Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

A

Paper-II
COMPUTER SCIENCE AND APPLICATIONS

Signature and Name of Invigilator

1. (Signature) ....

   (Name) ....

2. (Signature) ....

   (Name) ....

Seat No. [   ]

(In figures as in Admit Card)

Seat No. ....

(In words)

OMR Sheet No. [   ]

MAR - 37223

(To be filled by the Candidate)

Time Allowed : 2 Hours]   **[Maximum Marks : 200**

Number of Pages in this Booklet : **28**   Number of Questions in this Booklet : **100**

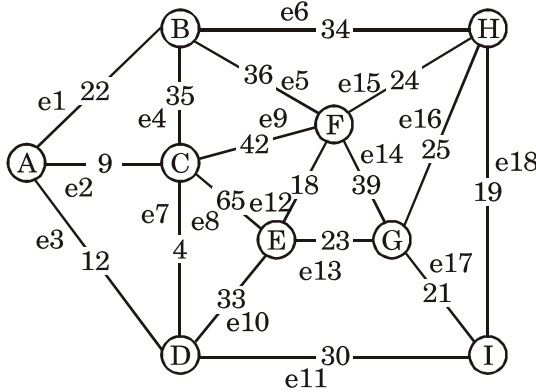| Instructions for the Candidates	विद्यार्थ्यांसाठी महत्त्वाच्या सूचना
1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.	1. परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोप-यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. This paper consists of **100** objective type questions. Each question will carry *two* marks. *All* questions of Paper II will be compulsory.	2. सदर प्रश्नपत्रिकेत 100 बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :	3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
(i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal or open booklet.	(i) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्वीकारू नये.
(ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.	(ii) पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.
(iii) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.	(iii) वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
4. Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item. **Example :** where (C) is the correct response. (A) (B) ● (D)	4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा. **उदा. :** जर (C) हे योग्य उत्तर असेल तर. (A) (B) ● (D)
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.	5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
6. Read instructions given inside carefully.	6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. Rough Work is to be done at the end of this booklet.	7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या को-या पानावरच कच्चे काम करावे.
8. If you write your Name, Seat Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, you will render yourself liable to disqualification.	8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणाव्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.	9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. Use only Blue/Black Ball point pen.	10. फक्त निळ्या किंवा काळ्या बॉल पेनाचाच वापर करावा.
11. Use of any calculator or log table, etc., is prohibited.	11. कॅल्क्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. There is no negative marking for incorrect answers.	12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

Computer Science and Applications
Paper II

Time Allowed : 120 Minutes]   **[Maximum Marks : 200**

Note : This Paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

1.

V = {A, B, C, D, E, F, G, H, I}

E = {e1 = (A, B), e2 = (A, C), e3 = (A, D), e4 = (B, C), e5 = (B, F), e6 = (B, H), e7 = (C, D), e8 = (C, E), e9 = (C, F), e10 = (D, E), e11 = (D, I), e12 = (E, F), e13 = (E, G), e14 = (F, G), e15 = (F, H), e16 = (G, H), e17 = (G, I), e18 = (H, I)}

W = {22, 9, 12, 35, 36, 34, 4, 33, 30, 18, 23, 24, 39, 25, 21, 19}

The weight of the shortest path from node A to I in the undirected graph is........... .

(A) 2   (B) 3

(C) 42   (D) 43

2. Group code are generated using

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

for communication. Then.......... is not code word.

(A) 000000   (B) 000111

(C) 101100   (D) 111111

3. The number of code word possible using the generator $G = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

is :

(A) 1   (B) 2

(C) 4   (D) 8

4. Let X and Y be random variables with joint distribution :
Pr(X = i, Y = j) =

$$\begin{cases} 1/6 & \text{for } i = 5,6 \text{ and } j = 3,6,9 \\ 0 & \text{otherwise} \end{cases}$$

Then the conditional entropy H(X|Y) = ...

(A) 0   (B) log(2)

(C) log(3)   (D) log(6)

     [P.T.O.

5. Let X and Y be random variable with the following distributions respectively :

X	1	2	3	4	5
P	0.1	0.2	0.4	0.2	0.1

Y	10	20	35	50	60
P	0.1	0.2	0.4	0.2	0.1

(A) Skewness of X and Y are same, Coefficient of Variations are the same

(B) Skewness of distribution of X and Y are not same, Coefficient of Variations are the same

(C) Skewness of distribution of X and Y are same, Coefficient of Variations are not same

(D) Skewness of distribution of X and Y are not same, Coefficient of Variations are not same

6. Notation :

$C(n, r) = n!/(r!*(n-r)!))$

$n!$ is factorial n.

$|A|$ cardinality of set A

$\bar{s}$ is negation of s

The number of ways to place r indistinguishable balls in $n(n < r)$ distinct boxes, with no box left empty, is............ .

(A) $C(r - 1, n - 1)$

(B) $C(n + r - 1, n - 1)$

(C) $C(n + r - 1, r - 1)$

(D) $C(n - 1, r - 1)$

7. Consider the following Linear Programming Problem :

Maximize : $Z = 5x_1 + 6x_2 + 4x_3$

Subject to $3x_1 + x_2 + 4x_3 \leq 60$

$2x_1 + 3x_2 + 3x_3 \leq 75$

$x_1, x_2, x_3 \geq 0$

The value of the decision variables after the first iteration will be :

(A) $x_1 = 0, x_2 = 0, x_3 = 25$

(B) $x_1 = 0, x_2 = 25, x_3 = 0$

(C) $x_1 = 20, x_2 = 0, x_3 = 0$

(D) $x_1 = 0, x_2 = 37.5, x_3 = 0$

8. Consider the following Linear Programming Problem :

Maximize : $Z = 5x_1 + 10x_2$

Subject to : $\qquad x_1 \leq 4$

$\qquad\qquad x_2 \geq 2$

$x_1 + x_2 = 5, \; x_1, x_2 \geq 0$

The dual of this problem is given by :

(A) Maximize : $Z' = 4y_1 + 2y_2$

$\qquad\qquad + 5y_3 - 5y_4$

Subject to :

$\qquad y_1 + y_3 - y_4 \geq 5$

$\qquad -y_2 + y_3 - y_4 \geq 10$

$\qquad y_1, y_2, y_3, y_4 \geq 0$

(B) Minimize : $Z' = 4y_1 + 2y_2$

$\qquad\qquad + 5y_3 - 5y_4$

Subject to :

$\qquad y_1 + y_3 - y_4 \geq 5$

$\qquad -y_2 + y_3 - y_4 \geq 10$

$\qquad y_1, y_2, y_3, y_4 \geq 0$

(C) Maximize : $Z' = 4y_1 + 2y_2$

$\qquad\qquad + 5y_3$

Subject to : $\qquad y_1 + y_3 \geq 4$

$\qquad\qquad y_2 + y_3 \geq 2$

$\qquad y_1 + y_2 + y_3 = 5$

$\qquad\qquad y_1, y_2, y_3 \geq 0$

(D) The dual cannot be written as there are mixed constraints.

9. The transportation problem of m resources and n destinations can be written as Linear Programming Problem with :

(A) mn decision variables and mn constraints

(B) $(m + n)$ decision variables and $(m + n)$ constraints

(C) $(m + n)$ decision variables and mn constraints

(D) (mn) decision variables and $(m + n)$ constraints

10. The optimal solution to the following assignment problem

	J_1	J_2	J_3	J_4
M_1	10	9	8	7
M_2	3	4	5	6
M_3	2	1	1	2
M_4	4	3	5	6

is given by :

(A) $M_1 \rightarrow J_3$, $M_2 \rightarrow J_2$, $M_3 \rightarrow J_1$, $M_4 \rightarrow J_4$

(B) $M_1 \rightarrow J_4$, $M_2 \rightarrow J_1$, $M_3 \rightarrow J_2$, $M_4 - J_3$

(C) $M_1 \rightarrow J_4$, $M_2 \rightarrow J_1$, $M_3 - J_3$, $M_4 - J_2$

(D) $M_1 - J_3$, $M_2 - J_4$, $M_3 - J_2$, $M_4 - J_1$

11. A switch debouncer circuit is an application of :
    (A) The gated SR latch
    (B) The $\overline{S}\overline{R}$ latch
    (C) SR latch
    (D) The gated D latch

12. The ASCII code for decimal digit 9 with an even parity, placing the parity bit in the most significant position is :
    (A) 00111001
    (B) 10111001
    (C) 00100101
    (D) 11000110

13. The 15's complement of $A9B_H$ is :
    (A) $B02_H$
    (B) 173_H
    (C) $CD2_H$
    (D) 564_H

14. The write pulse width (t_{wp}) is the time for which :
    (A) $\overline{WR}$ goes high
    (B) $\overline{WR}$ goes low
    (C) WR goes high
    (D) WR goes low

15. The speed of information being transferred in and out of memory depends on which of the following parameters ?
    (i) Access time t_A
    (ii) Cycle time t_c
    (iii) Access rate r_A
    (iv) Bandwidth r_c
    (A) (i) & (ii)
    (B) (ii) & (iii)
    (C) (i), (ii) & (iii)
    (D) (i), (ii), (iii) & (iv)

16. Which of the following assembler directives can be used to define & re-define numeric constants ?
    (i) EQU
    (ii) % assign
    (iii) % define
    (A) (i) & (ii) only
    (B) (ii) & (iii) only
    (C) (i) & (iii) only
    (D) (i), (ii) & (iii)

17. A horizontal micro-programmed control unit supports the following. Identify the *correct* ones.

  (*i*) Longer control word

  (*ii*) Used in parallel processing applications

  (*iii*) Allows high degree of parallelism

  (*iv*) Requires no additional hardware (decoders)

  (A) (*i*), (*ii*) & (*iii*)

  (B) (*i*), (*iii*) & (*iv*)

  (C) (*i*), (*ii*), (*iii*) & (*iv*)

  (D) (*ii*), (*iii*), (*iv*)

18. Which of the following are representative application areas where vector processing is used ?

  (*i*) AI & Expert systems

  (*ii*) Seismic Data Analysis

  (*iii*) Petroleum Explorations

  (*iv*) Medical Diagnosis

  (A) (*i*), (*ii*), (*iii*) & (*iv*)

  (B) Only (*i*)

  (C) Only (*ii*) & (*iv*)

  (D) None of the above

19. A computer has 512 KB, 4-way set associative, write back data cache with block size of 32 bytes. The processor sends 32 bit addresses to the cache controller. Each cache tag directory entry contains, in addition to address tag, 2 valid bits, 1 modified bit and 1 replacement bit. The number of bits in the tag field of an address is :

  (A) 80   (B)   32

  (C) 64   (D)   15

20. Why do race conditions occur ?

  (*i*) Values of memory locations replicated in registers during execution.

  (*ii*) Content switches at arbitrary times during execution.

  (*iii*) Threads can see stale memory values in registers.

  (A) Only (*ii*)

  (B) Only (*iii*)

  (C) (*i*) & (*ii*)

  (D) (*i*), (*ii*) & (*iii*)

21. A normalised heterogeneous abstract syntax tree must :
    (*i*) Trees with magnitude of node type are called heterogeneous tree
    (*ii*) Normalised heterogeneous tree use a normalised list of children like homogeneous tree
    (*iii*) Nodes have irregular children
    (*iv*) Use more than a single node data type but with normalised child list representation.
    (A) (*i*), (*ii*) and (*iv*)
    (B) (*i*) and (*ii*)
    (C) (*ii*) and (*iv*)
    (D) (*iv*) only

22. Which of the following comparison between static and dynamic type checking is correct ?
    (*i*) dynamic type checking slow down execution
    (*ii*) dynamic type checking offers more flexibility to the programmers
    (*iii*) Dynamic type checking is more reliable
    (*iv*) Unlike static type checking the dynamic type checking is done during compilations.
    (A) (*i*) and (*ii*)
    (B) (*i*) and (*iii*)
    (C) (*ii*) and (*iii*)
    (D) (*iv*) only

23. Consider the following 'C' program fragment :

    int *i* = 5;

    do

    {

        putchar (*i* + 100);

        printf ("%d", *i*...);

    } while (*i*);

    results in the following output :

    (A) *i* 5 *h* 4 *g* 3 *f* 2 *e* 1
    (B) *i* 4 *h* 3 *g* 2 *f* 1 *e* 0
    (C) An error message will come
    (D) Went into infinite loop

24. The object-oriented programming can be seen as an attempt to enhance opportunities for code reuse be making it ease to define new abstraction as :
    (A) Extension or refinement
    (B) Independence
    (C) Containment
    (D) Facult containment

25. Exception handling is not meant to handle problems for which case ?

   (*i*)   termination of program

   (*ii*) handle return value representing error

   (*iii*) hand return a legal value and leave the program in an illegal state

   (*iv*) call an error handler function

   (A) (*i*) and (*ii*)

   (B) (*ii*) and (*iii*)

   (C) (*iv*) only

   (D) (*i*), (*ii*) and (*iv*)

26. The scope rules, especially the rules for nested type ensures that the resulting multitude of..........type do not interface with each other.

   (A) Enumerated

   (B) Inherited

   (C) Encapsulated

   (D) Contained

27. Most of recent browsers support an additional ENCTYPE of multipart/ form-data, which statements out of the following correctly define it ?

   (*i*)   This encoding transmit each field as a separate part of MIME compatible document automatically

   (*ii*) MIME compatible document automatically use POST to submit data in multipart

   (*iii*) This attribute specifies the way in which data is enclosed

   (*iv*) This encoding sometime makes it easier for server side program to handle complex data.

   (A) (*i*) and (*ii*)

   (B) (*ii*) and (*iv*)

   (C) (*iii*) and (*iv*)

   (D) (*i*), (*ii*) and (*iv*)

28. Identify odd one from the following :

   (A) Digitizer

   (B) Touch panel

   (C) Plotter

   (D) Trackball

29. The transformation matrix

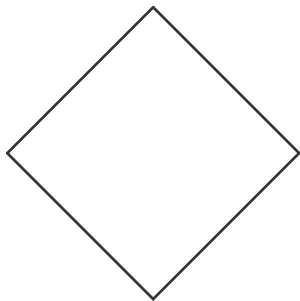$$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ is used to obtain the

reflection about the.......... .

(A) Y-axis, flipping x-coordinates

(B) line Y = 0

(C) Diagonal line Y = $-x$

(D) Diagonal line Y = x

30. Given $r_x = r_y$, the following super ellipse has the parameter value ρ = ...

(A) 0.5   (B) 1

(C) 1.5   (D) 2

31. Data integrity constraints are used for :
    (i) Establishing limits on allowable property values
    (ii) Specifying a set of acceptable, predefined options to property values
    (iii) Ensuring that duplicate values are not entered in the table
    (iv) Controlling that data is accessed by authorised users
    (A) (i) & (ii)
    (B) (i), (ii) & (iii)
    (C) (iii) & (iv)
    (D) (i), (ii), (iii) & (iv)

32. Match the following statements in Group 1 with database objects in Group 2 :

    Group 1
    P. View
    Q. Table
    R. Role
    S. Function

    Group 2
    I. that which contains data
    II. that which returns a value
    III. that helps in managing groups of privileges
    IV. that which contains only a stored SQL statement
    (A) P→I, Q→II, R→III, S→IV
    (B) P→II, Q→I, R→IV, S→III
    (C) P→IV, Q→I, R→III, S→II
    (D) P→IV, Q→III, R→I, S→II

33. Every table with two single valued attributes is in :
    (A) 2NF
    (B) 3NF
    (C) BCNF
    (D) All of the above

34. Database contains two tables :
    Employee (id, name, salary, did) and Dept. (did, dname).
    Which of the following is an *incorrect* SQL query ?
    (A) Select name, dname from employee natural join Dept;
    (B) Delete from employee where did in (Select did from Dept);
    (C) Update employee set salary = salary * 1.03 where salary > 100000;
    (D) Insert values into employee (1, 'vijay', 100000, 12);

35. Which keyword is used to rename a field name in SQL query ?
    (A) AS
    (B) ALTER
    (C) LIKE
    (D) FROM

36. Which amongst the following statements are *correct* ?
    (*i*) Writing a database object without reading its initial value is called Blind write
    (*ii*) In wound wait technique, the number of rollback is low
    (*iii*) In wait-die technique, the younger transaction is never rolled back
    (*iv*) The different locks in 2PL mechanism are shared, read, write and unlock.
    (A) (*i*), (*ii*) and (*iii*)
    (B) (*i*) & (*ii*)
    (C) (*i*), (*ii*) and (*iv*)
    (D) (*ii*), (*iii*) and (*iv*)

37. An association rule which involves numeric attributes having implicit ordering among values is known as...............association rule.
    (A) Multivalued
    (B) Ordered
    (C) Numeric
    (D) Quantitative

38. Agglomerative approach of clustering is one of the..........methods.
    (A) Density
    (B) Partitioning
    (C) Hierarchical
    (D) Model based

39. What is the default replication factor in HDFS for a hadoop cluster having 100 data nodes ?
    (A) 1
    (B) 2
    (C) 3
    (D) 4

40. Which of the following is a wide column store ?
    (A) Cassandra
    (B) Riak
    (C) Mango DB
    (D) Redis

41. Consider a system having 'm' resources of the same type. These resources are shared by three processes P1, P2 and P3 which have peak demands of 2, 5 and 7 resources respectively. For what value of 'm' deadlock will not occur ?
    (A) 70
    (B) 14
    (C) 13
    (D) 7

42. A virtual memory has a page size of 1K words. There are eight pages and four blocks. The associative memory page table contains the following entries :

Page	Block
0	3
2	1
5	2
7	0

Which of the following lists of virtual addresses (in decimal) will NOT cause any page fault if referenced by the CPU ?
    (A) 1024, 3072, 4096, 6144
    (B) 1234, 4012, 5000, 6200
    (C) 1020, 3012, 6120, 8100
    (D) 2021, 4050, 5112, 7100

43. A memory management system has 64 pages with page size of 512 bytes. Physical memory consists of 32 page frames. Number of bits required in logical and physical address are respectively :
    (A) 14 and 15
    (B) 14 and 29
    (C) 15 and 14
    (D) 16 and 32

44. A FAT (File Allocation Table) based file system is being used and the total overhead of each entry in the FAT is 4 bytes in size. Given a 100×10^6 bytes disk on which the file system is stored and data block size is 10^3 bytes, the maximum size of a file that can be stored on this disk in units of 10^6 bytes is........... .

   (A) 99.55 to 99.65
   (B) 100.5 to 101.4
   (C) 97.2 to 98.5
   (D) 89.1 to 91.2

45. A computer has twenty physical page frames which contain pages numberd 101 through 120. Now a program accesses the pages numbered 1, 2,....., 100 in that order, and repeats the access sequence THRICE. Which one of the following page replacement policies experiences the same number of page faults as the optimal page replacement policy for this program ?

   (A) Least-recently-used
   (B) First-in-first-out
   (C) Last-in-first-out
   (D) Most-recently-used

46. We need to design a filesystem to store image files having maximum one block size. Which of the following disk space allocation methods is most appropriate to meet this requirement ?

   (A) Contiguous Allocation
   (B) Linked Allocation
   (C) Indexed Allocation
   (D) Hashed Allocation

47. Which type of encryption is preferred to encrypt the data stored on a conventional hard-disk ?

   (A) Symmetric-key cryptography
   (B) Asymmetric-key cryptography
   (C) Hashing
   (D) Quantum cryptography

48. Which system call replaces a current process in Linux ?

   (A) pipe
   (B) fork
   (C) exec
   (D) dup

49. Which of the following is *not* an Inter-process-communication mechanism in Linux ?

(A) Pipe

(B) Redirection

(C) Socket

(D) Signal

50. Windows operating system use the following two modes to protect user applications from accessing and/or modifying critical operating system data :

(A) Normal user mode and Administrator mode

(B) User mode and Kernel mode

(C) Hardware mode and Software mode

(D) Hardware interrupt mode and Software interrupt mode

51. In software development process, ... is a design strategy that tries to address the design and implementation complications associated with such inter-dependencies by explicitly introducing aspects as system characteristics.

(A) Agile development model

(B) Evolutionary development model

(C) Rapid linear sequence development model

(D) Aspect-oriented development model

52. In software development process, which is not one of the key questions that is answered by each team member at each daily Scrum meeting ?

    (A) What did you do since the last meeting ?

    (B) What obstacles are you encountering ?

    (C) What is the cause of the problems you are encountering ?

    (D) What do you plan to accomplish at the next team meeting ?

53. A user is describing a real-life example during requirement gathering stage of a software development project.

    This most appropriately represents which requirement discovery technique ?

    (A) Viewpoint

    (B) Interview

    (C) Scenario

    (D) Use-case

54. Cohesion is........and coupling is...... .

    (A) Intra-module, Inter-module

    (B) Inter-module, Intra-module

    (C) Intra-module, Intra-module

    (D) Inter-module, Inter-module

55. One of the following is most desirable when using LOC as a size oriented metric ?

    (A) LOC is language dependent

    (B) LOC is language independent

    (C) LOC can be computed before design phase

    (D) LOC can be easily computed

56. Which of the following is *not* a size metric ?

    (A) LOC

    (B) Function Count

    (C) Program Length

    (D) Cyclomatic Complexity

57. An independent path is a path through the program that introduces set of.......... .

(*i*)   new conditions

(*ii*) processing statements

(A) (*i*) only

(B) (*ii*) only

(C) (*i*) or (*ii*) or both

(D) Neither (*i*) nor (*ii*)

58. Software Configuration Management (SCM) provides systematic evolution of a software under development and provides for :

(*i*)   Visibility

(*ii*)   Controlled change

(*iii*) Traceability

(*iv*)   Monitoring

(A) (*i*), (*ii*) and (*iii*)

(B) (*i*), (*ii*) and (*iv*)

(C) (*i*), (*ii*), (*iii*) and (*iv*)

(D) (*ii*) and (*iii*)

59. When error occurs, the process of anticipating such errors through setting up error handling paths to reroute or terminating processing cleanly is known as............ .

(A) Debugging

(B) Rebugging

(C) Prebugging

(D) Antibugging

60. Which is the correct evolutionary path of five level capability maturity model ?

(A) initial, defined, repeatable, managed, optimizing

(B) initial, repeatable, defined, managed, optimizing

(C) initial, defined, managed, optimizing, repeatable

(D) initial, repeatable, managed, defined, optimizing

61. For a given max-heap, which is the *correct* answer ?

    (A) The leaf nodes have values greater than or equal to their parents

    (B) The leaf nodes have values less than or equal to their parents

    (C) The leaf nodes and their parents have same values

    (D) The leaf nodes have values different from their parents

62. B^+ trees are considered BALANCED because :

    (A) The lengths of the paths from the root to all leaf nodes are all equal

    (B) The lengths of the paths from the root to all leaf nodes differ from each other by at most 1

    (C) The number of children of any two non-leaf sibling nodes differ by at most 1

    (D) The number of records in any two leaf nodes differ by at most 1.

63. The in-order traversal output and pre-order traversal output of a binary tree are same, then the binary tree is :

    (A) Left skewed

    (B) Right skewed

    (C) Balanced

    (D) Completely balanced

64. The two statements that can change the flow of control are :

    (A) if and switch

    (B) if and while

    (C) switch and do-while

    (D) break and continue

65. A deque is :

    (A) A queue implemented with a doubly linked list

    (B) A queue implemented with both singly and doubly linked lists

    (C) Just a queue

    (D) A queue with insert and delete defined for both front and rear ends of the queue

66. The postfix form of A*B+C/D is :

(A) * A B / C D +

(B) A B * C D / +

(C) A * B C + / D

(D) A B C D + / *

67. Let S be a sorted array of n integers. Let T(n) denote the time taken by the most efficient algorithm to determine if there are two elements in S with sum greater than m, then :

(A) T(n) is of $\theta(1)$

(B) T(n) is of $\theta(m)$

(C) T(n) is of $\theta(n)$

(D) T(n) is of $\theta(\log n)$

68. Match the algorithms in Group 1 with the design strategy used by the algorithm in Group 2

Group 1

P. Merge Sort

Q. Insertion Sort

R. Prim's algorithm

S. Kruskal's algorithm

Group 2

I. Greedy Strategy

II. Dynamic Programming

III. Divide and Conquer

IV. Decrease and Conquer

(A) P→III, Q→II, R→I, S→IV

(B) P→I, Q→III, R→II, S→IV

(C) P→IV, Q→III, R→II, S→I

(D) P→III, Q→IV, R→I, S→II

69. Which of the following is *not* true for the problem classes P, NP, NP-complete and NP-hard ?

(A) $P \subset NP$

(B) NP-complete $\subset$ NP

(C) NP-hard $\subset$ NP

(D) NP-complete $\subset$ NP-hard

70. Maximum finding algorithm takes $O(\log_2 n)$ parallel time with $p \geq n/2$ processors using P-RAM model of parallel computation. If we have $p < n/2$ processors in reality, then which condition will retain the parallel time complexity of $O(\log n)$ extended with some constant factor.

(A) $\left(n - p\left(\lceil n / \overline{p}\rceil\right) < = \lceil n / \overline{p}\rceil\right)$

(B) $\left(n - (p-1)\lceil n / \overline{p}\rceil \leq \lceil n / \overline{p}\rceil\right)$

(C) $n * (p-1)\lceil n / \overline{p}\rceil \leq n / p$

(D) $n - \lceil n / \overline{p}\rceil \leq \lceil n / \overline{p}\rceil$

71. For the language $L = \{a^n b / n \geq 0\}$ which of the following is/are DFA represents the above language ?

I.

II.

III.

IV.

(A) I and II only

(B) I and III only

(C) II and IV only

(D) III and IV only

[P.T.O.

72. Consider the context free grammar with productions :

$$S \rightarrow ABa$$
$$A \rightarrow aab$$
$$B \rightarrow Ac$$

After constructing an equivalent grammar in Chomsky Normal form, the resulting grammar will contain ....productions.

(A) 10   (B) 08

(C) 06   (D) 09

73. For Σ to be an alphabet and $L \subseteq \Sigma^*$ be a language A is said to be decidable if there exists a Turing machine M for every string $\omega \in \Sigma^*$ with which of the following conditions.

(i) If $\omega \in L$, the computation of TM M on input string ω terminates in accept state

(ii) If $\omega \notin L$ (ω does not belong to L) then computation of TM M on input string ω terminates in reject state

(iii) If $\omega \in L$ then computation of TM M on input string ω terminates in reject state.

(A) (iii) only

(B) (i) and (iii) only

(C) (i) and (ii) only

(D) (ii) and (iii) only

74. The decision problem "Given a Turing Machine M and a step-counting function "myfun", is the language accepted by M in Time (myfun) ?" is........... .

(A) Stable

(B) Unsolvable

(C) Partially solvable

(D) Solvable

75. Consider the grammar G with productions S→ACB/CbB/Ba, A→da/BC, B→g/∈ C → h/∈

Which of the following is *correct* set for FIRST (S) ?

(A) {a, b, h, g}

(B) {a, d, g, ∈}

(C) {g, d, b, h, ∈}

(D) {g, d, a, b, h, ∈}

76. An attribute grammar in which all the attributes are..........is called an.......attributed grammar.

    (A) Synthesized, S

    (B) Inherited, S

    (C) Synthesized, L

    (D) Inherited, L

77. Which of the following parameter passing methods works with the idea that the argument is not evaluated until its actual use as a parameter in the called program ?

    (A) Pass by Value-Result

    (B) Pass by Name

    (C) Pass by Value

    (D) Pass by Reference

78. An...........is a data structure that is constructed from input data to a program and from which part or all of the output data of the program is constructed.

    (A) Symbol Table

    (B) Flow Graph

    (C) Intermediate Representation

    (D) Object File

79. Consider the following function with line numbers.

    1. Int Myfunction( )

    2. {

    3.   int a = 24;

    4.   int b = 25;

    5.   int c;

    6.   if ($a!$ = 24)

    7.   printf ("Is less than or not equal to 24");

    8. $c = a << 2$;

    9.   return c;

    10. b = 24;

    11. }

    Which line numbers contain the dead code/dead variable/unreachable code in the above function definition ?

    (A) 4, 6, 7

    (B) 6, 7, 10

    (C) 4, 6, 7, 8, 10

    (D) 4, 6, 7, 10

[P.T.O.

80. Consider the grammar shown below

$$S \rightarrow AA$$

$$A \rightarrow aA/d$$

The grammar is :

(A) LL(1)

(B) SLR(1) but not LL(1)

(C) LALR(1) but not SLR(1)

(D) LR(1) but not LALR(1)

81. While linking to Anonymous FTP system which of the following anchors is correct ?

(A) google's public FTP servers

(B) google's public FTP servers

(C) <a href : "ftp ://ftp.google.com"> google's public FTP servers

(D) <a href : "ftp to : //ftp. google.com"> google's public FTP servers '

82. While virtulizing X-86 architecture, type-I hypervisor :

(A) Interact with OS through ABI and emulate the ISA for Guest OS

(B) run directly on top of the hardware with ISA exposed by the hardware

(C) is known as hosted virtual machine

(D) run directly on top of the hardware with API exposed

83. The guard interval is provided in Orthogonal Frequency-Division Multiplexing (OFDM).

(A) To eliminate the need of pulse shaping filter

(B) To eliminiate Inter Symbol Interface (ISI)

(C) High symbol rate

(D) Both (A) and (B)

89. In symmetric-key cryptography, how many keys are needed for more secure communication if Alice and Bob want to communicate with each other ?

(A) 2

(B) 3

(C) 4

(D) 8

90. Match the classes of IP addresses with their functional applications :

(a) Class A   (1) Multicast Services

(b) Classs B   (2) Reserved for future use

(c) Class D   (3) Large Organizations

(d) Class E   (4) Midsize Organizations

(A) (a)-4, (b)-3, (c)-2, (d)-1

(B) (a)-2, (b)-4, (c)-1, (d)-3

(C) (a)-1, (b)-2, (c)-3, (d)-4

(D) (a)-3, (b)-4, (c)-1, (d)-2

91. Which of the following is *not* an agent communication language ?

(A) FIPA–ACL

(B) KSE–KQML

(C) KSE–KIF

(D) FIPA–QIF

92. An intermediate form between syntactic and logical form used in Natural language processing is known as :

(A) Quantified logical form

(B) Quasi-logical form

(C) Syntactic-logical form

(D) Definite clause grammar

93. Forward state space search is also known as :

(A) Regression planning

(B) Progression planning

(C) Contingency planning

(D) Consistency planning

94. In the following knowledge representation using first order logic ∀ person Indian (person) ^ know (person, English) ⇒ [Mother tongue (person, lang) ^ hate (person, lang)], the number of predicates and variables are respectively :

(A) 4, 2

(B) 4, 3

(C) 3, 4

(D) 5, 2

95. Which of the following statements are true for 'Rational Agents' ?

(i) it perceives its environment through sensors

(ii) it acts upon the environment through actuators

(iii) it improves its performance through learning

(iv) it knows the actual outcome of its actions

(A) (i) and (ii)

(B) (i), (ii) and (iii)

(C) (i), (ii) and (iv)

(D) (iii) and (iv)

96. Consider a non-binary genome of length l, over an alphabet of size $p(p>2)$. How many different schemata are there ?

(A) 2^l

(B) 2^p

(C) 2^{p+l}

(D) 2^{p^2}

97. If $A = \left\{ \dfrac{1}{2} + \dfrac{0.5}{3} + \dfrac{0.3}{4} + \dfrac{0.2}{5} \right\}$ and

$B = \left\{ \dfrac{0.5}{2} + \dfrac{0.7}{3} + \dfrac{0.2}{4} + \dfrac{0.4}{5} \right\}$,

then A/B is :

(A) $\left\{ \dfrac{0.5}{2} + \dfrac{0.2}{3} + \dfrac{0.1}{4} + \dfrac{0.2}{5} \right\}$

(B) $\left\{ \dfrac{0.5}{2} + \dfrac{0.2}{3} + \dfrac{0.1}{4} + \dfrac{0.6}{5} \right\}$

(C) $\left\{ \dfrac{0.5}{2} + \dfrac{0.3}{3} + \dfrac{0.3}{3} + \dfrac{0.2}{5} \right\}$

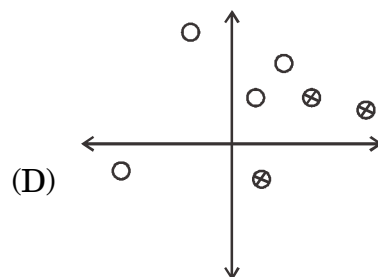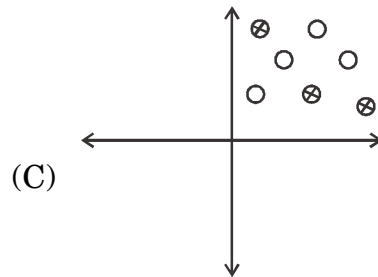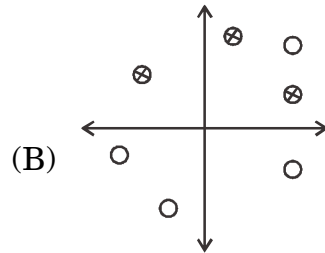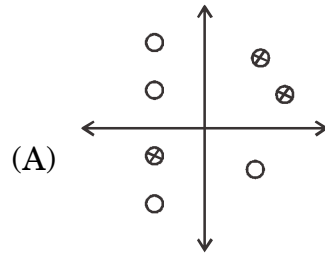(D) $\left\{ \dfrac{0}{2} + \dfrac{0.5}{3} + \dfrac{0.2}{4} + \dfrac{0.4}{5} \right\}$

98. Functions that qualify as fuzzy intersections and fuzzy unions are referred to as :

(A) t-norms & t-conorms

(B) i-norms & v-conorms

(C) t-norms & i-norms

(D) None of the above

99. A single layer perception cannot compute the following logical function :

(A) AND

(B) OR

(C) XOR

(D) NOT

100. Which of the following data is linearly separable ?

(A)

(B)

(C)

(D)

ROUGH WORK

ROUGH WORK