COMPUTER SCIENCE AND APPLICATIONS

Name & Signature of the Invigilator

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PAPER-II
COT-14/19

ICR Answer Sheet No. : | | | | | |

Roll No. : | | | | | |

Roll Number in words : .....

.....

Time : 1.15 Hours] **No. of Printed Pages : 24** **[Maximum Marks : 100**

Instructions for the Candidates

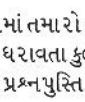
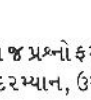
1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **fifty (50)** multiple choice type questions. **All** questions are compulsory.
3. At the commencement of examination, the question booklet will be given to candidate. In the first 5 minutes, candidate is 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 five 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 ICR answer sheet and the ICR Answer Sheet number should be entered on this test booklet.
4. Each item has upto four alternative responses marked (A), (B), (C) and (D). The answer should be a capital letter for the selected option. The answer letter should entirely be contained within the corresponding square.

   Correct method  Wrong method  OR 

5. Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under Paper II only.
6. Read instructions given inside carefully.
7. Rough work is to be done in the end of the booklet only.
8. You have to return the original ICR Answer 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 ICR sheet and test booklet on conclusion of the examination.
9. Use black ball point pen.
10. Use of any Calculators or log tables or any other electronic devices is prohibited.
11. There shall be no negative marking.
12. In case of any discrepancy in Gujarati and English version of questions the English version should be taken as final.

પરીક્ષાર્થીઓ માટે સૂચનાઓ :

1. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલનંબર લખો.
2. આ પ્રશ્નપત્રમાં બહુવૈકલ્પિક ઉત્તરો ધરાવતા કુલ **પચાસ (૫૦)** પ્રશ્નો આપેલા છે. **બધા જ** પ્રશ્નો ફરજિયાત છે.
3. પરીક્ષાની શરૂઆતમાં ઉમેદવારને પ્રશ્નપુસ્તિકા આપવામાં આવશે. પ્રથમ ૫ મિનિટ દરમ્યાન, ઉમેદવારે પ્રશ્નપુસ્તિકા ખોલી અને ફરજિયાતપણે નીચે મુજબ પરીક્ષણ કરવું.
   (*i*) પ્રશ્નપુસ્તિકાનો વપરાશ કરવા માટે આ કવર પેજની ધાર પર આપેલ સીલ ફાડી નાખો. કોઈપણ સંજોગોમાં સીલ સ્ટીકર વગરની કે ખુલ્લી પ્રશ્નપુસ્તિકા સ્વીકારશો નહીં.
   (*ii*) કવર પૃષ્ઠ પર છપાયેલ નિર્દેશાનુસાર પ્રશ્નપુસ્તિકાના પ્રશ્નો પૃષ્ઠો અને સંખ્યાને બરાબર ચકાસી લો. ખામીયુક્ત પ્રશ્નપુસ્તિકા કે જેમાં પૃષ્ઠો/પ્રશ્નો ઓછા હોય, બે વાર છપાયા હોય, અનુક્રમમાં અથવા કોઈ અન્ય ફરક હોય અર્થાત કોઈપણ કારણે ખામીયુક્ત પ્રશ્નપુસ્તિકા સ્વીકારવી નહીં. એને જો ખામીયુક્ત પ્રશ્નપુસ્તિકા મળી હોય તો નિરીક્ષક પાસેથી તુરંત જ બીજી સારી પ્રશ્નપુસ્તિકા મેળવી લેવી. આ માટે ઉમેદવારને પાંચ મિનિટનો સમયગાળો આપવામાં આવશે. પછીથી, પ્રશ્નપુસ્તિકા બદલવામાં આવશે નહીં કે કોઈ વધારાનો સમય પણ આપવામાં આવશે નહીં.
   (*iii*) આ ચકાસણી સમાપ્ત થાયપછી, ટેસ્ટ પુસ્તિકા નંબર ICR જવાબ પત્રકમાં લખવો અને ICR જવાબ પત્રક નંબર પ્રશ્નપુસ્તિકા પર લખવો.
4. પ્રત્યેક પ્રશ્ન માટે ચાર ઉત્તર વિકલ્પ (A), (B), (C) અને (D) આપવામાં આવેલ છે. પસંદગીનો જવાબ માત્ર અંગ્રેજી કેપીટલ મૂળાક્ષર દ્વારા જ આપવો. પસંદ કરેલ અંગ્રેજી કેપીટલ અક્ષર આપેલ ખાનામાં સંપૂર્ણ રીતે સમાઈ જાય તે રીતે લખવો.

   સાચી રીત :  ખોટી રીત :  અથવા 

5. આ પ્રશ્નપુસ્તિકાના પ્રશ્નોના જવાબ અલગથી આપવામાં આવેલ ICR જવાબ પત્રકમાં પેપર–૨ લખેલ વિભાગમાં જ લખવા.
6. અંદર આપેલ સૂચનાઓ ધ્યાનપૂર્વક વાંચો.
7. આ પ્રશ્નપુસ્તિકાની અંતે આપેલ પાનું રફ કામ માટે છે.
8. પરીક્ષા સમય પૂરો થઈ ગયા પછી ઓરીજીનલ ICR જવાબ પત્રક જે તે નિરીક્ષકને ફરજીયાત સોંપી દેવું અને કોઈપણ સંજોગોમાં પરીક્ષાખંડની બહાર જઈ શકશે નહીં. પરીક્ષા પૂર્ણ થયા બાદ ઉમેદવાર પ્રશ્નપુસ્તિકા તથા ICR જવાબવહીની ડુપ્લિકેટ કોપી પોતાની સાથે લઈ જઈ શકે છે.
9. માત્ર કાળી પેન/કાળી બોલ પેન વાપરવી.
10. કેલ્કયુલેટર અને અન્ય ઈલેકટ્રોનિક યંત્રોનો ઉપયોગ કરવાની મનાઈ છે.
11. ખોટા જવાબ માટે નેગેટિવ ગુણાંકન પ્રથા નથી.
12. પ્રશ્નપુસ્તિકાના કોઈ પ્રશ્નમાં અનુવાદ અંગે કોઈ વિવાદ/મતભેદ જણાય તો અંગ્રેજી વર્ઝન યોગ્ય ગણાશે.

COMPUTER SCIENCE AND APPLICATIONS

PAPER - II

Note : This paper contains **FIFTY (50)** multiple-choice, matching questions, each question carrying **TWO (2)** marks. Attempt **All** the questions.

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1. A partial order relation is :

   (A) Reflexive, Symmetric, Transitive

   (B) Irreflexive, Symmetric, Transitive

   (C) Reflexive, Antisymmetric, Transitive

   (D) Reflexive, Asymmetric, Transitive

2. Which of the following statements is *True* for functions $X \xrightarrow{f} Y \xrightarrow{g} Z$?

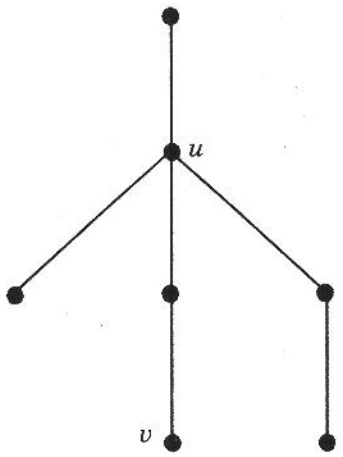
   (A) If f is injective and g is injective, the composition f o g must be surjective

   (B) If f is surjective and g is injective, the composition f o g cannot be injective

   (C) If f is injective and g is surjective, the composition f o g must be injective

   (D) If f is surjective and g is surjective, the composition f o g cannot be surjective

3. What is the eccentricity of u and v in the graph given below ?



(A) 4, 1

(B) 1, 1

(C) 3, 0

(D) 2, 4

4. Which of the following is *not* an example of an undecidable problem ?

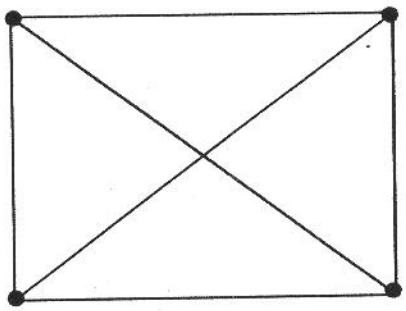
(A) Travelling Salesman Problem

(B) Halting Problem

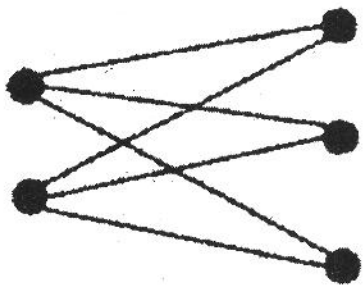
(C) Post's Correspondence Problem

(D) Busy Beaver Problem

5. Which of the following is valid about the graphs G1 and G2 given below ?



G1



G2

(A) G1 is planar, G2 is planar

(B) G1 is non-planar, G2 is planar

(C) G1 is planar, G2 is non-planar

(D) G1 is non-planar, G2 is non-planar

6. With propositional variables P and Q, which of the following is a sufficient condition for the assertion $P \Rightarrow (Q \wedge R)$ to be true :

(A) P is true

(B) P is false

(C) Q is true

(D) R is false

7. Which of the following is the *correct* expression of the assertion "Not all trigonometric functions are continuous" ? Assume that the universe is the set of all functions and predicate $T(x)$ stands for "x is a trigonometric function" and $C(x)$ stands for "x is a continuous function."

(A) $\forall x\,[\neg T(x) \Rightarrow C(x)]$

(B) $\exists x\,[T(x) \wedge \neg C(x)]$

(C) $\forall x\,[C(x) \wedge \neg T(x)]$

(D) $\exists x\,[\neg T(x) \vee C(x)]$

8. Which is the principal rule of inference used in the following argument :

All men are mortal. Socrates is a man. Therefore Socrates is mortal.

(A) Universal generalization

(B) Existential generalization

(C) Universal instantiation

(D) Existential instantiation

9. Which of the following octal numbers can be expressed as a hexadecimal number containing only digits 0 and 1 ?

(A) 241

(B) 412

(C) 124

(D) 421

10. How many literals are eliminated due to the occurrence of an octet in the Karnaugh map of a Boolean function ?

(A) 2

(B) 3

(C) 4

(D) 8

11. In C/C++ an array of pointers is same as :

(A) Pointer to array

(B) Pointer to pointer

(C) Pointer to function

(D) Pointer to structure

12. Given the statement, maruti.engine.bolts = 25; which of the following is *true* ?

(A) Structure bolts is nested within structure engine

(B) Structure engine is nested within structure maruti

(C) Structure maruti is nested within structure engine

(D) Structure maruti is nested within structure bolts

13. In C++, dynamic memory allocation is accomplished with the operator :

(A) new

(B) this

(C) malloc()

(D) delete

14. Which of the following operations cannot be performed on pointers in C/C ++ ?

(A) Addition of two pointers

(B) Subtraction of a number from a pointer

(C) Subtraction of one pointer from another

(D) Addition of a number to a pointer

15. In C++ a constructor can have the following return type :

(A) int.

(B) string.

(C) void.

(D) A constructor cannot have a return type

16. What is the output of the following program ?

```
class B
{
public :
    B( )      {cout<<"ConstructB"<<endl;}
    virtual  ~B( )
    {cout<<"DestructB"<<endl;}
};
class D : public B
{
public :
    D( )      {cout<<"ConstructD"<<endl;}
    virtual~D( )
    {cout<<"DestructD"<<endl;}
};
int main (int argc, char ** argv)
{
    D   b;
    return 0;
}
```

(A) Construct B, Destruct B, Construct D, Destruct D

(B) Construct D, Construct B, Destruct B, Destruct D

(C) Construct D, Construct B, Destruct D, Destruct B

(D) Construct B, Construct D, Destruct D, Destruct B

17. A table has seven attributes, which are given below along with dependencies :

PROJ_NUM, EMP_NUM → PROJ_NAME, EMP_NAME, JOB_CLASS, CHG_HOUR, HOURS

PROJ_NUM → PROJ_NAME

EMP_NUM → EMP_NAME, JOB_CLASS, CHG_HOUR

If this table is to be normalized, select which of the following options is valid ?

(A) Two tables will be required in case normalization is done in 2NF, because there are two keys

(B) Two tables will be required in case normalization is done in 1NF, because there are two keys

(C) Three tables will be required in case normalization is done in 2NF, because there are two keys but dependencies are three

(D) Three tables will be required in case normalization is done in 1NF, because there are two keys but dependencies are three

18. Which one of the following statements is *False* ?

(A) Partial dependency can exist only when a table's primary key is composed of more than one attributes

(B) If a table is in 2NF and it contains transitive dependencies, it will be in 3NF

(C) If a primary key of a table consists of only one attribute and the table is in 1NF, then it is automatically in 2NF

(D) A table in 1NF can contain both partial and transitive dependencies.

19. Which one of the following statements related to DBMS is *True* ?

(A) SELECT statement using BETWEEN operator considers the interval between lower range and higher range as closed interval

(B) A view is a virtual table which does not get updated dynamically

(C) Index is useful in SQL performance optimization when the data sparsity on the indexed column is high

(D) If you use a SEQUENCE in Oracle to assign values to a table attribute, the values assigned based on a sequence cannot be edited or updated

20. Which one of the following statements is *True* in the context of Data Definition and Manipulation Languages used in DBMS ?

(A) It is possible to create new table(s) by copying the contents of selected columns of a given table

(B) When you create a new table based on another table, the new table does include integrity rules from the old table

(C) The UNION set operator combines the output of two (or more) queries and produces a new relation which may include duplicate rows from both queries

(D) The redundant relationships between related entities do not remain consistent across the model

21. If the address of A[1][1] and A[2][1] are 1000 and 1010 respectively and each element occupies 2 bytes, then the array has been stored in.....order.

(A) row major

(B) column major

(C) matrix major

(D) none of the above

22. The concatenation of two lists is to be performed in $O(1)$ time. Which of the following implementations of a list should be used ?

(A) Singly linked list

(B) Doubly linked list

(C) Circular doubly linked list

(D) Array implementation of list

23. There is a tree where the left subtree contains 1000 nodes, and the right subtree contains 100 nodes. For preorder, inorder, and postorder traversals, how many nodes are processed before the root ?

(A) 1, 1000, 1099

(B) 0, 1000, 1100

(C) 0, 1100, 1000

(D) 1, 1099, 1000

24. A data structure is required for storing a set of integers such that each of the following operations can be done in $O(\log n)$ time, where n is the number of elements in the set :

(I) Deletion of the smallest element

(II) Insertion of an element if it is not already present

Which of the following data structures can be used for this purpose ?

(A) A max heap can be used but not an AVL tree

(B) An AVL tree can be used but not a max heap

(C) Both AVL tree and max heap can be used

(D) Neither AVL tree nor max heap can be used

25. Consider a B-Tree of order 5 created from the following keys in the order they come : c s a m r e z b t d f h g. How many keys are present in the root node of the B-Tree ?

(A) 1 (B) 2

(C) 3 (D) 4

26. Which of the following is *false* about the max Heap data structure ?

(A) An inorder traversal of the Heap results in a sorted list of elements

(B) Insertion of a new element takes $O(\log n)$ time

(C) Extracting the maximum element takes $O(\log n)$ time

(D) Deletion of the maximum element takes $O(\log n)$ time

27. How many pairs of wires are present in a CAT6 UTP (Unshielded Twisted Pair) cable ?

(A) 2 (B) 4

(C) 8 (D) 6

28. Which type of UTP cable is used to directly connect the RJ-45 ports on two hosts ?

(A) Cross-over

(B) Roll-over

(C) Straight-Through

(D) Take-Over

29. What is the main purpose of communicating with the loop back address 127.0.0.1 from a host in the network ?

(A) Testing the bandwidth of links

(B) Testing connectivity with other hosts

(C) Testing the networking module of the sending host

(D) Communicating with gateway of network

30. Which is the OSI Layer at which a Router performs its routing functions ?

(A) Application Layer

(B) Network Layer

(C) Datalink Layer

(D) Physical Layer

31. Which layer of OSI reference model is associated with initiating simplex, half-duplex or full-duplex mode communication sessions between two hosts ?

(A) Data link

(B) Transport

(C) Network

(D) Session

32. An assembler that runs on one machine but produces machine code for another machine is called :

(A) Cross assembler

(B) Emulator

(C) Cross compiler

(D) Simulator

33. Once grammatical structure is known, an analysis phase which determines the meaning of the statement is known as :

(A) Syntax analysis

(B) Semantic analysis

(C) Lexical analysis

(D) Both (A) and (C)

34. Which loader is executed when the computer system is started or re-started ?

(A) Boot loader

(B) Bootstrap loader

(C) Compiler and Go loader

(D) Both (B) and (C)

35. The function of Pass 2 in two pass assembler is to :

(A) Build the symbol table

(B) Synthesize the target program

(C) Build intermediate code

(D) Determine operator precedence

36. Which one *does not* belong to Synthesis phase ?

(A) Obtain machine code corresponding to the mnemonic.

(B) Obtain address of a memory operand from the symbol table

(C) Perform LC processing

(D) Synthesize a machine form of a constant

37. The degree of multi-programming is :

(A) the number of processes executed per unit time.

(B) the number of processes in the ready queue.

(C) the number of processes in the I/O queue.

(D) the number of processes in memory.

38. The dining philosophers problem will occur in case of :

(A) 5 philosophers and 5 chopsticks

(B) 4 philosophers and 5 chopsticks

(C) 3 philosophers and 5 chopsticks

(D) 6 philosophers and 5 chopsticks

39. What will happen if a non-recursive mutex is locked more than once ?

(A) Starvation

(B) Deadlock

(C) Aging

(D) Signaling

40. Which of the following scheduling algorithms gives minimum average waiting time ?

(A) FCFS

(B) SJF

(C) Round-robin

(D) Priority

41. Assume there are four processes —P1, P2, P3 and P4 —with burst time of 6, 8, 7 and 3 milliseconds respectively. If processes are being scheduled with SJF algorithm, then which process has waiting time of 0 milliseconds ?

(A) P1

(B) P2

(C) P3

(D) P4

42. A good design has :

(A) High cohesion and coupling

(B) Low cohesion and coupling

(C) High cohesion and low coupling

(D) Low cohesion and high coupling

43. Which one is the worst type of coupling in Software Engineering ?

(A) Data

(B) Content

(C) Stamp

(D) Control

44. Collaboration diagrams of UML usually have two components. They are :

(A) Objects and messages

(B) Objects and methods

(C) Messages and classes

(D) Methods and classes

45. Which of the following models uses the Waterfall model in an iterative manner ?

(A) RAD

(B) Spiral

(C) Incremental

(D) Prototyping

46. Which model is usually used to develop a system in a small life cycle of 60 to 90 days ?

(A) RAD

(B) Spiral

(C) Incremental

(D) JAD

47. Which one of the following statements is *true* for mobile computing ?

(A) GPRS is a popular protocol of mobile networks

(B) Adjacent cells in a cellular network have the same frequency as per FDMA standard

(C) CDMA system uses distinctive spreading codes to spread the symbols before transmission

(D) IMT-2000 is a 3G wireless communication standard defined by the recommendations of ITU. It specifies that the minimum data transfer rate for 3G is 512 kbps

48. Which one of the following options is *False* in the context of secure electronic transactions (SET) ?

(A) SET ensures integrity for all transmitted data

(B) SET provides authentication that a buyer is a legitimate user of a branded bank card account

(C) SET facilitates and encourages inter-operability across software and network providers

(D) SET ensures non-repudiation of origin, receipt, and delivery

49. Given the following sequence database :

Transaction Id : Sequence of items bought

(1) <(33) (99)>

(2) <(11 22) (33) (44 66 77)>

(3) <(33) (44 77) (99)>

(4) <(33 55 77)>

(5) <(99)>

Which of the following satisfies a minimum support of 25%, and are maximal ?

(A) <(33) (44) (77)>

(B) <(33) (44) (77) (99)>

(C) <(33) (44)>, <(33) (77)>

(D) <(33) (99) >, <(33) (44 77)>

50. Which of the following statements is *false* ?

(A) PageRank is used for ranking webpages by importance

(B) PageRank is based on in-links

(C) The total PageRank in the network is a constant

(D) The PageRank algorithm will always converge.

ROUGH WORK

SEAL