Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

B

Paper-II
COMPUTER SCIENCE AND APPLICATIONS

Signature and Name of Invigilator

Seat No. ☐☐☐☐☐

1. (Signature) ....

(In figures as in Admit Card)

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2. (Signature) ....

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OMR Sheet No. ☐☐☐☐☐☐

JUN - 37220

(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**

Computer Science and Applications
Paper II

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

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

1. Objects life time generally corresponds to which storage allocation mechanism from the following :
   (*i*)   Static objects
   (*ii*) Stack objects
   (*iii*) Heap objects
   (*iv*) Serialised objects
   (A) (*i*), (*ii*) and (*iv*)
   (B) (*i*), (*ii*) and (*iii*)
   (C) (*i*), (*iii*) and (*iv*)
   (D) (*ii*) and (*iii*)

2. Consider the following segment of 'C' programming code, upon execution it will produce output as :
```
int main( )
{
    auto int i=1;
    {   auto int i=2;
        {   auto int i=3;
            {   printf("\n%d", i);
        }
        print f("%d", i);
        }
        printf("d%", i);
    }
}
```
   (A) 3 2 1
   (B) 3 3 2
   (C) 3 3 1
   (D) 3 1 2

3. Consider the following 'C' program fragment :
```
int main( )
{
    char *a, *b, c[10], d[10];
    a=b;
    b=c;
    c=d;
    d=a;
    return φ;
}
```
Choose the statement having error from the following :
   (A) b=c; and c=d;
   (B) a=b; and b=c;
   (C) c=d; and d=a;
   (D) a=b; and d=a;

3   **[P.T.O.**

4. In object oriented programming, an abstraction that holds a collection of objects of some given class is called :
   (*i*) Package list
   (*ii*) Container or collection
   (*iii*) Library
   (*iv*) Directory list
   (A) (*i*) and (*iii*)
   (B) (*ii*) only
   (C) (*i*) and (*iv*)
   (D) (*ii*) and (*iii*)

5. Function declaration gives the name of the function. Which of the following statements are relevant for function :
   (*i*) The semantics of argument passing are identical to semantics of initialisation.
   (*ii*) The argument types are checked and implicit argument type conversion takes place when necessary.
   (*iii*) The argument types are unchecked and explicit argument type conversion takes place when necessary.
   (*iv*) A function declaration may contain argument names
   (A) (*i*) and (*ii*)
   (B) (*i*), (*ii*) and (*iv*)
   (C) (*i*), (*ii*) and (*iii*)
   (D) (*ii*) and (*iv*)

6. Which of the following properties makes user defined class good ?
   (*i*) Something that has a small and well defined set of operations.
   (*ii*) Something that can be seen as a "Black Box" manipulated exclusively through that set of operations.
   (*iii*) Something whose actual representation could conceivable be modified without affecting the way that set of operation is used.
   (*iv*) Something one might want more than one of.
   (A) (*ii*) and (*iii*)
   (B) (*i*), (*ii*), (*iii*) and (*iv*)
   (C) (*i*) and (*ii*)
   (D) (*iv*) only

7. Which action has the ability to match the request parameter to properties of some name in java bean be specifying "*" for attribute property ?
   (A) < jsp : include >
   (B) < jsp : set Property >
   (C) < jsp : use Bean >
   (D) < jsp : param >

8. Which of the following points lies over the line when Bresenham's line drawing algorithm is used to draw the line between the points (4, 6) and (15, 12) ?

(A) (5, 6)

(B) (7, 7)

(C) (11, 9)

(D) (13, 11)

9. Minimum and maximum window and viewport coordinates are (2, 4), (18, 30) and (8, 8), (16, 20) respectively. The scaling factors along x and y axes are :

(A) 0.5 and 0.66

(B) 0.25 and 0.5

(C) 0.4 and 0.55

(D) 2 and 1.5

10. From modeling coordinates to device coordinates in general 3D transformation pipeline, identify the correct order of other coordinates involved :

(*i*) Viewing coordinates

(*ii*) Projection coordinates

(*iii*) World coordinates

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

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

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

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

11. Which of the following is *not* one of the Codd's rules ?

(A) Everything in database must be stored in a table format.

(B) Null values in database must be given a systematic and uniform treatment.

(C) The structure definition stored in data dictionary should be accessible to all users

(D) Database must support insertion, updation and deletion of a single row as also a set of records

12. Which of the following statements are *true* ?

(*i*) Logical independence is the capacity to change the conceptual schema without having to change external schema.

(*ii*) Logical independence is the capacity to change the conceptual schema without having to change internal schema.

(*iii*) Physical independence is the capacity to change the internal schema without having to change conceptual schema.

(*iv*) Physical independence is the capacity to change the conceptual schema without having to change external schema

(A) (*i*) and (*iii*)

(B) (*i*) and (*iv*)

(C) (*ii*) and (*iii*)

(D) (*ii*) and (*iv*)

13. In a schema with attributes A, B, C, D and E, with the following set of functional dependencies {A → B, A → C, CD → E, B → D, E → A}, which of the following functional dependencies are *not* implied by the above set ?

(A) CD → AC

(B) BD → CD

(C) BE → AD

(D) AB → CD

14. Database contains the relation course (Id, name, semester, year), which of the following is an *incorrect* SQL query ?

(A) Select * from course order by year;

(B) Select count(semester), semester from course group by semester;

(C) Select semester from course group by semester where count (semester) > z;

(D) Select count (semester), semester from course group by semester order by count (semester);

15. Which connective is used to test the absence of set membership in SQL ?

(A) minus

(B) not in

(C) intersection

(D) or

16. Which of the following are the lock modes in multiple granularity locking ?

(*i*) S

(*ii*) X

(*iii*) SIX

(*iv*) IX

(*v*) IS

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

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

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

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

17. The information gain, one of the attribute selection measures, used in partition of data (D), is expressed as

Info (D) = ...

where p_i is the probability that an arbitrary tuple in D belongs to class c_i :

(A) $-\sum\limits_{i=1}^{m} p_i \log(p_i)$

(B) $\sum\limits_{i=1}^{m} p_i \log(p_i)$

(C) $-\sum\limits_{i=1}^{m} p_i \log_2(p_i)$

(D) $\sum\limits_{i=1}^{m} p_i \log_2(p_i)$

18. Which of the following is a method for mining frequent subgraphs ?

(*i*) Pattern growth approach.

(*ii*) Priori-based approach.

(A) (*i*) only

(B) (*ii*) only

(C) (*i*) and (*ii*)

(D) None of the above

19. Which among the following is *correct* sequence of data flow in Apached hadoop parallel MapReduce ?

(A) map, split, reduce, shuffle

(B) split, shuffle, map, reduce

(C) split, map, shuffle, reduce

(D) split, map, reduce, shuffle

20. For storing the information about networks, such as social connections, the stores used are ....

(A) Key-value

(B) Graph

(C) Wide-column

(D) Document

21. 'Login-ID and Password' mechanism is implemented in an operating system to ensure which of the following aspects of security ?

(A) Confidentiality

(B) Integrity

(C) Authentication

(D) Authorization

22.
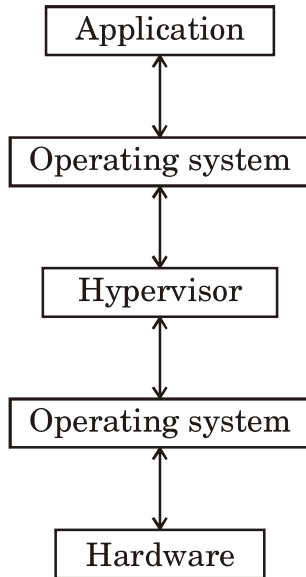
The given diagram represents which of the following scenario ?

(A) Type 1 Hypervisor or virtual machine monitor

(B) Type 2 Hypervisor or virtual machine monitor

(C) Type 3 Hypervisor or virtual machine monitor

(D) Type 4 Hypervisor or virtual machine monitor

23. What is the most appropriate purpose of 'kill' command in Linux ?

(A) Kill a running process

(B) Send a signal to a process

(C) Abort a user login

(D) Shutdown the operating system

24. Windows operating system follows ……………. and Linux operating system follows …………. type of kernel architecture.

Select most appropriate option from the following :

(A) Monolithic, Micro

(B) Hybrid, Monolithic

(C) Micro, Monolithic

(D) Micro, Micro

25. Which of the following scenario most appropriately depicts the primary use of a distributed file system ?

(A) Store data and its backup on multiple computer systems

(B) Access data stored on remote computer systems

(C) Store parts of related data on different computer systems

(D) Allow multiple file systems on one computer system

26. Consider a system with 12 magnetic tape drives and three processes P_1, P_2 and P_3. Process P_1 requires maximum 10 tape drives, P_2 may need 4 tape drives and P_3 may need upto 9 tape drives. Suppose at time t_1, process P_1 is holding 5 tape drives, process P_2 is holding 2 tape drives and process P_3 is holding 3 tape drives. At time t_1 the system is in :

(A) safe state

(B) unsafe state

(C) deadlocked state

(D) starvation state

27. In a demand paging memory system, page table is held in registers. The time taken to service a page fault is 8 m.sec. if an empty frame is available or if the replaced page is not modified, and it takes 20 m.sec. if the replaced page is modified. What is the average access time to service a page fault assuming that the page to be replaced is modified 70% of the times ?

(A) 11.6 m.sec.

(B) 16.4 m.sec.

(C) 28 m.sec.

(D) 14 m.sec.

28. A hierarchical memory system that uses cache memory has cache access time of 50 nano seconds, main memory access time of 300 nano seconds, 75% of memory requests are for read, hit ratio of 0.8 for read access and the write-through scheme is used. What will be the average access time of the system, both for read and write requests ?

(A) 157.5 nano sec.

(B) 110 nano sec.

(C) 75 nano sec.

(D) 82.5 nano sec.

29. Suppose a disk has 201 cylinders, numbered 0 to 200. At some time the disk arm is at cylinder 100, and there is a queue of disk access requests for cylinder 30, 85, 90, 100, 105, 110, 135 and 145. If shortest-seek time first (SSTF) is being used for scheduling the disk access the request for cylinder 90 is serviced after servicing .... number of requests.

(A) 1

(B) 2

(C) 3

(D) 4

30. Let m[0] ...... m[4] be mutexes (binary semaphores) and P[0] .... P[4] be processes. Suppose each process P[i] executes the following :

wait (m[i]); wait (m[(i+1) mod 4]);

....

release (m[i]); release (m[(i+1) mod 4]);

This could be :

(A) Thrashing

(B) Deadlock

(C) Starvation but not deadlock

(D) None of the above

31. Which one of these is appropriate in an agile and iterative software development process ?

(A) Gather a complete set of requirements before designing/building anything

(B) Implement the system incrementally, building it up bit by bit

(C) Implement the backend of the system first, that is, before implementing the front-end functionality with which users interact

(D) Generate and maintain complete, detailed design documents, which comprehensively model all aspects of the design

32. Which of the following provides a concise, unambiguous, and consistent method for documenting system requirements in software development process ?

(A) CMM

(B) ISO standard

(C) CASE tools

(D) Formal methods

33. Use-cases are not well suited for capturing .... requirements.

(A) functional

(B) non-functional

(C) user interaction

(D) hardware interaction

34. The architectural model generally is derived from which of the following sources ?

(i) Information about application domain for software.

(ii) Data flow diagram or analysis classes (along with their relationships and collaborations)

(iii) Availability of design patterns/frameworks

(A) (i) and (ii) only but not (iii)

(B) (i) and (iii) only but not (ii)

(C) (ii) and (iii) only but not (i)

(D) (i), (ii) and (iii)

35. FP based estimation decomposes problems based on :

(A) Process activities

(B) Project schedule

(C) Information

(D) Software procedures

36. Assume that the size of an organic type software product has been estimated to be 34,000 lines of source code. Assume that the average salary of software engineers is ₹ 20,000 per month. Determine the effort and cost required to develop the software product along with the nominal development time.

(A) 91 PM, 210,000, 14 months

(B) 97 PM, 280,000, 14 months

(C) 91 PM, 280,000, 14 months

(D) 97 PM, 210,000, 12 months

37. The concurrent version system (CVS) is widely used for version control, where it is originally designed for source code, but useful for any text-based file, then CVS system must perform :

(*i*) Establishing a simple repository.

(*ii*) Maintains all version of a file in a single named file by storing only the difference between progressive version of the original file.

(*iii*) Protect against simultaneous changes to a file by establishing different directories for each developer thus insulating one from another.

(*iv*) The CVS merges changes when each developer completes the work.

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

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

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

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

38. Suppose a graph has 5 flow graph edges and 3 flow graph modes, the cyclometric complexity V(G) of flow graph G is ....

(A) –2

(B) 2

(C) 4

(D) 8

39. Which is/are the *false* statement(s) about alpha test ?

    (*i*) It is conducted by developers.

    (*ii*) It is conducted in controlled environment.

    (*iii*) It is conducted on live application.

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

    (B) (*i*) and (*iii*)

    (C) (*ii*) and (*iii*)

    (D) (*iii*) only

40. Which amongst the following are McCalls production transition factors ?

    (*i*) Reliability

    (*ii*) Portability

    (*iii*) Testability

    (*iv*) Reusability

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

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

    (C) (*ii*) and (*iv*)

    (D) (*i*) and (*iii*)

41. A doubly linked list is :

    (A) A linear data structure

    (B) A non-linear data structure

    (C) Both linear and non-linear data structure

    (D) Neither linear nor non-linear data structure

42. Consider the usual algorithm for determining whether a sequence of parentheses is balanced.

    The maximum number of parentheses that appear on the stack AT ANY ONE TIME when the algorithm analyzes $\left(\ (\ )\ ((\ ))\ ((\ ))\ \right)$ is :

    (A) 12

    (B) 6

    (C) 3

    (D) 4

43. A queue data structure can be used for :

    (A) Resource allocation

    (B) Expression parsing

    (C) Recursion

    (D) Expression evaluation

44. The minimum number of nodes possible in a binary tree of height h (assuming that the root is at height 1) is :

    (A) h

    (B) 2^h

    (C) 2^{h-1}

    (D) $2^h - 1$

45. If the in-order traversal output sequence of a binary tree is :

    D B E A F C

    and its pre-order traversal output sequence is :

    A B D E C F

    then its post-order traversal output sequence is :

    (A) A B C D E F

    (B) F E D C B A

    (C) D E B F C A

    (D) F E D C B A

46. Some differences between B tree and B^+ tree approaches are :

    (i) In a B tree, search keys and data are stored in internal or leaf nodes. But, in B^+ tree, data are stored only in leaf nodes.

    (ii) A link is maintained among all the nodes so that one can move from the left-most node to right-most node in B^+ tree.

    (A) only (i) is correct

    (B) only (ii) is correct

    (C) Both (i) and (ii) are correct

    (D) Both (i) and (ii) are incorrect

47. If $f(n) = 4n^2$ for all n and $g(n) = n$ if $n > 100$ and n^3 if $n \leq 100$, then :

    (A) $g(n)$ is of $O(f(n))$
    (B) $g(n)$ is of $\Omega(f(n))$
    (C) $f(n)$ is of $O(g(n))$
    (D) $g(n)$ is of $\theta(f(n))$

48. Let $C^\wedge(x)$ denote the ranking function that associates cost with a node in Branch and Bound Formulation of Travelling Salesperson Problem. What is the value of $C^\wedge(x)$ for the root node for the following problem instance ?

	1	2	3	4
1	∞	3	5	10
2	11	∞	6	8
3	16	7	∞	20
4	13	12	10	∞

    (A) 26

    (B) 29

    (C) 31

    (D) 36

49. Which amongst the following is *not* an NP-complete problem ?

    (A) CNF satisfiability problem

    (B) Clique decision problem

    (C) Node Cover decision problem

    (D) Halting problem

50. Consider the following segment of a parallel algorithm expressed in PRAM model of computing and allows concurrent read exclusive write model. What is the "Parallel time" complexity ?

For $k = m - 1$ step $- 1$ to 0 do

for all j, $2^k \leq j \leq 2^{k+1} - 1$, in parallel do

$A(j) = \max \{A(2j), A(2j + 1)\}$

where "max" is a function that find maximum of two numbers using single comparison operation.

(A) $O(n^2)$

(B) $O(n)$

(C) $O(\log_2 n)$

(D) $O(n \log_2 n)$

51. Which of the following languages are denoted/represented by the regular expression :

$((0+1)(0+1)^*)^*$ 00 $(0 + 1)^*$

(i) The language contains strings over 0's and 1's with at least one pair of consecutive zeros.

(ii) The language contains strings over 0's and 1's with strings starting with either 0 or 1 and may end with 0 or 1.

(iii) The language contains strings over 0's and 1's with number of 0's to be more than number of 1's.

(A) (ii) and (iii) only

(B) (iii) only

(C) (i) and (ii) only

(D) (i) and (iii) only

52. Consider the grammar with productions :

$S \rightarrow aBDh$, $B \rightarrow cC$, $C \rightarrow bC/\in$,

$D \rightarrow EF$, $E \rightarrow g/\in$, $F \rightarrow f/\in$

Which of the following is correct set for FOLLOW (E) ?

(A) {g, f, h, $}

(B) {f, h, $}

(C) {h, $}

(D) {g, $, $\in$}

53. Which of the following is/are correct statement(s) :

(i) A language L is said to be a deterministic context free language if and only if there exists a deterministic ρDA M such that :

$$L = L(M)$$

(ii) If every grammar that generates L is ambiguous, then the language is called inherently ambiguous.

(iii) A CFG is in Greibach Normal Form if all productions in G have the form A $\rightarrow$ BC and A $\rightarrow$ a where A, B, C are non-terminals and a is a terminal.

(A) (i) and (iii) only

(B) (ii) and (iii) only

(C) (i) and (ii) only

(D) (i), (ii) and (iii) only

54. The process of computing an attribute and associating its computed value with the language construction is referred as .... of the attribute.

    (A) Binding

    (B) Collision

    (C) Synthesizing

    (D) Chaining

55. .... refers to the order in which individual statements or instructions of a program are executed.

    (A) Data flow

    (B) Control flow

    (C) Register allocation

    (D) Instruction scheduling

56. Match all items in Group 1 with correct options from Group 2 below :

    Group 1

    (*i*)   Regular expression

    (*ii*) Pushdown automata

    (*iii*) Data flow analysis

    (*iv*) Register allocation

    Group 2

    (1) Syntax analysis

    (2) Code generation

    (3) Lexical analysis

    (4) Code optimization

    (A) (*i*)—(4), (*ii*)—(1), (*iii*)—(2), (*iv*)—(3)

    (B) (*i*)—(3), (*ii*)—(1), (*iii*)—(4), (*iv*)—(2)

    (C) (*i*)—(3), (*ii*)—(4), (*iii*)—(1), (*iv*)—(2)

    (D) (*i*)—(2), (*ii*)—(1), (*iii*)—(4), (*iv*)—(3)

57. Which of the following is/are type of data supported/added by/in typical object file formats in code generation phase of a compiler ?

   (*i*)   Data segment

   (*ii*) Block started by symbol

   (*iii*) Text segment

   (A) (*i*) only

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

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

   (D) (*i*) and (*iii*) only

58. A synthesized attributes can be :

   (*i*)   Result of attribute evaluation rules.

   (*ii*) The one whose value at a node in a parse tree is defined in terms of its sibling or parent.

   (*iii*) The one whose value at parent node can be determined from its children.

   (A) (*i*) only

   (B) (*i*) and (*iii*) only

   (C) (*i*) and (*ii*) only

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

59. Which among the following is/are *correct* statement/statements ?

   (*i*)   A class of problems with two outputs "yes" or "no" is said to be decidable (solvable) if there exists some definite algorithm which always terminates (halts) with one of two outputs "yes" or "no". Otherwise, the class of problems is said to be undecidable.

   (*ii*) A decision problem is a problem that requires a yes or no answer.

   (*iii*) Undecidable problem can be solved by a computer or a computer program of any kind.

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

   (B) (*i*) and (*iii*) only

   (C) (*ii*) and (*iii*) only

   (D) (*i*), (*ii*) and (*iii*) only

60. Which of the following production forms belongs to unrestricted grammar (Type 0) :

    (i) S → ASA A → BCa BC → Aa

    (ii) S → aSa/∈

    (iii) BSA → aSb/ASB, A → aB/b

    B → Bb/a

    (A) (i) and (iii) only

    (B) (ii) and (iii) only

    (C) (i) and (ii) only

    (D) (i), (ii) and (iii) only

61. A noiseless channel with bandwidth of 3000 Hz transmitting a signal with four signal levels (for each level we send 2 bits). Then the maximum bit rate is :

    (A) 6,000 bps

    (B) 8,000 bps

    (C) 10,000 bps

    (D) 12,000 bps

62. What is the minimum Hamming distance for detection of six errors or correction of two errors ?

    (A) 7

    (B) 5

    (C) 3

    (D) 1

63. Find the class of the following two addresses :

    (a) 0000 0001 0000 1011 00001011 11101111

    (b) 14.23.120.8

    (A) Class D, Class D

    (B) Class C, Class C

    (C) Class B, Class B

    (D) Class A, Class A

64. Imagine a flow specification that has a maximum packet size of 1000 bytes, a token bucket rate of 10 million bytes/sec, a token bucket size of 1 million bytes, and a maximum transmission rate of 50 million bytes/sec. How long can a burst at maximum speed last ?

(A) 50 sec

(B) 50 msec

(C) 25 sec

(D) 25 msec

65. In symmetric key cryptography, if every person in a group of 10 people needs to communicate with every other person in the group, how many secret keys are required ?

(A) 9

(B) 90

(C) 45

(D) 10

66. Which ARQ mechanism deals with the transmission of only damaged or lost frames despite the other multiple frames by increasing the efficiency and its utility in noisy channels ?

(A) Go-Back-N ARQ

(B) Selective Repeat ARQ

(C) Stop-and-Wait ARQ

(D) All of the above

67. The role of Common Gateway Interface (CGI) is to :

(A) Generate dynamic web pages

(B) Stream videos

(C) Program used to view html document

(D) Generate executable files from web content by web server

68. In virtual cluster management "templates" can be implemented using :

(A) Skip and relay format

(B) Copy and relay format

(C) NOW (newtor of workstation) format

(D) COW (copy on write) format

69. GSM is an example of :

    (A) TDMA cellular systems

    (B) FDMA cellular systems

    (C) CDMA cellular systems

    (D) SDMA cellular systems

70. The responsibility of a Certification Authority (CA) for Digital Signature is to authenticate the :

    (A) hash function used

    (B) private keys of subscribers

    (C) key used in DES

    (D) public keys of subscribers

71. A population of size 400, consists of 123 copies of genome 0001 (with fitness 0.12), 57 copies of genome 1111 (with fitness 0.23), 201 copies of genome 1010 (with fitness 0.56) and 19 copies of genome 0110 (with fitness 0.43). What is the estimated fitness of schema 1 *** ?

    (A) 0.4870

    (B) 0.4880

    (C) 0.4877

    (D) 0.5870

72. If $\underset{\sim}{A}$ = near 0.74 = $\left\{ \dfrac{0}{0.730} + \right.$

    $\dfrac{0.8}{0.735} + \dfrac{1}{0.740} + \dfrac{0.6}{0.745} + \left. \dfrac{0}{0.750} \right\}$

    and $\underset{\sim}{B}$ = in 0.74 = $\left\{ \dfrac{0}{0.730} + \right.$

    $\dfrac{0.4}{0.735} + \dfrac{0.8}{0.740} + \dfrac{1}{0.745} + \left. \dfrac{0.6}{0.750} \right\}$

    then $\overline{A \cup B}$ is :

    (A) $\left\{ \dfrac{1}{0.730} + \dfrac{0.2}{0.735} + \dfrac{0}{0.740} + \right.$

    $\left. \dfrac{0.4}{0.745} + \dfrac{1}{0.750} \right\}$

    (B) $\left\{ \dfrac{1}{0.730} + \dfrac{0.6}{0.735} + \dfrac{0.2}{0.740} + \right.$

    $\left. \dfrac{0}{0.745} + \dfrac{0.4}{0.750} \right\}$

    (C) $\left\{ \dfrac{2}{0.730} + \dfrac{0.8}{0.735} + \dfrac{0.2}{0.740} + \right.$

    $\left. \dfrac{0.4}{0.745} + \dfrac{0.6}{0.750} \right\}$

    (D) $\left\{ \dfrac{1}{0.730} + \dfrac{0.2}{0.735} + \dfrac{0}{0.740} + \right.$

    $\left. \dfrac{0}{0.745} + \dfrac{0.4}{0.750} \right\}$

73. Suppose the function y and a fuzzy integer number around -4 for X are given as :

$$y = (x - 3) 2 + 2$$

Around -4 = {(2, 0.3), (3, 0.6), (4, 1), (5, 0.6), (6, 0.3)} respectively, then f(Around -4) is given by :

(A) {(2, 0.6), (3, 0.3), (6, 1), (11, 0.3)}

(B) {(2, 0.6), (3, 1), (6, 1), (11, 0.3)}

(C) {(2, 0.6), (3, 1), (6, 0.6), (11, 0.3)}

(D) {(2, 0.6), (3, 0.3), (6, 0.6), (11, 0.3)}

74. Which amongst the following are the four types of agents in Artificial Intelligence ?

(*i*) Simple reflex

(*ii*) Model based

(*iii*) Goal based

(*iv*) Action based

(*v*) Utility based

(*vi*) Learning action

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

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

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

(D) (*iii*), (*iv*), (*v*) and (*vi*)

75. The ability to manipulate the existing knowledge representational structures to derive new structures, is known as :

(A) Representational adequacy

(B) Inferential adequacy

(C) Inferential efficiency

(D) Acquisitional efficiency

76. Which of the following is *not* true for STRIPS language used for planning ?

(A) There is no support for equality and types.

(B) The goals and effects are specified as conjunction.

(C) It uses open world assumption

(D) It uses only positive literals in states

77. In the source language, a single pronoun may stand for many things that require distinct pronouns in the target language. This difficulty in Natural language understanding encountered by machine translation systems is known as :

    (A) Lexical disambiguation

    (B) Grammatical ambiguity

    (C) Anaphoric references

    (D) Idioms

78. What are the two middle agents involved in a Distributed Environment Centered Agent Framework ?

    (A) Dispatcher and Planner

    (B) Matchmaker and Broker

    (C) Dispatcher and Broker

    (D) Scheduler and Broker

79. The activation levels of node in neural network depends on the activation function chosen. If it is a sigmoid function, then activation levels are :

    (A) [0, 1]

    (B) unrestricted

    (C) [– ∞, + ∞]

    (D) 0 (or – 1) and 1

80. We have to use a Hopfield network to store three vectors as follows :

    (1, 1, 1, 1, 1)

    (1, –1, –1, 1, –1)

    (–1, 1, –1, –1, –1)

    Find the weight matrix using outer products method :

    (A) $\begin{bmatrix} 0 & -1 & 1 & 3 & 1 \\ -1 & 0 & 1 & -1 & 1 \\ 1 & 1 & 0 & 1 & 3 \\ 3 & -1 & 1 & 0 & 1 \\ 1 & 1 & 3 & 1 & 0 \end{bmatrix}$

    (B) $\begin{bmatrix} 0 & -1 & -1 & 3 & 1 \\ -1 & 0 & 1 & -1 & 1 \\ 1 & 1 & 0 & 1 & 2 \end{bmatrix}$

    (C) $\begin{bmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \\ 3 & -1 & 1 \\ 2 & 1 & 1 \end{bmatrix}$

    (D) $\begin{bmatrix} 1 & 3 & 1 \\ 1 & -1 & 1 \\ 0 & 1 & 3 \\ 1 & 0 & 1 \\ 3 & 1 & 0 \end{bmatrix}$

81.
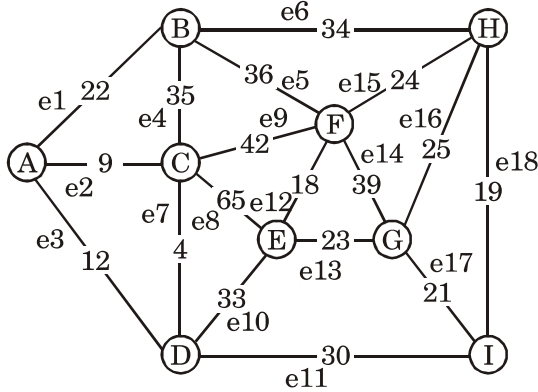
V = {A, B, C, D, E, F, G, H, I}

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}

.... is a Eulerian path in

the above graph.

(A) e1, e6, e15, e9, e7, e10, e13, e17

(B) e2, e7, e11, e17, e13, e8, e9, e14,
     e16, e6

(C) e3, e11, e17, e13, e8, e9, e14, e16,
     e6, e4

(D) e10, e12, e14, e16, e18, e11, e3,
     e1, e4

82. Group code set is built by using a
     generator G of size 5 × 8 with
     full rank. How many distinct words
     can be used for communication using
     these code set ?

     (A) 32

     (B) 16

     (C) 8

     (D) 4

83. The number of errors can be
     corrected using the code words of
     group code with the generator :

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

     (A) 3

     (B) 2

     (C) 1

     (D) 0

84. Let f be a Boolean expression in
     8 variables which has true value
     exactly for 4 combinations out of 2^8
     possible combinations. Then f can be
     expressed as sum of .... min terms.
     (A) 10
     (B) 8
     (C) 6
     (D) 4

85. A person with list of n items, collects 1st item one (unit) time, 2nd item two (2 units) times, 3rd item three (3 units) times, ... rth items r times (r units) .... to his cart while going around the mart .... number of units will be in his cart by the time he reaches to billing counter, if he has list of $6(n = 6)$ items for that day procurement.

(A) 6

(B) 14

(C) 21

(D) 42

86. 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 equivalence relations of order n that can be defined over A of size $r = |A|$ $(r > n)$, is ....

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

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

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

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

87. Consider the following Linear Programming Problem :
A company produces two types of hats say A and B. Each type A hat requires twice as much labour as type B. If all the hats are of type B only, the company can produce 500 hats a day. The market limits the sale of type A and type B hats to 150 and 250 respectively. If the profit earned on type A hat is ₹ 8 and type B hat is ₹ 5, how many hats of each type should be produced so as to maximize the profit ? The primal and dual of this problem is :

(A) Maximize : $Z = 8x_1 + 5x_2$
Subject to : $2x_1 + x_2 \leq 500$
$x_1 \leq 150$
$x_2 \leq 250$, $x_1, x_2 \geq 0$
Dual : Minimize :
$Z' = 500y_1 + 150y_2 + 250y_3$
Subject to : $2y_1 + y_2 \leq 8$
$y_1 + y_3 \leq 5$, $y_1, y_2 \geq 0$

(B) Maximize : $Z = 8x_1 + 5x_2$
Subject to : $2x_1 + x_2 \leq 500$
$x_1 \leq 150$
$x_2 \leq 250$, $x_1, x_2 \geq 0$
Dual : Minimize :
$Z' = 500y_1 + 150y_2 + 250y_3$
Subject to : $2y_1 + y_2 \geq 8$
$y_1 + y_3 \geq 5$, $y_1, y_2 \geq 0$

(C) Maximize : $Z = 8x_1 + 5x_2$
Subject to : $2x_1 + x_2 \leq 500$
$x_1 \leq 150$
$x_2 \leq 250$, $x_1, x_2 \geq 0$
Dual : Minimize : $Z' = 8y_1 + 5y_2$
Subject to : $2y_1 + y_2 \geq 500$
$y_1 \geq 150$
$y_2 \geq 250$, $y_1, y_2 \geq 0$

(D) Primal and dual are the same
Maximize : $Z = 8x_1 + 5x_2$
Subject to : $2x_1 + x_2 \leq 500$
$x_1 \leq 150$
$x_2 \leq 250$, $x_1, x_2 \geq 0$

88. The optimal solution of the linear programming problem is located :

   (A) in the interior of the feasible region

   (B) at the center of the feasible region

   (C) at one of the corners of the feasible region

   (D) on the surface of the feasible region

89. Consider the following transportation problem :

Destinations

	D_1	D_2	D_3	D_4	
S_1	6	4	1	5	14
S_2	8	9	2	7	16
S_3	4	3	6	2	5
	6	10	15	4	

Sources

The initial transportation cost by Vogel's method is :

   (A) 128

   (B) 152

   (C) 124

   (D) 114

90. The Hungarian method for the assignment problem is based on the fact that :

   (A) The optimal assignment is not affected if a constant is subtracted from any row or column

   (B) The value of the objective function is not affected by adding or subtracting a constant from any row or column

   (C) The optimal assignment is not affected by adding or subtracting a constant from any row or column

   (D) The optimal assignment is not affected if each entry in the cost matrix is treated separately to obtain sufficient number of zeros

91. For even number of 1's at the input or inputs having all 0's, the output of EX-NOR gate is :

    (A) Not defined

    (B) High

    (C) Low

    (D) None of the above

92. Binary cyclic code :

    (*i*) Detects all single errors.

    (*ii*) Detects all odd number of error bits.

    (*iii*) Detects all burst errors of 16 or fewer bits.

    (A) Only (*i*)

    (B) Only (*ii*)

    (C) (*ii*) and (*iii*)

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

93. Using 16's complement method of subtraction compute $CB2_H - 972_H$:

    (A) $68D_H$

    (B) 1340_H

    (C) 340_H

    (D) $CB2_H$

94. The minimum time required for memory device to put valid data on the data bus after $\overline{CS}$ goes low is called :

    (A) t_{ACS} : Chip select access time

    (B) t_{HZ} : Chip deselection to output in tri-state

    (C) t_{LZ} : Chip selection to output in tri-state

    (D) t_{AA} : Address access time

95. Determine the status of the condition flags if the operation performed on A and B is A ∧ B where A = 01100010 and B = 01000101 :

    (A) N = 1, V = 1, C = 0 and Z = 0

    (B) N = 0, V = 0, C = 0 and Z = 1

    (C) N = 1, V = 1, C = 1 and Z = 1

    (D) N = 0, V = 0, C = 0 and Z = 0

96. If a byte is used as a storage unit, number 5 and character 5 in assembly language are stored as :

    (A) 00000101B and 00110101B

    (B) 01110101C and 00110101B

    (C) 00000011B and 00000101B

    (D) None of the above

97. Which one of the following is *not* a most common use of displacement addressing ?

    (A) Relative addressing

    (B) Base-register addressing

    (C) Indexing

    (D) Register-indirect addressing

98. One of the following *cannot* be classified as an Interrupt :

    (A) Priority

    (B) Daisy chaining

    (C) Non-maskable

    (D) Memory

99. Assume that an instruction pipeline has 5 stages without any branch prediction. Fetch Instruction (FI), Decode Instruction (DI), Fetch Operand (FO), Execute Instruction (EI) and Write Operand (WO) with state delays as 6, 8, 6, 5 and 4 ns respectively.

    Consider a program with 15 instructions (I_1 .... I_{15}) where only I_7 is a branch instruction and I_{12} is the target instruction.

    If the branch is taken during execution of the program then what is the time needed to complete the program ?

    (A) 2^{10}ns

    (B) 2^{16}ns

    (C) 2^5ns

    (D) 144ns

100. Which protocol is responsible for distributing the responsibility for maintaining cache coherence among all the cache controllers in a multiprocessor system ?

    (A) Snoopy protocol

    (B) Directory protocol

    (C) Write-back protocol

    (D) Write-through protocol

ROUGH WORK

ROUGH WORK