COMPUTER SCIENCE AND APPLICATIONS

Name & Signature of the Invigilator

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PAPER-II
AUG–17/19

OMR Answer Sheet No. : | | | | | |

Roll No. : | | | | | |

(in figures as in Hall Ticket)

Roll Number in words : .....

.....

Time : 1¼ Hours] **No. of Printed Pages : 20** **[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 of questions. **All** questions are compulsory.
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 Answer Sheet and the OMR Answer 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) ● (C) (D) where (B) is the correct response.
5. Your responses to the items are to be indicated on the OMR Answer Sheet under Paper – II only. If you mark your response at any place other than in the oval in the OMR 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, Roll Number, Phone Number or put any mark on any part of the OMR Answer 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 Answer Sheet to the invigilator 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 Answer 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 shall be no negative marking.
13. In case of any discrepancy in the English and Gujarati versions of questions, English version will be taken as final.

પરીક્ષાર્થીઓ માટે સૂચનાઓ :

1. આ પાનાની ટોચ પર દર્શાવેલી જગ્યામાં તમારો રોલ નંબર લખો.
2. આ પ્રશ્નપત્રમાં બહુવૈકલ્પિક **ઉત્તરો** ધરાવતા **પચાસ (૫૦) પ્રશ્નો** આપેલા છે. **બધાજ** પ્રશ્નો ફરજિયાત છે.
3. પરીક્ષાની શરૂઆતમાં આપને **પ્રશ્નપુસ્તિકા** આપવામાં આવશે. પ્રથમ પાંચ (૫) મિનિટ દરમ્યાન તમારે પ્રશ્નપુસ્તિકા ખોલી અને ફરજિયાતપણે નીચે મુજબ પરીક્ષણ કરવું :
   (*i*) પ્રશ્નપુસ્તિકાનો વપરાશ કરવા માટે આ કવર પૃષ્ઠની ધાર પર આપેલ સીલ સ્ટીકર 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 પ્રશ્નો/પૃષ્ઠો ઓછા હોય, બે વાર છપાયા હોય, અનુક્રમમાં અથવા અન્ય કોઈ ફરક હોય અર્થાત કોઈપણ સંજોગોમાં ખામીયુક્ત પ્રશ્નપુસ્તિકા સ્વીકારશો નહીં. અને જો ખામીયુક્ત પ્રશ્નપુસ્તિકા મળી હોય તો નિરીક્ષક પાસેથી તુરંત જ **બીજી** સારી પ્રશ્નપુસ્તિકા મેળવી લેવી. આ માટે ઉમેદવારને પાંચ (૫) મિનિટનો સમયગાળો આપવામાં આવશે. પછી થી, પ્રશ્નપુસ્તિકા બદલવામાં આવશે **નહીં** કે કોઈ વધારાનો સમયગાળો આપવામાં આવશે નહીં.
   (*iii*) આ ચકાસણી સમાપ્ત થાય પછી, પ્રશ્નપુસ્તિકાનો નંબર OMR જવાબ પત્રક પર લખવો અને OMR જવાબ પત્રકનો નંબર પ્રશ્નપુસ્તિકા પર લખવો.
4. પ્રત્યેક પ્રશ્ન માટે ચાર જવાબ વિકલ્પ (A), (B), (C) અને (D) આપવામાં ઓવલ છે. તમારે સાચા જવાબના ઓવલ (oval) ને નીચે આપેલ ઉદાહરણ મુજબ પેનથી ભરીને સંપૂર્ણ કાળું કરવાનું રહેશે.

   ઉદાહરણ : (A) ● (C) (D) કે જ્યાં (B) સાચો જવાબ છે.
5. આ પ્રશ્નપુસ્તિકાના પ્રશ્નો ના જવાબ અલગથી આપવામાં આવેલ OMR જવાબ પત્રકમાં પેપર–II લખેલ વિભાગમાં જ અંકિત કરવા. જો આપ OMR જવાબ પત્રકમાં આપેલ ઓવલ (oval) સિવાય અન્ય સ્થાને જવાબ અંકિત કરશો તો તે જવાબનું મૂલ્યાંકન કરવામાં આવશે નહીં
6. અંદર આપેલ સૂચનાઓ ધ્યાનપૂર્વક વાંચો.
7. કાચું કામ (Rough Work) પ્રશ્નપુસ્તિકાના અન્તિમ પૃષ્ઠ પર કરવું.
8. જો આપ OMR જવાબ પત્રક નિયત જગ્યા સિવાય અન્ય કોઈપણ સ્થાને, **આપનું** નામ, રોલ નંબર, ફોન નંબર અથવા એવું કોઈ ચિન્હકે જેનાથી તમારી ઓળખ થઈ શકે, અંકિત કરશો અથવા અભદ્ર ભાષાનો પ્રયોગ કરો, અથવા અન્ય કોઈ અનુચિત સાધનોનો ઉપયોગ કરો, જેમ કે અંકિત કરી દીધેલ જવાબ ભૂંસી નાખવો કે સફેદ શાહીનો ઉપયોગ કરી બદલશો તો આપને પરીક્ષા માટે અયોગ્ય જાહેર થઈ શકો છો.
9. પરીક્ષા સમય પૂરો થઈ ગયા બાદ ઓરીજીનલ OMR જવાબ પત્રક જે તે નિરીક્ષકને ફરજીયાત સોંપી દેવું અને કોઈ પણ સંજોગોમાં તે પરીક્ષાખંડની બહાર લઈ જવું નહીં. પરીક્ષા પૂર્ણ થયા બાદ ઉમેદવાર ઓરીજીનલ **પ્રશ્નપુસ્તિકા** અને **OMR** જવાબ પત્રકની ડુપ્લિકેટ કોપી પોતાની સાથે લઈ જઈ શકે છે.
10. માત્ર કાળી/ભૂરી બોલ પોઈન્ટ પેન વાપરવી.
11. કેલ્કયુલેટર અને અન્ય ઈલેકટ્રોનિક યંત્રોનો ઉપયોગ કરવાની મનાઈ છે.
12. ખોટા જવાબ માટે નકારાત્મક ગુણાંકન પ્રથા નથી.
13. પ્રશ્નપુસ્તિકાના કોઈ પ્રશ્નમાં અનુવાદ અંગે કોઈ વિવાદ/મતભેદ જણાય તો **અંગ્રેજી** વર્ઝન યોગ્ય ગણાશે.

SEAL

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 language is represented by a regular expression $(a)^*(a + ab + b)$. Which of the following string does NOT belong to the regular set represented by the above expression ?

   (A) aab (B) aba

   (C) abab (D) aaaaba

2. Which of the following Relations on {1,2,3} → {5, 6,7,8} is an injective function ?

   (A) $1 \rightarrow 6,\ 2 \rightarrow 7,\ 3 \rightarrow 5$

   (B) $1 \rightarrow 7,\ 2 \rightarrow 7,\ 3 \rightarrow 5$

   (C) $1 \rightarrow 8,\ 2 \rightarrow 5,\ 3 \rightarrow 8$

   (D) $1 \rightarrow 6,\ 2 \rightarrow 7,\ 3 \rightarrow 5,\ 1 \rightarrow 8$

3. The halting problem is an example of :

   (A) an NP-complete problem

   (B) an NP-hard problem that is not NP-complete

   (C) an undecidable problem

   (D) a recursively enumerable problem

4. Consider the following statements about Spanning Trees :

S1. The path between any pair of vertices in a Spanning Tree must pass through the root.

S2. The number of edges in a Spanning tree of n nodes is $2(n - 1)$.

S3. The degree of all non-leaf nodes in a Spanning tree is 2.

Which of the following is *correct* ?

(A) All statements are false

(B) Only S1 is true

(C) Only S2 is true

(D) Only S3 is true

5. Consider the following statements in the context of planar graphs :

S1. The complete graph on 4 vertices (K_4) is not planar.

S2. The complete bipartite graph $K_{2,3}$ is not planar.

S3. The complete graph on 5 vertices (K_5) is not planar.

S4. The complete bipartite graph $K_{3,3}$ is not planar.

Which of the above statements are TRUE ?

(A) S1 and S2 (B) S3 and S4

(C) S1 and S3 (D) S2 and S4

6. Consider the following truth table for three inputs x, y, z and output F.

x	y	z	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Which of the following is TRUE for F ?

(A) $x + y'z$ (B) $x + y + z'$

(C) $x + yz'$ (D) $x + y' + z$

7. In Boolean algebra, for a single variable x, which of the following identity is FALSE ?

(A) $x + 0 = x$ (B) $x \bullet x = x$

(C) $x + x' = 0$ (D) $x \bullet 1 = x$

8. Consider a 4-bit 2's complement integer representation. Which of the following numbers CANNOT be represented ?

(A) 8 (B) –8

(C) –1 (D) 0

9. $(12)_8 + (16)_8 = (?)_8$

(A) $(24)_8$ (B) $(28)_8$

(C) $(25)_8$ (D) $(30)_8$

10. In IEEE-754 floating point representation, which of the following bit patterns represents infinity ?

(A) An exponent of all 1*s* and a mantissa of all 0*s*.

(B) An exponent of all 0*s* and a mantissa of all 1*s*.

(C) An exponent of all 0*s* and a mantissa of all 0*s*.

(D) An exponent of all 1*s* and a non-zero mantissa.

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

```
for (i = x = 0; i < 100; i += 3, x++)
{
        if ( ! (i % 5) )
                i += 3;
}
printf ("%d", x);
```

(A) 26 (B) 27

(C) 32 (D) 33

12. What is the output of following C code segment ?

(Assume int occupies 4 bytes, char occupies 1 byte and pointer variable needs 4 bytes)

```
typedef struct
{
        int top;
        char items [16];
} Stack;
void main ( )
{
    Stack **p1, **p2;
    p1 = (Stack **) 200;
    p2 = (Stack **) 600;
    printf ("\n%d", p2–p1);
}
```

(A) 400 (B) 100

(C) 20 (D) Syntax error

13. One of the disadvantages of "Pass-by-Reference" is that the called function may inadvertently modify the called data. How can you avoid this ?

(A) Passing pointers

(B) Declaring the formal parameters constant

(C) Declaring the actual parameters constant

(D) Cannot be avoided

14. Which of the following keyword in C++ is used in resolving method at run-time ?

(A) static (B) extern

(C) virtual (D) runtime

15. Consider the declaration in C :

```
int b[10], *bPtr = b;
```

Element b[5] is NOT the same as

(A) *(b + 5) (B) *(bPtr + 5)

(C) b[0] + 5 (D) 5[b]

16. Which of the following is NOT true for a primary key ?

(A) Primary key cannot allow duplicate rows.

(B) Primary key will not allow NULL values.

(C) Only one primary key is allowed per table.

(D) Primary key cannot be created from more than one column.

17. Which of the following is TRUE for foreign key constraint ?

(A) Child may have duplicates and NULLs.

(B) Foreign key constraint can be specified on parent.

(C) Master table can be updated if child record exists.

(D) Parent record can be deleted if child record exists.

18. "Select the data set which applies to multiple rows, and place them in separate tables. Then create the relationship among these tables" is achieved in :

(A) 1st NF (B) 2NF

(C) BCNF (D) 4NF

19. Which of the following is a DCL statement ?

(A) CALL (B) SAVEPOINT

(C) LOCK (D) REVOKE

20. Consider the following statements with reference to E–R diagrams :

S1. Generalisation is a bottom-up approach in which two lower level entities form a higher level entity.

S2. In Aggregation, the relation between two entities is treated as a single entity.

Which of the following is *correct* ?

(A) Only S1 (B) Only S2

(C) Both S1 and S2 (D) Neither S1 nor S2

21. Consider the following statements :

S1. The time complexity of accessing an element in an array is O(1).

S2. The time complexity of accessing an element in a linked-list is O(1).

S3. The time complexity of inserting an element in an array is O(1).

S4. The time complexity of inserting an element in a linked-list is O(1).

Which of the above statements are *correct* ?

(A) S1 and S3 (B) S2 and S3

(C) S2 and S4 (D) S1 and S4

22. Consider the following statements :

S1. A priority queue can be implemented as a heap.

S2. A stack can be modelled as a priority queue.

S3. A queue can be modelled as a priority queue.

Which of the above statements are *correct* ?

(A) S1 and S3 (B) S1 only

(C) S2 and S3 (D) All of the above

23. Consider the following statements :

S1. A B-tree stores data elements only in the leaf-nodes.

S2. A B+ tree stores data in the intermediate nodes as well for faster access.

S3. B-trees and B+ trees are typically used for organising information in the main memory.

Which of the above statements are *correct* ?

(A) None of them (B) S3 only

(C) S1 and S2 (D) All of the above

24. Consider the following statements :

S1. A min-heap with n-elements is of height O(log n).

S2. An insert operation into a min-heap takes O(log n) time.

S3. Finding the smallest element in a min-heap takes O(log n) time.

Which of the above statements are FALSE ?

(A) S1 only (B) S2 only

(C) S3 only (D) S2 and S3

25. Consider the following statements about collision resolution in Hashing :

S1. In open addressing, there are no collisions in the Hash table.

S2. In separate chaining, cache performance is not as good as in open addressing.

S3. Compared to open addressing, separate chaining is less sensitive to the hash function.

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

(A) S1 only (B) S2 and S3

(C) S1 and S3 (D) S1 and S2

26. Which one of the following is a loop back address ?

(A) 127.0.0.0 (B) 127.0.0.1

(C) 127.0.1.1 (D) 127.1.1.1

27. Which of the following IP range is reserved for multicast group ?

(A) 240.0.0.0 to 254.255.255.254

(B) 1.0.0.1 to 126.255.255.254

(C) 224.0.0.0 to 239.255.255.255

(D) 128.1.0.1 to 191.255.255.254

28. Which of the following is NOT true for subnet mask ?

(A) It is a 32-bit number.

(B) It divides IP address into network address and host address.

(C) It is made by setting all network bits to "1".

(D) It is made by setting all host bits to "1".

29. Which OSI Layer provides node-to-node data transmission ?

(A) Data Link Layer (B) Transport Layer

(C) Session Layer (D) Physical Layer

30. Which of the following is TRUE for network port ?

(A) It is used by the Physical layer.

(B) It is used by the Transport layer.

(C) It is used by the Session layer.

(D) It is used by the Application layer.

31. Which analysis phase of a compiler determines the meaning of a statement once its grammatical structure becomes known ?

(A) Syntax analysis phase

(B) Lexical analysis phase

(C) Semantic analysis phase

(D) Code Generator phase

32. Which one of the following is NOT an Assembler directive ?

(A) ORG (B) ASSUME

(C) END (D) ADD

33. Which of the following statements is/are FALSE for Semantic Analysis in Compiler design ?

(I) Semantic analysis is performed once syntactic structure is known or build-up.

(II) Semantic analysis phase is carried out before Syntactic analysis phase.

(III) Semantic analysis usually includes type checking.

(IV) Semantic analysis phase builds the symbol table.

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

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

34. Consider the following rules for grammars :

R1. $S \rightarrow \varepsilon$

R2. $S \rightarrow AA$

R3. $S \rightarrow ASB$

R4. $bS \rightarrow a$

Which of the above rule(s) is/are NOT permitted while generating a Context-free grammar ?

(A) R1 only (B) R4 only

(C) R1 and R2 (D) R1 and R3

35. Consider the following grammars :

G1. $A \rightarrow Ab \mid a$

G2. $A \rightarrow aB;\ B \rightarrow aB \mid b$

G3. $A \rightarrow aA \mid b$

Which of the following is *correct* ?

(A) Only G1 and G2 generate the same language.

(B) Only G1 and G3 generate the same language.

(C) Only G2 and G3 generate the same language.

(D) G1, G2 and G3 generate the same language.

36. Increasing the RAM of a computer typically improves program execution performance because :

(A) Virtual memory increases

(B) Larger RAMs are faster

(C) Fewer page faults occur

(D) Fewer segmentation faults occur

37. Which is the most appropriate data structure for implementing Round Robin scheduling algorithm ?

(A) Stack

(B) Binary tree

(C) Priority queue

(D) Circular queue

38. Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), and memory requests by four processes for 2l2 Kb,417 Kb, 112 Kb, and 426 Kb (in order). If First fit, Best fit and Worst fit allocation algorithms are applied, which of the algorithms will be able to successfully allocate the memory to all the four processes ?

(A) First-fit (B) Worst-fit

(C) Best-fit (D) All of these

[Instructions for Q. 39 and Q. 40]

The next two questions pertain to the following contents of the file 'a.txt' on unix :

these are the voyages

of the starship enterprise.

it's continuing mission

to seek out new life ...

39. If we run the command :

$ tail –1 a.txt | sed 's/\. / ! /g'

the output we get is :

(A) these are the voyages

(B) to seek out new life...

(C) to seek out new life ! ! !

(D) to seek out new life

40. If we run the command :

$ grep enterprise a.txt | cut –c4 –15

the output we get is :

(A) the starship (B) starship enterprise

(C) to seek out new life ... (D) of the starship enterprise.

41. Consider categorization of coupling as Content, Common, Control, Stamp, and Data. This categorization can be ranked in the order of strongest (i.e. least desirable) to weakest (i.e. most desirable) is :

(A) Data, Stamp, Control, Common, Content

(B) Stamp, Common, Data, Control, Content

(C) Content, Common, Control, Stamp, Data

(D) Content, Control, Common, Stamp, Data

42. Which of the following statements is/are FALSE for software testing ?

(I) White Box testing is applied at the integration level of the software testing process.

(II) Alpha testing is performed after Beta testing.

(III) Decision table is one of the Black Box testing methods.

(IV) Static testing involves verification whereas dynamic testing involves validation.

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

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

43. Which of the following statements is/are TRUE for software process model ?

(I) Risk assessment and minimization is one of the activities of the Spiral model.

(II) Specifications can be developed incrementally in the Evolutionary model.

(III) The prototype becomes the final system in Throwaway prototype model.

(IV) The prototype process model is more appropriate compared to Waterfall model when objectives (*i.e.* functionalities) are unclear.

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

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

(C) (I), (III) and (IV)

(D) (I), (II) and (IV)

44. Which diagram is used to show activities and their interrelationships in software project management ?

(A) Gantt Chart

(B) PERT

(C) DFD

(D) Flow chart

45. Which of the following statements is/are TRUE for software reliability ?

(I) Reliability is a non-functional requirement of the software system.

(II) Mean Time to Failure is a reliability metric.

(III) Reliability is the degree to which the software continuous to work without failing in a specified environment.

(IV) Reliability metric POFOD (Probability Of Failure On Demand) of 0.001 means that 1 in 1000 requests may result in failure.

(A) (II) and (III)

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

(C) (I), (II), (III), and (IV)

(D) (II), (III), and (IV)

46. Which of the following is a connection-oriented protocol ?

(A) UDP (B) TCP

(C) Datagram (D) HTTP

47. Which of the following is NOT a control channel in GSM ?

(A) Broadcast Control Channel (B) Common Control Channel

(C) Dedicated Control Channel (D) Transport Control Channel

48. Which of the following is NOT a data mining functionality ?

(A) Characterization and Discrimination

(B) Classification and Regression

(C) Selection and Interpretation

(D) Clustering and Analysis

49. Which of the following facilities is NOT available to users in digital library ?

(A) Searching (B) Browsing

(C) Printing (D) Editing

50. Which of the following statements are TRUE ?

S1. Bitcoin is a crypto-currency.

S2. Bitcoin is a digital payment system.

S3. Bitcoin is a public ledger for recording transactions.

(A) S1 and S2 (B) S1 and S3

(C) S2 and S3 (D) All of these

ROUGH WORK

SEAL