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–8708

PAPER – II

Test Booklet No.

COMPUTER SCIENCE AND APPLICATIONS

Time : 1¼ hours] **[Maximum Marks : 100**

Number of Pages in this Booklet : **8** 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 in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.

   Example : (A) (B) ● (D)

   where (C) is the correct response.
5. Your responses to the items are to be indicated in the Answer Sheet given **inside the Paper I booklet only**. If you mark at any place other than in the ovals in the Answer 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 or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test question booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले 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 उसके कवर पेज 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 की क्रम संख्या OMR पत्रक पर अंकित करें और OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उत्तर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।

   उदाहरण : (A) (B) ● (D)

   जबकि (C) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पत्र I के अन्दर दिये गये** उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हांकित करते है, 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 उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान जिससे आपकी पहचान हो सके, किसी भी भाग पर दर्शाते या अंकित करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
9. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
10. **केवल नीले/काले बाल प्वाईंट पैन का ही इस्तेमाल करें।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
12. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

Computer Science and Applications

PAPER – II

Note : This paper contains **fifty** (50) objective-type questions, each question carrying **two** (2) marks. Attempt **all** of them.

1. Which of the following does ***not*** define a tree ?

(A) A tree is a connected acyclic graph.

(B) A tree is a connected graph with $n-1$ edges where 'n' is the number of vertices in the graph.

(C) A tree is an acyclic graph with $n-1$ edges where 'n' is the number of vertices in the graph.

(D) A tree is a graph with no cycles.

2. The complexity of Kruskal's minimum spanning tree algorithm on a graph with 'n' nodes and 'e' edges is :

(A) O (n) (B) O ($n \log n$) (C) O ($e \log n$) (D) O (e)

3. If a code is t-error correcting, the minimum Hamming distance is equal to :

(A) $2t+1$ (B) $2t$ (C) $2t-1$ (D) $t-1$

4. The set of positive integers under the operation of ordinary multiplication is :

(A) not a monoid (B) not a group

(C) a group (D) an Abelian group

5. In a set of 8 positive integers, there always exists a pair of numbers having the same remainder when divided by :

(A) 7 (B) 11 (C) 13 (D) 15

6. An example of a tautology is :

(A) x v y (B) x v $(\sim y)$

(C) x v $(\sim x)$ (D) $(x => y) \wedge (x <= y)$

7. Among the logic families RTL, TTL, ECL and CMOS, the fastest family is :

(A) ECL (B) CMOS (C) TTL (D) RTL

8. The octal equivalent of the hexadecimal number FF is :

(A) 100 (B) 150 (C) 377 (D) 737

9. The characteristic equation of a T flip flop is given by :

(A) $Q_{N+1} = TQ_N$ (B) $Q_{N+1} = T + Q_N$

(C) $Q_{N+1} = T \oplus Q_N$ (D) $Q_{N+1} = \overline{T} + Q_N$

10. The idempotent law in Boolean algebra says that :

(A) $\sim(\sim x) = x$ (B) $x + x = x$ (C) $x + xy = x$ (D) $x(x + y) = x$

11. What is the effect of the following C code ?

```
for(int i=1; i≤5; i=i+½)
printf("%d,",i);
```

(A) It prints 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, and stops

(B) It prints 1, 2, 3, 4, 5, and stops

(C) It prints 1, 2, 3, 4, 5, and repeats forever

(D) It prints 1, 1, 1, 1, 1, and repeats forever

12. Consider the following declaration in C :

```
char a[];
char *p;
```

Which of the following statement is ***not*** a valid statement ?

(A) p = a; (B) p = a + 2; (C) a = p; (D) p = &a[2];

13. Consider the following C code :

```
{int a=5, b=9;
float r;
r=b/a;}
```

What is the value of r ?

(A) 1.8 (B) 1.0 (C) 2.0 (D) 0.0

14. Function overloading is a concept in which :

(A) a function is used to implement lots of tasks at the same time.

(B) a function is called too many number of times by another function.

(C) a function provides common interface to the user to carry out possibly different functions in each call.

(D) a function is computationally too expensive for the system to handle.

15. Which of the following is ***true*** ?

(A) A "static" member of a class cannot be inherited by its derived class.

(B) A "static" member of a class can be initialized only within the class it is a member of.

(C) A "static" member of a class can be initialized before an object of that class is created.

(D) Since "static" member of a class is actually a global element, it does not require a class/object qualifier to access it independently of class/object.

16. A superkey for an entity consists of :

(A) one attribute only (B) at least two attributes

(C) at most two attributes (D) one or more attributes

17. Which of the following set of keywords constitutes a mapping in SQL ?
(A) SELECT, FROM, TABLE (B) SELECT, FROM, WHERE
(C) CONNECT, TABLE, CREATE (D) SELECT, TABLE, INSERT

18. If a relation is in 2NF then :
(A) every candidate key is a primary key
(B) every non-prime attribute is fully functionally dependent on each relation key
(C) every attribute is functionally independent
(D) every relational key is a primary key

19. Which of the following is ***true*** ?
(A) A relation in 3NF is always in BCNF
(B) A relation in BCNF is always in 3NF
(C) BCNF and 3NF are totally different
(D) A relation in BCNF is in 2NF but not in 3NF

20. Consider the query : SELECT student_name FROM student_data WHERE rollno (SELECT rollno FROM student_marks WHERE SEM1_MARK = SEM2_MARK);
Which of the following is ***true*** ?
(A) It gives the name of the student whose marks in semester 1 and semester 2 are same.
(B) It gives all the names and roll nos of those students whose marks in semester 1 and semester 2 are same.
(C) It gives the names of all the students whose marks in semester 1 and semester 2 are same.
(D) It gives roll numbers of all students whose marks in semester 1 and semester 2 are same.

21. Which of the following data structures is most efficient in terms of both space and time to reverse a string of characters ?
(A) Linked list (B) Stack (C) Array (D) Tree

22. Which of the following can be the sequence of nodes examined in a binary search tree while searching for key 98 ?
(A) 100, 50, 75, 60, 98 (B) 100, 120, 90, 95, 98
(C) 200, 70, 100, 95, 98 (D) 75, 150, 90, 80, 98

23. Which of the following is ***true*** for a sorted list with 'n' elements ?
(A) Insertion in a sorted array takes constant time.
(B) Insertion in a sorted linear linked list takes constant time.
(C) Searching for a key in a sorted array can be done in O(log n) time.
(D) Searching for a key in a sorted linear linked list can be done in O(log n) time.

24. Files that are related to input/output and are used to model serial I/O devices such as terminals, printers and networks are called :

(A) regular files (B) character special files
(C) directories (D) block special files

25. An example of a possible file attribute is :

(A) minimum size (B) permanent flag
(C) archive flag (D) EBCDIC flag

26. The ATM cells are _____ bytes long.

(A) 48 (B) 53 (C) 64 (D) 69

27. For slotted ALOHA, the maximum channel utilization is :

(A) 100% (B) 50% (C) 36% (D) 18%

28. For a channel of 3 KHz bandwidth and signal to noise ratio of 30 dB, the maximum data rate is :

(A) 3000 bps (B) 6000 bps (C) 15000 bps (D) 30000 bps

29. An example of a public key encryption algorithm is :

(A) Caesar cipher algorithm (B) DES algorithm
(C) AES algorithm (D) Knapsack algorithm

30. With reference to hierarchical routing, the optimum number of levels for an m router subnet is :

(A) m^2 (B) m (C) $ln\ m$ (D) $\sqrt{m}$

31. Assembler program is :

(A) dependent on the operating system
(B) dependent on the compiler
(C) dependent on the hardware
(D) independent of the hardware

32. In the indirect addressing scheme, the second part of an instruction contains :

(A) the operand in decimal form
(B) the address of the location where the value of the operand is stored
(C) the address of the location where the address of the operand is stored
(D) the operand in an encoded form

33. At the end of parsing,

(A) tokens are identified.
(B) set of instructions are identified.
(C) the syntactic groups are identified.
(D) machine instructions are identified.

34. Dead-code elimination in machine code optimization refers to :

(A) removal of all labels.

(B) removal of values that never get used.

(C) removal of function which are not involved.

(D) removal of a module after its use.

35. A parse tree is an annotated parse tree if :

(A) it shows attribute values at each node.

(B) there are no inherited attributes.

(C) it has synthesized nodes as terminal nodes.

(D) every non-terminal nodes is an inherited attribute.

36. An example of a non-preemptive CPU scheduling algorithm is :

(A) Shortest job first scheduling. (B) Round robin scheduling.

(C) Priority scheduling. (D) Fair share scheduling.

37. There are 'n' processes in memory. A process spends a fraction 'p' of its time waiting for I/O to complete. The CPU utilization is given by :

(A) p^n (B) $1 - p^n$ (C) $(1-p)^n$ (D) $1 - n\ p$

38. An example of a memory management system call in UNIX is :

(A) fork. (B) mmap. (C) sigaction. (D) execve.

39. With 64 bit virtual addresses, a 4KB page and 256 MB of RAM, an inverted page table requires :

(A) 8192 entries. (B) 16384 entries.

(C) 32768 entries. (D) 65536 entries.

40. A computer has 6 tape drives with 'n' processes competing for them. Each process may need two drives. For which values of 'n' is the system deadlock free ?

(A) 1 (B) 2 (C) 3 (D) 6

41. Water fall model for software development is :

(A) a top down approach. (B) a bottom up approach.

(C) a sequential approach. (D) a consequential approach.

42. In software development, value adjustment factors include the following among others :

(A) the criticality of the performance and reusability of the code.

(B) number of lines of code in the software.

(C) number of technical manpower and hardware costs.

(D) time period available and the level of user friendliness.

43. While designing the user interface, one should :
(A) use as many short cuts as possible.
(B) use as many defaults as possible.
(C) use as many visual layouts as possible.
(D) reduce the demand on short-term memory.

44. In software cost estimation, base estimation is related to :
(A) cost of similar projects already completed.
(B) cost of the base model of the present project.
(C) cost of the project with the base minimum profit.
(D) cost of the project under ideal situations.

45. In clean room software engineering :
(A) only eco-friendly hardware is used.
(B) only hired facilities are used for development.
(C) correctness of the code is verified before testing.
(D) implementation is done only after ensuring correctness.

46. Amdahl's law states that the maximum speedup S achievable by a parallel computer with 'p' processors is given by :
(A) $S \leq f + (1-f)/p$ (B) $S \leq f/p + (1-f)$
(C) $S \leq 1/[f + (1-f)/p]$ (D) $S \leq 1/[1-f+f/p]$

47. With reference to cluster analysis in data mining, a distance measure that is NOT used is :
(A) Euclidean distance. (B) Manhattan distance.
(C) Chebychev's distance. (D) Lee distance.

48. In a mobile communication system, a geographic region is divided into cells. For each frequency set, there is a buffer _____ wide where that frequency is not used.
(A) one-cell (B) two-cells (C) three-cells (D) four-cells

49. Identify the ***incorrect*** statement :
(A) The overall strategy drives the e-commerce data warehousing strategy.
(B) Data warehousing in an e-commerce environment should be done in a classical manner.
(C) E-commerce opens up an entirely new world of web servers.
(D) E-commerce security threats can be grouped into three major categories.

50. Identify the ***incorrect*** statement :
(A) The ATM adaptation layer is not service dependent.
(B) Logical connections in ATM are referred to as virtual channel connections.
(C) ATM is a streamlined protocol with minimal error and flow control capabilities.
(D) ATM is also known as cell relay.

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Space For Rough Work