PAPER-II
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 : **1 1/4** hours] [Maximum Marks : **100**

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

Number of Questions in this Booklet : **50**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty 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 पचास 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 अर्थात् 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 प्वाईट 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 – II

Note : This paper contains **fifty (50)** objective type questions of **two (2)** marks each. **All** questions are compulsory.

1. The Boolean function $[\sim (\sim p \wedge q) \wedge \sim (\sim p \wedge \sim q)] \vee (p \wedge r)$ is equal to the Boolean function :

(1) q (2) $p \wedge r$

(3) $p \vee q$ (4) p

2. Let us assume that you construct ordered tree to represent the compound proposition $(\sim (p \wedge q)) \leftrightarrow (\sim p \vee \sim q)$.

Then, the prefix expression and post-fix expression determined using this ordered tree are given as ____ and _____ respectively.

(1) $\leftrightarrow\sim\wedge pq\vee \sim\sim pq, pq\wedge\sim p\sim q\sim\vee\leftrightarrow$ (2) $\leftrightarrow\sim\wedge pq\vee \sim p\sim q, pq\wedge\sim p\sim q\sim\vee\leftrightarrow$

(3) $\leftrightarrow\sim\wedge pq\vee \sim\sim pq, pq\wedge\sim p\sim\sim q\vee\leftrightarrow$ (4) $\leftrightarrow\sim\wedge pq\vee \sim p\sim q, pq\wedge\sim p\sim\sim q\vee\leftrightarrow$

3. Let A and B be sets in a finite universal set U. Given the following :

$|A - B|$, $|A \oplus B|$, $|A| + |B|$ and $|A \cup B|$

Which of the following is in order of increasing size ?

(1) $|A - B| \leq |A \oplus B| \leq |A| + |B| \leq |A \cup B|$

(2) $|A \oplus B| \leq |A - B| \leq |A \cup B| \leq |A| + |B|$

(3) $|A \oplus B| \leq |A| + |B| \leq |A - B| \leq |A \cup B|$

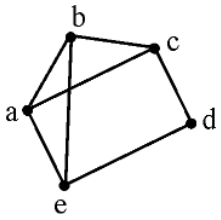
(4) $|A - B| \leq |A \oplus B| \leq |A \cup B| \leq |A| + |B|$

4. What is the probability that a randomly selected bit string of length 10 is a palindrome ?

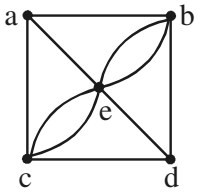
(1) $\frac{1}{64}$ (2) $\frac{1}{32}$

(3) $\frac{1}{8}$ (4) $\frac{1}{4}$

5. Given the following graphs :



(G_1)



(G_2)

Which of the following is correct ?

(1) G_1 contains Euler circuit and G_2 does not contain Euler circuit.

(2) G_1 does not contain Euler circuit and G_2 contains Euler circuit.

(3) Both G_1 and G_2 do not contain Euler circuit.

(4) Both G_1 and G_2 contain Euler circuit.

6. The octal number 326.4 is equivalent to

(1) $(214.2)_{10}$ and $(D6.8)_{16}$ (2) $(212.5)_{10}$ and $(D6.8)_{16}$

(3) $(214.5)_{10}$ and $(D6.8)_{16}$ (4) $(214.5)_{10}$ and $(D6.4)_{16}$

7. Which of the following is the most efficient to perform arithmetic operations on the numbers ?

(1) Sign-magnitude (2) 1's complement

(3) 2's complement (4) 9's complement

8. The Karnaugh map for a Boolean function is given as

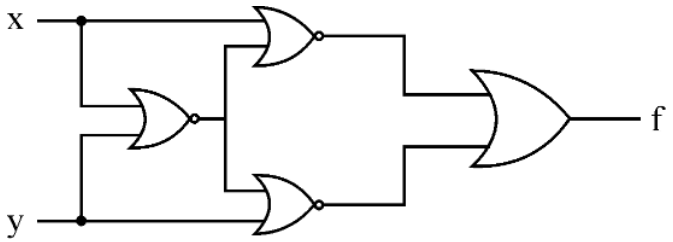
	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	0	0	0
$\bar{A}B$	0	0	1	0
AB	1	1	1	1
$A\bar{B}$	0	1	1	1

The simplified Boolean equation for the above Karnaugh Map is

(1) $AB + CD + A\bar{B} + AD$ (2) $AB + AC + AD + BCD$

(3) $AB + AD + BC + ACD$ (4) $AB + AC + BC + BCD$

9. Which of the following logic operations is performed by the following given combinational circuit ?



(1) EXCLUSIVE-OR (2) EXCLUSIVE-NOR

(3) NAND (4) NOR

10. Match the following :

List – I	**List – II**
a. Controlled Inverter	i. a circuit that can add 3 bits
b. Full adder	ii. a circuit that can add two binary numbers
c. Half adder	iii. a circuit that transmits a binary word or its 1's complement
d. Binary adder	iv. a logic circuit that adds 2 bits

Codes :

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

11. Given i= 0, j = 1, k = – 1

x = 0.5, y = 0.0

What is the output of given 'C' expression ?

x * 3 & & 3 || j | k

(1) –1 (2) 0

(3) 1 (4) 2

12. The following 'C' statement :

int * f[ ]( ) ;

declares :

(1) A function returning a pointer to an array of integers.

(2) Array of functions returning pointers to integers.

(3) A function returning an array of pointers to integers.

(4) An illegal statement.

13. If a function is friend of a class, which one of the following is wrong ?

(1) A function can only be declared a friend by a class itself.

(2) Friend functions are not members of a class, they are associated with it.

(3) Friend functions are members of a class.

(4) It can have access to all members of the class, even private ones.

14. In C++, polymorphism requires :

(1) Inheritance only

(2) Virtual functions only

(3) References only

(4) Inheritance, Virtual functions and references

15. A function template in C++ provides _____ level of generalization.

(1) 4 (2) 3

(3) 2 (4) 1

16. DBMS provides the facility of accessing data from a database through

(1) DDL (2) DML

(3) DBA (4) Schema

17. Relational database schema normalization is NOT for :

(1) reducing the number of joins required to satisfy a query.

(2) eliminating uncontrolled redundancy of data stored in the database.

(3) eliminating number of anomalies that could otherwise occur with inserts and deletes.

(4) ensuring that functional dependencies are enforced.

18. Consider the following statements regarding relational database model :

(a) NULL values can be used to opt a tuple out of enforcement of a foreign key.

(b) Suppose that table T has only one candidate key. If Q is in 3NF, then it is also in BCNF.

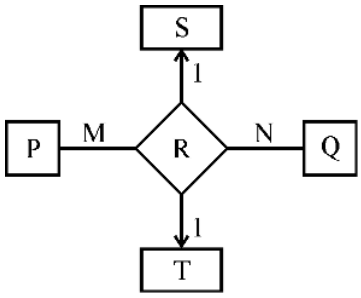
(c) The difference between the project operator (Π) in relational algebra and the SELECT keyword in SQL is that if the resulting table/set has more than one occurrences of the same tuple, then Π will return only one of them, while SQL SELECT will return all.

One can determine that :

(1) (a) and (b) are true. (2) (a) and (c) are true.

(3) (b) and (c) are true. (4) (a), (b) and (c) are true.

19. Consider the following Entity-Relationship (E-R) diagram and three possible relationship sets (I, II and III) for this E-R diagram :



I :

P	Q	S	T
p_1	q_1	s_1	t_1
p_1	q_1	s_1	t_2

II :

P	Q	S	T
p_1	q_1	s_1	t_1
p_1	q_1	s_2	t_2

III:

P	Q	S	T
p_1	q_1	s_1	t_1
p_1	q_2	s_1	t_1

If different symbols stand for different values (e.g., t_1 is definitely not equal to t_2), then which of the above could <u>not</u> be the relationship set for the E-R diagram ?

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

20. Consider a database table R with attributes A and B. Which of the following SQL queries is illegal ?

(1) SELECT A FROM R;
(2) SELECT A, COUNT(*) FROM R;
(3) SELECT A, COUNT(*) FROM R GROUP BY A;
(4) SELECT A, B, COUNT(*) FROM R GROUP BY A, B;

21. Consider an implementation of unsorted single linked list. Suppose it has its representation with a head and a tail pointer (i.e. pointers to the first and last nodes of the linked list). Given the representation, which of the following operation can not be implemented in O(1) time ?

(1) Insertion at the front of the linked list.
(2) Insertion at the end of the linked list.
(3) Deletion of the front node of the linked list.
(4) Deletion of the last node of the linked list.

22. Consider an undirected graph G where self-loops are not allowed. The vertex set of G is $\{(i, j) \mid 1 \leq i \leq 12, 1 \leq j \leq 12\}$. There is an edge between (a, b) and (c, d) if $|a - c| \leq 1$ or $|b - d| \leq 1$. The number of edges in this graph is

(1) 726 (2) 796

(3) 506 (4) 616

23. The runtime for traversing all the nodes of a binary search tree with n nodes and printing them in an order is

(1) O(lg n) (2) O(n lg n)

(3) O(n) (4) $O(n^2)$

24. Consider the following statements :

S_1 : A queue can be implemented using two stacks.

S_2 : A stack can be implemented using two queues.

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 correct.

(4) Both S_1 and S_2 are not correct.

25. Given the following prefix expression :

* + 3 + 3 ↑ 3 + 3 3 3

What is the value of the prefix expression ?

(1) 2178 (2) 2199

(3) 2205 (4) 2232

26. Which of the following statements is not true with respect to microwaves ?

(1) Electromagnetic waves with frequencies from 300 GHz to 400 THz.

(2) Propagation is line-of-sight.

(3) Very high-frequency waves cannot penetrate walls.

(4) Use of certain portions of the band requires permission from authorities.

27. In a fast Ethernet cabling, 100 Base-TX uses ____ cable and maximum segment size is _____.

(1) twisted pair, 100 metres (2) twisted pair, 200 metres

(3) fibre optics, 1000 metres (4) fibre optics, 2000 metres

28. A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network ?

(1) 1 Mbps (2) 2 Mbps

(3) 10 Mbps (4) 12 Mbps

29. Match the following :

List – I	**List – II**
a. Session layer	i. Virtual terminal software
b. Application layer	ii. Semantics of the information transmitted
c. Presentation layer	iii. Flow control
d. Transport layer	iv. Manage dialogue control

Codes :

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

30. Which of the following protocols is used by email server to maintain a central repository that can be accessed from any machine ?

(1) POP3

(2) IMAP

(3) SMTP

(4) DMSP

31. The number of strings of length 4 that are generated by the regular expression $(0^+ 1^+ | 2^+ 3^+)^*$, where | is an alternation character and {+, *} are quantification characters, is :

(1) 08 (2) 09

(3) 10 (4) 12

32. The content of the accumulator after the execution of the following 8085 assembly language program, is

MVI A, 35H

MOV B, A

STC

CMC

RAR

XRA B

(1) 00H (2) 35H

(3) EFH (4) 2FH

33. In compiler optimization, operator strength reduction uses mathematical identities to replace slow math operations with faster operations. Which of the following code replacements is an illustration of operator strength reduction ?

(1) Replace P + P by 2 * P or Replace 3 + 4 by 7.

(2) Replace P * 32 by P < < 5

(3) Replace P * 0 by 0

(4) Replace (P < <4) – P by P * 15

34. Which of the following are the principles tasks of the linker ?

I. Resolve external references among separately compiled program units.

II. Translate assembly language to machine code.

III. Relocate code and data relative to the beginning of the program.

IV. Enforce access-control restrictions on system libraries.

(1) I and II (2) I and III

(3) II and III (4) I and IV

35. Which of the following is FALSE ?

(1) The grammar $S \rightarrow aS|aSbS|\in$, where S is the only non-terminal symbol, and $\in$ is the null string, is ambiguous.

(2) An unambiguous grammar has same left most and right most derivation.

(3) An ambiguous grammar can never be LR(k) for any k.

(4) Recursive descent parser is a top-down parser.

36. Consider a system with seven processes A through G and six resources R through W.

Resource ownership is as follows :

process A holds R and wants T

process B holds nothing but wants T

process C holds nothing but wants S

process D holds U and wants S & T

process E holds T and wants V

process F holds W and wants S

process G holds V and wants U

Is the system deadlocked ? If yes, _____ processes are deadlocked.

(1) No (2) Yes, A, B, C

(3) Yes, D, E, G (4) Yes, A, B, F

37. Suppose that the virtual Address space has eight pages and physical memory with four page frames. If LRU page replacement algorithm is used, _____ number of page faults occur with the reference string.

0 2 1 3 5 4 6 3 7 4 7 3 3 5 5 3 1 1 1 7 2 3 4 1

(1) 11 (2) 12

(3) 10 (4) 9

38. Consider a system having 'm' resources of the same type. These resources are shared by three processes P_1, P_2 and P_3 which have peak demands of 2, 5 and 7 resources respectively. For what value of 'm' deadlock will not occur ?

(1) 70 (2) 14

(3) 13 (4) 7

39. Five jobs A, B, C, D and E are waiting in Ready Queue. Their expected runtimes are 9, 6, 3, 5 and x respectively. All jobs entered in Ready queue at time zero. They must run in _____ order to minimize average response time if $3 < x < 5$.

(1) B, A, D, E, C

(2) C, E, D, B, A

(3) E, D, C, B, A

(4) C, B, A, E, D

40. Consider three CPU intensive processes P1, P2, P3 which require 20, 10 and 30 units of time, arrive at times 1, 3 and 7 respectively. Suppose operating system is implementing Shortest Remaining Time first (preemptive scheduling) algorithm, then _____ context switches are required (suppose context switch at the beginning of Ready queue and at the end of Ready queue are not counted).

(1) 3

(2) 2

(3) 4

(4) 5

41. Which of the following is used to determine the specificity of requirements ?

(1) $\frac{n_1}{n_2}$

(2) $\frac{n_2}{n_1}$

(3) $n_1 + n_2$

(4) $n_1 - n_2$

Where n_1 is the number of requirements for which all reviewers have identical interpretations, n_2 is number of requirements in a specification.

42. The major shortcoming of waterfall model is

(1) the difficulty in accommodating changes after requirement analysis.

(2) the difficult in accommodating changes after feasibility analysis.

(3) the system testing.

(4) the maintenance of system.

43. The quick design of a software that is visible to end users leads to _____.

(1) iterative model

(2) prototype model

(3) spiral model

(4) waterfall model

44. For a program of k variables, boundary value analysis yields _____ test cases.

(1) $4k - 1$ (2) $4k$

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

45. The extent to which a software performs its intended functions without failures, is termed as

(1) Robustness

(2) Correctness

(3) Reliability

(4) Accuracy

46. An attacker sits between the sender and receiver and captures the information and retransmits to the receiver after some time without altering the information. This attack is called as _____.

(1) Denial of service attack

(2) Masquarade attack

(3) Simple attack

(4) Complex attack

47. _____ is subject oriented, integrated, time variant, nonvolatile collection of data in support of management decisions.

(1) Data mining

(2) Web mining

(3) Data warehouse

(4) Database Management System

48. In Data mining, classification rules are extracted from _____.

(1) Data

(2) Information

(3) Decision Tree

(4) Database

49. Discovery of cross sales opportunities is called as _____.

(1) Association

(2) Visualization

(3) Correlation

(4) Segmentation

50. In Data mining, _____ is a method of incremental conceptual clustering.

(1) STRING

(2) COBWEB

(3) CORBA

(4) OLAD

_____

Space For Rough Work