PAPER-II
COMPUTER SCIENCE

Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

| D | 8 | 7 | 1 | 4 |

OMR Sheet No. : ....

(To be filled by the Candidate)

Roll No. | | | | | | | | |

(In figures as per admission card)

Roll No._____

(In words)

Time : 1 ¹/₄ hours]   [Maximum Marks : **100**

| Number of Pages in this Booklet : **12** | 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 : Ⓐ Ⓑ ● Ⓓ
   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 original question booklet and 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 : Ⓐ Ⓑ ● Ⓓ
   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 मूल प्रश्न-पुस्तिका तथा 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 ।

D-87-14   1   P.T.O.

Paper – II

Note : This paper contains **fifty (50)** objective type questions of **two (2)** marks each. **All** questions are compulsory.
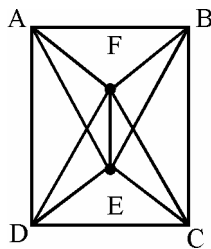
1. Consider a set A = {1, 2, 3, …….., 1000}. How many members of A shall be divisible by 3 or by 5 or by both 3 and 5 ?

   (A) 533   (B) 599

   (C) 467   (D) 66

2. A certain tree has two vertices of degree 4, one vertex of degree 3 and one vertex of degree 2. If the other vertices have degree 1, how many vertices are there in the graph ?

   (A) 5   (B) $n - 3$

   (C) 20   (D) 11

3. Consider the Graph shown below :

   This graph is a _____.

   (A) Complete Graph   (B) Bipartite Graph

   (C) Hamiltonian Graph   (D) All of the above

4. A computer program selects an integer in the set {k : $1 \leq k \leq 10,00,000$} at random and prints out the result. This process is repeated 1 million times. What is the probability that the value $k = 1$ appears in the printout atleast once ?

   (A) 0.5   (B) 0.704

   (C) 0.632121   (D) 0.68

5. If we define the functions f, g and h that map R into R by :

$f(x) = x^4$, $g(x) = \sqrt{x^2 + 1}$, $h(x) = x^2 + 72$, then the value of the composite functions ho(gof) and (hog)of are given as

(A) $x^8 - 71$ and $x^8 - 71$ (B) $x^8 - 73$ and $x^8 - 73$

(C) $x^8 + 71$ and $x^8 + 71$ (D) $x^8 + 73$ and $x^8 + 73$

6. The BCD adder to add two decimal digits needs minimum of

(A) 6 full adders and 2 half adders

(B) 5 full adders and 3 half adders

(C) 4 full adders and 3 half adders

(D) 5 full adders and 2 half adders

7. The Excess-3 decimal code is a self-complementing code because

(A) The binary sum of a code and its 9's complement is equal to 9.

(B) It is a weighted code.

(C) Complement can be generated by inverting each bit pattern.

(D) The binary sum of a code and its 10's complement is equal to 9.

8. How many PUSH and POP operations will be needed to evaluate the following expression by reverse polish notation in a stack machine $(A * B) + (C * D/E)$?

(A) 4 PUSH and 3 POP instructions   (B) 5 PUSH and 4 POP instructions

(C) 6 PUSH and 2 POP instructions   (D) 5 PUSH and 3 POP instructions

9. The range of representable normalized numbers in the floating point binary fractional representation in a 32-bit word with 1-bit sign, 8-bit excess 128 biased exponent and 23-bit mantissa is

(A) 2^{-128} to $(1 - 2^{-23}) \times 2^{127}$ (B) $(1 - 2^{-23}) \times 2^{-127}$ to 2^{128}

(C) $(1 - 2^{-23}) \times 2^{-127}$ to 2^{23} (D) 2^{-129} to $(1 - 2^{-23}) \times 2^{127}$

10. The size of the ROM required to build an 8-bit adder/subtractor with mode control, carry input, carry output and two's complement overflow output is given as

(A) $2^{16} \times 8$ (B) $2^{18} \times 10$

(C) $2^{16} \times 10$ (D) $2^{18} \times 8$

11. What will be the output of the following 'C' code ?

    main ( )

    {   int x = 128;

           printf ("\n%d", 1 + x ++);

    }

    (A) 128   (B) 129

    (C) 130   (D) 131

12. What does the following expression means ?

    char *(*(* a[N]) ( )) ( );

    (A) a pointer to a function returning array of n pointers to function returning character pointers.

    (B) a function return array of N pointers to functions returning pointers to characters

    (C) an array of n pointers to function returning pointers to characters

    (D) an array of n pointers to function returning pointers to functions returning pointers to characters.

13. Which of the following is not a member of class ?

    (A) Static function   (B) Friend function

    (C) Const function   (D) Virtual function

14. When an array is passed as parameter to a function, which of the following statements is correct ?

    (A) The function can change values in the original array.

    (B) In C, parameters are passed by value, the function cannot change the original value in the array.

    (C) It results in compilation error when the function tries to access the elements in the array.

    (D) Results in a run time error when the function tries to access the elements in the array.

15. Which of the following differentiates between overloaded functions and overridden functions ?

(A) Overloading is a dynamic or runtime binding and overridden is a static or compile time binding.

(B) Overloading is a static or compile time binding and overriding is dynamic or runtime binding.

(C) Redefining a function in a friend class is called overloading, while redefining a function in a derived class is called as overridden function.

(D) Redefining a function in a derived class is called function overloading, while redefining a function in a friend class is called function overriding.

16. Division operation is ideally suited to handle queries of the type :

(A) customers who have no account in any of the branches in Delhi.

(B) customers who have an account at all branches in Delhi.

(C) customers who have an account in atleast one branch in Delhi.

(D) customers who have only joint account in any one branch in Delhi

17. Which of the following is true ?

I. Implementation of self-join is possible in SQL with table alias.

II. Outer-join operation is basic operation in relational algebra.

III. Natural join and outer join operations are equivalent.

(A) I and II are correct.   (B) II and III are correct.

(C) Only III is correct.   (D) Only I is correct.

18. What kind of mechanism is to be taken into account for converting a weak entity set into strong entity set in entity-relationship diagram ?

(A) Generalization   (B) Aggregation

(C) Specialization   (D) Adding suitable attributes

19. The best normal form of relation scheme R(A, B, C, D) along with the set of functional dependencies F = {AB → C, AB → D, C → A, D → B} is

(A) Boyce-Codd Normal form   (B) Third Normal form

(C) Second Normal form   (D) First Normal form

20. Identify the minimal key for relational scheme R(A, B, C, D, E) with functional dependencies F = {A → B, B → C, AC → D}

(A) A   (B) AE

(C) BE   (D) CE

21. Convert the following infix expression into its equivalent post fix expression

(A + B^ D) / (E – F) + G

(A) ABD^ + EF – / G+   (B) ABD + ^EF – / G+

(C) ABD + ^EF / – G+   (D) ABD^ + EF / – G+

22. You have to sort a list L, consisting of a sorted list followed by a few 'random' elements. Which of the following sorting method would be most suitable for such a task ?

(A) Bubble sort   (B) Selection sort

(C) Quick sort   (D) Insertion sort

23. The directory can be viewed as _____ that translates filenames into their directory entries.

(A) Symbol table   (B) Partition

(C) Swap space   (D) Cache

24. Consider an array A[20, 10], assume 4 words per memory cell and the base address of array A is 100. What is the address of A[11, 5] ? Assume row major storage.

(A) 560   (B) 565

(C) 570   (D) 575

25. A full binary tree with n leaves contains

(A) n nodes   (B) $\log_2$ n nodes

(C) 2n –1 nodes   (D) 2^n nodes

26. The period of a signal is 10 ms. What is its frequency in Hertz ?

(A) 10   (B) 100

(C) 1000   (D) 10000

27. In a classful addressing, first four bits in Class A IP address is

(A) 1010   (B) 1100

(C) 1011   (D) 1110

28. Which of the following algorithms is not a broadcast routing algorithm ?

   (A) Flooding   (B) Multidestination routing

   (C) Reverse path forwarding   (D) All of the above

29. An analog signal has a bit rate of 6000 bps and a baud rate of 2000 baud. How many data elements are carried by each signal element ?

   (A) 0.336 bits/baud   (B) 3 bits/baud

   (C) 120,00,000 bits/baud   (D) None of the above

30. How many distinct stages are there in DES algorithm, which is parameterized by a 56-bit key ?

   (A) 16   (B) 17

   (C) 18   (D) 19

31. Shift-Reduce parsers perform the following :

   (A) Shift step that advances in the input stream by K(K > 1) symbols and Reduce step that applies a completed grammar rule to some recent parse trees, joining them together as one tree with a new root symbol.

   (B) Shift step that advances in the input stream by one symbol and Reduce step that applies a completed grammar rule to some recent parse trees, joining them together as one tree with a new root symbol.

   (C) Shift step that advances in the input stream by K(K = 2) symbols and Reduce step that applies a completed grammar rule to form a single tree.

   (D) Shift step that does not advance in the input stream and Reduce step that applies a completed grammar rule to form a single tree.

32. Which of the following is true ?

   (A) Canonical LR parser is LR (1) parser with single look ahead terminal

   (B) All LR(K) parsers with K > 1 can be transformed into LR(1) parsers.

   (C) Both (A) and (B)

   (D) None of the above

33. In a two-pass assembler, symbol table is

(A) Generated in first pass

(B) Generated in second pass

(C) Not generated at all

(D) Generated and used only in second pass

34. Debugger is a program that

(A) allows to examine and modify the contents of registers

(B) does not allow execution of a segment of program

(C) allows to set breakpoints, execute a segment of program and display contents of register

(D) All of the above

35. The following Context-Free Grammar (CFG) :

S → aB | bA

A → a | as | bAA

B → b | bs | aBB

will generate

(A) odd numbers of a's and odd numbers of b's

(B) even numbers of a's and even numbers of b's

(C) equal numbers of a's and b's

(D) different numbers of a's and b's

36. Consider the following justifications for commonly using the two-level CPU scheduling :

I. It is used when memory is too small to hold all the ready processes.

II. Because its performance is same as that of the FIFO.

III. Because it facilitates putting some set of processes into memory and a choice is made from that.

IV. Because it does not allow to adjust the set of in-core processes.

Which of the following is true ?

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

(C) III and IV (D) I and III

37. A specific editor has 200 K of program text, 15 K of initial stack, 50 K of initialized data, and 70 K of bootstrap code. If five editors are started simultaneously, how much physical memory is needed if shared text is used ?

(A) 1135 K   (B) 335 K

(C) 1065 K   (D) 320 K

38. Which of the following conditions does not hold good for a solution to a critical section problem ?

(A) No assumptions may be made about speeds or the number of CPUs.

(B) No two processes may be simultaneously inside their critical sections.

(C) Processes running outside its critical section may block other processes.

(D) Processes do not wait forever to enter its critical section.

39. For the implementation of a paging scheme, suppose the average process size be x bytes, the page size be y bytes, and each page entry requires z bytes. The optimum page size that minimizes the total overhead due to the page table and the internal fragmentation loss is given by

(A) $\dfrac{x}{2}$ (B) $\dfrac{xz}{2}$

(C) $\sqrt{2xz}$ (D) $\dfrac{\sqrt{xz}}{2}$

40. In a demand paging memory system, page table is held in registers. The time taken to service a page fault is 8 m.sec. if an empty frame is available or if the replaced page is not modified, and it takes 20 m.secs., if the replaced page is modified. What is the average access time to service a page fault assuming that the page to be replaced is modified 70% of the time ?

(A) 11.6 m.sec.   (B) 16.4 m.sec.

(C) 28 m.sec.   (D) 14 m.sec.

41. _____ are applied throughout the software process.

(A) Framework activities   (B) Umbrella activities

(C) Planning activities   (D) Construction activities

42. Requirement Development, Organizational Process Focus, Organizational Training, Risk Management and Integrated Supplier Management are process areas required to achieve maturity level

(A) Performed

(B) Managed

(C) Defined

(D) Optimized

43. The software _____ of a program or a computing system is the structure or structures of the system, which comprise software components, the externally visible properties of those components, and the relationships among them.

(A) Design

(B) Architecture

(C) Process

(D) Requirement

44. Which one of the following set of attributes should not be encompassed by effective software metrics ?

(A) Simple and computable

(B) Consistent and objective

(C) Consistent in the use of units and dimensions

(D) Programming language dependent

45. Which one of the following is used to compute cyclomatic complexity ?

(A) The number of regions – 1

(B) E – N + 1, where E is the number of flow graph edges and N is the number of flow graph nodes.

(C) P – 1, where P is the number of predicate nodes in the flow graph G.

(D) P + 1, where P is the number of predicate nodes in the flow graph G.

46. Consider the following statements S1 and S2 :

S1 : A hard handover is one in which the channel in the source cell is retained and used for a while in parallel with the channel in the target cell.

S2 : A soft handover is one in which the channel in the source cell is released and only then the channel in the target cell is engaged.

(A) S1 is true and S2 is not true.
(B) S1 is not true and S2 is true.
(C) Both S1 and S2 are true.
(D) Both S1 and S2 are not true.

47. Fact-less fact table in a data warehouse contains

(A) only measures
(B) only dimensions
(C) keys and measures
(D) only surrogate keys

48. Which e-business model allows consumers to name their own price for products and services ?

(A) B2 B
(B) B2 G
(C) C2 C
(D) C2 B

49. _____ model is designed to bring prices down by increasing the number of customers who buy a particular product at once.

(A) Economic Order Quantity
(B) Inventory
(C) Data Mining
(D) Demand-Sensitive Pricing

50. Match the following :

List – I		List – II
a. Call control protocol	i.	Interface between Base Transceiver Station (BTS) and Base Station Controller (BSC)
b. A-bis	ii.	Spread spectrum
c. BSMAP	iii.	Connection management
d. CDMA	iv.	Works between Mobile Switching Centre (MSC) and Base Station Subsystem (BSS)

Codes :

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

_____

QNO	ANS	QNO	ANS	QNO	ANS	QNO	ANS
1	C	26	B	51		76	
2	D	27	Z	52		77	
3	C	28	D	53		78	
4	C	29	B	54		79	
5	D	30	D	55		80	
6	D	31	B	56		81	
7	2	32	C	57		82	
8	B	33	A	58		83	
9	D	34	C	59		84	
10	B	35	Z	60		85	
11	B	36	D	61		86	
12	Z	37	B	62		87	
13	B	38	C	63		88	
14	A	39	C	64		89	
15	B	40	B	65		90	
16	B	41	B	66		91	
17	D	42	C	67		92	
18	D	43	B	68		93	
19	B	44	D	69		94	
20	A	45	D	70		95	
21	A	46	D	71		96	
22	D	47	D	72		97	
23	A	48	D	73		98	
24	A	49	D	74		99	
25	C	50	B	75		100	

Z=ALL OPTIONS ARE CORRECT/ 1=A,B/ 2=A & C OPTIONS ARE CORRECT/ 3=A & D OPTIONS ARE
CORRECT/ 4=B & C OPTIONS ARE CORRECT/ 5=B & D OPTIONS ARE CORRECT/ 6=D & C OPTIONS
ARE CORRECT/ 7=A, C & D OPTIONS ARE CORRECT/ 8=A, B & C OPTIONS ARE CORRECT