = 8, m = 6

(C) C = 3, M = 6, m = 6

(D) C = 4, M = 6, m = 4

63. Which of the following statements is *correct* ?

(A) An unsigned binary number is multiplied by 2^K by shifting it left by K bit positions and adding K zeros to the right of the least significant bit.

(B) An unsigned binary number is divided by 2^K by shifting it right by K bit positions and adding K zeros to the left of the most significant bit.

(C) A signed binary number is divided by 2^K by shifting it right by K bit positions and adding the sign bit K times to the left of the most significant bit.

(D) All of the above

64. Which one specifies the specific number of entity occurrences associated with one occurrence of the related entity ?

(A) Connectivity of relationship
(B) Cardinality of relationship
(C) Degree of relationship
(D) None of these

65. Consider a system having N resource of same type. These resources are shared by 3 processes X, Y and Z, which have peak demands of 3, 4 and 6 respectively. For what value of N deadlock will *not* occur ?

(A) 13
(B) 10
(C) 7
(D) None of these

66. In a two-dimensional parity check method three errors affects :

(A) three parities
(B) two parities
(C) one parity
(D) four parities

67. Which one is the function of a distributed DBMS ?

(A) Distributed data recovery
(B) Replicated data management
(C) Distributed query processing
(D) All of these

68. When an AND gate is implemented as a CMOS gate then how many transistors are required ?

(A) 6
(B) 2
(C) 4
(D) All of these

69. A combinational circuit has inputs A, B and C and its Karnaugh map is as shown below. Which one gives the output of the circuit ?

C \ AB	00	01	11	10
0		1		1
1	1		1	

(A) $(A'B + AB')C$

(B) $(A'B + AB')C'$

(C) $A \oplus B \oplus C$

(D) $A'B'C'$

70. Let R = R(A, B, C, D) and functional dependencies F = {AB → C, C → D, D → A}, then which one is candidate key(s) of relation R ?

(A) AB

(B) BC

(C) BD

(D) All of these

71. Size of window for the host H when value of receiver window is 3000 bytes and the value of congestion window is 3500 bytes is :

(A) 3500 bytes

(B) 6500 bytes

(C) 3000 bytes

(D) None of these

72. A containership implements :

(A) polymorphism

(B) inheritance

(C) abstraction

(D) aggregation

73. When performing the following operations involving 8-bit 2's complement number then in which arithmetic overflow occurs ?

(A) 01110101 + 11011110

(B) 00110110 + 01000101

(C) 01110101 – 11010110

(D) 11010011 – 11101100

74. Which of the following testing methods is normally used as the acceptance test for a software system ?

(A) Integration testing

(B) Unit testing

(C) Functional testing

(D) Regression testing

75. When number of address bits in a memory is reduced by two and the addressability is doubled, then the size of the memory i.e. number of bits stored in the memory will :

(A) Halve

(B) Remain unchanged

(C) Double

(D) None of these

76. Which one of the following translate and execute an instructio simultaneously ?

(A) Assembler

(B) Compiler

(C) Operating system

(D) Interpreter

77. Let we have two algorithms for the same problem and time complexity of first algorithm is 100 N and 0.01 N^2 for the second algorithm. The value of N for which first algorithm start to show its better performance is :

(A) $N > 10000$ (B) $N < 10000$

(C) $N > 1000$ (D) No such value of N possible

78. When the memory chip size is 256×1 bits then the number of chips required to make up 1 K bytes of memory is :

(A) 4 (B) 8

(C) 32 (D) 24

79. ..... functions cannot use recursion.

(A) user defined (B) friend

(C) inline (D) polymorphic

80. A class having a pure virtual function is called as :

(A) abstract class (B) friend class

(C) base class (D) All of these

PART B

ELECTRONICS AND COMMUNICATION ENGINEERING

For writing state equations for a network, the following set is used as state variables :

(A) Capacitor voltage and inductor voltage

(B) Capacitor current and inductor voltage

(C) Capacitor voltage and inductor current

(D) Capacitor current and inductor current

2. The relation between quality factor (Q) of a coil and the frequency (f) is :

(A) Q varies linearly with f

(B) Q varies inversely with f

(C) Q is independent of f

(D) None of these

3. If the current in a 20 Ω resistor is given by :

$$i(t) = 4 + 5 \sin \omega t - 3 \cos 3\omega t \text{ Amps,}$$

the power consumed in watts by the resistor is :

(A) 660

(B) 320

(C) 250

(D) 90

4. For a parallel RLC resonant circuit, the damped frequency, $\omega_d = \sqrt{8}$ rad/sec and bandwidth = 2 rad/sec, the resonant frequency in rad/sec is given by :

(A) $\sqrt{10}$ (B) $\sqrt{7}$

(C) 2 (D) 3

5. The unit of $\nabla \times H$ is :

(A) Ampere (B) Ampere – Meter

(C) Ampere/Meter (D) Ampere/Meter^2

6. An inductor L, 5 Ω and 10 Ω resistors are all connected in series across a $50 \cos \omega t$ voltage source. If the power consumed by the 5 Ω resistor is 10 watts, the power factor of the circuit is :

(A) 0.3 (B) 0.4

(C) 0.6 (D) 0.8

7. For a two terminal network, if the applied voltage is, $v(t) = 160 \sin(\omega t + 10°)$ volts and the resulting current is, $i(t) = 5 \sin(\omega t - 20°)$ Amps. The reactive power absorbed by the circuit in Vars is :

(A) 136.8 (B) 346.4

(C) 400 (D) 200

8. Given the driving point impedance of a network, $z(s) = (s + a)/(s + b)$, for sinusoidal excitation the voltage leads the current if :

(A) a and b are real positive and $a > b$

(B) a and b are real positive and $a < b$

(C) a is real positive and b is real negative

(D) none of the above is correct

9. If two-port network is reciprocal, which of the following is *not true* ?

(A) $z_{21} = z_{12}$ (B) $y_{21} = y_{12}$

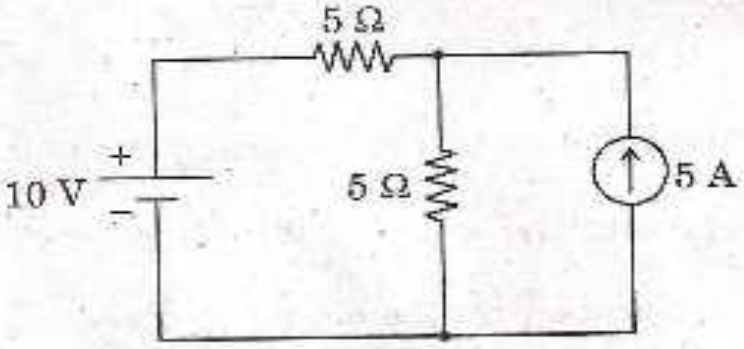
(C) $h_{21} = h_{12}$ (D) AD = BC + 1

10. If $f(t) = \sin 10t + \sin 20t$, what is the r.m.s. value of $f(t)$?

(A) 1 (B) 0.5

(C) π (D) 1.414

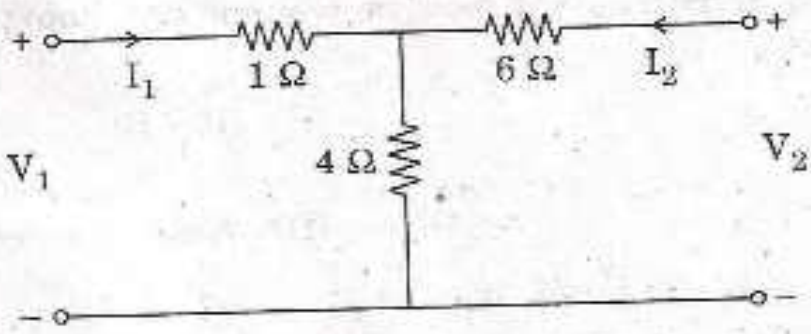
11. The voltage across 5 A source in the given circuit is :



(A) 25 V (B) 20 V

(C) 17.5 V (D) 15.5 V

12. For the network shown, the parameters h_{11} and h_{21} are :



(A) 5 Ω and −2/3

(B) 3.4 and −2/5

(C) 3.4 and −3/5

(D) none of these

13. The d.c. gain of a circuit having its transfer function $\frac{25}{(s+2)(s+3)}$ is :

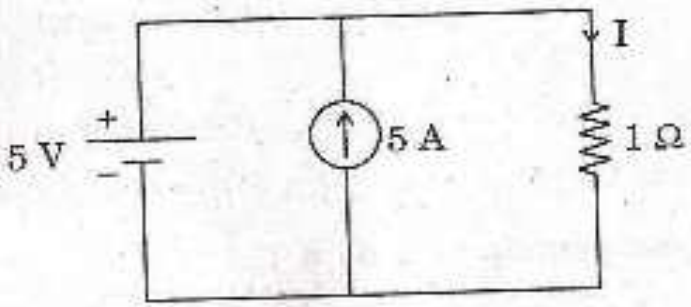
(A) 25

(B) 10

(C) 25/6

(D) 5/6

14. The value of current I flowing through 1 Ω resistor for the circuit shown is :



(A) 10 A

(B) 6 A

(C) 5 A

(D) 4 A

15. A drawn wire of resistance 5 Ω is further drawn so that its diameter becomes one-fifth, its resistance will now be (volume remaining same) :

(A) 625 Ω

(B) 125 Ω

(C) 25 Ω

(D) None of these

16. A parallel plate capacitor is made of two circular plates separated by a distance of 5 mm and with a dielectric of dielectric constant 2.2 between them. When the electric field in the dielectric is 3×10^4 V/m, charge density of the positive plate will be close to :

(A) 3×10^{-7} C/m^2

(B) 6×10^4 C/m^2

(C) 3×10^4 C/m^2

(D) 6×10^{-7} C/m^2

17. The magnetic field in a travelling (in free-space) electromagnetic wave has a peak value of 20nT. The peak value of electric field strength is :

(A) 3 V/m

(B) 6 V/m

(C) 9 V/m

(D) 12 V/m

18. A rectangular waveguide acts as a :

(A) low-pass filter

(B) high-pass filter

(C) band-pass filter

(D) band-stop filter

19. A transmission line has characteristic impedance of 50 Ω and length $l = \lambda/8$. If load $Z_L = (R + j30)$ Ω, then the value of R, at which input impedance of transmission line will be real is :

(A) 20 Ω (B) 40 Ω

(C) 80 Ω (D) None of these

20. Which one of the fundamental equation was modified by Maxwell to form the basis of electromagnetic theory ?

(A) Coulomb law (B) Faraday law

(C) Gauss law of electrostatic (D) Ampere circuital law

21. For static electric and magnetic fields in a homogeneous source-free medium, which of the following represents the *correct* form of two of Maxwell's equations ?

(A) $\nabla \cdot E = 0, \nabla \times B = 0$ (B) $\nabla \cdot E = 0, \nabla \cdot B = 0$

(C) $\nabla \times B = 0, \nabla \times E = 0$ (D) $\nabla \times E = 0, \nabla \cdot B = 0$

22. The wavelength of a wave having propagation constant $\gamma = 0.1\pi + j0.2\pi$ rad/m is :

(A) 10 m (B) 20 m

(C) 25 m (D) 30 m

23. Which of the following antenna is designed by modifying waveguides ?

(A) Dipole antenna

(B) Horn antenna

(C) Microstrip antenna

(D) Yagi-Uda antenna

24. Antenna used in mobile communication is :

(A) Dish antenna

(B) Patch antenna

(C) Horn antenna

(D) Dipole antenna

25. The depth of penetration of electromagnetic wave in a medium having conductivity σ at a frequency of 1 MHz is 25 cm. The depth of penetration at a frequency of 4 MHz will be :

(A) 50.0 cm

(B) 25.0 cm

(C) 12.5 cm

(D) 6.25 cm

26. The bandwidth of voice grade channel is approximately :

(A) 3000 Hz

(B) 4000 Hz

(C) 5000 Hz

(D) 6000 Hz

27. Bit rate is always ..... to the baud rate.

(A) equal (B) more

(C) equal or more (D) none of these

28. A signal of bandwidth 4 kHz is recorded in a tape recorder at normal speed. If for transmission purposes, the recorder is replayed at 4 times the normal speed, then the transmission bandwidth will be :

(A) 1 kHz (B) 4 kHz

(C) 8 kHz (D) 16 kIIz

29. In a 100% modulated AM signal with carrier power 100 W, the power in the upper sideband is :

(A) 75.5 (B) 50

(C) 25 (D) none of these

30. Medium wave AM radio broadcast band is :

(A) 3 MHz to 10 MHz (B) 10 MHz to 30 MHz

(C) 88 MHz to 108 MIz (D) 530 kHz to 1600 kHz

31. The topology used by a contral controller or hub is :

(A) Mesh (B) Star

(C) Bus (D) Ring

32. In FM modulation, when the modulation index increases, transmitted power is :

(A) increased (B) decreased

(C) constant (D) none of these

33. An earth station transmitter consists of :

(A) RF to IF down converter (B) IF to RF converter

(C) Power to RF converter (D) None of these

34. The maximum power in AM, when modulation index is :

(A) 0.1 (B) 0.5

(C) 0.7 (D) 1.0

35. An AM demodulator can be implemented with a linear multiplier followed by the following filter :

(A) low-pass (B) high-pass

(C) band-pass (D) band-stop

36. The following is *not* associated with a *p-n* junction ?

(A) junction

(B) depletion capacitance

(C) charge storage capacitance

(D) channel length modulation

37. A Zener diode, when used as voltage regulator, is biased in :

(A) forward bias region

(B) reverse breakdown region

(C) forward bias current mode

(D) reverse bias region below breakdown voltage

38. The phenomenon of "Early Effect" in BJT refers to reduction of effective base-width caused by :

(A) electron-hole recombination at the base

(B) the forward biasing of emitter-base junction

(C) the reverse biasing of base-collector junction

(D) the early removal of stored base charge

39. The action of a JFET in its equivalent circuit can best be represented as :

(A) Current controlled current source

(B) Current controlled voltage source

(C) Voltage controlled current source

(D) Voltage controlled voltage source

40. If the differential voltage gain and the common mode gain of a differential amplifier are 50 db and 4 db respectively, then its CMRR is :

(A) 54 db
(B) 12.5 db
(C) 46 db
(D) ∞ db

41. The minimum number of diodes in a full wave rectifier is :

(A) 1
(B) 2
(C) 3
(D) 4

42. Practically in order to create an electron-hole pair in p-n diode, the energy of the incident photon should be :

(A) Less than E_g
(B) Equal to E_g
(C) Greater than E_g
(D) Much greater than E_g

43. Given that germanium (Ge) has a band gap of 0.67 eV, what is the maximum wavelength that will be absorbed by it ?

(A) 7080 nm
(B) 4560 nm
(C) 1850 nm
(D) 1100 nm

nity gain frequency of op-amp. 741 is :

(A) 100 MHz

(B) 1 MHz

(C) 100 kHz

(D) 10 Hz

A lossy integrator exhibits a frequency response similar to a :

(A) low-pass filter

(B) high-pass filter

(C) band-pass filter

(D) band-stop filter

In a piecewise linear diode model, the diode resistance is :

(A) low for all biases

(B) high for all biases

(C) low for biases greater than cut in voltage and high for biases less than cut in voltage

(D) high for biases greater than cut in voltage and low for biases less than cut in voltage

In a *p-n-p* transistor biased in the active region, in the *n*-type base, holes :

(A) drift

(B) diffuse and recombine

(C) are injected from collector

(D) experience avalanche multiplication

48. The Cascade amplifier is a multi-stage configuration of :

(A) CC-CB

(B) CE-CB

(C) CC-CE

(D) CC-CC

49. Three identical amplifiers with each having a voltage gain of 50 are cascaded. The open loop circuit voltage gain of the combined amplifier is :

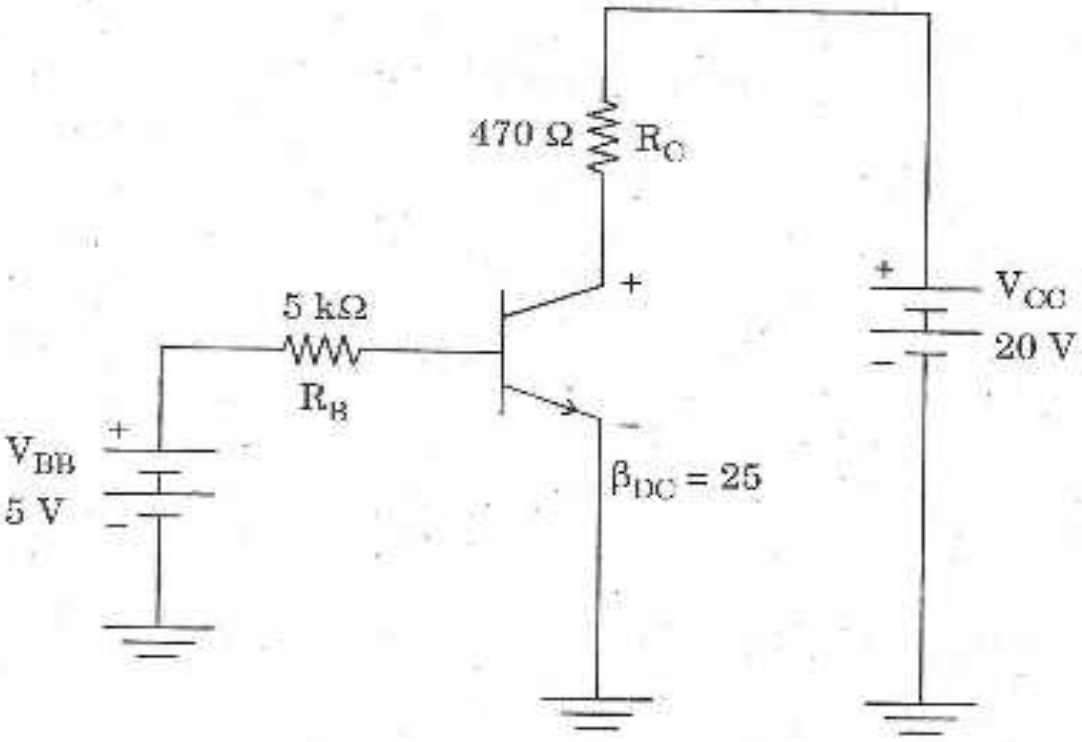
(A) 48 db

(B) 51 db

(C) 98 db

(D) 102 db

50. Refer to Fig., the value of V_{BE} is :



(A) 0.2 V

(B) 0.6 V

(C) 0.7 V

(D) 1.2 V

51. The width of the depletion region of a p-n junction :

(A) increases with reverse bias voltage

(B) decreases with reverse bias voltage

(C) is not affected by voltage

(D) increases with forward bias voltage

52. A MOSFET acts as a voltage controlled variable resistor in the :

(A) cut-off region (B) linear region

(C) saturation region (D) sub-threshold region

53. Biasing in integrated circuits is done using :

(A) self-biasing circuit (B) reverse biased diode

(C) current source (D) sinusoidal voltage

54. A BJT can be used for linear amplification of small signals in the :

(A) cut off region (B) active region

(C) saturation region (D) reverse active region

55. Which of the following statements is *true* ?

(A) A BJT has a higher transconductance than a MOSFET

(B) A MOSFET has a higher transconductance than a BJT

(C) Both have the same transconductance

(D) None of the above is correct

56. Instruction LHLD 2000 belongs to :

(A) Data transfer group
(B) Logical group
(C) Branching group
(D) Arithmetic group

57. 8085 microprocessor is having address lines :

(A) 8
(B) 16
(C) 32
(D) None of these

58. Which of the following is an interrupt of microprocessor 8085 ?

(A) READY
(B) SOD
(C) CLK
(D) TRAP

59. Stack pointer in 8085 microprocessor is a :

(A) 4-bit register
(B) 8-bit register
(C) 16-bit register
(D) None of these

60. Which flag will be affected by giving the instruction DCXRP ?

(A) Panty flag
(B) Carry flag and sign flag
(C) No flag is affected
(D) All flags will be affected

61. If one input to an XOR gate is A and the other is 1, the output is :

(A) 0 (B) 1

(C) A (D) A'

62. A logic function may be implemented using :

(A) ROM (B) Decoder

(C) Multiplexer (D) All of these

63. The number of logic functions of N variables are :

(A) N (B) 2^N

(C) 2^{2^N} (D) N log N

64. Which logic family is the fastest ?

(A) DTL (B) NMOS

(C) ECL (D) TTL

65. A combinational system has :

(A) two states (B) one state

(C) zero state (D) infinite number of states

66. The inverse Laplace transform of $X(s) = \frac{3}{(s+2)(s-1)}$ ROC : $-2 < \text{Re}(s) < 1$ is :

(A) $e^{2t}u(t) - e^{-t}u(t)$

(B) $e^{-t}u(t) + e^{t}u(-t)$

(C) $e^{-2t}u(t) + e^{t}u(-t)$

(D) $-e^{-2t}u(-t) + e^{t}u(-t)$

67. For a system with input $x[n] = \delta[n-1]$ and impulse response $h[n] = \delta[n+1]$, the z-transform of the output is :

(A) z

(B) z^{-1}

(C) 0

(D) 1

68. A finite length signal has $X(z) = 0.5 + 0.2z^{-1} + 0.7z^{-2} + 0.5z^{-3}$, its ROC is :

(A) inside the unit circle

(B) on the unit circle

(C) outside the unit circle

(D) entire z-plane except $z = 0$

69. The frequency response of a system with $h[n] = \delta[n] - \delta[n-1]$ is given by :

(A) $\delta(e^{jw}) - \delta(e^{j(w-1)})$

(B) $1 - e^{jw}$

(C) $u(e^{jw}) - u(e^{j(w-1)})$

(D) $1 - e^{-jw}$

70. The Fourier transform of a signal $x(t)$ is, $X(f) = 1/j\pi f$, then $x(t)$ is equal to :

(A) $u(t)$

(B) 1

(C) $2u(t) - 1$

(D) $\frac{1}{\pi t}$

71. For a feedback control system, if $G(s) = \frac{4}{s(s+3)}$ and $H(s) = \frac{1}{s}$, then the type of the control system is :

(A) 2 (B) 1

(C) 0 (D) None of these

72. The gain margin in dbs. for a unity feedback control system, whose open-loop transfer is $G(s) = \frac{1}{s(s+1)}$, is given by :

(A) 0 (B) 1

(C) 20 (D) ∞

73. In servo system, the device used for providing derivative feedback is called :

(A) synchro (B) servomotor

(C) potentiometer (D) tacho generator

74. For the open-loop transfer function of a system, $G(s)H(s) = \frac{4}{s(s+2)(s+4)(s+6)}$ the centroid of the root-locus is located at :

(A) -1 (B) -2

(C) -3 (D) -4

75. The open-loop transfer function of the control system has one pole in the RHS-plane and its Nyquist plot encircles $-1 + j0$ point twice in the clockwise direction, then the system is :

(A) stable (B) unstable

(C) critically stable (D) conditionally stable

76. When the roots of the characteristic equation of a feedback system are conjugate and on the imaginary axis, the response is of the type :

(A) $Ae^{\sigma t}$ (B) $A\sin(\omega t + \theta)$

(C) $Ae^{-\sigma t}$ (D) A

77. The poles of a stable system lie in which region of the s-plane ?

(A) right half plane (B) left half plane

(C) imaginary axis (D) lower half plane

78. If ramp input is applied to a type-2 system, the steady state error is :

(A) Positive constant (B) Negative constant

(C) Zero (D) Positive infinity

79. The response of a second order system to a step input is obtained as :

$$c(t) = 1.66e^{-8t}\sin(6t + 37°)$$

the damping ratio is :

(A) 0.4 (B) 0.5

(C) 0.8 (D) 1.0

80. A phase lead network has $G_c(s) = 10(1 + 0.04s)/(1 + 0.01s)$, the maximum phase lead occurs at :

(A) $\omega_m = 50$ rad/sec (B) $\omega_m = 25$ rad/sec

(C) $\omega_m = 10$ rad/sec (D) $\omega_m = 4$ rad/sec

PART C

COMPULSORY AND COMMON FOR ALL CANDIDATES

81. Which of the following dances is *not* correctly matched with the area it is specifically performed ?

(A) Gee and Burah dance — Sirmaur

(B) Shunto dance — Lahaul and Spiti

(C) Dangi dance — Kinnaur

(D) Cholamba dance — Ropa valley

82. Which of the following fairs is *not* correctly matched with the area ?

(A) Minjer fair — Chamba

(B) Renuka fair — Sirmaur

(C) Lavi trade fair — Rampur

(D) Naina Devi fair — Mandi

83. Jhoori is :

(A) A type of song

(B) A type of dance

(C) A type of musical instrument

(D) A string puppet

84. Which of the following is *not* a scheduled tribe in Himachal Pradesh ?

(A) Gaddis

(B) Pangawals

(C) Kennets

(D) Kinnars

85. Dhoti Kurta, coat, coat waist, turban and a hand towel is the traditional dress of :

(A) Rajputs

(B) Scheduled tribes of Lahaul Spiti

(C) Kolis

(D) Brahmins

86. Who of the following is the Chairman of the HP Society for promotion of IT and E-Governance (SIYEG) ?

(A) Chief Secretary

(B) Secretary, IT, Government of India

(C) Director-General, NIC

(D) Chief Minister

87. HP State Co-operative Agriculture and Rural Development Bank Ltd. is :

(A) Registered as a cooperative society under the HP Co-operative Societies Act, 1956

(B) Registered as public limited company

(C) Registered as a private limited firm

(D) Registered as a joint sector company

88. Who of the following was elected unopposed as the President of the HP Olympic Association in 2012 ?

(A) DD Thakur
(B) Anurag Thakur
(C) Sanjeev Katwal
(D) Sushil Bhardwaj

89. The biggest hazard that poses the biggest threat to the state of HP is :

(A) Drought
(B) Dam failures
(C) Earthquakes
(D) Flash floods

90. How much area of HP is under cultivation ?

(A) About 25%
(B) About 20%
(C) About 15%
(D) About 10%

91. Disaster Management Act was passed in the year :

(A) 2000
(B) 2002
(C) 2003
(D) 2005

92. Who is the Chief Minister of Haryana since October, 2014 ?

(A) Rao Virendra Singh
(B) Manohar Lal Khattar
(C) Rao Inderjit Singh
(D) Captain Abhimanyu

93. Which of the following is *not* one of the expenditure reforms introduced by the Union Finance Ministry under the Modi Government ?

(A) An administrative ministry can approve projects upto 100 crores without the prior approval of the Finance Ministry

(B) Only projects costing rupees 1000 crore would require approval by the Union Cabinet

(C) Schemes shall be evaluated using measurably defined outcomes

(D) Union Cabinet's approval is necessary for projects costing rupees 300 crores

94. According to a review in Journal Nature, a university is supposed to be :

(1) Centre of education

(2) Centre of discovery and research

(3) Engine of economic growth

(4) Beacon of social justice

Select the *correct* answer from the codes given below :

(A) 1, 2, 3 and 4 (B) 1, 2 and 3

(C) 2, 3 and 4 (D) 1, 2 and 4

95. Who of the following was awarded 'Man Booker International Prize 2013' ?

(A) Lydia Davis (B) Richard Flanagau

(C) Marino Warner (D) Nadeem Aslam

96. The Warsaw Climate Conference was held in :

(A) November 2011 (B) December 2012

(C) October 2013 (D) November 2013

97. India is re-elected for 2015-2017 as member of :

(A) United Nations Human Rights Commission

(B) UNESCO

(C) FAO

(D) International Court of Justice

98. Which of the following statements about Swasthya Bima Yojna is *not correct* ?

(A) It is a scheme under the Ministry of Labour

(B) It is a scheme under the Ministry of Health

(C) It is a scheme that benefits unorganized workers

(D) It is a scheme that is in operation since 2008

99. Which of the following is *not* a proposal regarding debarring candicates from contesting elections was submitted by the Election Commission in October, 2014 ?

(A) All those against whom charges have been framed in serious crimes involving punishments of 5 years

(B) Such charges should have been framed by a competent court at least 6 months before the date of elections

(C) False Affidavits should become a ground for disqualification for being an MP or MLA

(D) There should be no bar to contest election to the Lok Sabha or the State Assembly on a person declared as proven insolvent

100. Civil Nuclear Agreement between India and the USA was signed in :

(A) 2006

(B) 2007

(C) 2008

(D) 2009