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 ¼** 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 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 – II

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

1. How many different equivalence relations with exactly three different equivalence classes are there on a set with five elements ?

(1) 10 (2) 15

(3) 25 (4) 30

2. The number of different spanning trees in complete graph, K_4 and bipartite graph, $K_{2,\ 2}$ have _____ and _____ respectively.

(1) 14, 14 (2) 16, 14

(3) 16, 4 (4) 14, 4

3. Suppose that R_1 and R_2 are reflexive relations on a set A.

Which of the following statements is correct ?

(1) $R_1 \cap R_2$ is reflexive and $R_1 \cup R_2$ is irreflexive.

(2) $R_1 \cap R_2$ is irreflexive and $R_1 \cup R_2$ is reflexive.

(3) Both $R_1 \cap R_2$ and $R_1 \cup R_2$ are reflexive.

(4) Both $R_1 \cap R_2$ and $R_1 \cup R_2$ are irreflexive.

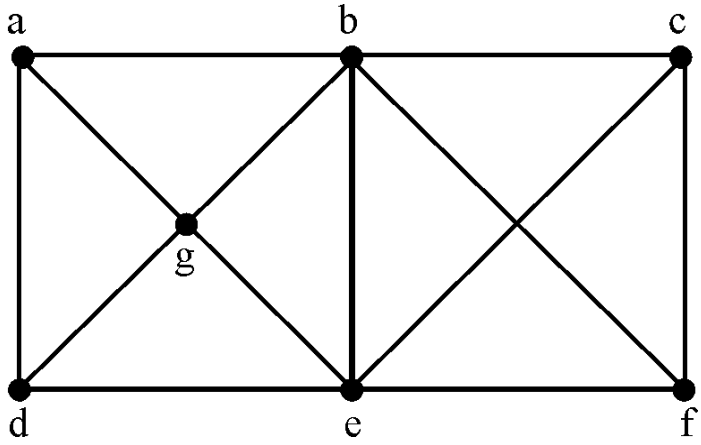
4. There are three cards in a box. Both sides of one card are black, both sides of one card are red, and the third card has one black side and one red side. We pick a card at random and observe only one side.

What is the probability that the opposite side is the same colour as the one side we observed ?

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

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

5. A clique in a simple undirected graph is a complete subgraph that is not contained in any larger complete subgraph. How many cliques are there in the graph shown below ?



(1) 2

(2) 4

(3) 5

(4) 6

6. Which of the following logic expressions is incorrect ?

(1) $1 \oplus 0 = 1$

(2) $1 \oplus 1 \oplus 1 = 1$

(3) $1 \oplus 1 \oplus 0 = 1$

(4) $1 \oplus 1 = 0$

7. The IEEE-754 double-precision format to represent floating point numbers, has a length of _____ bits.

(1) 16 (2) 32

(3) 48 (4) 64

8. Simplified Boolean equation for the following truth table is :

x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

(1) $F = y\bar{z} + \bar{y}z$

(2) $F = x\bar{y} + \bar{x}y$

(3) $F = \bar{x}z + x\bar{z}$

(4) $F = \bar{x}z + x\bar{z} + xyz$

9. The simplified form of a Boolean equation $(A\bar{B} + A\bar{B}C + AC)(\bar{A}\bar{C} + \bar{B})$ is :

(1) $A\bar{B}$ (2) $A\bar{B}C$

(3) $\bar{A}B$ (4) ABC

10. In a positive-edge-triggered JK flip-flop, if J and K both are high then the output will be _____ on the rising edge of the clock.

(1) No change (2) Set

(3) Reset (4) Toggle

11. Given i = 0, j = 1, k = –1

x = 0.5, y = 0.0

What is the output of the following expression in C language ?

$x * y < i + j \,||\, k$

(1) – 1 (2) 0

(3) 1 (4) 2

12. The following statement in 'C'

int (*f())[ ];

declares

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

(2) a function returning an array of pointers to integers.

(3) array of functions returning pointers to integers.

(4) an illegal statement.

13. Which one of the following is correct, when a class grants friend status to another class ?

(1) The member functions of the class generating friendship can access the members of the friend class.

(2) All member functions of the class granted friendship have unrestricted access to the members of the class granting the friendship.

(3) Class friendship is reciprocal to each other.

(4) There is no such concept.

14. When a method in a subclass has the same name and type signatures as a method in the superclass, then the method in the subclass _____ the method in the superclass.

(1) Overloads (2) Friendships

(3) Inherits (4) Overrides

15. What is the value returned by the function f given below when n = 100 ?

```
int f (int n)
    { if (n = = 0) then return n;
      else
      return n + f(n-2);
    }
```

(1) 2550 (2) 2556

(3) 5220 (4) 5520

16. In RDBMS, the constraint that no key attribute (column) may be NULL is referred to as :

(1) Referential integrity

(2) Multi-valued dependency

(3) Entity Integrity

(4) Functional dependency

17. Which of the following statement(s) is/are FALSE in the context of Relational DBMS ?

I. Views in a database system are important because they help with access control by allowing users to see only a particular subset of the data in the database.

II. E-R diagrams are useful to logically model concepts.

III. An update anomaly is when it is not possible to store information unless some other, unrelated information is stored as well.

IV. SQL is a procedural language.

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

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

18. In a relational database model, NULL values can be used for all but which one of the following ?

(1) To allow duplicate tuples in the table by filling the primary key column(s) with NULL.

(2) To avoid confusion with actual legitimate data values like 0 (zero) for integer columns and '' (the empty string) for string columns.

(3) To leave columns in a tuple marked as ''unknown'' when the actual value is unknown.

(4) To fill a column in a tuple when that column does not really "exist" for that particular tuple.

19. Consider the following two commands C1 and C2 on the relation R from an SQL database :

C1 : drop table R;

C2 : delete from R;

Which of the following statements is TRUE ?

I. Both C1 and C2 delete the schema for R.

II. C2 retains relation R, but deletes all tuples in R.

III. C1 deletes not only all tuples of R, but also the schema for R.

(1) I only (2) I and II only

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

20. Consider the following database table having A, B, C and D as its four attributes and four possible candidate keys (I, II, III and IV) for this table :

A	B	C	D
a_1	b_1	c_1	d_1
a_2	b_3	c_3	d_1
a_1	b_2	c_1	d_2

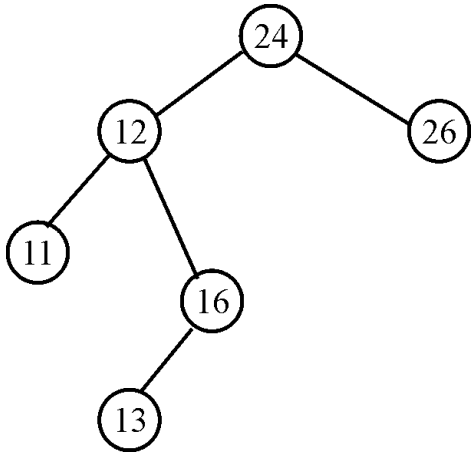
I : {B} II : {B, C} III : {A, D} IV : {C, D}

If different symbols stand for different values in the table (e.g., d_1 is definitely not equal to d_2), then which of the above could <u>not</u> be the candidate key for the database table ?

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

(3) II only (4) I only

21. Consider the following binary search tree :



If we remove the root node, which of the node from the left subtree will be the new root ?

(1) 11 (2) 12

(3) 13 (4) 16

22. Consider the following operations performed on a stack of size 5 :

Push (a); Pop() ; Push(b); Push(c); Pop();

Push(d); Pop();Pop(); Push (e)

Which of the following statements is correct ?

(1) Underflow occurs

(2) Stack operations are performed smoothly

(3) Overflow occurs

(4) None of the above

23. Suppose you are given a binary tree with n nodes, such that each node has exactly either zero or two children. The maximum height of the tree will be

(1) $\frac{n}{2} - 1$ (2) $\frac{n}{2} + 1$

(3) $(n - 1)/2$ (4) $(n + 1)/2$

24. Which of the following is not an inherent application of stack ?

(1) Implementation of recursion

(2) Evaluation of a postfix expression

(3) Job scheduling

(4) Reverse a string

25. In how many ways can the string

$A \cap B - A \cap B - A$

be fully parenthesized to yield an infix expression ?

(1) 15 (2) 14

(3) 13 (4) 12

26. A multiplexer combines four 100-Kbps channels using a time slot of 2 bits. What is the bit rate ?

(1) 100 Kbps (2) 200 Kbps

(3) 400 Kbps (4) 1000 Kbps

27. In a fully-connected mesh network with 10 computers, total _____ number of cables are required and _____ number of ports are required for each device.

(1) 40, 9 (2) 45, 10

(3) 45, 9 (4) 50, 10

28. In TCP/IP Reference model, the job of _____ layer is to permit hosts to inject packets into any network and travel them independently to the destination.

(1) Physical (2) Transport

(3) Application (4) Host-to-network

29. If there are N people in the world and are using secret key encryption/decryption for privacy purpose, then number of secret keys required will be :

(1) N (2) $(N - 1)$

(3) $\frac{N(N-1)}{2}$ (4) $\frac{N(N+1)}{2}$

30. Optical fiber uses reflection to guide light through a channel, in which angle of incidence is _____ the critical angle.

(1) equal to (2) less than

(3) greater than (4) less than or equal to

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

(1) 08 (2) 10

(3) 11 (4) 12

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

```
        MVI A, 42H
        MVI B, 05H
UGC:    ADD B
        DCR B
        JNZ UGC
        ADI 25H
        HLT
```

(1) 82 H (2) 78 H

(3) 76 H (4) 47 H

33. In _____, the bodies of the two loops are merged together to form a single loop provided that they do not make any references to each other.

(1) Loop unrolling
(2) Strength reduction
(3) Loop concatenation
(4) Loop jamming

34. Which of the following is <u>not</u> typically a benefit of dynamic linking ?

I. Reduction in overall program execution time.

II. Reduction in overall space consumption in memory.

III. Reduction in overall space consumption on disk.

IV. Reduction in the cost of software updates.

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

35. Which of the following is FALSE ?

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

(2) SLR is powerful than LALR.

(3) An LL(1) parser is a top-down parser.

(4) YACC tool is an LALR(1) parser generator.

36. Consider the reference string

0 1 2 3 0 1 4 0 1 2 3 4

If FIFO page replacement algorithm is used, then the number of page faults with three page frames and four page frames are _____ and _____ respectively.

(1) 10, 9
(2) 9, 9
(3) 10, 10
(4) 9, 10

37. Suppose there are four processes in execution with 12 instances of a Resource R in a system.

The maximum need of each process and current allocation are given below :

Process	Max. Need	Current Allocation
P_1	8	3
P_2	9	4
P_3	5	2
P_4	3	1

With reference to current allocation, is system safe ? If so, what is the safe sequence ?

(1) No

(2) Yes, $P_1P_2P_3P_4$

(3) Yes, $P_4P_3P_1P_2$

(4) Yes, $P_2P_1P_3P_4$

38. If the Disk head is located initially at track 32, find the number of disk moves required with FCFS scheduling criteria if the disk queue of I/O blocks requests are :

98, 37, 14, 124, 65, 67

(1) 320

(2) 322

(3) 321

(4) 319

39. In UNIX, _____ creates three subdirectories : 'PIS' and two subdirectories 'progs' and 'data' from just created subdirectory 'PIS'.

(1) mkdir PIS/progs PIS/data PIS

(2) mkdir PIS progs data

(3) mkdir PIS PIS/progs PIS/data

(4) mkdir PIS/progs data

40. A scheduling Algorithm assigns priority proportional to the waiting time of a process. Every process starts with priority zero (lowest priority). The scheduler reevaluates the process priority for every 'T' time units and decides next process to be scheduled. If the process have no I/O operations and all arrive at time zero, then the scheduler implements _____ criteria.

(1) Priority scheduling

(2) Round Robin Scheduling

(3) Shortest Job First

(4) FCFS

41. If S_1 is total number of modules defined in the program architecture, S_3 is the number of modules whose correct function depends on prior processing then the number of modules not dependent on prior processing is :

(1) $1 + \frac{S_3}{S_1}$ (2) $1 - \frac{S_3}{S_1}$

(3) $1 + \frac{S_1}{S_3}$ (4) $1 - \frac{S_1}{S_3}$

42. The _____ model is preferred for software development when the requirements are not clear.

(1) Rapid Application Development

(2) Rational Unified Process

(3) Evolutionary Model

(4) Waterfall Model

43. Which of the following is not included in waterfall model ?

(1) Requirement analysis (2) Risk analysis

(3) Design (4) Coding

44. The cyclomatic complexity of a flow graph V(G), in terms of predicate nodes is :

(1) P + 1 (2) P – 1

(3) P – 2 (4) P + 2

Where P is number of predicate nodes in flow graph V(G).

45. The extent to which a software tolerates the unexpected problems, is termed as :

(1) Accuracy (2) Reliability

(3) Correctness (4) Robustness

46. An attacker sits between customer and Banker, and captures the information from the customer and retransmits to the banker by altering the information. This attack is called as _____.

(1) Masquerade Attack

(2) Replay Attack

(3) Passive Attack

(4) Denial of Service Attack

47. Consider the following two statements :

(A) Business intelligence and Data warehousing is used for forecasting and Data mining.

(B) Business intelligence and Data warehousing is used for analysis of large volumes of sales data.

Which one of the following options is correct ?

(1) (A) is true, (B) is false.

(2) Both (A) and (B) are true.

(3) (A) is false, (B) is true.

(4) Both (A) and (B) are false.

48. Pipelining improves performance by :

(1) decreasing instruction latency

(2) eliminating data hazards

(3) exploiting instruction level parallelism

(4) decreasing the cache miss rate

49. Consider the following two statements :

(A) Data scrubling is a process to upgrade the quality of data, before it is moved into Data warehouse.

(B) Data scrubling is a process of rejecting data from data warehouse to create indexes.

Which one of the following options is correct ?

(1) (A) is true, (B) is false.

(2) (A) is false, (B) is true.

(3) Both (A) and (B) are false.

(4) Both (A) and (B) are true.

50. Given the following statements :

(A) Strategic value of data mining is timestamping.

(B) Information collection is an expensive process in building an expert system.

Which of the following options is correct ?

(1) Both (A) and (B) are false.

(2) Both (A) and (B) are true.

(3) (A) is true, (B) is false.

(4) (A) is false, (B) is true.

Space For Rough Work