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 8715

PAPER - II
COMPUTER SCIENCE

Time : 1¼ 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 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 Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There are 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 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 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 चिन्हांकित 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 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

PAPER - II

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

1. How many strings of 5 digits have the property that the sum of their digits is 7 ?

(1) 66 (2) 330 (3) 495 (4) 99

2. Consider an experiment of tossing two fair dice, one black and one red. What is the probability that the number on the black die divides the number on red die ?

(1) $\frac{22}{36}$ (2) $\frac{12}{36}$ (3) $\frac{14}{36}$ (4) $\frac{6}{36}$

3. In how many ways can 15 indistinguishable fish be placed into 5 different ponds, so that each pond contains atleast one fish ?

(1) 1001 (2) 3876 (3) 775 (4) 200

4. Consider the following statements :

(a) Depth - first search is used to traverse a rooted tree.

(b) Pre - order, Post-order and Inorder are used to list the vertices of an ordered rooted tree.

(c) Huffman's algorithm is used to find an optimal binary tree with given weights.

(d) Topological sorting provides a labelling such that the parents have larger labels than their children.

Which of the above statements are **true** ?

(1) (a) and (b) (2) (c) and (d)

(3) (a), (b) and (c) (4) (a), (b), (c) and (d)

5. Consider a Hamiltonian Graph (G) with no loops and parallel edges. Which of the following is true with respect to this Graph (G) ?

(a) $\deg(v) \geq n/2$ for each vertex of G

(b) $|E(G)| \geq 1/2\ (n-1)\ (n-2) + 2$ edges

(c) $\deg(v) + \deg(w) \geq n$ for every v and ω not connected by an edge

(1) (a) and (b) (2) (b) and (c) (3) (a) and (c) (4) (a), (b) and (c)

6. Consider the following statements :

(a) Boolean expressions and logic networks correspond to labelled acyclic digraphs.

(b) Optimal boolean expressions may not correspond to simplest networks.

(c) Choosing essential blocks first in a Karnaugh map and then greedily choosing the largest remaining blocks to cover may not give an optimal expression.

Which of these statement(s) is/are **correct** ?

(1) (a) only (2) (b) only

(3) (a) and (b) (4) (a), (b) and (c)

7. Consider a full - adder with the following input values :

(a) $x=1$, $y=0$ and C_i(carry input) $=0$

(b) $x=0$, $y=1$ and $C_i=1$

Compute the values of S(sum) and C_o (carry output) for the above input values.

(1) $S=1$, $C_o=0$ and $S=0$, $C_o=1$ (2) $S=0$, $C_o=0$ and $S=1$, $C_o=1$

(3) $S=1$, $C_o=1$ and $S=0$, $C_o=0$ (4) $S=0$, $C_o=1$ and $S=1$, $C_o=0$

8. "If my computations are correct and I pay the electric bill, then I will run out of money. If I don't pay the electric bill, the power will be turned off. Therefore, if I don't run out of money and the power is still on, then my computations are incorrect."

Convert this argument into logical notations using the variables c, b, r, p for propositions of computations, electric bills, out of money and the power respectively. (Where $\neg$ means NOT)

(1) if $(c\wedge b)\rightarrow r$ and $\neg b\rightarrow\neg p$, then $(\neg r\wedge p)\rightarrow\neg c$

(2) if $(c\vee b)\rightarrow r$ and $\neg b\rightarrow\neg p$, then $(r\wedge p)\rightarrow c$

(3) if $(c\wedge b)\rightarrow r$ and $\neg p\rightarrow\neg b$, then $(\neg r\vee p)\rightarrow\neg c$

(4) if $(c\vee b)\rightarrow r$ and $\neg b\rightarrow\neg p$, then $(\neg r\wedge p)\rightarrow\neg c$

9. Match the following :

	List - I		**List - II**
(a)	$(p\rightarrow q)\Leftrightarrow(\neg q\rightarrow\neg p)$	(i)	Contrapositive
(b)	$[(p\wedge q)\rightarrow r]\Leftrightarrow[p\rightarrow(q\rightarrow r)]$	(ii)	Exportation law
(c)	$(p\rightarrow q)\Leftrightarrow[(p\wedge\neg q)\rightarrow o]$	(iii)	Reductio ad absurdum
(d)	$(p\leftrightarrow q)\Leftrightarrow[(p\rightarrow q)\wedge(q\rightarrow p)]$	(iv)	Equivalence

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(i)	(iv)
(3)	(iii)	(ii)	(iv)	(i)
(4)	(iv)	(ii)	(iii)	(i)

10. Consider a proposition given as :

" $x \geq 6$, if $x^2 \geq 25$ and its proof as :

If $x \geq 6$, then $x^2 = x \cdot x \geq 6 \cdot 6 = 36 \geq 25$

Which of the following is correct w.r.to the given proposition and its proof ?

(a) The proof shows the converse of what is to be proved.

(b) The proof starts by assuming what is to be shown.

(c) The proof is correct and there is nothing wrong.

(1) (a) only (2) (c) only (3) (a) and (b) (4) (b) only

11. What is the output of the following program ?

(Assume that the appropriate preprocessor directives are included and there is no syntax error)

```
main ( )
    {    char S[ ] = "ABCDEFGH";
         printf ("%C", * (& S[3]));
         printf ("%s", S + 4);
         printf ("%u", S);
    /* Base address of S is 1000 */
    }
```

(1) ABCDEFGH1000 (2) CDEFGH1000

(3) DDEFGHH1000 (4) DEFGH1000

12. Which of the following, in C++, is inherited in a derived class from base class ?

(1) constructor (2) destructor (3) data members (4) virtual methods

13. Given that $x = 7.5$, j = -1.0, n = 1.0, m = 2.0

the value of $- - x + j = = x > n > = m$ is :

(1) 0 (2) 1 (3) 2 (4) 3

14. Which of the following is **incorrect** in C++ ?

(1) When we write overloaded function we must code the function for each usage.

(2) When we write function template we code the function only once.

(3) It is difficult to debug macros

(4) Templates are more efficient than macros

15. When the inheritance is private, the private methods in base class are in the derived class (in C++).

(1) inaccessible (2) accessible (3) protected (4) public

16. An Assertion is a predicate expressing a condition we wish database to always satisfy. The correct syntax for Assertion is :

(1) CREATE ASSERTION 'ASSERTION Name' CHECK 'Predicate'

(2) CREATE ASSERTION 'ASSERTION Name'

(3) CREATE ASSERTION, CHECK Predicate

(4) SELECT ASSERTION

17. Which of the following concurrency protocol ensures both conflict serializability and freedom from deadlock ?

(a) z - phase Locking

(b) Time stamp - ordering

(1) Both (a) and (b) (2) (a) only

(3) (b) only (4) Neither (a) nor (b)

18. Drop Table cannot be used to drop a Table referenced by constraint.

(a) Primary key (b) Sub key (c) Super key (d) Foreign key

(1) (a) (2) (a), (b) and (c) (3) (d) (4) (a) and (d)

19. Database applications were built directly on top of file system to overcome the following drawbacks of using file-systems :

(a) Data redundancy and inconsistency

(b) Difficulty in accessing Data

(c) Data isolation

(d) Integrity problems

(1) (a) (2) (a) and (d)

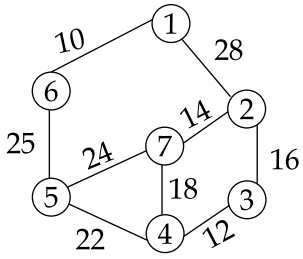
(3) (a), (b) and (c) (4) (a), (b), (c) and (d)

20. For a weak entity set to be meaningful, it must be associated with another entity set in combination with some of their attribute values, is called as :

(1) Neighbour Set (2) Strong Entity Set

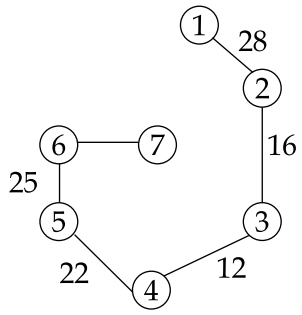
(3) Owner Entity Set (4) Weak Set

21. Consider the given graph

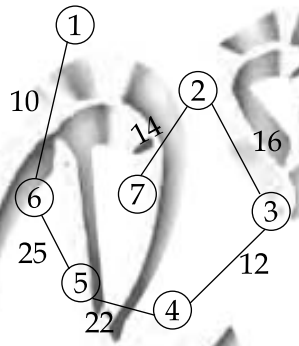


Its Minimum Cost Spanning Tree is .

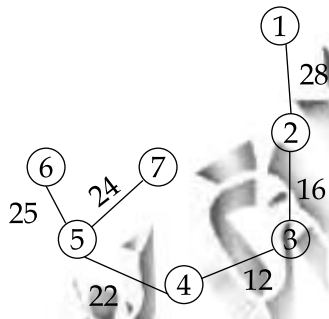
(1)



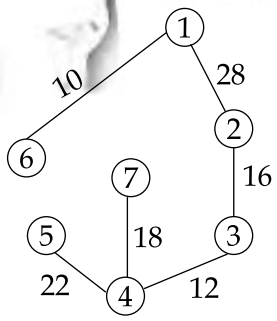
(2)



(3)



(4)



22. The inorder and preorder Traversal of binary Tree are dbeafcg and abdecfg respectively. The post-order Traversal is .

(1) dbefacg (2) debfagc (3) dbefcga (4) debfgca

23. Level order Traversal of a rooted Tree can be done by starting from root and performing :

(1) Breadth First Search (2) Depth First Search

(3) Root Search (4) Deep Search

24. The average case occurs in the Linear Search Algorithm when :

(1) The item to be searched is in some where middle of the Array

(2) The item to be searched is not in the array

(3) The item to be searched is in the last of the array

(4) The item to be searched is either in the last or not in the array

25. To determine the efficiency of an algorithm the time factor is measured by :

(1) Counting micro seconds (2) Counting number of key operations

(3) Counting number of statements (4) Counting kilobytes of algorithm

26. Which of the following protocols is an application layer protocol that establishes, manages and terminates multimedia sessions ?

(1) Session Maintenance Protocol

(2) Real - time Streaming Protocol

(3) Real - time Transport Control Protocol

(4) Session Initiation Protocol

27. Match the following port numbers with their uses :

	List - I		**List - II**
(a)	23	(i)	World wide web
(b)	25	(ii)	Remote Login
(c)	80	(iii)	USENET news
(d)	119	(iv)	E - mail

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(ii)	(iv)	(iii)	(i)
(4)	(ii)	(iv)	(i)	(iii)

28. Which of the following is not associated with the session layer ?

(1) Dialog control

(2) Token management

(3) Semantics of the information transmitted

(4) Synchronization

29. What is the size of the 'total length' field in IPv 4 datagram ?

(1) 4 bits (2) 8 bits (3) 16 bits (4) 32 bits

30. Which of the following is/are restriction(s) in classless addressing ?

(1) The number of addresses needs to be a power of 2.

(2) The mask needs to be included in the address to define the block.

(3) The starting address must be divisible by the number of addresses in the block.

(4) All of the above

31. Match the following :

(a)	Forward Reference Table	(i)	Assembler directive
(b)	Mnemonic Table	(ii)	Uses array data structure
(c)	Segment Register Table	(iii)	Contains machine OP code
(d)	EQU	(iv)	Uses linked list data structure

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(iv)	(i)	(iii)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

32. The translator which performs macro calls expansion is called :

(1) Macro processor (2) Micro pre - processor

(3) Macro pre - processor (4) Dynamic Linker

33. If all the production rules have single non - terminal symbol on the left side, the grammar defined is :

(1) context free grammar (2) context sensitive grammar

(3) unrestricted grammar (4) phrase grammar

34. Which one from the following is **false** ?

(1) LALR parser is Bottom - Up parser

(2) A parsing algorithm which performs a left to right scanning and a right most deviation is RL (1).

(3) LR parser is Bottom - Up parser.

(4) In LL(1), the 1 indicates that there is a one - symbol look - ahead.

35. Which phase of compiler generates stream of atoms ?

(1) Syntax Analysis (2) Lexical Analysis

(3) Code Generation (4) Code Optimization

36. A disk drive has 100 cyclinders, numbered 0 to 99. Disk requests come to the disk driver for cyclinders 12, 26, 24, 4, 42, 8 and 50 in that order. The driver is currently serving a request at cyclinder 24. A seek takes 6 msec per cyclinder moved. How much seek time is needed for shortest seek time first (SSTF) algorithm ?

(1) 0.984 sec (2) 0.396 sec (3) 0.738 sec (4) 0.42 sec

37. Let P_i and P_j be two processes, R be the set of variables read from memory, and W be the set of variables written to memory. For the concurrent execution of two processes P_i and P_j which of the following conditions is **not true** ?

(1) $R(P_i) \cap W(P_j) = \Phi$ (2) $W(P_i) \cap R(P_j) = \Phi$

(3) $R(P_i) \cap R(P_j) = \Phi$ (4) $W(P_i) \cap W(P_j) = \Phi$

38. A LRU page replacement is used with four page frames and eight pages. How many page faults will occur with the reference string 0172327103 if the four frames are initially empty ?

(1) 6 (2) 7 (3) 5 (4) 8

39. What does the following command do ?

grep −vn "abc" *x*

(1) It will print all of the lines in the file *x* that match the search string "abc".

(2) It will print all of the lines in file *x* that do not match the search string "abc".

(3) It will print the total number of lines in the file *x* that match the string "abc".

(4) It will print the specific line numbers of the file *x* in which there is a match for string "abc".

40. The Unix Kernel maintains two key data structures related to processes, the process table and the user structure. Which of the following information is not the part of user structure ?

(1) File descriptor table (2) System call state

(3) Scheduling parameters (4) Kernel stack

41. Match the following :

(a)	Size-oriented metrics	(i)	uses number of external interfaces as one of the measurement parameter.
(b)	Function-oriented metrics	(ii)	originally designed to be applied to business information systems.
(c)	Extended Function Point metrics	(iii)	derived by normalizing quality and/or productivity measures by considering the size of the software.
(d)	Function point	(iv)	uses algorithm characteristics as one of the measurement parameter.

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(iv)	(ii)	(iii)	(i)
(4)	(iii)	(i)	(iv)	(ii)

42. In which testing strategy requirements established during requirements analysis are validated against developed software ?

(1) Validation testing (2) Integration testing

(3) Regression testing (4) System testing

43. Which process model is also called as classic life cycle model ?

(1) Waterfall model (2) RAD model

(3) Prototyping model (4) Incremental model

44. Cohesion is an extension of :

(1) Abstraction concept (2) Refinment concept

(3) Information hiding concept (4) Modularity

45. Which one from the following is highly associated activity of project planning ?

(1) Keep track of the project progress.

(2) Compare actual and planned progress and costs.

(3) Identify the activities, milestones and deliverables produced by a project.

(4) Both (2) and (3).

46. In the case of parallelization, Amdahl's law states that if P is the proportion of a program that can be made parallel and (1 − P) is the proportion that cannot be parallelized, then the maximum speed-up that can be achieved by using N processors is :

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

47. Which of the following statements is **incorrect** for Parallel Virtual Machine (PVM) ?

(1) The PVM communication model provides asynchronous blocking send, asynchronous blocking receive, and non-blocking receive function.

(2) Message buffers are allocated dynamically.

(3) The PVM communication model assumes that any task can send a message to any other PVM task and that there is no limit to the size or number of such messages.

(4) In PVM model, the message order is not preserved.

48. Which of the following algorithms sort n integers, having the range 0 to (n^2-1), in ascending order in O(n) time ?

(1) Selection sort (2) Bubble sort (3) Radix sort (4) Insertion sort

49. Which of the following statements is **FALSE** about weak entity set ?

(1) Weak entities can be deleted automatically when their strong entity is deleted.

(2) Weak entity set avoids the data duplication and consequent possible inconsistencies caused by duplicating the key of the strong entity.

(3) A weak entity set has no primary keys unless attributes of the strong entity set on which it depends are included.

(4) Tuples in a weak entity set are not partitioned according to their relationship with tuples in a strong entity set.

50. Which of the following is **not** valid with reference to Message Passing Interface (MPI) ?

(1) MPI can run on any hardware platform.

(2) The programming model is a distributed memory model.

(3) All parallelism is implicit.

(4) MPI - Comm - Size returns the total number of MPI processes in specified communication.

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Space For Rough Work