PAPER-II
COMPUTER SCIENCE AND 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)

D 8 7 1 3

Time : **1 $^{1}/_{4}$** 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 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 circle 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 **OMR Sheet given inside the Paper I Booklet only.** If you mark 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 test question booklet and 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 duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
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 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 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 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 वृत्त 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 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 प्रश्न-पुस्तिका एवं 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 OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं ।
10. **केवल नीले/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 AND APPLICATIONS
Paper – II

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

1. When data and acknowledgement are sent in the same frame, this is called as

(A) Piggy packing

(B) Piggy backing

(C) Back packing

(D) Good packing

2. Encryption and Decryption is the responsibility of _____ Layer.

(A) Physical

(B) Network

(C) Application

(D) Datalink

3. An analog signal carries 4 bits in each signal unit. If 1000 signal units are sent per second, then baud rate and bit rate of the signal are _____ and _____.

(A) 4000 bauds \ sec & 1000 bps

(B) 2000 bauds \ sec & 1000 bps

(C) 1000 bauds \ sec & 500 bps

(D) 1000 bauds \ sec & 4000 bps

4. The VLF and LF bauds use _____ propagation for communication.

(A) Ground (B) Sky

(C) Line of sight (D) Space

5. Using the RSA public key crypto system, if p = 13, q = 31 and d = 7, then the value of e is

(A) 101 (B) 103

(C) 105 (D) 107

6. FAN IN of a component A is defined as

(A) Number of components that can call or pass control to component A.

(B) Number of components that are called by component A.

(C) Number of components related to component A.

(D) Number of components dependent on component A.

7. The relationship of data elements in a module is called

(A) Coupling

(B) Modularity

(C) Cohesion

(D) Granularity

8. Software Configuration Management is the discipline for systematically controlling

(A) the changes due to the evolution of work products as the project proceeds.

(B) the changes due to defects (bugs) being found and then fixed.

(C) the changes due to requirement changes

(D) all of the above

9. Which one of the following is not a step of requirement engineering ?

(A) Requirement elicitation

(B) Requirement analysis

(C) Requirement design

(D) Requirement documentation

10. Testing of software with actual data and in actual environment is called

(A) Alpha testing

(B) Beta testing

(C) Regression testing

(D) None of the above

11. The student marks should not be greater than 100. This is

(A) Integrity constraint

(B) Referential constraint

(C) Over-defined constraint

(D) Feasible constraint

12. GO BOTTOM and SKIP-3 commands are given one after another in a database file of 30 records. It shifts the control to

(A) 28^{th} record (B) 27^{th} record

(C) 3^{rd} record (D) 4^{th} record

13. An ER Model includes

I. An ER diagram portraying entity types.

II. Attributes for each entity type

III. Relationships among entity types.

IV. Semantic integrity constraints that reflects the business rules about data not captured in the ER diagram.

(A) I, II, III & IV (B) I & IV

(C) I, II & IV (D) I & III

14. Based on the cardinality ratio and participation _____ associated with a relationship type, choose either the Foreign Key Design, the Cross Referencing Design or Mutual Referencing Design.

(A) Entity (B) Constraints

(C) Rules (D) Keys

15. Data Integrity control uses _____

(A) Upper and lower limits on numeric data.

(B) Passwords to prohibit unauthorised access to files.

(C) Data dictionary to keep the data

(D) Data dictionary to find last access of data

16. What does the following declaration mean ?

```
int (*ptr) [10];
```

(A) ptr is an array of pointers of 10 integers.

(B) ptr is a pointer to an array of 10 integers.

(C) ptr is an array of 10 integers.

(D) none of the above.

17. Which of the following has compilation error in C ?

(A) int n = 32 ;

(B) char ch = 65 ;

(C) float f = (float) 3.2 ;

(D) none of the above

18. Which of the following operators can not be overloaded in C+ + ?

(A) * (B) + =

(C) = = (D) : :

19. _____ allows to create classes which are derived from other classes, so that they automatically include some of its "parent's" members, plus its own members.

(A) Overloading

(B) Inheritance

(C) Polymorphism

(D) Encapsulation

20. The correct way to round off a floating number *x* to an integer value is

(A) y = (int) (*x* + 0.5)

(B) y = int (*x* + 0.5)

(C) y = (int) *x* + 0.5

(D) y = (int) ((int)*x* + 0.5)

21. What is the value of the postfix expression ?

a b c d + – ∗ (where a = 8, b = 4, c = 2 and d = 5)

(A) $-\frac{3}{8}$ (B) $-\frac{8}{3}$

(C) 24 (D) –24

22. If the queue is implemented with a linked list, keeping track of a front pointer and a rear pointer, which of these pointers will change during an insertion into a non-empty queue ?

(A) Neither of the pointers change

(B) Only front pointer changes

(C) Only rear pointer changes

(D) Both of the pointers changes

23. _____ is often used to prove the correctness of a recursive function.

(A) Diagonalization

(B) Communitivity

(C) Mathematical Induction

(D) Matrix Multiplication

24. For any B-tree of minimum degree $t \geq 2$, every node other than the root must have atleast _____ keys and every node can have at most _____ keys.

(A) t – 1, 2t + 1

(B) t + 1, 2t + 1

(C) t – 1, 2t – 1

(D) t + 1, 2t – 1

25. Given two sorted list of size 'm' and 'n' respectively. The number of comparison needed in the worst case by the merge sort algorithm will be

(A) m × n

(B) max (m, n)

(C) min (m, n)

(D) m + n – 1

26. Given the following statements :

S_1 : SLR uses follow information to guide reductions. In case of LR and LALR parsers, the look-aheads are associated with the items and they make use of the left context available to the parser.

S_2 : LR grammar is a larger sub-class of context free grammar as compared to that SLR and LALR grammars.

Which of the following is true ?

(A) S_1 is not correct and S_2 is not correct.

(B) S_1 is not correct and S_2 is correct.

(C) S_1 is correct and S_2 is not correct.

(D) S_1 is correct and S_2 is correct.

27. The context free grammar for the language

$L = \{a^n b^m \mid n \leq m + 3, n \geq 0, m \geq 0\}$ is

(A) $S \rightarrow aaa\ A$; $A \rightarrow aAb \mid B$, $B \rightarrow Bb \mid \lambda$

(B) $S \rightarrow aaaA|\lambda$, $A \rightarrow aAb \mid B$, $B \rightarrow Bb \mid \lambda$

(C) $S \rightarrow aaaA \mid aa\ A \mid \lambda$, $A \rightarrow aAb \mid B$, $B \rightarrow Bb| \lambda$

(D) $S \rightarrow aaaA \mid aa\ A \mid aA \mid \lambda$, $A \rightarrow aAb \mid B$, $B \rightarrow Bb \mid \lambda$

28. Given the following statements :

S_1 : If L is a regular language then the language $\{uv \mid u \in L, v \in L^R\}$ is also regular.

S_2 : $L = \{ww^R\}$ is regular language.

Which of the following is true ?

(A) S_1 is not correct and S_2 is not correct.

(B) S_1 is not correct and S_2 is correct.

(C) S_1 is correct and S_2 is not correct.

(D) S_1 is correct and S_2 is correct.

29. The process of assigning load addresses to the various parts of the program and adjusting the code and data in the program to reflect the assigned addresses is called _____.

(A) Symbol resolution

(B) Parsing

(C) Assembly

(D) Relocation

30. Which of the following derivations does a top-down parser use while parsing an input string ? The input is scanned from left to right.

(A) Leftmost derivation

(B) Leftmost derivation traced out in reverse

(C) Rightmost derivation traced out in reverse

(D) Rightmost derivation

31. The dual of a Boolean expression is obtained by interchanging

(A) Boolean sums and Boolean products

(B) Boolean sums and Boolean products or interchanging 0's and 1's

(C) Boolean sums and Boolean products and interchanging 0's & 1's

(D) Interchanging 0's and 1's

32. Given that $(292)_{10} = (1204)_x$ in some number system x. The base x of that number system is

(A) 2

(B) 8

(C) 10

(D) None of the above

33. The sum of products expansion for the function

$F(x, y, z) = (x + y)\bar{z}$ is given as

(A) $\bar{x}\bar{y}z + xy\bar{z} + \bar{x}y\bar{z}$

(B) $xyz + xy\bar{z} + x\bar{y}\bar{z}$

(C) $x\bar{y}\bar{z} + \bar{x}\bar{y}\bar{z} + xy\bar{z}$

(D) $xy\bar{z} + x\bar{y}\bar{z} + \bar{x}y\bar{z}$

34. Let P(m, n) be the statement

"m divides n" where the universe of discourse for both the variables is the set of positive integers. Determine the truth values of each of the following propositions :

I. $\forall m \, \forall n \, P(m, n)$,

II. $\exists m \, \forall n \, P(m, n)$

(A) Both I and II are true

(B) Both I and II are false

(C) I – false & II – true

(D) I – true & II – false

35. Big – O estimate for

$f(x) = (x + 1) \log(x^2 + 1) + 3x^2$ is given as

(A) $O(x \log x)$

(B) $O(x^2)$

(C) $O(x^3)$

(D) $O(x^2 \log x)$

36. How many edges are there in a forest of t-trees containing a total of n vertices ?

(A) n + t

(B) n – t

(C) n * t

(D) n^t

37. Let f and g be the functions from the set of integers to the set integers defined by

$f(x) = 2x + 3$ and $g(x) = 3x + 2$

Then the composition of f and g and g and f is given as

(A) $6x + 7, 6x + 11$

(B) $6x + 11, 6x + 7$

(C) $5x + 5, 5x + 5$

(D) None of the above

38. If n and r are non-negative integers and $n \geq r$, then $p(n + 1, r)$ equals to

(A) $\frac{p(n, r)\,(n + 1)}{(n + 1 - r)}$

(B) $\frac{p(n, r)\,(n + 1)}{(n - 1 + r)}$

(C) $\frac{p(n, r)\,(n - 1)}{(n + 1 - r)}$

(D) $\frac{p(n, r)\,(n + 1)}{(n + 1 + r)}$

39. A graph is non-planar if and only if it contains a subgraph homomorphic to

(A) $K_{3,2}$ or K_5 (B) $K_{3,3}$ and K_6

(C) $K_{3,3}$ or K_5 (D) $K_{2,3}$ and K_5

40. Which of the following statements are true ?

I. A circuit that adds two bits, producing a sum bit and a carry bit is called half adder.

II. A circuit that adds two bits, producing a sum bit and a carry bit is called full adder.

III. A circuit that adds two bits and a carry bit producing a sum bit and a carry bit is called full adder.

IV. A device that accepts the value of a Boolean variable as input and produces its complement is called an inverter.

(A) I & II (B) II & III

(C) I, II, III (D) I, III & IV

41. Active X controls are Pentium binary programs that can be embedded in _____

(A) Word pages

(B) URL pages

(C) Script pages

(D) Web pages

42. Match the following :

List – I	**List – II**
a. Wireless Application Environment	i. HTTP
b. Wireless Transaction Protocol	ii. IP
c. Wireless Datagram Protocol	iii. Scripts
d. Wireless	iv. UDP

Codes :

	a	b	c	d
(A)	ii	iv	i	iii
(B)	iv	iii	ii	i
(C)	iv	iii	i	ii
(D)	iii	i	iv	ii

43. Which of the following is widely used inside the telephone system for long-haul data traffic ?

(A) ISDN

(B) ATM

(C) Frame Relay

(D) ISTN

44. The document standards for EDI were first developed by large business house during the 1970s and are now under the control of the following standard organisation :

(A) ISO

(B) ANSI

(C) ITU-T

(D) IEEE

45. Electronic Data Interchange Software consists of the following four layers :

(A) Business application, Internal format conversion, Network translator, EDI envelope

(B) Business application, Internal format conversion, EDI translator, EDI envelope

(C) Application layer, Transport layer, EDI translator, EDI envelope

(D) Application layer, Transport layer, IP layer, EDI envelope

46. Consider a preemptive priority based scheduling algorithm based on dynamically changing priority. Larger priority number implies higher priority. When the process is waiting for CPU in the ready queue (but not yet started execution), its priority changes at a rate a = 2. When it starts running, its priority changes at a rate b = 1. All the processes are assigned priority value 0 when they enter ready queue. Assume that the following processes want to execute :

Process ID	Arrival Time	Service Time
P1	0	4
P2	1	1
P3	2	2
P4	3	1

The time quantum q = 1. When two processes want to join ready queue simultaneously, the process which has not executed recently is given priority. The finish time of processes P1, P2, P3 and P4 will respectively be

(A) 4, 5, 7 and 8

(B) 8, 2, 7 and 5

(C) 2, 5, 7 and 8

(D) 8, 2, 5 and 7

47. The virtual address generated by a CPU is 32 bits. The Translation Look-aside Buffer (TLB) can hold total 64 page table entries and a 4-way set associative (i.e. with 4-cache lines in the set). The page size is 4 KB. The minimum size of TLB tag is

(A) 12 bits

(B) 15 bits

(C) 16 bits

(D) 20 bits

48. Consider a disk queue with request for input/output to block on cylinders

98, 183, 37, 122, 14, 124, 65, 67

in that order. Assume that disk head is initially positioned at cylinder 53 and moving towards cylinder number 0. The total number of head movements using Shortest Seek Time First (SSTF) and SCAN algorithms are respectively

(A) 236 and 252 cylinders

(B) 640 and 236 cylinders

(C) 235 and 640 cylinders

(D) 235 and 252 cylinders

49. How much space will be required to store the bit map of a 1.3 GB disk with 512 bytes block size ?

(A) 332.8 KB

(B) 83.6 KB

(C) 266.2 KB

(D) 256.6 KB

50. Linux operating system uses

(A) Affinity Scheduling

(B) Fair Preemptive Scheduling

(C) Hand Shaking

(D) Highest Penalty Ratio Next

Space For Rough Work