

Subject Code: **0128/TFU-COMPSC/ELG-II**

Question Booklet No.

550200

परीक्षा केन्द्राध्यक्ष की मोहर
Seal of Superintendent of Examination Centre

परीक्षार्थी द्वारा बॉल-प्वाइंट पेन से भरा जाए
To be filled in by Candidate by Ball-Point pen only

उत्तर-शीट का क्रमांक
Sl. No. of Answer-Sheet

अनुक्रमांक
Roll No.

घोषणा : मैंने नीचे दिये गये निर्देश अच्छी तरह पढ़कर समझ लिए हैं।

Declaration : I have read and understood the instructions given below.

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(Signature of Invigilator)

वीक्षक के नाम

(Name of Invigilator)

अभ्यर्थी के हस्ताक्षर

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(Name of Candidate)

Paper : **II** Subject: **COMPUTER SCIENCE AND APPLICATIONS**

Time : 2 Hours

Maximum Marks : **200**

इस प्रश्न-पुस्तिका में पृष्ठों की संख्या
Number of Pages in this Question Booklet } **24**

इस प्रश्न-पुस्तिका में प्रश्नों की संख्या
Number of Questions in this Question Booklet } **100**

INSTRUCTION TO CANDIDATES

1. Immediately after getting the Booklet read instructions carefully, mentioned on the front and back page of the Question Booklet and do not open the seal given on the right hand side, unless asked by the invigilator. Do not accept a booklet without sticker-seal and do not accept an open booklet. As soon as you are instructed to open the booklet in the first 5 minutes you should compulsorily 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 within 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
2. Write your Roll No., Answer-Sheet No., in the specified places given above and put your signature.
3. Make all entries in the OMR Answer-Sheet as per the given instructions, otherwise Answer-Sheet will not be evaluated.
4. For each question in the Question Booklet choose only one correct/most appropriate answer, out of four options given and darken the circle provided against that option in the OMR Answer-Sheet, bearing the same serial number of the question. Darken the circle with **Black or Blue ball-point pen** only.
5. Darken the circle of chosen option fully, otherwise answers will not be evaluated.

Example : (A) (B) (C) (D) If (B) is correct answer.

6. There are 100 objective type questions in this Booklet. All questions are compulsory and carry 2 marks each.
7. Do not write anything anywhere in the Question Booklet or on the Answer-Sheet except making entries in the specified places. Rough work is to be done in the space provided in this booklet.
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9. There is no negative marks for incorrect answer.
10. Use of any calculator/log table/mobile phone is prohibited.

अभ्यर्थियों के लिए निर्देश

1. प्रश्न-पुस्तिका मिलते ही मुख पृष्ठ एवं अंतिम पृष्ठ में दिए गए निर्देशों को अच्छी तरह पढ़ लें। दाहिनी ओर लगी सील को वीक्षक के कहने से पूर्व न खोलें। स्टीकर सील के बगैर प्रश्न पुस्तिका या खुले हुये प्रश्न पुस्तिका को स्वीकार न करें। प्रश्न पुस्तिका को खोलने के लिए जैसा ही कहा जायेगा प्रथम 5 मिनट में अनिवार्यतः मुख पृष्ठ पर अंकित पृष्ठों की संख्या एवं प्रश्नों की संख्या को पुस्तिका में पृष्ठों की संख्या एवं प्रश्नों की संख्या से मिलान कर लें। पृष्ठों/प्रश्नों का छूटना या पुनः मुद्रित हो जाना या क्रम में नहीं रहना या अन्य किसी विरोधाभास के कारण प्राप्त त्रुटिपूर्ण प्रश्न पुस्तिका को इन्हीं 5 मिनट के अंदर बदलवा लें। इसके पश्चात न ही प्रश्न पुस्तिका बदला जा सकता है और न ही कोई अतिरिक्त समय दिया जायेगा।
2. ऊपर दिए हुए निर्धारित स्थानों में अपना अनुक्रमांक, उत्तर-पुस्तिका का क्रमांक लिखें तथा अपने हस्ताक्षर करें।
3. ओ.एम.आर. उत्तर-शीट में समस्त प्रविष्टियां दिये गये निर्देशानुसार करें अन्यथा उत्तर-शीट का मूल्यांकन नहीं किया जाएगा।
4. प्रत्येक प्रश्न के उत्तर हेतु प्रश्न-पुस्तिका में प्रश्न के नीचे दिए गए चार विकल्पों में से सही/सबसे उपयुक्त केवल एक ही विकल्प का चयन कर ओ.एम.आर. उत्तर-शीट में उसी विकल्प वाले गोले को, जो उस प्रश्न के सरल क्रमांक से सम्बंधित हो, काले या नीले बॉल-प्वाइंट पेन से भरें।
5. सही उत्तर वाले गोले को अच्छी तरह से भरें, अन्यथा उत्तरों का मूल्यांकन नहीं होगा।

उदाहरण : (A) (B) (C) (D) यदि (B) उत्तर सही है।

6. प्रश्न-पुस्तिका में 100 वस्तुनिष्ठ प्रश्न दिए गए हैं। प्रत्येक प्रश्न के लिए 2 अंक निर्धारित हैं। सभी प्रश्न अनिवार्य हैं।
7. प्रश्न-पुस्तिका तथा उत्तर-शीट में निर्दिष्ट स्थानों पर प्रविष्टियां भरने के अतिरिक्त कहीं भी कुछ न लिखें। रफ कार्य, इस पुस्तिका में उपलब्ध स्थान पर करें।
8. परीक्षा समाप्ति के उपरान्त तथा कक्ष छोड़ने के पूर्व मूल ओ.एम.आर. उत्तर-शीट वीक्षक को सौंपा जाए। प्रश्न-पुस्तिका एवं उत्तर-शीट की कार्बन कॉपी परीक्षार्थी अपने साथ ले जा सकते हैं।
9. ऋणात्मक मूल्यांकन नहीं किया जावेगा।
10. किसी भी तरह के कैलकुलेटर/लॉग टेबल/मोबाइल फोन का प्रयोग वर्जित है।

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COMPUTER SCIENCE AND APPLICATIONS - II

1. Consider an undirected connected graph. If w is the minimum weight among all edge weights and e is the specific edge of weight w , which of the following statement is false ?
 - (A) There is a minimum spanning tree containing e .
 - (B) If e is not in a minimum spanning tree T , then in the cycle formed by adding e to T , all edges have same weight.
 - (C) Every minimum spanning tree has an edge of weight w .
 - (D) e is present in every minimum spanning tree.
2. If A is a proper subset of B (i.e. $A \subset B$, but $A \neq B$), we write :
 - (A) $A \subsetneq B$
 - (B) $A \neq B$
 - (C) $A \subset B$
 - (D) $A \subsetneq B$
3. How many different rearrangements are there for the letters in the word BABAMS if two A's are never adjacent ?
 - (A) 24
 - (B) 144
 - (C) 120
 - (D) 180
4. The regular expression $(a + b)^* a(a + b)^* a(a + b)^*$ is representing :
 - (A) The set of all strings containing exactly 2a's.
 - (B) The set of all strings containing 2a's.
 - (C) The set of all strings containing the substring aa.
 - (D) The set of all strings containing atmost 2a's.
5. Consider the graph below :


```

graph LR
    A((A)) --> B((B))
    B --> 1((1))
    B --> C((C))
    C --> 2((2))
          
```

What should be the labels of nodes marked 1 and 2 if the breadth first traversal yields the list A B C D E ?

 - (A) D and E respectively
 - (B) E and D respectively
 - (C) unpredictable
 - (D) insufficient information to decide

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6. Hexadecimal equivalent of $(110011010)_2$ is :
- (A) $(19A)_{16}$
(B) $(CD0)_{16}$
(C) $(DC0)_{16}$
(D) $(199)_{16}$
7. A product of sums expression for the function $B\bar{D} + \bar{C}D$ is :
- (A) $(B + \bar{C})(\bar{D} + D)$
(B) $(B + \bar{D})(C + D)$
(C) $(B + D)(\bar{C} + \bar{D})$
(D) $(B + \bar{D})(\bar{C} + D)$
8. Total number of swapping to sort the following list
10, 20, 15, 8, 5, 7
using bubble sort is :
- (A) 11
(B) 15
(C) 12
(D) None is correct
9. The scope resolution operator usually _____.
- (A) limits the visibility of variables to a certain function
(B) tells about what the base-class that a class is derived
(C) can specify the function for which the object of the derived class should access
(D) resolves ambiguities.
10. What is the output of the following code ?
- ```
#include<stdio.h>

main()
{
 int var=5;
 printf("%d", var = ++var == 6)
}
```
- (A) 12  
(B) 6  
(C) 1  
(D) 0

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11. What is the output of following code ?

```
#ifndef include<stdio.h>

void main()

{

#endif

printf("%d", 900*90/90);

}
```

- (A) 900
- (B) 171
- (C) 90
- (D) 271

12. What will be printed if following code executed ?

```
#include<stdio.h>

#include<conio.h>

main()

{

clrscr()

printf(.6+, CHATISHGARH)
```

- (A) Runtime Error
- (B) CHATISHGARH
- (C) CHATISH
- (D) GARH

13. Suppose a relation is in 3NF. Still the relation may have some data redundancy because there may exist :

- (A) Non-trivial functional dependencies involving prime attributes on the right hand side.
- (B) Non-trivial functional dependencies involving prime attributes on the left hand side.
- (C) Non-trivial functional dependencies involving only prime attributes.
- (D) Transitive functional dependencies.

14. A relation R has the attributes A, B, C, D, E and satisfies the following set of FDS :

```
A → B C
B → D
C D → E
E → A
```

How many candidate keys are there ?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

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15. Which of the following is **true** ?
- (A) A relation in 3NF is also in BCNF
  - (B) There is no relation between BCNF and 3NF
  - (C) A relation in BCNF is also in 3NF
  - (D) A relation in BCNF is in 3NF but not in 2NF
16. Which one of the following is **not** a part of the ACID properties for database transactions ?
- (A) Atomicity
  - (B) Consistency
  - (C) Isolation
  - (D) Deadlock free
17. Which of the following is **true** ?
- (A) In a  $B^+$  tree data can be processed randomly.
  - (B) In a  $B^+$  tree data can be processed sequentially.
  - (C) In a  $B^+$  tree every node differ in height be more than one.
  - (D)  $B^+$  tree does not have a right child.
18. Which of the following takes  $O(1)$  time to find an element in a list ?
- (A) Linear search
  - (B) Binary search
  - (C) Hashing
  - (D) Breadth first search
19. In an undirected graph of  $v$  vertices and  $e$  edges, the sum of the degree of each vertex is equal to :
- (A)  $2v$
  - (B)  $(2v - 1)/2$
  - (C)  $2e$
  - (D)  $e^2/2$
20. In a queue, insertions can take place only at the other end called :
- (A) front
  - (B) rear
  - (C) top
  - (D) bottom

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21. Distance Vector Routing is generally preferred over Link State Routing because \_\_\_\_\_.
- Distance vector converges faster than Link state
  - Distance vector allows multiple routing metrics
  - Distance vector requires less memory for routing table
  - Distance vector requires more memory for routing table
22. Packet filter firewall operates on which of the following layers ?
- Network and Application Layer
  - Network and Transport Layer
  - Transport and Application Layer
  - Physical and Application Layer
23. The length of port address in TCP/IP is :
- 32 bits
  - 48 bits
  - 16 bits
  - 64 bits
24. Forwarding and Routing are two main important functions carried out by which layer ?
- Physical
  - Data link
  - Network
  - Application
25. What is the device used in System Software for connecting a number of devices to a controller ?
- Daisy Chain
  - Markov Chain
  - Deterministic Auto-mata
  - Directed Acyclic Graph
26. A system program that set up an executable program in main memory ready for execution is :
- LEX
  - SCANNER
  - Editor
  - Loader
27. Which of the following is used in nested macro-expansion ?
- FIFO rule
  - LIFO rule
  - LIFO rule
  - Priority rule
28. The Critical Section :
- is created for a specific amount of time by a user.
  - is used to avoid deadlocks.
  - is where shared resources are accessed.
  - is used in multitasking.

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29. Which is the main unit of UNIX which is responsible for maintaining all the important abstraction of the Operating System including virtual memory and processes ?
- Kernel
  - System Libraries
  - System Utilities
  - Daemons
30. The page replacement algorithm which gives the lowest page fault rate is :
- LRU
  - FIFO
  - Optional Page Replacement
  - Second chance algorithm
31. Suppose a processor is in Blocked state waiting for some i/o service. When the service is completed, it goes to :
- Running state
  - Suspended state
  - Ready state
  - Terminated state
32. In a multi-user OS, 20 requests are made to use a particular resource per hour on average. The Probability of having no request in 45 minutes :
- $e^{-5}$
  - $e^{-15}$
  - $1 - e^{-5}$
  - $1 - e^{-10}$
33. "Cyclomatic Complexity" is computer for \_\_\_\_\_.
- To write the Code
  - To design the Test Code
  - To find the Classes design
  - To find the Database design
34. The tools that supports different stages of Software development life cycle are called :
- CASE tools
  - CAM tools
  - SDLC tools
  - CARE tools
35. Proponents of agile software development take great pains to emphasize the importance of :
- Coding factor
  - People factor
  - Analysis factor
  - Testing factor
36. A Generic process framework for software engineering consist of five framework activities :
- Communication, Planning, Modeling, Construction and Deployment
  - Review, Feedback, Framing, Forming and Design
  - Coding, Algorithm, Process, Plan, and People
  - Testing, Persons, Party, Program and Plan

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37. "Smart City" is evolved from which type of E-commerce ?  
 (A) Business to Customer E-commerce  
 (B) Business to Government E-commerce  
 (C) Customer to Customer E-commerce  
 (D) Customer to Business E-commerce
38. Which of the following correctly defines Data Scrubbing ?  
 (A) A process to reject data from the data warehouse and to create necessary indexes  
 (B) A process to load the data in the data warehouse and to create the necessary indexes  
 (C) A process to upgrade the quality of data after it is moved into a data warehouse  
 (D) A process to upgrade the quality of data before it is moved into a data warehouse
39. Frame relay is a :  
 (A) Datagram Network  
 (B) Virtual Circuit Network  
 (C) Virtual Private Network  
 (D) Virtual Control Network
40. A fault simulation testing technique is :  
 (A) Stress testing  
 (B) Unit testing  
 (C) Mutation testing  
 (D) Robust testing
41. MOV A, 11H is from which type of addressing mode ?  
 (A) Immediate to register  
 (B) Register to immediate  
 (C) Register to memory  
 (D) Memory to register
42. What is the output of the following program ?  
 MOV A, 05H  
 MOV B, 07H  
 SUB 05H  
 MOV C, A  
 HLT  
 (A) A = 00H, B = 07H and C = 00H  
 (B) A = 05H, B = 02H and C = 05H  
 (C) A = 02H, B = 02H and C = 00H  
 (D) A = 0CH, B = 00H and C = 0CH
43. Suitable Addressing Modes for program relocation at runtime are :  
 (A) Absolute addressing and Indirect addressing  
 (B) Absolute addressing and Base addressing  
 (C) Base addressing and Relative addressing  
 (D) Absolute addressing, Base addressing and Indirect addressing

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44. Zero address instruction format is mainly used in :

- (A) Von Neuman architecture
- (B) Stack organized architecture
- (C) RISC architecture
- (D) CISC architecture

45. Microprocessor is :

- (A) Complex Asynchronous sequential digital logic circuit
- (B) Complex Synchronous sequential digital logic circuit
- (C) Complex Combinational digital logic circuit
- (D) Complex Combinational Analog logic circuit

46. The most relevant addressing mode to write position independent code is :

- (A) direct mode
- (B) indirect mode
- (C) relative mode
- (D) indexed mode

47. Which statements are correct related to data partitioning ?

- (a) Efficiency
- (b) Local optimization
- (c) Security
- (d) Recovery and uptime
- (e) Load Balancing

Code :

- (A) (a) and (b)
- (B) (a), (b), (c), (d) and (e)
- (C) (d) and (e)
- (D) (c), (d) and (e)

48. Suppose  $r(ABC)$  and  $s(ACDE)$ . Assume that  $a \in \text{Dom}(A)$ ,  $b \in \text{Dom}(B)$ ,  $c \in \text{Dom}(C)$  and  $d \in \text{Dom}(D)$ . Which of the following expressions are legal to carry out ?

- (a)  $r \cup s$
- (b)  $\pi_B(r) \cap \pi_B(s)$
- (c)  $\sigma_{D=d}(r)$
- (d)  $r \cap s$

Code :

- (A) (b)
- (B) (a) and (d)
- (C) (b) and (c)
- (D) None of these

49. Which of the following is not true about Audit trail in DBMS ?

- (A) It is important for database security
- (B) It reduces the performance of Database Management System
- (C) It enables DBA to track the use of database resources
- (D) It enables users to see only a small part of the database

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50. Consider the following relational schema :

Sailor (sid : integer, sname : string, rating : integer, age : real)

Reserves (sid : integer, bid : integer, day : date)

Boat (bid : integer, bname : string, color : string)

Write a query to find the sids of all sailors who have reserved red boats but not green.

(A) SELECT sid

FROM Sailors S, Reserves R, Boat B

WHERE sid = R.sid AND

R.bid = B.bid AND B.Color = 'green'

EXCEPT

SELECT S<sub>2</sub>.Sid

FROM Sailors S<sub>2</sub>, Reserves R<sub>2</sub>, Boats B<sub>2</sub>

S<sub>2</sub>.Sid = R<sub>2</sub>.Sid AND R<sub>2</sub>.bid = B<sub>2</sub>.bid  
AND B<sub>2</sub>.Color = 'Red'

(B) SELECT Sid

FROM Sailors S, Reserves R, Boat B

WHERE Sid = R.Sid AND

R.bid = B.bid AND B.Color <> 'Red'

EXCEPT

SELECT S<sub>2</sub>.Sid

FROM Sailors S<sub>2</sub>, Reserves R<sub>2</sub>, Boats B<sub>2</sub>

S<sub>2</sub>.Sid = R<sub>2</sub>.Sid AND R<sub>2</sub>.bid = B<sub>2</sub>.bid  
AND B<sub>2</sub>.Color = 'green'

(C) SELECT S.Sid

FROM Sailors S, Reserves R, Boats B

WHERE Sid = R.Sid AND  
R.bid = B.bid AND B.Color = 'red'

EXCEPT

SELECT S<sub>2</sub>.Sid

FROM Sailors S<sub>2</sub>, Reserves R<sub>2</sub>, Boats B<sub>2</sub>

S<sub>2</sub>.Sid = R<sub>2</sub>.Sid AND R<sub>2</sub>.bid = B<sub>2</sub>.bid  
AND B<sub>2</sub>.Color = 'green'

(D) SELECT Sid

FROM Sailors S, Reserves R, Boat B

WHERE Sid = R.bid AND  
R.bid = B.bid AND B.Color = 'green'

EXCEPT

SELECT S<sub>2</sub>.Sid

FROM Sailors S<sub>2</sub>, Reserves R<sub>2</sub>, Boats B<sub>2</sub>

S<sub>2</sub>.Sid = R<sub>2</sub>.Sid AND R<sub>2</sub>.bid = B<sub>2</sub>.bid  
AND B<sub>2</sub>.Color <> 'red'

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51. Which of the following technique in Computer Graphics is **not** a general transcend interaction technique ?

- (A) Resolution Technique
- (B) Specific Direction Preference Technique
- (C) Specific Positioning Technique
- (D) Specific Feedback Technique

52. Consider the employee relation (name, sex, supervisor\_name) with name as the primary key. What does the following Tuple relational calculus query produce ?

$\{e.name/employee \mid e \wedge \forall (x)[\neg employee(x) \vee x.supervisor\_name \neq e.name \vee x.sex = male]\}$

- (A) Name of employees with male supervisor
- (B) Name of employees with no immediate female supervisor
- (C) Name of employees with no immediate male supervisor
- (D) None of the above

53. AVI stands for :

- (A) Audio Video Interleaved
- (B) Audio Visual Interface
- (C) Animation Video Interleaved
- (D) Architectural Video Interleaved

54. Which of the following frame type is **not** used by video compression algorithms ?

- (A) I frames
- (B) P frames
- (C) B frames
- (D) L frames

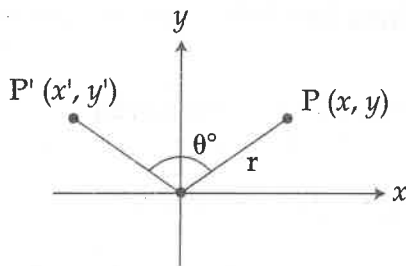
55. What is the aspect ratio of 12 in  $\times$  16 in display ?

- (A) 2 : 3
- (B) 3 : 4
- (C) 4 : 3
- (D) 3 : 2

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56.



Refer to the figure. Point P is rotated by  $\theta^\circ$ . Then value of  $x'$  and  $y'$  are :

- (A)  $x' = r\cos\theta + r\sin\theta$   
 $y' = r\cos\theta - r\sin\theta$
- (B)  $x' = r\sin\theta - r\cos\theta$   
 $y' = r\cos\theta + r\sin\theta$
- (C)  $x' = x\cos\theta - y\sin\theta$   
 $y' = x\sin\theta + y\cos\theta$
- (D)  $x' = \sin\theta + \cos\theta$   
 $y' = \cos\theta - \sin\theta$

57. Consider the following code given in table for a message U.

| U       | Code 1            | Code 2            | Code 3            | Code 4            |
|---------|-------------------|-------------------|-------------------|-------------------|
| (Input) | (C <sub>1</sub> ) | (C <sub>2</sub> ) | (C <sub>3</sub> ) | (C <sub>4</sub> ) |
| a       | 0                 | 0                 | 10                | 0                 |
| b       | 0                 | 010               | 00                | 10                |
| c       | 1                 | 01                | 11                | 110               |
| d       | 1                 | 10                | 110               | 111               |

Which is the following true about the codes ?

- (A) C<sub>1</sub> singular, C<sub>2</sub> nonsingular, not uniquely decodable, C<sub>3</sub> uniquely decodable not prefix free, C<sub>4</sub> prefix free trivially decodable
- (B) C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> prefix free decodable
- (C) C<sub>1</sub>, C<sub>2</sub> singular, C<sub>3</sub>, C<sub>4</sub> non-singular
- (D) None of the above

58. For a binary symmetric channel with transmission probability  $P = 10^{-2}$  the channel capacity is :

- (A) 0.919
- (B) 0.818
- (C) 0.717
- (D) 0.617

59. Consider the following macro :

Macro      Add X, Y  
  
                 Load Y  
  
                 Mul X  
  
                 Store Y

End      Macro

X and Y are :

- (A) Identifiers
- (B) Variables
- (C) Actual parameters
- (D) Formal parameters

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60. Which of the following is **not** correct ?

- (a) shorts are at least 2 bytes big
- (b) longs are at least 3 bytes big
- (c) shorts are never bigger than ints
- (d) ints are never bigger than longs

Code :

- (A) (b) and (c)
- (B) (c) and (d)
- (C) (b)
- (D) (a) and (b)

61. Match the following :

List-I

List-II

- |         |                       |
|---------|-----------------------|
| (a) ::  | (i) direct member     |
| (b) .   | (ii) global scope     |
| (c) →   | (iii) subscript       |
| (d) [ ] | (iv) indirect member  |
| (e) ()  | (v) type construction |

Code :

- |     |       |       |       |       |
|-----|-------|-------|-------|-------|
| (a) | (b)   | (c)   | (d)   | (e)   |
| (A) | (ii)  | (i)   | (iv)  | (iii) |
| (B) | (i)   | (ii)  | (iii) | (iv)  |
| (C) | (ii)  | (iii) | (iv)  | (v)   |
| (D) | (iii) | (iv)  | (v)   | (i)   |

62. Which of the following grammar are LR(0) ?

(a)  $S \rightarrow AA$

$A \rightarrow aA$

$A \rightarrow b$

(b)  $E \rightarrow T + E \mid T$

$T \rightarrow id$

(c)  $S \rightarrow aB$

$A \rightarrow ba$

$A \rightarrow c$

$B \rightarrow Bb$

$B \rightarrow c$

(d)  $S \rightarrow AaAb \mid BaBb$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

Code :

- (A) (a) and (b)
- (B) (b) and (c)
- (C) (b) and (d)
- (D) (a) and (c)

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53. Choose the **correct** statements :

- (a) Every SLR(1) grammar is LALR(1) but every LALR(1) need not be SLR(1).
- (b) CLR(1) parser is more powerfull than other parsers.
- (c) Number of entries in LALR(1) parse table is less than equal to entries in CLR(1) parse table.
- (d) Every LALR(1) grammar is CLR(1) but every CLR(1) need not be LALR(1).

**Code :**

- (A) (d), (c), (a)
- (B) (b), (a), (d)
- (C) (a), (b), (c)
- (D) All of the above

4. State which of the following in virtual functions is **correct** ?

- (A) Virtual function can group objects of different classes so that they can be accessed by the same function code.
- (B) Virtual function use the same function call to execute a member function of objects from different classes.
- (C) Virtual functions can be used to access a class's private data even though it is not a member function of that class.
- (D) Virtual functions can create an array of pointers so that they can hold pointers to derived classes.

65. UDP version with congestion control is :

- (A) Datagram congestion control protocol
- (B) Stream control transmission protocol
- (C) Structured stream transport protocol
- (D) None of the above

66. \_\_\_\_\_ translates internet domain and host names to IP address.

- (A) Domain name system
- (B) Routing information protocol
- (C) Network time protocol
- (D) Internet relay protocol

67. Find the Hamming distance between two pairs of words :

- (a) d(000, 011)
- (b) d(10101, 11110)

**Code :**

- (A) 2 and 3
- (B) 3 and 4
- (C) 3 and 2
- (D) 4 and 3

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68. A slotted ALOHA network transmits 200 bit frames using a shared channel with a 200-kbps bandwidth. Find the throughput if the system produces 1000 frames per second.

(A) 369  
(B) 368  
(C) 367  
(D) 366

69. A file of size  $10^6$  bits is to be transmitted from node A to node B which are connected by 2 routers and 3 links. Each link length is 100 km and has a speed of  $10^8 \text{ ms}^{-1}$ .

What will be total transmission time if delay is not zero ?

(A) 3100 seconds  
(B) 3003 ms  
(C) 3003 seconds  
(D) 3100 ms

70. Two computers  $C_1$  and  $C_2$  are configured as :

$C_1$  : IP - 203.197.2.53/255.255.128.0

$C_2$  : IP - 203.197.75.201/255.255.192.0

(A)  $C_1$  thinks  $C_2$  on same LAN  
(B)  $C_2$  thinks  $C_1$  on same LAN  
(C)  $C_1$  and  $C_2$  are both on same LAN  
(D)  $C_1$  and  $C_2$  are on different LAN

71. Suppose  $T_1(n)$  and  $T_2(n)$  are the time complexities of two program fragments  $P_1$  and  $P_2$  where  $T_1(n) = O(f(n))$  and  $T_2(n) = O(g(n))$ .

What is the time complexity of program fragment  $P_1$  followed by  $P_2$  ?

(A)  $O(\max(f(n), g(n)))$   
(B)  $O(f(n) \cdot g(n))$   
(C)  $O(\min(f(n), g(n)))$   
(D)  $O(f(n)/g(n))$

72. In a linked list, the pointer of the last node contains a special value, called the \_\_\_\_\_ pointer.

(A) NULL  
(B) ZERO  
(C) LINK  
(D) NEXT

73. A complete graph with  $n$  vertices has how many Hamiltonian circuits ?

(A)  $(n-1)/2$   
(B)  $(n-1)!$   
(C)  $n!$   
(D)  $(n-1)!/2$

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74. A given connected graph is Euler graph iff it is a :
- All vertices of the graph are of odd degree
  - All vertices of the graph are of even degree
  - Number of vertices are of even degree
  - Number of vertices are of odd degree
75. The diagram which depicts the flow of task between various components of a system developed using OOAD is :
- Class diagram
  - Activity diagram
  - Use case diagram
  - Sequence diagram and implementation diagram
76. A class is defined as a collection of :
- Similar objects
  - Similar objects with shared attributes
  - Similar objects with shared attributes and behaviours
  - None of these
77. How to define a pointer to the member of Class ?
- ```

Class A
{
    private :
        int m;
    public :
        void show();
};

```
- int A::*ip=&A::m
 - int A::*ip=&A;
 - int A*ip=&A;
 - int A::*ip=A::m;
78. Match the following :
- | List-I | List-II |
|---|---------------------------------|
| (a) Private | (i) Visible to all functions |
| (b) Protected | (ii) Multiple Inheritance |
| (c) Public | (iii) Friend of the class |
| (d) Function | (iv) Visible to member function |
| (e) Can inherit the attributes of two or more classes | (v) Optional |
- Code :
- | | (a) | (b) | (c) | (d) | (e) |
|-----|-------|-------|------|-------|-------|
| (A) | (ii) | (iii) | (v) | (iv) | (i) |
| (B) | (iii) | (ii) | (iv) | (i) | (v) |
| (C) | (iv) | (i) | (v) | (ii) | (iii) |
| (D) | (v) | (iv) | (i) | (iii) | (ii) |

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79. Let us consider that the size estimated for a software project is 45,000 lines of code. The average salary paid per Engineer is ₹ 40,000 per month. Calculate the cost required if the software is of embedded type.
- (A) 1,58,40,000
(B) 1,39,80,000
(C) 1,38,40,000
(D) None of these

80. Consider a payroll software that prints file of employees and a transaction file for each employee for the current month. It updates the employee file and produces an earning report, a reduction report together with analysis of report. The software produces three different types of error messages and is capable of interest command to print on individually requested payslip. It also processes a file containing details of payment to be used in other activities.

Weight table	Simple	Average	Complex
No. of inputs	3	4	6
No. of outputs	4	5	7
No. of inquiries	3	4	6
No. of files	7	10	15
No. of Interfaces	5	7	10

Estimate the unadjusted function point :

- (A) 60
(B) 62
(C) 64
(D) 68

81. White box testing is also known as :

- (A) Syntax Driven Testing
(B) Functional Testing
(C) Glass Box Testing
(D) Decision Table Based Testing

82. Which of the following is **not** a Validation Method ?

- (A) Cause affect Graphs
(B) Boundary Value Analysis
(C) Inspection
(D) Syntax Driven Testing

83. Which of the following functions of I/O device drivers is **incorrect** ?

- (A) To optimize the system input output performance
(B) To handle the interrupts that have arrived from the device
(C) To handle the dead lock prevention
(D) To initiate I/O to the particular device through I/O Modules

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84. The initial value of a counting semaphore is 8. If five P operations and three V operations are executed on the semaphore successively, then what will be the final value of the semaphore ?
- (A) 10
(B) 0
(C) 8
(D) 6
85. If there are 3 page frames, how many page faults will occur for following page reference string using LRU page replacement algorithm ?
56126364236321261561
- (A) 12
(B) 14
(C) 09
(D) 15
- Working set model is used in memory management to implement the concept of :
- (A) Swapping
(B) Principal of locality
(C) Segmentation
(D) Thrashing
87. A* algorithm uses _____ heuristic function to search any goal node.
- (A) Admissible function
(B) Evaluation function
(C) Fitness function
(D) Probabilistic function
88. AO* algorithm has another name based upon its functionality :
- (A) Admissible Optimal algorithm
(B) Accurate Optimistic algorithm
(C) AND-OR algorithm
(D) AND-AND algorithm
89. In the Applications of EXPERT SYSTEM state which of the following is true ?
- (A) PROSPECTOR is the first expert system developed for Medical Personal to diagnose prospective diseases.
(B) PROSPECTOR is an expert system developed for Configuring Components to Complex Computer Systems.
(C) PROSPECTOR is an expert system used for arbitring the geologists to discover mineral deposits.
(D) PROSPECTOR is an expert system used for military personal, guiding the prospective path navigation.

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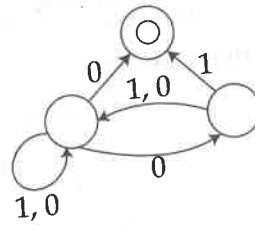
90. A Horn clause with no positive literal is sometimes called :

- (A) indefinite clause
- (B) definite clause
- (C) goal clause
- (D) infinite clause

91. Let W be a string of length n in $\{0, 1\}^*$. Let L be the set of all substrings of W . What is the minimum number of states in a Non-deterministic finite automata that accepts L ?

- (A) $n - L$
- (B) $n + 1$
- (C) n
- (D) $2^n - 1$

92. Consider the NFA Machine M stated below :



Let the Language accepted by M be L . Let L_1 be the Language accepted by the NFA M_1 , obtained by changing the accepted state to M to a non-accepting state and by changing the non-accepting state of M to accepting states. Which of the following is true ?

- (A) $L_1 = \{0, 1\}^* - L$
- (B) $L_1 = \{0, 1\}^*$
- (C) $L_1 \subseteq L$
- (D) $L_1 = L$

93. Which of the following optimization techniques are typically applied on loops ?

- (A) Peephole optimization
- (B) Constant folding
- (C) Removal of invariant computation
- (D) Invariant computation

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94. Match all items in **Group-1** with correct options from those given in **Group-2**.

Group-1	Group-2
(a) Regular Expression	(i) Syntax analysis
(b) Pushdown automata	(ii) Code generation
(c) Dataflow analysis	(iii) Lexical analysis
(d) Register allocation	(iv) Code optimization

Code :

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

For solving Non linear programming problems Khun-Tucker conditions are :

- (A) Necessary conditions
- (B) Sufficient conditions
- (C) Necessary and sufficient conditions
- (D) Neither necessary nor sufficient conditions

96. Which of the following command is used to move all files to the bin sub-directory of the parent directory ?

- (A) `mv *.* /bin/`
- (B) `mv */bin/*`
- (C) `mv * ../bin*.*`
- (D) None of the above

97. What is Fuzzy Approximation Theorem (FAT) ?

- (A) Fuzzy set can be used to Model any set
- (B) Any smooth function can be approximated by an Fuzzy set with an appropriate structure
- (C) All step functions can be approximated by Fuzzy set
- (D) Fuzzy set can be approximated by a probability function

98. A three-input neural network has the weights 2, 5 and 3. The transfer function is linear in which proportionality constant is 3. If the input is {4, -1, 2}, what will be the output ?

- (A) 25
- (B) 29
- (C) 27
- (D) 21

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99. Using public key cryptography, X adds a digital signature σ to message M, encrypts $\langle M, \sigma \rangle$ and sends to Y, where it is decrypted. Which one of the following sequences of keys is used for the operations ?

(A) Encryption :

X's private key followed by Y's private key.

Decryption :

X's public key followed by Y's public key.

(B) Encryption :

X's private key followed by Y's public key.

Decryption :

X's public key followed by Y's private key.

(C) Encryption :

X's public key followed by Y's private key.

Decryption :

Y's public key followed by X's private key.

(D) Encryption :

X's private key followed by Y's public key.

Decryption :

Y's private key followed by X's public key.

100. Given the language L {ab, aa, baa}, which of the following strings satisfy the language ?

(a) abaabaaabaa

(b) aaaabaaaa

(c) baaaaabaaaaab

(d) baaaaabaa

Code :

(A) (a), (b) and (d)

(B) (a), (c) and (d)

(C) (b), (c) and (d)

(D) (a), (b), (c) and (d)

- o O o -

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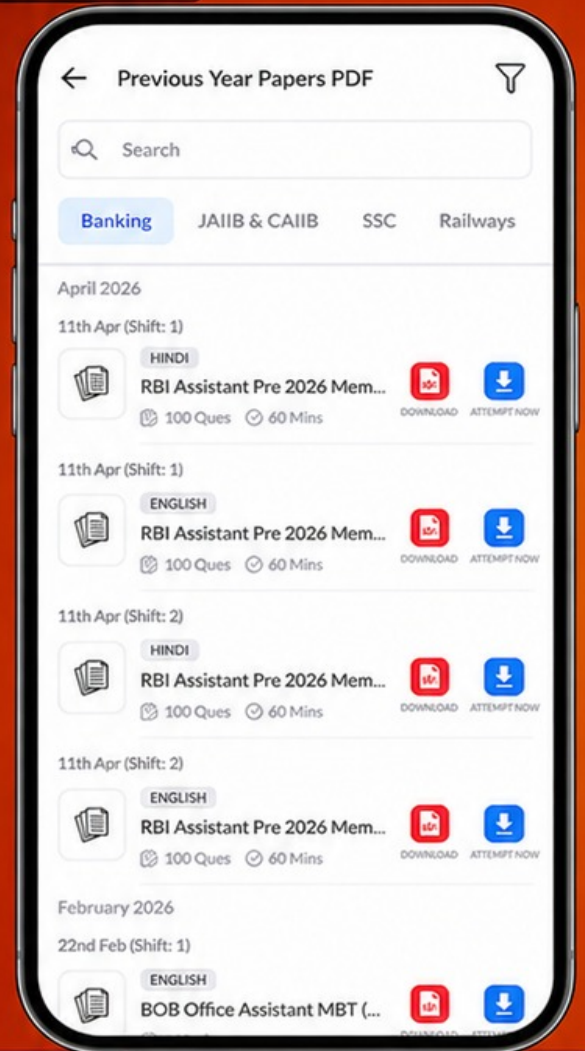
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Time for marking answers : 2 Hours

अधिकतम अंक : 200
Maximum Marks : 200

नोट :

1. इस प्रश्न-पुस्तिका में 100 प्रश्न हैं - प्रत्येक प्रश्न 2 अंक का है। सभी प्रश्न हल करना अनिवार्य है।
2. प्रश्नों के उत्तर, दी गई OMR उत्तर-शीट (आंसर-शीट) पर अंकित कीजिए।
3. ऋणात्मक मूल्यांकन नहीं किया जावेगा।
4. किसी भी तरह के कैलकुलेटर या लॉग टेबल एवं मोबाइल फोन का प्रयोग वर्जित है।
5. OMR उत्तर-शीट (आंसर-शीट) का प्रयोग करते समय ऐसी कोई असावधानी न करें/बरतें जिससे यह फट जाये या उसमें मोड़ या सिलवट आदि पड़ जाये जिसके फलस्वरूप वह खराब हो जाये।

Note :

1. There are 100 objective type questions in this booklet. All questions are compulsory carry two marks each.
2. Indicate your answers on the OMR Answer-Sheet provided.
3. No negative marking will be done.
4. Use of any type of calculator or log table and mobile phone is prohibited.
5. While using OMR Answer-Sheet care should be taken so that the Answer-Sheet does not get torn or spoiled due to folds and wrinkles.