Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

OMR Sheet No. : .....
(To be filled by the Candidate)

Roll No. | | | | | | | | | |
(In figures as per admission card)

PAPER - III

Roll No. _____
(In words)

J 8715

COMPUTER SCIENCE AND APPLICATIONS

Time : 2½ hours] **[Maximum Marks : 150**

Number of Pages in this Booklet : **16**

Number of Questions in this Booklet : **75**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of seventy five multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (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 and do not accept an open booklet.
   (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 pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
   (iii) After this verification is over, the Test Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (1), (2), (3) and (4). You have to darken the circle as indicated below on the correct response against each item.
   Example : ① ② ● ④ where (3) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll 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, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There are no negative marks for incorrect answers.**

परीक्षार्थियों के लिए निर्देश

1. इस पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. इस प्रश्न-पत्र में पचहत्तर बहुविकल्पीय प्रश्न हैं।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे, जिसकी जाँच आपको अवश्य करनी है :
   (i) प्रश्न-पुस्तिका खोलने के लिए पुस्तिका पर लगी कागज की सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
   (ii) **कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ/प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।**
   (iii) इस जाँच के बाद प्रश्न-पुस्तिका का नंबर OMR पत्रक पर अंकित करें और OMR पत्रक का नंबर इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (1), (2), (3) तथा (4) दिये गये हैं। आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
   उदाहरण : ① ② ● ④ जबकि (3) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पुस्तिका के अन्दर दिये गये OMR पत्रक पर ही** अंकित करने हैं। यदि आप OMR पत्रक पर दिये गये वृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हांकित करते हैं, तो उसका मूल्यांकन नहीं होगा।
6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
8. यदि आप OMR पत्रक पर नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपकी पहचान हो सके, अंकित करते हैं अथवा अभद्र भाषा का प्रयोग करते हैं, या कोई अन्य अनुचित साधन का प्रयोग करते हैं, जैसे कि अंकित किये गये उत्तर को मिटाना या सफेद स्याही से बदलना तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं।
9. आपको परीक्षा समाप्त होने पर मूल OMR पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें। हालांकि आप परीक्षा समाप्ति पर मूल प्रश्न-पुस्तिका तथा OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं।
10. **केवल नीले/काले बाल प्वाईंट पेन का ही इस्तेमाल करें।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
12. **गलत उत्तरों के लिए कोई नकारात्मक अंक नहीं हैं।**

COMPUTER SCIENCE AND APPLICATIONS
PAPER - III

Note : This paper contains **seventy five (75)** objective type questions of **two (2)** marks each. **All** questions are **compulsory**.

1. For the 8 - bit word 00111001, the check bits stored with it would be 0111. Suppose when the word is read from memory, the check bits are calculated to be 1101. What is the data word that was read from memory ?

(1) 10011001 (2) 00011001 (3) 00111000 (4) 11000110

2. Consider a 32 - bit microprocessor, with a 16 - bit external data bus, driven by an 8 MHz input clock. Assume that this microprocessor has a bus cycle whose minimum duration equals four input clock cycles. What is the maximum data transfer rate for this microprocessor ?

(1) 8×10^6 bytes/sec (2) 4×10^6 bytes/sec

(3) 16×10^6 bytes/sec (4) 4×10^9 bytes/sec

3. The RST 7 instruction in 8085 microprocessor is equivalent to :

(1) CALL 0010 H (2) CALL 0034 H (3) CALL 0038 H (4) CALL 003C H

4. The equivalent hexadecimal notation for octal number 2550276 is :

(1) FADED (2) AEOBE (3) ADOBE (4) ACABE

5. The CPU of a system having 1 MIPS execution rate needs 4 machine cycles on an average for executing an instruction. The fifty percent of the cycles use memory bus. A memory read/ write employs one machine cycle. For execution of the programs, the system utilizes 90 percent of the CPU time. For block data transfer, an IO device is attached to the system while CPU executes the background programs continuously. What is the maximum IO data transfer rate if programmed IO data transfer technique is used ?

(1) 500 Kbytes/sec (2) 2.2 Mbytes/sec (3) 125 Kbytes/sec (4) 250 Kbytes/sec

6. The number of flip-flops required to design a modulo - 272 counter is :

(1) 8 (2) 9 (3) 27 (4) 11

7. Let E_1 and E_2 be two entities in E-R diagram with simple single valued attributes. R_1 and R_2 are two relationships between E_1 and E_2 where R_1 is one - many and R_2 is many - many. R_1 and R_2 donot have any attribute of their own. How many minimum number of tables are required to represent this situation in the Relational Model ?

(1) 4 (2) 3 (3) 2 (4) 1

8. The STUDENT information in a university stored in the relation STUDENT (Name, SEX, Marks, DEPT_Name)
Consider the following SQL Query SELECT DEPT_Name from STUDENT where SEX='M' group by DEPT_Name having avg (Marks)>SELECT avg (Marks) from STUDENT. It Returns the Name of the Department for which :
(1) The Average marks of Male students is more than the average marks of students in the same Department
(2) The average marks of male students is more than the average marks of students in the University
(3) The average marks of male students is more than the average marks of male students in the University
(4) The average marks of students is more than the average marks of male students in the University

9. Select the 'False' statement from the following statements about Normal Forms :
(1) Lossless preserving decomposition into 3NF is always possible
(2) Lossless preserving decomposition into BCNF is always possible
(3) Any Relation with two attributes is in BCNF
(4) BCNF is stronger than 3NF

10. The Relation
Vendor Order (V_no, V_ord_no, V_name, Qty_sup, unit_price)
is in 2NF because :
(1) Non_key attribute V_name is dependent on V_no which is part of composite key
(2) Non_key attribute V_name is dependent on Qty_sup
(3) Key attribute Qty_sup is dependent on primary_key unit price
(4) Key attribute V_ord_no is dependent on primary_key unit price

11. The relation schemas R_1 and R_2 form a Lossless join decomposition of R if and only if :
(a) $R_1 \cap R_2 \twoheadrightarrow (R_1 - R_2)$
(b) $R_1 \rightarrow R_2$
(c) $R_1 \cap R_2 \twoheadrightarrow (R_2 - R_1)$
(d) $R_2 \rightarrow R_1 \cap R_2$
Codes :
(1) (a) and (b) happens
(2) (a) and (d) happens
(3) (a) and (c) happens
(4) (b) and (c) happens

12. In the indexed scheme of blocks to a file, the maximum possible size of the file depends on :
(1) The number of blocks used for index and the size of index
(2) Size of Blocks and size of Address
(3) Size of index
(4) Size of Block

13. Give the number of principal vanishing point(s) along with their direction for the standard perspective transformation :

(1) Only one in the direction K (2) Two in the directions I and J

(3) Three in the directions I, J and K (4) Only two in the directions J and K

14. Consider a triangle A(0,0), B(1,1) and C(5,2). The triangle has to be rotated by an angle of 45° about the point P(−1, −1). What shall be the coordinates of the new triangle ?

(1) $A' = \left(1, \sqrt{2} - 1\right)$, $B' = \left(-1, 2\sqrt{2} - 1\right)$ and $C' = \left(3\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(2) $A' = \left(1, \sqrt{2} - 1\right)$, $B' = \left(2\sqrt{2} - 1, -1\right)$ and $C' = \left(3\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(3) $A' = \left(-1, \sqrt{2} - 1\right)$, $B' = \left(-1, 2\sqrt{2} - 1\right)$ and $C' = \left(3\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(4) $A' = \left(\sqrt{2} - 1, -1\right)$, $B' = \left(-1, 2\sqrt{2} - 1\right)$ and $C' = \left(3\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

15. The process of dividing an analog signal into a string of discrete outputs, each of constant amplitude, is called :

(1) Strobing (2) Amplification (3) Conditioning (4) Quantization

16. Which of the following is not a basic primitive of the Graphics Kernel System (GKS) ?

(1) POLYLINE (2) POLYDRAW (3) FILL AREA (4) POLYMARKER

17. Which of the following statement(s) is/are incorrect ?

(a) Mapping the co-ordinates of the points and lines that form the picture into the appropriate co-ordinates on the device or workstation is known as viewing transformation.

(b) The right-handed cartesian co-ordinates system in whose co-ordinates we describe the picture is known as world co-ordinate system.

(c) The co-ordinate system that corresponds to the device or workstation where the image is to be displayed is known as physical device co-ordinate system.

(d) Left - handed co-ordinate system in which the display area of the virtual display device corresponds to the unit (|x|) square whose lower left-hand corner is at the origin of the co-ordinate system, is known as normalized device co-ordinate system.

Codes :

(1) (a) only (2) (a) and (b) (3) (c) only (4) (d) only

18. Match the following :

	List - I		**List - II**
(a)	Flood Gun	(i)	An electron gun designed to flood the entire screen with electrons.
(b)	Collector	(ii)	Partly energised by flooding gun, stores the charge generated by the writing gun.
(c)	Ground	(iii)	Used to discharge the collector.
(d)	Phosphorus grains	(iv)	Used in memory - tube display and similar to those used in standard CRT.
(e)	Writing Gun System	(v)	Used in memory - tube display and basically the same as the electron gun used in a conventional CRT.

Codes :

	(a)	**(b)**	**(c)**	**(d)**	**(e)**
(1)	(i)	(ii)	(iii)	(iv)	(v)
(2)	(ii)	(iii)	(i)	(iv)	(v)
(3)	(iii)	(i)	(ii)	(v)	(iv)
(4)	(iv)	(v)	(i)	(ii)	(iii)

19. Minimal deterministic finite automaton for the language $L = \{0^n \mid n \geq 0, n \neq 4\}$ will have :

(1) 1 final state among 5 states (2) 4 final states among 5 states

(3) 1 final state among 6 states (4) 5 final states among 6 states

20. The regular expression corresponding to the language L where

$L = \left\{ x \in \{0, 1\}^* \mid x \text{ ends with 1 and does not contain substring 00} \right\}$ is :

(1) $(1+01)^*(10+01)$ (2) $(1+01)^* 01$

(3) $(1+01)^*(1+01)$ (4) $(10+01)^* 01$

21. The transition function for the language $L = \{w \mid n_a(w)$ and $n_b(w)$ are both odd$\}$ is given by :

$\delta(q_0, a) = q_1$; $\delta(q_0, b) = q_2$

$\delta(q_1, a) = q_0$; $\delta(q_1, b) = q_3$

$\delta(q_2, a) = q_3$; $\delta(q_2, b) = q_0$

$\delta(q_3, a) = q_2$; $\delta(q_3, b) = q_1$

The initial and final states of the automata are :

(1) q_0 and q_0 respectively (2) q_0 and q_1 respectively

(3) q_0 and q_2 respectively (4) q_0 and q_3 respectively

22. The clausal form of the disjunctive normal form $\neg A \vee \neg B \vee \neg C \vee D$ is :

(1) $A \wedge B \wedge C \Rightarrow D$ (2) $A \vee B \vee C \vee D \Rightarrow$ true

(3) $A \wedge B \wedge C \wedge D \Rightarrow$ true (4) $A \wedge B \wedge C \wedge D \Rightarrow$ false

23. Which of the following is false for the programming language PROLOG ?

(1) A PROLOG variable can only be assigned to a value once

(2) PROLOG is a strongly typed language

(3) The scope of a variable in PROLOG is a single clause or rule

(4) The scope of a variable in PROLOG is a single query

24. Which one of the following is true ?

(1) The resolvent of two Horn clauses is not a Horn clause

(2) The resolvent of two Horn clauses is a Horn clause

(3) If we resolve a negated goal G against a fact or rule A to get clause C then C has positive literal or non-null goal

(4) If we resolve a negated goal G against a fact or rule A to get clause C then C has positive literal or null goal

25. Which transmission technique guarantees that data packets will be received by the receiver in the same order in which they were sent by the sender ?

(1) Broadcasting (2) Unicasting

(3) Packet switching (4) Circuit switching

26. Which of the following control fields in TCP header is used to specify whether the sender has no more data to transmit ?

(1) FIN (2) RST (3) SYN (4) PSH

27. Which are the two modes of IP security ?

(1) Transport and certificate (2) Transport and tunnel

(3) Certificate and tunnel (4) Preshared and transport

28. A message "COMPUTERNETWORK" encrypted (ignore quotes) using columnar transposition cipher with a key "LAYER". The encrypted message is :

(1) CTTOEWMROPNRUEK (2) MROUEKCTTPNROEW

(3) OEWPNRCTTUEKMRO (4) UEKPNRMROOEWCTT

29. Suppose a digitized voice channel is made by digitizing 8 kHz bandwidth analog voice signal. It is required to sample the signal at twice the highest frequency (two samples per hertz). What is the bit rate required, if it is assumed that each sample requires 8 bits ?

(1) 32 kbps (2) 64 kbps (3) 128 kbps (4) 256 kbps

30. The maximum payload of a TCP segment is :

(1) 65,535 (2) 65,515 (3) 65,495 (4) 65,475

31. An all-pairs shortest-paths problem is efficiently solved using :

(1) Dijkstra' algorithm (2) Bellman-Ford algorithm

(3) Kruskal algorithm (4) Floyd-Warshall algorithm

32. The travelling salesman problem can be solved in :

(1) Polynomial time using dynamic programming algorithm

(2) Polynomial time using branch-and-bound algorithm

(3) Exponential time using dynamic programming algorithm or branch-and-bound algorithm

(4) Polynomial time using backtracking algorithm

33. Which of the following is asymptotically smaller ?

(1) lg(lg*n) (2) lg*(lgn) (3) lg(n!) (4) lg*(n!)

34. Consider a hash table of size m = 100 and the hash function h(k) = floor (m(kA mod 1)) for $A = \frac{(\sqrt{5}-1)}{2} = 0.618033$. Compute the location to which the key k = 123456 is placed in hash table.

(1) 77 (2) 82 (3) 88 (4) 89

35. Let $f(n)$ and $g(n)$ be asymptotically non-negative functions. Which of the following is correct ?

(1) $\theta(f(n)*g(n)) = \min(f(n), g(n))$ (2) $\theta(f(n)*g(n)) = \max(f(n), g(n))$

(3) $\theta(f(n)+g(n)) = \min(f(n), g(n))$ (4) $\theta(f(n)+g(n)) = \max(f(n), g(n))$

36. The number of nodes of height h in any n - element heap is _____.

(1) h (2) z^h (3) $\text{ceil}\left(\frac{n}{z^h}\right)$ (4) $\text{ceil}\left(\frac{n}{z^{h+1}}\right)$

37. In Java, when we implement an interface method, it must be declared as :

(1) Private (2) Protected (3) Public (4) Friend

38. The Servlet Response interface enables a servlet to formulate a response for a client using the method _____.

(1) void log(Exception e, String s) (2) void destroy()

(3) int get ServerPort() (4) void set ContextType(String type)

39. Which one of the following is correct ?

(1) Java applets can not be written in any programming language

(2) An applet is not a small program

(3) An applet can be run on its own

(4) Applets are embedded in another applications

40. In XML we can specify the frequency of an element by using the symbols :

(1) + * ! (2) # * ! (3) + * ? (4) − * ?

41. In XML, DOCTYPE declaration specifies to include a reference to _____ file.

(1) Document type Definition (2) Document type declaration

(3) Document transfer definition (4) Document type language

42. Module design is used to maximize cohesion and minimize coupling. Which of the following is the key to implement this rule ?

(1) Inheritance (2) Polymorphism (3) Encapsulation (4) Abstraction

43. Verification :

(1) refers to the set of activities that ensure that software correctly implements a specific function

(2) gives answer to the question - Are we building the product right ?

(3) requires execution of software

(4) both (1) and (2)

44. Which design matric is used to measure the compactness of the program in terms of lines of code ?

(1) Consistency (2) Conciseness (3) Efficiency (4) Accuracy

45. Requirements prioritisation and negotiation belongs to :

(1) Requirements validation (2) Requirements elicitation

(3) Feasibility study (4) Requirements reviews

46. Adaptive maintenance is a maintenance which _____.

(1) correct errors that were not discovered till testing phase.

(2) is carried out to port the existing software to a new environment.

(3) improves the system performance.

(4) both (2) and (3)

47. A Design concept Refinement is a :
(1) Top-down approach
(2) Complementary of Abstraction concept
(3) Process of elaboration
(4) All of the above

48. A software design is highly modular if :
(1) cohesion is functional and coupling is data type.
(2) cohesion is coincidental and coupling is data type.
(3) cohesion is sequential and coupling is content type.
(4) cohesion is functional and coupling is stamp type.

49. Match the following for operating system techniques with the most appropriate advantage :

List - I	List - II
(a) Spooling	(i) Allows several jobs in memory to improve CPU utilization
(b) Multiprogramming	(ii) Access to shared resources among geographically dispersed computers in a transparent way
(c) Time sharing	(iii) Overlapping I/O and computations
(d) Distributed computing	(iv) Allows many users to share a computer simultaneously by switching processor frequently

Codes :

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(ii)	(iv)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(ii)	(iii)	(iv)	(i)

50. Which of the following statements is not true for Multi Level Feedback Queue processor scheduling algorithm ?
(1) Queues have different priorities
(2) Each queue may have different scheduling algorithm
(3) Processes are permanently assigned to a queue
(4) This algorithm can be configured to match a specific system under design

51. What is the most appropriate function of Memory Management Unit (MMU) ?
(1) It is an associative memory to store TLB
(2) It is a technique of supporting multiprogramming by creating dynamic partitions
(3) It is a chip to map virtual address to physical address
(4) It is an algorithm to allocate and deallocate main memory to a process

52. Dining Philosopher's problem is a :

(1) Producer - consumer problem (2) Classical IPC problem

(3) Starvation problem (4) Synchronization primitive

53. In _____ allocation method for disk block allocation in a file system, insertion and deletion of blocks in a file is easy.

(1) Index (2) Linked (3) Contiguous (4) Bit Map

54. A unix file may be of the type :

(1) Regular file (2) Directory file

(3) Device file (4) Any one of the above

55. Match the following :

	List - I		**List - II**
(a)	Intelligence	(i)	Contextual, tacit, transfer needs learning
(b)	Knowledge	(ii)	Scattered facts, easily transferable
(c)	Information	(iii)	Judgemental
(d)	Data	(iv)	Codifiable, endorsed with relevance and purpose

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(iv)	(i)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(i)	(iii)	(iv)	(ii)

56. Match the following knowledge representation techniques with their applications :

	List - I		**List - II**
(a)	Frames	(i)	Pictorial representation of objects, their attributes and relationships
(b)	Conceptual dependencies	(ii)	To describe real world stereotype events
(c)	Associative networks	(iii)	Record like structures for grouping closely related knowledge
(d)	Scripts	(iv)	Structures and primitives to represent sentences

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

57. In propositional logic $P \leftrightarrow Q$ is equivalent to (Where ~ denotes NOT) :

(1) $\sim (P \vee Q) \wedge \sim (Q \vee P)$ (2) $(\sim P \vee Q) \wedge (\sim Q \vee P)$

(3) $(P \vee Q) \wedge (Q \vee P)$ (4) $\sim (P \vee Q) \rightarrow \sim (Q \vee P)$

58. Which of the following statements is true for Branch - and - Bound search ?

(1) Underestimates of remaining distance may cause deviation from optimal path.
(2) Overestimates can't cause right path to be overlooked.
(3) Dynamic programming principle can be used to discard redundant partial paths.
(4) All of the above

59. Match the following with respect to heuristic search techniques :

	List - I		**List - II**
(a)	Steepest - accent Hill Climbing	(i)	Keeps track of all partial paths which can be candidate for further exploration
(b)	Branch - and - bound	(ii)	Discover problem state(s) that satisfy a set of constraints
(c)	Constraint satisfaction	(iii)	Detects difference between current state and goal state
(d)	Means - end - analysis	(iv)	Considers all moves from current state and selects best move

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iv)	(iii)	(ii)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(i)	(iv)	(ii)	(iii)
(4)	(iv)	(ii)	(i)	(iii)

60. Match the following for methods of MIS development :

	List - I		**List - II**
(a)	Joint Application Design (JAD)	(i)	Delivers functionality in rapid iteration measured in weeks and needs frequent communication, development, testing and delivery
(b)	Computer Aided Software Engg	(ii)	Reusable applications generally with one specific function. It is closely linked with idea of web services and service oriented architecture.
(c)	Agile development	(iii)	Tools to automate many tasks of SDLC
(d)	Component based technology	(iv)	A group based tool for collecting user requirements and creating system design. Mostly used in analysis and design stages of SDLC

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iii)	(i)	(iv)	(ii)

61. A context free grammar for $L = \{ w \mid n_0 (w) > n_1 (w)\}$ is given by :

(1) $S \rightarrow 0 \mid 0\,S \mid 1\,S\,S$ (2) $S \rightarrow 0\,S \mid 1\,S \mid 0\,S\,S \mid 1\,S\,S \mid 0 \mid 1$

(3) $S \rightarrow 0 \mid 0\,S \mid 1\,S\,S \mid S\,1\,S \mid S\,S\,1$ (4) $S \rightarrow 0\,S \mid 1\,S \mid 0 \mid 1$

62. Given the following two statements :

S_1 : If L_1 and L_2 are recursively enumerable languages over Σ, then $L_1 \cup L_2$ and $L_1 \cap L_2$ are also recursively enumerable.

S_2 : The set of recursively enumerable languages is countable.

Which of the following is correct ?

(1) S_1 is correct and S_2 is not correct

(2) S_1 is not correct and S_2 is correct

(3) Both S_1 and S_2 are not correct

(4) Both S_1 and S_2 are correct

63. Given the following grammars :

G_1 : $S \rightarrow AB|aaB$

$A \rightarrow aA \mid \epsilon$

$B \rightarrow bB \mid \epsilon$

G_2 : $S \rightarrow A \mid B$

$A \rightarrow a\ A\ b \mid ab$

$B \rightarrow a\ b\ B \mid \epsilon$

Which of the following is correct ?

(1) G_1 is ambiguous and G_2 is unambiguous grammars

(2) G_1 is unambiguous and G_2 is ambiguous grammars

(3) both G_1 and G_2 are ambiguous grammars

(4) both G_1 and G_2 are unambiguous grammars

64. Given the symbols A, B, C, D, E, F, G and H with the probabilities $\frac{1}{30}, \frac{1}{30}, \frac{1}{30}, \frac{2}{30}, \frac{3}{30}, \frac{5}{30}, \frac{5}{30}$, and $\frac{12}{30}$ respectively. The average Huffman code size in bits per symbol is :

(1) $\frac{67}{30}$ (2) $\frac{70}{34}$ (3) $\frac{76}{30}$ (4) $\frac{78}{30}$

65. The redundancy in images stems from :

(1) pixel decorrelation (2) pixel correlation

(3) pixel quantization (4) image size

66. In a binary Hamming Code the number of check digits is r then number of message digits is equal to :

(1) $2^r - 1$ (2) $2^r - r - 1$ (3) $2^r - r + 1$ (4) $2^r + r - 1$

67. In the Hungarian method for solving assignment problem, an optimal assignment requires that the maximum number of lines that can be drawn through squares with zero opportunity cost be equal to the number of :

(1) rows or columns (2) rows + columns

(3) rows + columns − 1 (4) rows + columns +1

68. Consider the following transportation problem :

	→ Warehouse			
↓	W_1	W_2	W_3	Supply
Factory F_1	16	20	12	200
Factory F_2	14	8	18	160
Factory F_3	26	24	16	90
Demand	180	120	150	

The initial basic feasible solution of the above transportation problem using Vogel's Approximation Method (VAM) is given below :

	→ Warehouse			
↓	W_1	W_2	W_3	Supply
Factory F_1	16 (140)	20	12 (60)	200
Factory F_2	14 (40)	8 (120)	18	160
Factory F_3	26	24	16 (90)	90
Demand	180	120	150	

The solution of the above problem :

(1) is degenerate solution (2) is optimum solution

(3) needs to improve (4) is infeasible solution

69. Given the following statements with respect to linear programming problem :

S1 : The dual of the dual linear programming problem is again the primal problem

S2 : If either the primal or the dual problem has an unbounded objective function value, the other problem has no feasible solution.

S3 : If either the primal or dual problem has a finite optimal solution, the other one also possesses the same, and the optimal value of the objective functions of the two problems are equal.

Which of the following is true ?

(1) S1 and S2 (2) S1 and S3

(3) S2 and S3 (4) S1, S2 and S3

70. Consider the two class classification task that consists of the following points :

Class C_1 : [1 1.5] [1 -1.5]

Class C_2 : [-2 2.5] [-2 -2.5]

The decision boundary between the two classes using single perceptron is given by :

(1) $x_1 + x_2 + 1.5 = 0$ (2) $x_1 + x_2 - 1.5 = 0$

(3) $x_1 + 1.5 = 0$ (4) $x_1 - 1.5 = 0$

71. Let A and B be two fuzzy integers defined as :

A = {(1, 0.3), (2, 0.6), (3, 1), (4, 0.7), (5, 0.2)}

B = {(10, 0.5), (11, 1), (12, 0.5)}

Using fuzzy arithmetic operation given by

$$\mu_{A+B}(z) = \underset{x + y = z}{\oplus} (\mu_A(x) \otimes \mu_B(y))$$

f(A+B) is _____ . $\left[\text{Note : } \begin{matrix} \oplus \equiv \max \\ \otimes \equiv \min \end{matrix}\right]$

(1) {(11, 0.8), (13, 1), (15,1)}

(2) {(11, 0.3), (12, 0.5), (13, 1), (14, 1), (15, 1), (16, 0.5), (17, 0.2)}

(3) {(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 1), (16, 0.5), (17, 0.2)}

(4) {(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 0.7), (16, 0.5), (17, 0.2)}

72. 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 :

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

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

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

(4) {(2, 0.6), (3, 0.3), (6, 0.6), (11, 0.3)}

73. Match the following for unix system calls :

	List - I		List - II
(a)	exec	(i)	Creates a new process
(b)	brk	(ii)	Invokes another program overlaying memory space with a copy of an executable file
(c)	wait	(iii)	To increase or decrease the size of data region
(d)	fork	(iv)	A process synchronizes with termination of child process

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(iv)	(iii)	(i)	(ii)

74. WOW32 is a :

(1) Win 32 API library for creating processes and threads.

(2) Special kind of file system to the NT name space.

(3) Kernel - mode objects accessible through Win 32 API

(4) Special execution environment used to run 16 bit Windows applications on 32 - bit machines.

75. The unix command :

$ vi file1 file2

(1) Edits file1 and stores the contents of file1 in file2

(2) Both files i.e. file1 and file2 can be edited using 'ex' command to travel between the files

(3) Both files can be edited using 'mv' command to move between the files

(4) Edits file1 first, saves it and then edits file2

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Space For Rough Work