PAPER-III
COMPUTER SCIENCE & APPLICATIONS

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)

Roll No._____
(In words)

J 87 16

Time : **2 ½** 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 Black Ball point pen provided by C.B.S.E.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is 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 चिह्नांकित 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 C.B.S.E. द्वारा प्रदान किये गये 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 & APPLICATIONS
PAPER – III

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

1. Which of the following is a sequential circuit ?
(1) Multiplexer (2) Decoder
(3) Counter (4) Full adder

2. 8085 microprocessor has _____ hardware interrupts.
(1) 2 (2) 3
(3) 4 (4) 5

3. Which of the following in 8085 microprocessor performs HL = HL + DE ?
(1) DAD D (2) DAD H
(3) DAD B (4) DAD SP

4. The register that stores all interrupt requests is :
(1) Interrupt mask register (2) Interrupt service register
(3) Interrupt request register (4) Status register

5. The _____ addressing mode is similar to register indirect addressing mode, except that an offset is added to the contents of the register. The offset and register are specified in the instruction.
(1) Base indexed (2) Base indexed plus displacement
(3) Indexed (4) Displacement

6. In _____ method, the word is written to the block in both the cache and main memory, in parallel.
(1) Write through (2) Write back
(3) Write protected (4) Direct mapping

7. Which of the following statements concerning Object-Oriented databases is FALSE ?
(1) Objects in an object-oriented database contain not only data but also methods for processing the data.
(2) Object-oriented databases store computational instructions in the same place as the data.
(3) Object-oriented databases are more adapt at handling structured (analytical) data than relational databases.
(4) Object-oriented databases store more types of data than relational databases and access that data faster.

8. In distributed databases, location transparency allows for database users, programmers and administrators to treat the data as if it is at one location. A SQL query with location transparency needs to specify :
(1) Inheritances (2) Fragments
(3) Locations (4) Local formats

9. Consider the relations R(A, B) and S(B, C) and the following four relational algebra queries over R and S :

I. $\Pi_{A, B}\ (R \bowtie S)$

II. $R \bowtie \Pi_B(S)$

III. $R \cap (\Pi_A(R) \times \Pi_B(S))$

IV. $\Pi_{A,R.B}\ (R \times S)$ where R·B refers to the column B in table R.

One can determine that :

(1) I, III and IV are the same query. (2) II, III and IV are the same query.

(3) I, II and IV are the same query. (4) I, II and III are the same query.

10. Which of the following statements is TRUE ?

D_1 : The decomposition of the schema R(A, B, C) into R_1(A, B) and R_2 (A, C) is always lossless.

D_2 : The decomposition of the schema R(A, B, C, D, E) having AD $\rightarrow$ B, C $\rightarrow$ DE, B $\rightarrow$ AE and AE $\rightarrow$ C, into R_1 (A, B, D) and R_2 (A, C, D, E) is lossless.

(1) Both D_1 and D_2 (2) Neither D_1 nor D_2

(3) Only D_1 (4) Only D_2

11. Consider the following ORACLE relations :

R (A, B, C) = {<1, 2, 3>, <1, 2, 0>, <1, 3, 1>, <6, 2, 3>, <1, 4, 2>, <3, 1, 4> }

S (B, C, D) = {<2, 3, 7>, <1, 4, 5>, <1, 2, 3>, <2, 3, 4>, <3, 1, 4>}.

Consider the following two SQL queries SQ_1 and SQ_2 :

SQ_1 : SELECT R·B, AVG (S·B)
FROM R, S
WHERE R·A = S·C AND S·D < 7
GROUP BY R·B;

SQ_2 : SELECT DISTINCT S·B, MIN (S·C)
FROM S
GROUP BY S·B
HAVING COUNT (DISTINCT S·D) > 1;

If M is the number of tuples returned by SQ_1 and N is the number of tuples returned by SQ_2 then

(1) M = 4, N = 2 (2) M = 5, N = 3

(3) M = 2, N = 2 (4) M = 3, N = 3

12. Semi-join strategies are techniques for query processing in distributed database system. Which of the following is a semi-join technique ?

(1) Only the joining attributes are sent from one site to another and then all of the rows are returned.

(2) All of the attributes are sent from one site to another and then only the required rows are returned.

(3) Only the joining attributes are sent from one site to another and then only the required rows are returned.

(4) All of the attributes are sent from one site to another and then only the required rows are returned.

13. Consider the Breshenham's circle generation algorithm for plotting a circle with centre (0, 0) and radius 'r' units in first quadrant. If the current point is (x_i, y_i) and decision parameter is p_i then what will be the next point (x_{i+1}, y_{i+1}) and updated decision parameter p_{i+1} for $p_i \geq 0$?

(1) $x_{i+1} = x_i + 1$
$y_{i+1} = y_i$
$p_{i+1} = p_i + 4x_i + 6$

(2) $x_{i+1} = x_i + 1$
$y_{i+1} = y_i - 1$
$p_{i+1} = p_i + 4(x_i - y_i) + 10$

(3) $x_{i+1} = x_i$
$y_{i+1} = y_i - 1$
$p_{i+1} = p_i + 4(x_i - y_i) + 6$

(4) $x_{i+1} = x_i - 1$
$y_{i+1} = y_i$
$p_{i+1} = p_i + 4x_i + 10$

14. A point P(5, 1) is rotated by 90° about a pivot point (2, 2). What is the coordinate of new transformed point P′ ?

(1) (3, 5) (2) (5, 3)
(3) (2, 4) (4) (1, 5)

15. Let R be the rectangular window against which the lines are to be clipped using 2D Sutherland-Cohen line clipping algorithm. The rectangular window has lower left-hand corner at (– 5, 1) and upper right-hand corner at (3, 7). Consider the following three lines for clipping with the given end point co-ordinates :
Line AB : A (– 6, 2) and B (–1, 8)
Line CD : C (– 1, 5) and D (4, 8)
Line EF : E (–2, 3) and F (1, 2)
Which of the following line(s) is/are candidate for clipping ?

(1) AB (2) CD
(3) EF (4) AB and CD

16. In perspective projection, if a line segment joining a point which lies in front of the viewer to a point in back of the viewer is projected to a broken line of infinite extent. This is known as _____.

(1) View confusion (2) Vanishing point
(3) Topological distortion (4) Perspective foreshortening

17. Let us consider that the original point is (x, y) and new transformed point is (x', y'). Further, Sh_x and Sh_y are shearing factors in x and y directions. If we perform the y-direction shear relative to $x = x_{ref}$ then the transformed point is given by _____.

(1) $x' = x + Sh_x \cdot (y - y_{ref})$
$y' = y$

(2) $x' = x$
$y' = y \cdot Sh_x$

(3) $x' = x$
$y' = Sh_y (x - x_{ref}) + y$

(4) $x' = Sh_y \cdot y$
$y' = y \cdot (x - x_{ref})$

18. Which of the following statement(s) is/are correct with reference to curve generation ?

I. Hermite curves are generated using the concepts of interpolation.

II. Bezier curves are generated using the concepts of approximation.

III. The Bezier curve lies entirely within the convex hull of its control points.

IV. The degree of Bezier curve does not depend on the number of control points.

(1) I, II and IV only (2) II and III only

(3) I and II only (4) I, II and III only

19. Given the following statements :

(A) To implement Abstract Data Type, a programming language require a syntactic unit to encapsulate type definition.

(B) To implement ADT, a programming language requires some primitive operations that are built in the language processor.

(C) C++, Ada, Java 5.0, C#2005 provide support for parameterised ADT.

Which one of the following options is correct ?

(1) (A), (B) and (C) are false.

(2) (A) and (B) are true; (C) is false.

(3) (A) is true; (B) and (C) are false.

(4) (A), (B) and (C) are true.

20. Match the following types of variables with the corresponding programming languages :

(a)	Static variables	(i)	Local variables in Pascal
(b)	Stack dynamic	(ii)	All variables in APL
(c)	Explicit heap dynamic	(iii)	Fortran 77
(d)	Implicit heap dynamic	(iv)	All objects in JAVA

Codes :

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

21. Which of the following is false regarding the evaluation of computer programming languages ?

(1) Application oriented features (2) Efficiency and Readability

(3) Software development (4) Hardware maintenance cost

22. The symmetric difference of two sets S_1 and S_2 is defined as

$S_1 \ominus S_2 = \{x | x \in S_1$ or $x \in S_2$, but x is not in both S_1 and $S_2\}$

The nor of two languages is defined as

nor $(L_1, L_2) = \{w | w \notin L_1$ and $w \notin L_2\}$.

Which of the following is correct ?

(1) The family of regular languages is closed under symmetric difference but not closed under nor.

(2) The family of regular languages is closed under nor but not closed under symmetric difference.

(3) The family of regular languages are closed under both symmetric difference and nor.

(4) The family of regular languages are not closed under both symmetric difference and nor.

23. The regular expression for the complement of the language $L = \{a^n b^m | n \geq 4, m \leq 3\}$ is :

(1) $(\lambda + a + aa + aaa)\, b^* + a^*\, bbbb^* + (a + b)^*\, ba(a + b)^*$

(2) $(\lambda + a + aa + aaa)\, b^* + a^*\, bbbbb^* + (a + b)^*\, ab(a + b)^*$

(3) $(\lambda + a + aa + aaa) + a^*\, bbbbb^* + (a + b)^*\, ab(a + b)^*$

(4) $(\lambda + a + aa + aaa)b^* + a^*\, bbbbb^* + (a + b)^*\, ba(a + b)^*$

24. Consider the following two languages :

$L_1 = \{0^i 1^j | \text{ gcd } (i, j) = 1\}$

L_2 is any subset of 0^*.

Which of the following is correct ?

(1) L_1 is regular and L_2^* is not regular

(2) L_1 is not regular and L_2^* is regular

(3) Both L_1 and L_2^* are regular languages

(4) Both L_1 and L_2^* are not regular languages

25. If link transmits 4000 frames per second and each slot has 8 bits, the transmission rate of circuit of this TDM is _____.

(1) 64 Kbps (2) 32 MbpS

(3) 32 Kbps (4) 64 MbpS

26. Given the following statements :

(A) Frequency Division Multiplexing is a technique that can be applied when the bandwidth of a link is greater than combined bandwidth of signals to be transmitted.

(B) Wavelength Division Multiplexing (WDM) is an analog multiplexing Technique to combine optical signals.

(C) WDM is a Digital Multiplexing Technique.

(D) TDM is a Digital Multiplexing Technique.

Which of the following is correct ?

(1) (A), (B), (C) and (D) are true.

(2) (A), (B), (C) and (D) are false.

(3) (A), (B) and (D) are false; (C) is true.

(4) (A), (B) and (D) are True; (C) is false.

27. A pure ALOHA Network transmits 200 bit frames using a shared channel with 200 Kbps bandwidth. If the system (all stations put together) produces 500 frames per second, then the throughput of the system is _____.

(1) 0.384 (2) 0.184

(3) 0.286 (4) 0.586

28. Match the following :

(a)	Line coding	(i)	A technique to change analog signal to digital data.
(b)	Block coding	(ii)	Provides synchronization without increasing number of bits.
(c)	Scrambling	(iii)	Process of converting digital data to digital signal.
(d)	Pulse code modulation	(iv)	Provides redundancy to ensure synchronization and inherits error detection.

Codes :

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

29. Assume that we need to download text documents at the rate of 100 pages per minute. A page is an average of 24 lines with 80 characters in each line and each character requires 8 bits. Then the required bit rate of the channel is _____.

(1) 1.636 Kbps (2) 1.636 Mbps

(3) 3.272 Mbps (4) 3.272 Kbps

30. Encrypt the plain text Message "EXTRANET" using Transposition cipher technique with the following key :

3	5	2	1	4	(Cipher text)
1	2	3	4	5	(Plain text)

Using 'Z' as bogus character.

(1) TAXERTZENZ (2) EXTRANETZZ

(3) EZXZTRZANZET (4) EXTZRANZETZ

31. The number of different binary trees with 6 nodes is _____.

(1) 6 (2) 42

(3) 132 (4) 256

32. Let A[1…n] be an array of n distinct numbers. If i < j and A[i] > A[j], then the pair (i, j) is called an inversion of A. What is the expected number of inversions in any permutation on n elements ?

(1) $\theta(n)$ (2) $\theta(\lg n)$

(3) $\theta(n \lg n)$ (4) $\theta(n^2)$

33. Which one of the following array represents a binary max-heap ?

(1) [26, 13, 17, 14, 11, 9, 15] (2) [26, 15, 14, 17, 11, 9, 13]

(3) [26, 15, 17, 14, 11, 9, 13] (4) [26, 15, 13, 14, 11, 9, 17]

34. Match the following :

(a)	Huffman codes	(i)	$O(n^2)$
(b)	Optimal polygon triangulation	(ii)	$\theta(n^3)$
(c)	Activity selection problem	(iii)	O(nlgn)
(d)	Quicksort	(iv)	$\theta(n)$

Codes :

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

35. Suppose that we have numbers between 1 and 1,000 in a binary search tree and want to search for the number 364. Which of the following sequences could not be the sequence of nodes examined ?

(1) 925, 221, 912, 245, 899, 259, 363, 364
(2) 3, 400, 388, 220, 267, 383, 382, 279, 364
(3) 926, 203, 912, 241, 913, 246, 364
(4) 3, 253, 402, 399, 331, 345, 398, 364

36. A triangulation of a polygon is a set of T chords that divide the polygon into disjoint triangles. Every triangulation of n-vertex convex polygon has _____ chords and divides the polygon into _____ triangles.

(1) n – 2, n – 1 (2) n – 3, n – 2
(3) n – 1, n (4) n – 2, n – 2

37. Implicit return type of a class constructor is :

(1) not of class type itself (2) class type itself
(3) a destructor of class type (4) a destructor not of class type

38. It is possible to define a class within a class termed as nested class. There are _____ types of nested classes.

(1) 2 (2) 3
(3) 4 (4) 5

39. Which of the following statements is correct ?

(1) Aggregation is a strong type of association between two classes with full ownership.
(2) Aggregation is a strong type of association between two classes with partial ownership.
(3) Aggregation is a weak type of association between two classes with partial ownership.
(4) Aggregation is a weak type of association between two classes with full ownership.

40. Which of the following statements is correct ?

(1) Every class containing abstract method must not be declared abstract.
(2) Abstract class cannot be directly initiated with ‘new’ operator.
(3) Abstract class cannot be initiated.
(4) Abstract class contains definition of implementation.

41. Which of the following statements is not correct ?

(1) HTML is not screen precise formatting language.

(2) HTML does not specify a logic.

(3) DHTML is used for developing highly interactive web pages.

(4) HTML is a programming language.

42. When one object reference variable is assigned to another object reference variable then

(1) a copy of the object is created.

(2) a copy of the reference is created.

(3) a copy of the reference is not created.

(4) it is illegal to assign one object reference variable to another object reference variable.

43. A server crashes on the average once in 30 days, that is, the Mean Time Between Failures (MTBF) is 30 days. When this happens, it takes 12 hours to reboot it, that is, the Mean Time to Repair (MTTR) is 12 hours. The availability of server with these reliability data values is approximately :

(1) 96.3% (2) 97.3%

(3) 98.3% (4) 99.3%

44. Match the software maintenance activities in List – I to its meaning in List – II.

	List – I		**List – II**
I.	Corrective	(a)	Concerned with performing activities to reduce the software complexity thereby improving program understandability and increasing software maintainability.
II.	Adaptive	(b)	Concerned with fixing errors that are observed when the software is in use.
III.	Perfective	(c)	Concerned with the change in the software that takes place to make the software adaptable to new environment (both hardware and software).
IV.	Preventive	(d)	Concerned with the change in the software that takes place to make the software adaptable to changing user requirements.

Codes :

	I	II	III	IV
(1)	(b)	(d)	(c)	(a)
(2)	(b)	(c)	(d)	(a)
(3)	(c)	(b)	(d)	(a)
(4)	(a)	(d)	(b)	(c)

45. Match each application/software design concept in List – I to its definition in List – II.

List – I		List – II	
I.	Coupling	(a)	Easy to visually inspect the design of the software and understand its purpose.
II.	Cohesion	(b)	Easy to add functionality to a software without having to redesign it.
III.	Scalable	(c)	Focus of a code upon a single goal.
IV.	Readable	(d)	Reliance of a code module upon other code modules.

Codes :

	I	II	III	IV
(1)	(b)	(a)	(d)	(c)
(2)	(c)	(d)	(a)	(b)
(3)	(d)	(c)	(b)	(a)
(4)	(d)	(a)	(c)	(b)

46. Software safety is quality assurance activity that focuses on hazards that
(1) affect the reliability of a software component.
(2) may cause an entire system to fail.
(3) may result from user input errors.
(4) prevent profitable marketing of the final product.

47. Which of the following sets represent five stages defined by Capability Maturity Model (CMM) in increasing order of maturity ?
(1) Initial, Defined, Repeatable, Managed, Optimized.
(2) Initial, Repeatable, Defined, Managed, Optimized.
(3) Initial, Defined, Managed, Repeatable, Optimized.
(4) Initial, Repeatable, Managed, Defined, Optimized.

48. The number of function points of a proposed system is calculated as 500. Suppose that the system is planned to be developed in Java and the LOC/FP ratio of Java is 50. Estimate the effort (E) required to complete the project using the effort formula of basic COCOMO given below :

$E = a(KLOC)^b$

Assume that the values of a and b are 2.5 and 1.0 respectively.
(1) 25 person months (2) 75 person months
(3) 62.5 person months (4) 72.5 person months

49. In UNIX, processes that have finished execution but have not yet had their status collected are known as _____.
(1) Sleeping processes (2) Stopped processes
(3) Zombie processes (4) Orphan processes

50. In Unix operating system, when a process creates a new process using the fork () system call, which of the following state is shared between the parent process and child process ?
(1) Heap (2) Stack
(3) Shared memory segments (4) Both Heap and Stack

51. Which of the following information about the UNIX file system is not correct ?

(1) Super block contains the number of i-nodes, the number of disk blocks, and the start of the list of free disk blocks.

(2) An i-node contains accounting information as well as enough information to locate all the disk blocks that holds the file's data.

(3) Each i-node is 256-bytes long.

(4) All the files and directories are stored in data blocks.

52. Which of the following option with reference to UNIX operating system is not correct ?

(1) INT signal is sent by the terminal driver when one types <Control-C> and it is a request to terminate the current operation.

(2) TERM is a request to terminate execution completely. The receiving process will clean up its state and exit.

(3) QUIT is similar to TERM, except that it defaults to producing a core dump if not caught.

(4) KILL is a blockable signal.

53. A multicomputer with 256 CPUs is organized as 16 × 16 grid. What is the worst case delay (in hops) that a message might have to take ?

(1) 16 (2) 15

(3) 32 (4) 30

54. Suppose that the time to do a null remote procedure call (RPC) (i.e. 0 data bytes) is 1.0 msec, with an additional 1.5 msec for every 1K of data. How long does it take to read 32 K from the file server as 32 1K RPCs ?

(1) 49 msec (2) 80 msec

(3) 48 msec (4) 100 msec

55. Let L be the language generated by regular expression 0*10* and accepted by the deterministic finite automata M. Consider the relation R_M defined by M. As all states are reachable from the start state, R_M has _____ equivalence classes.

(1) 2 (2) 4

(3) 5 (4) 6

56. Let $L = \{0^n1^n | n \geq 0\}$ be a context free language.
Which of the following is correct ?

(1) $\overline{L}$ is context free and L^k is not context free for any $k \geq 1$.

(2) $\overline{L}$ is not context free and L^k is context free for any $k \geq 1$.

(3) Both $\overline{L}$ and L^k is for any $k \geq 1$ are context free.

(4) Both $\overline{L}$ and L^k is for any $k \geq 1$ are not context free.

57. Given a Turing Machine

$M = (\{q_0, q_1, q_2, q_3\}, \{a, b\}, \{a, b, B\}, \delta, B, \{q_3\})$

Where δ is a transition function defined as

$\delta(q_0, a) = (q_1, a, R)$

$\delta(q_1, b) = (q_2, b, R)$

$\delta(q_2, a) = (q_2, a, R)$

$\delta(q_2, b) = (q_3, b, R)$

The language L(M) accepted by the Turing Machine is given as :

(1) aa*b (2) abab

(3) aba*b (4) aba*

58. Consider a discrete memoryless channel and assume that H(x) is the amount of information per symbol at the input of the channel; H(y) is the amount of information per symbol at the output of the channel; H(x|y) is the amount of uncertainty remaining on x knowing y; and I (x; y) is the information transmission.

Which of the following does not define the channel capacity of a discrete memoryless channel ?

(1) $\max_{p(x)} I(x; y)$ (2) $\max_{p(x)} [H(y) - H(y|x)]$

(3) $\max_{p(x)} [H(x) - H(x|y)]$ (4) $\max_{p(x)} H(x|y)$

59. Consider a source with symbols A, B, C, D with probabilities 1/2, 1/4, 1/8, 1/8 respectively. What is the average number of bits per symbol for the Huffman code generated from above information ?

(1) 2 bits per symbol (2) 1.75 bits per symbol

(3) 1.50 bits per symbol (4) 1.25 bits per symbol

60. Which of the following is used for the boundary representation of an image object ?

(1) Quad Tree (2) Projections

(3) Run length coding (4) Chain codes

61. The region of feasible solution of a linear programming problem has a _____ property in geometry, provided the feasible solution of the problem exists.

(1) concavity (2) convexity

(3) quadratic (4) polyhedron

62. Consider the following statements :

(a) Revised simplex method requires lesser computations than the simplex method.

(b) Revised simplex method automatically generates the inverse of the current basis matrix.

(c) Less number of entries are needed in each table of revised simplex method than usual simplex method.

Which of these statements are correct ?

(1) (a) and (b) only (2) (a) and (c) only

(3) (b) and (c) only (4) (a), (b) and (c)

63. The following transportation problem :

	A	B	C	Supply
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Demand	4	2	2	

has a solution

	A	B	C
I	1		
II	3	0	
III		2	2

The above solution of a given transportation problem is

(1) infeasible solution (2) optimum solution

(3) non-optimum solution (4) unbounded solution

64. Let R and S be two fuzzy relations defined as :

$$R = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix} \end{array}$$

and

$$S = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix} \end{array}$$

Then, the resulting relation, T, which relates elements of universe x to elements of universe z using max-min composition is given by

(1) $$T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} .5 & .7 & .5 \\ .8 & .8 & .8 \end{bmatrix} \end{array}$$

(2) $$T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} .5 & .7 & .5 \\ .9 & .6 & .5 \end{bmatrix} \end{array}$$

(3) $$T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.7 & 0.6 & 0.5 \\ 0.8 & 0.6 & 0.4 \end{bmatrix} \end{array}$$

(4) $$T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.7 & 0.6 & 0.5 \\ 0.8 & 0.8 & 0.8 \end{bmatrix} \end{array}$$

65. Compute the value of adding the following two fuzzy integers :

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

B = {(0.5, 11), (1, 12), (0.5, 13)}

Where fuzzy addition is defined as

$$\mu_{A+B}(z) = \max_{x + y = z} (\min(\mu_A(x), \mu_B(x)))$$

Then, f (A + B) is equal to

(1) {(0.5, 12), (0.6, 13), (1, 14), (0.7, 15), (0.7, 16), (1, 17), (1, 18)}

(2) {(0.5, 12), (0.6, 13), (1, 14), (1, 15), (1, 16), (1, 17), (1, 18)}

(3) {(0.3, 12), (0.5, 13), (0.5, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)}

(4) {(0.3, 12), (0.5, 13), (0.6, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)}

66. A perceptron has input weights $W_1 = -3.9$ and $W_2 = 1.1$ with threshold value T = 0.3. What output does it give for the input $x_1 = 1.3$ and $x_2 = 2.2$?

(1) – 2.65 (2) – 2.30
(3) 0 (4) 1

67. What is the function of following UNIX command ?

WC – *l* <a > b &

(1) It runs the word count program to count the number of lines in its input, a, writing the result to b, as a foreground process.
(2) It runs the word count program to count the number of lines in its input, a, writing the result to b, but does it in the background.
(3) It counts the errors during the execution of a process, a, and puts the result in process b.
(4) It copies the '*l*' numbers of lines of program from file, a, and stores in file b.

68. Which of the following statement is not correct with reference to cron daemon in UNIX O.S. ?

(1) The cron daemon is the standard tool for running commands on a pre-determined schedule.
(2) It starts when the system boots and runs as long as the system is up.
(3) Cron reads configuration files that contain list of command lines and the times at which they invoked.
(4) Crontab for individual users are not stored.

69. In Unix, files can be protected by assigning each one a 9-bit mode called rights bits. Now, consider the following two statements:

I. A mode of 641 (octal) means that the owner can read and write the file, other members of the owner's group can read it, and users can execute only.
II. A mode of 100 (octal) allows the owner to execute the file, but prohibits all other access.

Which of the following options is correct with reference to above statements ?

(1) Only I is correct. (2) Only II is correct.
(3) Both I and II are correct. (4) Both I and II are incorrect.

70. Consider the statement,

"Either $-2 \le x \le -1$ or $1 \le x \le 2$".

The negation of this statement is

(1) $x < -2$ or $2 < x$ or $-1 < x < 1$ (2) $x < -2$ or $2 < x$
(3) $-1 < x < 1$ (4) $x \le -2$ or $2 \le x$ or $-1 < x < 1$

71. Which of the following is characteristic of an MIS ?

(1) Provides guidance in identifying problems, finding and evaluating alternative solutions, and selecting or comparing alternatives.
(2) Draws on diverse yet predictable data resources to aggregate and summarize data.
(3) High volume, data capture focus.
(4) Has as its goal the efficiency of data movement and processing and interfacing different TPS.

72. How does randomized hill-climbing choose the next move each time ?

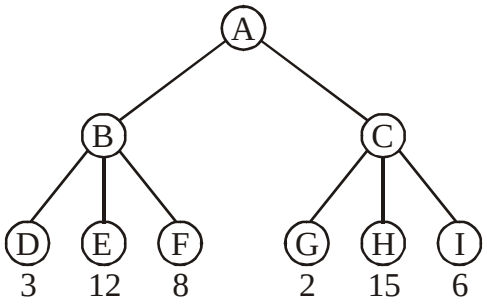
(1) It generates a random move from the moveset, and accepts this move.

(2) It generates a random move from the whole state space, and accepts this move.

(3) It generates a random move from the moveset, and accepts this move only if this move improves the evaluation function.

(4) It generates a random move from the whole state space, and accepts this move only if this move improves the evaluation function.

73. Consider the following game tree in which root is a maximizing node and children are visited left to right. What nodes will be pruned by the alpha-beta pruning ?



(1) I (2) HI

(3) CHI (4) GHI

74. Consider a 3-puzzle where, like in the usual 8-puzzle game, a tile can only move to an adjacent empty space. Given the initial state

1	2
	3

, which of the following state <u>cannot</u> be reached ?

(1)

3	1
	2

(2)

	3
2	1

(3)

1	3
	2

(4)

	2
1	3

75. A software program that infers and manipulates existing knowledge in order to generate new knowledge is known as :

(1) Data dictionary (2) Reference mechanism

(3) Inference engine (4) Control strategy

Space For Rough Work