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)

D–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. The channel capacity of a band-limited Gaussian channel is given by :

(A) $B \log_2 \left(2+\frac{S}{N}\right)$ (B) $B \log_2 \left(1+\frac{S}{N}\right)$

(C) $B \log_{10} \left(1+\frac{S}{N}\right)$ (D) $B \log_e \left(1+\frac{S}{N}\right)$

2. The graph $K_{3,4}$ has :

(A) 3 edges (B) 4 edges (C) 7 edges (D) 12 edges

3. The total number of spanning trees that can be drawn using five labelled vertices is :

(A) 125 (B) 64 (C) 36 (D) 16

4. Extremely low power dissipation and low cost per gate can be achieved in :

(A) MOS ICs (B) C MOS ICs (C) TTL ICs (D) ECL ICs

5. An example of a universal building block is :

(A) EX-OR gate (B) AND gate (C) OR gate (D) NOR gate

6. An example of a layer that is absent in broadcast networks is :

(A) physical layer (B) presentation layer

(C) network layer (D) application layer

7. The ATM cell is :

(A) 48 bytes long (B) 53 bytes long

(C) 64 bytes long (D) 69 bytes long

8. Four jobs J_1, J_2, J_3 and J_4 are waiting to be run. Their expected run times are 9, 6, 3 and 5 respectively. In order to minimise average response time, the jobs should be run in the order :

(A) $J_1\ J_2\ J_3\ J_4$ (B) $J_4\ J_3\ J_2\ J_1$ (C) $J_3\ J_4\ J_1\ J_2$ (D) $J_3\ J_4\ J_2\ J_1$

9. Suppose it takes 100 ns to access page table and 20 ns to access associative memory. If the average access time is 28 ns, the corresponding hit rate is :

(A) 100 percent (B) 90 percent (C) 80 percent (D) 70 percent

10. Transmission of N signals, each band limited to f_m Hz by TDM, requires a minimum band-width of :

(A) f_m (B) $2 f_m$ (C) $N f_m$ (D) $2N f_m$

11. If a code is 't' error detecting, the minimum humming distance should be equal to :

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

12. A relation R in {1, 2, 3, 4, 5, 6} is given by { (1, 2), (2, 3), (3, 4), (4, 4), (4, 5) }. This relation is :

(A) reflexive
(B) symmetric
(C) transitive
(D) not reflexive, not symmetric and not transitive

13. The dual of the switching function $x+yz$ is :

(A) $x+yz$ (B) $\bar{x}+\bar{y}\,\bar{z}$ (C) $x(y+z)$ (D) $\bar{x}(\bar{y}+\bar{z})$

14. The characteristic equation of D flip-flop is :

(A) $Q=1$ (B) $Q=0$ (C) $Q=\overline{D}$ (D) $Q=D$

15. If four 4 input multiplexers drive a 4 input multiplexer, we get a :

(A) 16 input MUX (B) 8 input MUX
(C) 4 input MUX (D) 2 input MUX

16. The throughput of slotted ALOHA is given by :

(A) $S=G$ (B) $S=Ge^{G}$ (C) $S=Ge^{-G}$ (D) $S=e^{G}$

17. Congestion control is done by :

(A) Network layer (B) Physical layer
(C) Presentation layer (D) Application layer

18. **Assertion (A)** : Twisted pairs are widely used as transmission medium.
Reasoning (R) : Twisted pairs have adequate performance and low cost.

(A) Both **(A)** and **(R)** are true and **(R)** is the correct explanation for **(A)**
(B) Both **(A)** and **(R)** are true but **(R)** is not the correct explanation
(C) **(A)** is true but **(R)** is false
(D) **(A)** is false but **(R)** is true

19. An example of a non-adaptive routing algorithm is :

(A) Shortest path routing (B) Centralised routing
(C) Baran's hot potato algorithm (D) Baran's backward learning algorithm

20. IP address in B class is given by :

(A) 125 . 123 . 123 . 2 (B) 191 . 023 . 21 . 54

(C) 192 . 128 . 32 . 56 (D) 10 . 14 . 12 . 34

21. N processes are waiting for I/O. A process spends a fraction p of its time in I/O wait state. The CPU utilisation is given by :

(A) $1 - p^{-N}$ (B) $1 - p^{N}$ (C) p^{N} (D) p^{-N}

22. If holes are half as large as processes, the fraction of memory wasted in holes is :

(A) $\frac{2}{3}$ (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) $\frac{1}{5}$

23. An example of a non - pre-emptive scheduling algorithm is :

(A) Round Robin (B) Priority Scheduling

(C) Shortest job first (D) 2 level scheduling

24. An example of a distributed OS is :

(A) Amoeba (B) UNIX

(C) MS-DOS (D) MULTICS

25. Which one of the following describes correctly a static variable ?

(A) It cannot be initialised

(B) It is initialised once at the commencement of execution and cannot be changed at run time

(C) It retains its value during the life of the program

(D) None of the above

26. The output of the program code

```
main ( )
  {
    int x = 0;
    while ( x < = 10 )
          for ( ; ; )
             if ( + + x % 10 = = 0 )
                break;
    print f("x = %d", x);
  }
```

is :

(A) $x = 1$ (B) compilation error

(C) $x = 20$ (D) none of the above

27. A copy constructor is invoked when :

(A) a function returns by value (B) an argument is passed by value

(C) a function returns by reference (D) none of the above

28. When a language has the capability to produce new data types, it is said to be :

(A) extensible (B) encapsulated

(C) overloaded (D) none of the above

29. How many constructors can a class have ?

(A) zero (B) 1

(C) 2 (D) any number

30. An entity has :

(i) a set of properties

(ii) a set of properties and values for all the properties

(iii) a set of properties and the values for some set of properties may non-uniquely identify an entity

(iv) a set of properties and the values for some set of properties may uniquely identify an entity

Which of the above are valid ?

(A) (i) only (B) (ii) only (C) (iii) only (D) (iv) only

31. Aggregation is :

(A) an abstraction through which relationships are treated as lower level entities.

(B) an abstraction through which relationships are treated as higher level entities.

(C) an abstraction through which relationships are not treated at all as entities.

(D) none of the above

32. Suppose R is a relation schema and F is a set of functional dependencies on R. Further, suppose R_1 and R_2 form a decomposition of R. Then the decomposition is a lossless join decomposition of R provided that :

(A) $R_1 \cap R_2 \rightarrow R_1$ is in F^+

(B) $R_1 \cap R_2 \rightarrow R_2$ is in F^+

(C) both $R_1 \cap R_2 \rightarrow R_1$ and $R_1 \cap R_2 \rightarrow R_2$ functional dependencies are in F^+

(D) at least one from $R_1 \cap R_2 \rightarrow R_1$ and $R_1 \cap R_2 \rightarrow R_2$ is in F^+

33. In a heap, every element is _____ of all the elements in the subtree.

(A) maximum (B) minimum (C) sum (D) product

34. If (rear == maxsize -1) rear $= 0$; else rear $=$ rear $+ 1$; is required in :

(A) circular queue (B) linear queue (C) stack (D) deque

35. A high performance switching and multiplexing technology that utilises fixed length packets to carry different types of traffic is :

(A) ATM (B) ADSL

(C) SONET (D) None of the above

36. A conventional LAN bridge specifies only the functions of OSI :

(A) layers 1 and 2 (B) layers 1 through 3

(C) all layers (D) none of the above

37. An assembly program contains :

(A) imperative and declarative statements

(B) imperative statements and assembler directives

(C) imperative and declarative statements as well as assembler directives

(D) declarative statements and assembler directives

38. In which addressing mode, the effective address of the operand is generated by adding a constant value to the contents of register ?

(A) absolute mode (B) immediate mode

(C) indirect mode (D) index mode

39. Which of the following are Assembler Directives ?

(i) EQU (ii) ORIGIN (iii) START (iv) END

(A) (ii), (iii) and (iv) (B) (i), (iii) and (iv)

(C) (iii) and (iv) (D) (i), (ii), (iii) and (iv)

40. Which of the following OS treats hardware as a file system ?

(A) UNIX (B) DOS

(C) Windows NT (D) None of the above

41. In which of the following, ready to execute processes must be present in RAM ?

(A) multiprocessing (B) multiprogramming

(C) multitasking (D) in all of the above

42. If the executing program size is greater than the existing RAM of a computer, it is still possible to execute the program if the OS supports :

(A) multitasking (B) virtual memory

(C) paging system (D) none of the above

43. Software Quality Assurance (SQA) encompasses :

(A) verification (B) validation

(C) both verification and validation (D) none of the above

44. Which level is called as "*defined*" in capability maturity model ?

(A) level 0 (B) level 3 (C) level 4 (D) level 1

45. COCOMO model is used for :

(A) product quality estimation (B) product complexity estimation

(C) product cost estimation (D) all of the above

46. Font sizes are usually expressed in points. One point is :

(A) 0.0069 inch (B) 0.0138 inch

(C) 0.0207 inch (D) 0.0276 inch

47. **Assertion (A)** : Cellular telephone systems can handle a multitude of users.

Reasoning (R) : Cellular telephone systems permit extensive frequency reuse in a small local area.

(A) Both **(A)** and **(R)** are true and **(R)** is the correct explanation for **(A)**

(B) Both **(A)** and **(R)** are true but **(R)** is not the correct explanation

(C) **(A)** is true but **(R)** is false

(D) **(A)** is false but **(R)** is true

48. E–commerce involves :

(A) Electronic Data Interchange (B) Electronic mail

(C) Electronic Bulletin Boards (D) All of the above

49. An example of a data mining algorithm which uses squared error score function is :

(A) CART algorithm (B) back propagation algorithm

(C) a priori algorithm (D) vector space algorithm

50. (I) Each object in the active directory of windows 2000 has an access control list.

(II) The scheme is a blueprint of all objects in the domain of windows 2000.

Which of the following is true ?

(A) only (I) (B) only (II)

(C) both (I) and (II) (D) none of the above

- o O o -

Space For Rough Work