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Series **D**

OCT-37226
Paper-II
Computer Science and Application

Question Booklet Serial No. प्रश्नपत्रिका अनुक्रमांक

Signature and Name of Invigilator

1. (Signature) .....

   (Name) .....

2. (Signature) .....

   (Name) .....

Seat No. | | | | | | | | |
(In figures as in Admit Card)

Seat No. .....
(In words)

OMR Sheet No. | | | | | | |
(To be filled by the Candidate)

Time Allowed : 2 Hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **24** Number of Questions in this Booklet : **100**

Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **100** objective type questions. **Each** question will carry **two** marks. **All** questions of Paper II will be **compulsory**.
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
   (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 or 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 missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes.** Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.
   (iii) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : where (B) is the correct response.
   (A) ● (C) (D)
   Following wrong methods should not be used as they are not recognised by scanning machine in digitized assessment. Candidate using such method will be responsible for their loss.

WRONG METHODS
(A) ✓ (C) (D) (A) ✗ (C) (D) (A) ◒ (C) (D) (A) (B) (C) (D)

5. Your responses to the items are to be indicated in the OMR Sheet given inside the Booklet only. If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. If you write your Name, Seat 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, you will render yourself liable to disqualification.
9. You have to return original OMR 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 the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
11. Use of any calculator or log table, etc., is prohibited.
12. There is no negative marking for incorrect answers.

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या OMR उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत **100** बहुविकल्प प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात :
   (i) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. **स्टीकर सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्वीकारू नये.**
   (ii) पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. **पृष्ठे कमी असलेली/कमी प्रश्न असलेली/ प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी.** त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया नोंद घ्यावी.
   (iii) वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा क्रमांक लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (B) हे योग्य उत्तर असेल तर.
   (A) ● (C) (D)
   खालील चुकीच्या पद्धती वापरू नये, कारण डिजिटाइज्ड (Digitized) मूल्यांकनात स्कॅनिंग मशीन त्यांना ओळखत नाही. त्या पद्धती वापरून नुकसान झाल्यास त्यास विद्यार्थीच जबाबदार असतील.

चुकीची पद्धती
(A) ✓ (C) (D) (A) ✗ (C) (D) (A) ◒ (C) (D) (A) (B) (C) (D)

5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत**. इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. उत्तरपत्रिकेवर नमूद केलेल्या ठिकाणाव्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गांचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. **फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
11. कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

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OCT-37226–D

Computer Science and Application

Paper II

Time Allowed : 120 Minutes] **[Maximum Marks : 200**

Note : This Paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

1. In the following incomplete code for readers-writers problem, two binary semaphores mutex and wrt are used to obtain synchronization.

wait (wrt)

writing is performed

signal (wrt)

wait (mutex)

readcount = readcount + 1

if readcount = 1 then S1

S2

reading is performed

S3

readcount = readcount – 1

if readcount = 0 then S4

signal (mutex)

The value of S1, S2, S3, S4, (in that order) are _____

(A) Signal (mutex), Wait (wrt), Signal (wrt), Wait (mutex)

(B) Signal (wrt), Signal (mutex), Wait (mutex), Wait (wrt)

(C) Wait (wrt), Signal (mutex), Wait (mutex), Signal (wrt)

(D) Signal (mutex), Wait (mutex), Signal (mutex), Wait (mutex)

2. Disk requests come to disk driver for cylinders 10, 22, 20, 2, 40, 6 and 38 in that order at a time when the disk drive is reading from cylinder 20. The seek time is 6 msec per cylinder. Compute the total seek time if the disk arm scheduling algorithm is first come first served is

(A) 868 msec

(B) 884 msec

(C) 876 msec

(D) 892 msec

3. Consider six memory partitions of size 200 kB, 400 kB, 600 kB, 500 kB, 300 kB and 250 kB, where kB refers to kilobyte. These partitions need to be allotted to four processes of sizes 357 kB, 210 kB, 468 kB and 491 kB in that order. If the best fit algorithm is used, which partitions are *not* allotted to any process ?

(A) 200 kB and 300 kB

(B) 200 kB and 250 kB

(C) 250 kB and 300 kB

(D) 300 kB and 400 kB

4. If the postfix form of a string is ABC + – D∗, the actual string is

(A) (A – (B + C))∗ D

(B) ((A – B) + C) ∗ D

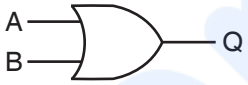
(C) ((A + B) – C) ∗ D

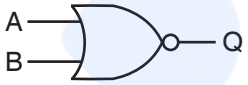
(D) (A + (B – C)) ∗ D

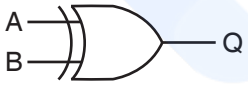
5. Which of the following systems software does the job of merging the records from two files into one ?
   (A) Security software
   (B) Utility program
   (C) Networking software
   (D) Documentation system

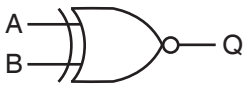
6. Given Truth Table represents which of the following Logic Gate ?

Input		Output
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

(A) 

(B) 

(C) 

(D) 

7. "100" is a number in Hexadecimal Number System. What will be its representation in Decimal Number System ?
   (A) 16
   (B) 100
   (C) 256
   (D) 512

8. The following Logical Microoperation represents which Truth Table ?
   $F \leftarrow \overline{A \oplus B}$

(A)

A	B	F
0	0	0
0	1	1
1	0	1
1	1	0

(B)

A	B	F
0	0	1
0	1	0
1	0	0
1	1	1

(C)

A	B	F
0	0	0
0	1	0
1	0	0
1	1	1

(D)

A	B	F
0	0	1
0	1	1
1	0	1
1	1	0

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9. Which of the following statement is *not* true ?

(A) Program execution can start if the instructions are present in RAM

(B) Program execution can start if the instructions are present in ROM

(C) Program execution can start if the instructions are present in EPROM

(D) Program execution can start if the instructions are present in CPU registers

10. What is the objective of Machine Level Language in a computer system ?

(A) To provide a programming environment for the programmers

(B) To provide a high-level abstraction for the programmers

(C) To enable direct execution of code by the computer system

(D) To enable execution of code on different computer system platforms

11. _____ is the traditional way to allocate a single channel among competing users.

(A) Polling

(B) Auction

(C) TDM

(D) FDM

12. The data link layer on the receiving end removes the DLE before the data are given to the network layer. This technique is called _____.

(A) bit stuffing

(B) character stuffing

(C) padding

(D) buffering

13. How many bit cheksum is used to catch all single and double errors ?

(A) 16 bit

(B) 8 bit

(C) 4 bit

(D) 32 bit

14. In SMTP Protocol, which response (return) code represents OK by the server ?

(A) 128

(B) 250

(C) 251

(D) 198

15. What is the name of the attack in which the attacker tries every possible key on a piece of ciphertext until an intelligible translation into plaintext is obtained ?

(A) Brute-force attack

(B) Timing Attack

(C) Meet-in-the-middle attack

(D) Man in the middle

16. The level of data abstraction that describes exactly how the data actually stored

(A) Conceptual level

(B) Physical level

(C) View level

(D) Logical level

17. Which normal form deals with multivalued dependency ?

(A) 4NF

(B) 3NF

(C) 2NF

(D) 1NF

18. A database management system for its operation requires which hardware component that is most important ?

(A) High speed magnetic tape reader

(B) High speed, large capacity disk to store data

(C) High resolution display

(D) High quality printer

19. What is transient data ?

(A) Data in which change to existing records cause the previous version of the records to be eliminated

(B) Data that are never altered once they have been added

(C) Data that are never deleted once they have been added

(D) Data in which changes to existing records do not cause previous version of the records to be eliminated

20. A distributed database means

(A) A loose collection of file that is limited to one location

(B) A single logical database that is constrained to one location

(C) A loose collection of files that is spread to multiple locations and is interconnected by a network

(D) A single logical database that is spread to multiple locations and is interconnected by a network

21. How is hard learning problem solved ?

(A) Using nonlinear differentiable output function for output layers.

(B) Using nonlinear differentiable output for hidden layers.

(C) Using nonlinear differentiable output function for output and hidden layers.

(D) Hard learning problem never be solved.

22. Suppose there is a basket and it is filled with some fresh fruits. The task is to arrange the same type of fruits at one place. But there is no information about those fruits beforehand. It's the first time that the fruits are being seen or discovered here the example of

(A) Reinforcement learning

(B) Supervised learning

(C) Unsupervised learning

(D) Federated learning

23. What is perceptron ?

(A) A single layer feed-forward neural network with pre processing

(B) An auto associative neural network

(C) A double layer auto associative neural network

(D) A neural network that contain feedback

24. Who is the inventor of Artificial Intelligence ?

(A) Geoffrey Hinton

(B) Andrew Ng

(C) John McCarthy

(D) Jurgen Schmidhuder

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25. Which of the following is *not* the commonly used programming language for Artificial Intelligence ?
(A) Perl
(B) Java
(C) PROLOG
(D) LISP

26. A relation R is defined on the set of integers as xRy if f(x + y) is even. Which of the following statements is true ?
(A) R is not an equivalence relation
(B) R is an equivalence relation having one equivalence class
(C) R is an equivalence relation having two equivalence classes
(D) R is an equivalence relation having three equivalence classes

27. Which of the following statements are true for the NFA M = ({p, q, r, s}, {0, 1}, δ, P, {q, s}), where 'δ' is given by

Q \ Σ	0	1
p	q, r	q
q	r	q,r
r	s	p
s	–	p

State transition table

(A) NFA accepts the string 00
(B) NFA does not accept the string 001
(C) NFA accepts the string 1111110
(D) NFA does not accept the string 00

28. Find the content free grammar for the following language (with $n \geq 0$, $m \geq 0$)
$L = \{a^n b^m; n \neq 2m\}$.

(A) $S \rightarrow S_1|S_2$
$S_1 \rightarrow aaS_1b|A|B$
$A \rightarrow aA|a$
$B \rightarrow bB|b$
$S_2 \rightarrow aaS_2|aC$
$C \rightarrow bC|\varepsilon$

(B) $S_1 \rightarrow aaS_1b|A|B$
$A \rightarrow aA|a$
$B \rightarrow bB|b$
$S_2 \rightarrow aaS_2|aC$
$C \rightarrow bC|\varepsilon$

(C) $S \rightarrow S_1|S_2$
$S_1 \rightarrow aaS_1b|A|B$
$S_2 \rightarrow aaS_2|aC$
$C \rightarrow bC|\ \varepsilon$

(D) $S \rightarrow S_1$
$S_1 \rightarrow aaS_1b|A|B$
$A \rightarrow aA|a$
$B \rightarrow bB|b$
$S_2 \rightarrow aaS_2|aC$
$C \rightarrow bC|\varepsilon$

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29. Define the language accepted by the PDA M = ($\{q_0, q_1, q_2, q_3, q_4, q_5\}$, {a, b}, {0, 1, 2}, δ, q_0, z, $\{q_5\}$) with 'δ' defined as follows :

$\delta(q_0, b, z) = \{(q_1, 1z)\}$

$\delta(q_1, b, 1) = \{(q_1, 11)\}$

$\delta(q_2, a, 1) = \{(q_3, \varepsilon)\}$

$\delta(q_3, a, 1) = \{(q_4, \varepsilon)\}$

$\delta(q_4, a, z) = \{(q_4, z), (q_5, z)\}$

(A) $L = \{w = a^n b^n | n \geq 0\}$

(B) $L = \{w = a^{n-1} b^n | n \geq 0\}$

(C) $L = \{w = a^{n+1} b^n | n \geq 1\}$

(D) $L = \{w = a^n b^{2n} | n \geq 0\}$

30. Let M = $(Q, \Sigma, \Gamma, \delta, q_0, B, F)$ be a Turing Machine. Then the language accepted by M can be defined as

(A) $L(M) = \{w \in \Sigma^+ : q_0 w \overset{*}{\vdash} x_1 q_f x_2$ for some $q_f \in F, x_1, x_2 \in \Gamma^*\}$

(B) $L(M) = \{w \in \Sigma : q_0 w \overset{*}{\vdash} x_1 q_f x_2, q_f \in F, x_1, x_2 \in \Gamma^*\}$

(C) $L(M) = \{w \in \Sigma^+ : w \overset{*}{\vdash} x_1 q_f x_2, q_f \in F, x_1, x_2 \in \Gamma^*\}$

(D) $L(M) = \{w \in \Sigma^+ : q_0 w \overset{*}{\vdash} x_1 q_f, q_f \in F, x_1, x_2 \in \Gamma^*\}$

31. Which of the following statement is true with respect to C++ language ?

(A) It supports shallow copy but not deep copy.

(B) It supports deep copy but not shallow copy.

(C) It supports shallow copy and deep copy.

(D) It does not support shallow copy or deep copy.

32. Which of the following tag is used in HTML to define the keywords used by search engines ?

(A) <keyword>

(B) <meta>

(C) <search>

(D) <info>

33. Document Object Model (DOM) is used in

(A) web programming to access and manipulate XML data.

(B) web programming to display the documents on the screen.

(C) web programming to provide object-oriented programming features to HTML.

(D) web programming to generate dynamic visualization models in a web page.

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34. The device which is created with a series of sensors to detect the hand and finger motions is known as

(A) digitizer

(B) space ball

(C) joystick

(D) data glove

35. Which of the following reflection transformation uses the reflection matrix ?

0	1	0
1	0	0
0	0	1

(A) Reflection about x-axis (y = 0)

(B) Reflection about y-axis (x = 0)

(C) Reflection along the diagonal line (y = x)

(D) Reflection about the diagonal (y = – x)

36. Architectural models that may be developed may include : A _____ model that shows the sub-systems or components that are to be developed as separate units.

(A) Static structural

(B) Dynamic process

(C) Interface model

(D) Relationship models

37. Which establishes a framework of organizational procedures and standards that lead to high-quality software ?

(A) Quality Check

(B) Quality Planning

(C) Quality Control

(D) Quality Assurance

38. _____ cost modelling uses a mathematical formula to predict project costs based on estimates of the project size, the number of software engineers, and other process and product factors.

(A) Expert judgment

(B) Parkinson's law

(C) Algorithmic

(D) Pricing to win

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39. _____ analyses and check system representations such as the requirements document, design diagrams and the program source code.

(A) Peer reviews

(B) Software testing

(C) System testing

(D) Hardware

40. A _____ database does *not* just include information about configuration items. It may also record information about users of components, system customers, execution platforms, proposed changes and so forth.

(A) Configuration

(B) Change management

(C) DBMS

(D) Testing

41. Which of the following statement is *not* true with respect to a Micro programmed Control Unit in comparison with a Hardwired Control Unit ?

(A) It provides more flexibility.

(B) It provides better execution speed.

(C) It enables a simpler control unit design.

(D) It makes it easier to troubleshoot design issues involving a control unit.

42. Which of the following register in x86 architecture is generally used as a pointer to data ?

(A) Counter Register (CX)

(B) Base Register (BX)

(C) Stack Pointer Register (SP)

(D) Stack Base Pointer Register (BP)

43. Which of the following computer system is represented by a generic personal computer ?

(A) Single Instruction Stream, Single Data Stream (SISD)

(B) Single Instruction Stream, Multiple Data Stream (SIMD)

(C) Multiple Instruction Stream, Single Data Stream (MISD)

(D) Multiple Instruction Stream, Multiple Data Stream (MIMD)

44. Which of the following generally does *not* use a Hardware Interrupt ?

(A) System Timer

(B) System Call

(C) Random Access Memory Controller

(D) Network Interface Card

45. Which type of memory enables appropriate for a scenario involving a pattern search ?

(A) Auxiliary Memory

(B) Associative Memory

(C) Cache Memory

(D) Virtual Memory

46. Which of the following is false in the case of a spanning tree of a graph G ?

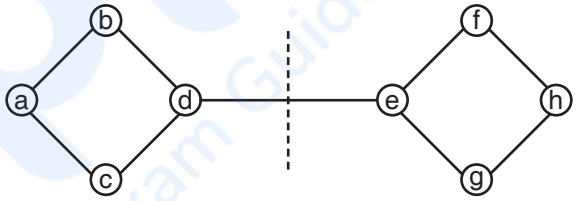
(A) It can be cyclic

(B) It is a tree that spans G

(C) It is a subgraph of G

(D) It includes every vertex of G

47. The given figure depicts



(A) Min cut problem

(B) Max cut problem

(C) Flow graph

(D) Dependency graph

48. Problems that cannot be solved by any algorithm are called

(A) Tractable problems

(B) Undecidable problems

(C) Decidable problems

(D) Intractable problems

49. Space complexity refers to

(A) Disk storage required to store the source program

(B) How much memory needed to perform the given task

(C) How long does it take to find a solution

(D) How much time is really required to perform the given task

50. Which algorithmic approach tries to achieve localized optimum solution ?

(A) Greedy approach

(B) Divide and conquer approach

(C) Dynamic approach

(D) Backtracking approach

51. If a processor uses a 32 bit virtual address and a 28 bit physical address with 2 kb pages, then how many bits are needed for the virtual and physical page number ?

(A) 17, 21

(B) 21, 17

(C) 6, 10

(D) 10, 6

52. With an average page fault service time of 20 ms, a MAT of 80 ns, and a 10% probability of a page fault, what will be the effective access time ?

(A) 2,000,672 ns

(B) 2,000,072 ns

(C) 2,000,036 ns

(D) 2,000,006 ns

53. Application of data structure queue is

(A) Level wise printing of tree

(B) Implementation of priority queues

(C) Function call implementation

(D) Depth first search in a graph

54. Consider the following statements.

S1 : Two user level threads implemented in the user space in the same process can not be synchronized using a semaphore.

S2 : When a context switch occurs between two threads of the same process then only program counter will be changed and no other attribute changes.

Which of the above statements is/are correct ?

(A) S1 only

(B) S2 only

(C) S1 and S2 both

(D) S1 and S2 both are incorrect

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55. The unix command utilized to determine the number of characters in a file is

(A) nc

(B) wc

(C) chcnt

(D) lc

56. Let us consider the graph G and its thickness is defined as minimum number of (edge-disjoint) planar subgraphs into which G can be decomposed. The thickness of G is defined as θ (G). For any linear graph with no-self loops of G is defined as $\theta(G) \geq \left\lceil \frac{e}{3v-6} \right\rceil$ because of

(A) Each of planar subgraphs into which G is decomposed can have atmost 3v – 6 edges

(B) Each of planar subgraphs into which G is decomposed can have atleast 3v – 6 edges

(C) Each of planar subgraphs into which G is decomposed can have exactly 3v + 6 edges

(D) Each of planar subgraphs into which G is decomposed can have 3v edges

57. A group of college students were asked about their TV watching habits. The conclusion of the given survey is as follows –

28 students watch The Walking Dead, 19 watch The Blacklist and 24 watch Game of Thrones. In addition to this, 16 watch The Walking Dead and The Blacklist, 14 watch The Walking Dead and Game of Thrones and 10 watch The Blacklist and Game of Thrones. There are 8 students who watch all 3 movies. How many students surveyed watched atleast one of the movie ?

(A) 39
(B) 45
(C) 23
(D) 55

58. There is set of magnetic alphabet letters (one of each of the 26 letters in the alphabet) that you need to put into boxes. The following rule must be followed, such that do not put 2 consecutive letters in the same box. What is the minimum number of boxes you need (assume the boxes are able to hold as many letters as they need to) ?

(A) 2 boxes
(B) 3 boxes
(C) 1 box
(D) 4 boxes

59. Linearity implies that linear programming must satisfy the properties

(A) Multiplicity and continuity
(B) Convexity and duality
(C) Proportionality and additivity
(D) Differentiability and feasibility

60. The interior and exterior paint production model is given as

Maximize $z = 5x_1 + 4x_2$

Subject to $6x_1 + 4x_2 \leq 24$

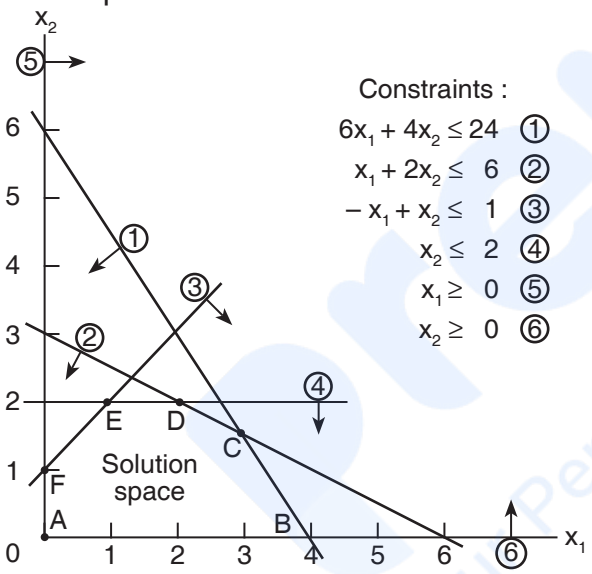
$x_1 + 2x_2 \leq 6$

$-x_1 + x_2 \leq 1$

$x_2 \leq 2$

$x_1, x_2 \geq 0.$

The optimum solution of this objective function is shown in the figure at point C. If we change the objective function $z = 5x_1 + 4x_2$ to $C_1x_1 + C_2x_2$ then solution at C remain optimum as long as z lies between the slopes of the intersecting lines at C. The relationship can be express as



(A) If $C_1 \neq 0$, then $\frac{4}{6} \leq \frac{C_2}{C_1} \leq \frac{2}{1}$ or if $C_2 \neq 0$, then $\frac{1}{2} \leq \frac{C_1}{C_2} \leq \frac{6}{4}$

(B) $C_1 \neq 0$, then $\frac{4}{6} \leq \frac{C_2}{C_1} \leq \frac{3}{1}$

(C) $C_2 \neq 0$, then $\frac{1}{2} \leq \frac{C_1}{C_2} \leq \frac{7}{4}$

(D) If $C_2 \neq 0$ and $C_1 = 0$, then $\frac{1}{3} \leq \frac{C_1}{C_2} \leq \frac{5}{4}$

61. In the full/full duplex (F/FDX) mode, transmission is possible in both direction at the same time but not between the same two stations. Means

(A) Sender and receiver are same

(B) One station is transmitting to a second station and receiving from a third station at the same time

(C) Sender S1 to Receiver R1 back to sender S1 from Receiver R1 nodes

(D) Sender to receiver has bidirectional connectivity

62. The _____ of a signal is the magnitude of the signal at any point on the waveform.

(A) Peak value

(B) Amplitude

(C) Peak to peak

(D) Phase

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63. In a transmission, if the binary pulse is maintained for the entire bit time, then it is called as _____.

(A) return to zero (RZ)

(B) unipolar return to zero (UPRZ)

(C) non-return to zero (NRZ)

(D) unipolar non-return to zero (UPNRZ)

64. Which coaxial cable is used for digital transmission ?

(A) 10 ohm cable

(B) 25 ohm cable

(C) 40 ohm cable

(D) 50 ohm cable

65. How many different modes of transmission exists in fiber optic data transmission ?

(A) 0

(B) 1

(C) 2

(D) 3

66. In ER model, if A is the dominant entity and B is a subordinate entity, then

(A) If B is deleted, then A is also deleted

(B) If A is deleted, then B is also deleted

(C) If A is deleted, then B is not deleted

(D) Both A and B must be always deleted together

67. Consider two relations s and e, where s is a relation on scheme S(R_no, Name, Marks) and e is a relation on scheme E(C_no, C_name). If s has m tuples and e has n tuples, the natural join between s and e has how many tuples ?

(A) $m + n$

(B) $m \times n$

(C) minimum of (m, n)

(D) maximum of (m, n)

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68. Consider the following concurrency control protocols.

I. Two-phase locking

II. Time-stamp ordering

Select the most appropriate option.

(A) Two-phase locking ensures conflict serializability

(B) Time-stamping ordering protocol ensures freedom from deadlock

(C) Both (A) and (B) are correct

(D) Both (A) and (B) are not correct

69. Let D1 and D2 be data items initialized to zero. Consider the following two transactions T1 and T2 :

```
T1 :  read(D1)
      read(D2)
      if D1=0 then D2 := D2+1;
      write(D2);
T2 :  read(D2);
      read(D1);
      if D2=0 then D1 := D1+1;
      write(D1)
```

Any non-serial interleaving of T1 and T2 for concurrent execution leads to

(A) A serializable schedule

(B) A schedule that is not conflict serializable

(C) A conflict serializable schedule

(D) A schedule that leads to deadlock

70. Identify concurrency-based protocol.

(A) Timestamp ordering protocol

(B) Lock based protocol

(C) Two-phase locking protocol

(D) All of the above

71. Which of the following is *not* a programming paradigm ?

(A) Procedural

(B) Object Based

(C) Logical

(D) Functional

72. Eclipse is an open-source software tool used by computer programmers as

(A) Programming Editor

(B) Language Processor (Interpreter/ Compiler)

(C) Source Code Debugger

(D) Integrated Development Environment

73. Predict the output of following source code in C language :

```
int main ( )
{
        char x = 65;
        printf("%c |%d|%f", x, x, x);
        return 0;
}
```

(A) 65 | 65 | 0.000000

(B) A | 65 | 0.000000

(C) 65 | 65 | 65.000000

(D) A | 65 | 65.000000

74. Select the appropriate source code translation sequence with respect to C language.

(A) Preprocessing – Assembling – Compiling – Linking

(B) Preprocessing – Compiling – Assembling – Linking

(C) Preprocessing – Compiling – Linking – Assembling

(D) Preprocessing – Assembling – Linking – Compiling

75. If a language supports encapsulating state and operations inside objects, but not inheritance, then it can appropriately categorise under which of the following category ?

(A) Procedural Language

(B) Object Oriented Language

(C) Object Based Language

(D) Scripting Language

76. The n^{th} statement in a list of 100 statements is "Exactly n of the statements in this list are false". What conclusion can you draw from these statements ?

(A) All statements are true

(B) All statements are false

(C) The 99^{th} statement is true and rest are false

(D) Exactly 10 statements are true

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77. Let R be a relation on a set S. R is circular if, x, y, z $\in$ S, whenever xRy and yRz, it follows that zRx. Which of the properties do a reflexive and circular relation possess ?

(A) Irreflexive

(B) Transitive

(C) Antisymmetric

(D) None of these

78. If X and Y are independent random variables, then the simplified form of the conditional variance law is

(A) The conditional variance of Y given X is equal to the product of the variances of X and Y

(B) The conditional variance of Y given X is equal to the sum of the variances of X and Y

(C) The conditional variance of Y given X is equal to the variance of Y

(D) The conditional variance of Y given X is equal to the unconditional variance of Y

79. Let us consider the chessboards such that, 2 chessboards are considered distinct if one cannot be obtained from another through rotation. Identify the number of distinct 2 × 2 chessboards whose cells are painted white and black.

(A) 6

(B) 8

(C) 3

(D) 7

80. How many different boolean functions F(x, y, z) are there such that $F(\bar{x}, \bar{y}, \bar{z}) = F(x, y, z)$ for all values of the boolean variables x, y and z ?

(A) 16

(B) 18

(C) 20

(D) 30

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81. Given a fuzzy set A defined on the universal set X and any number $\alpha \in [0, 1]$,

(A) ${}^{\alpha}A$ is fuzzy set and ${}^{\alpha+}A$ is crisp set

(B) ${}^{\alpha}A$ is crisp set and ${}^{\alpha+}A$ is fuzzy set

(C) ${}^{\alpha}A$ and ${}^{\alpha+}A$ are fuzzy sets

(D) ${}^{\alpha}A$ and ${}^{\alpha+}A$ are crisp sets

82. Given a fuzzy relation R(X, Y), the membership function of its domain dom R, domR(x) =

(A) $\min_{x \in Y} R(x, y)$

(B) $\min_{y \in Y} R(x, y)$

(C) $\max_{x \in Y} R(x, y)$

(D) $\max_{y \in Y} R(x, y)$

83. If the height, h(A), of a fuzzy set A is less than 1, then such a fuzzy set is called as

(A) normal

(B) abnormal

(C) subnormal

(D) fuzzy normal

84. Which of the following selection (reproduction) operator simulates based on the slow cooling of molten metal to achieve the minimization function value in a minimization problem ?

(A) Tournament selection

(B) Roulette-wheel selection

(C) Rank selection

(D) Boltzmann selection

85. Who stated that “When an axon of a cell A is near enough to excite cell B and repeatedly or persistently takes part in firing it, some growth process or metabolic change takes place in one or both cells such that A’s efficiency, as one of the cell firing cell B, is increased” ?

(A) Hopfield

(B) Pitts

(C) McCulloch

(D) Hebb

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86. Which software process model has benefit of having easier to get customer feedback on the development work that has been done ? (Like customers can comment on demonstrations of the software and see how much has been implemented.)

(A) The waterfall model

(B) Incremental development

(C) Reuse-oriented software engineering

(D) Modular approach

87. How many basic process activities are organized differently in different development processes of software process models ?

(A) 3

(B) 4

(C) 5

(D) 6

88. Acceptance testing is sometimes called

(A) Unit testing

(B) Beta testing

(C) Alpha testing

(D) Verification

89. Which of the following characteristics are the life cycle metrics of adaptive development method that focusses on product and projects ?

(A) Low change, low speed and high uncertainty

(B) Low change, high speed and high uncertainty

(C) High change, low speed and low uncertainty

(D) High speed, high change and high uncertainty

90. _____ is the property to measure time to restart after failure percentage of events causing failure probability of data corruption on failure.

(A) Ease of use

(B) Reliability

(C) Robustness

(D) Portability

91. Consider 3 problems P_1, P_2 and P_3. It is known that P_1 has polynomial time solution, P_2 is NP- complete and P_3 is in NP. Which one of the following is true ?

I. P_3 has polynomial time solution if P_1 is polynomial time reducible to P_3.

II. P_3 is NP complete if P_3 is polynomial time reducible to P_2.

III. P_3 is NP complete if P_2 is reducible to P_3.

IV. P_3 has polynomial time complexity and P_3 is reducible to P_2.

(A) I

(B) II

(C) III

(D) IV

92. Any non-trivial property F of the recursively enumerable languages is

(A) undecidable

(B) decidable

(C) recursive

(D) recursively enumerable

93. What is the key limitation of a Recursive Descent Parsing ?

(A) Inability to handle left recursion

(B) Inability to handle right recursion

(C) Difficulty in constructing parse trees

(D) Limited Lookahead capability

94. Which type of grammar is suitable for CYK (Cocke – Younger – Kasami) Parsing ?

(A) LL (1)

(B) LR (1)

(C) CFG

(D) Regular Grammar

95. Which of the following is *not* a common peephole optimization technique ?

(A) Constant Folding

(B) Dead Code Elimination

(C) Loop Unrolling

(D) Register Allocation

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96. In a graph, if we can split all the nodes into two sets V1 and V2, such that there are no edges between two vertices of V1 or between two vertices of V2, then it is called

(A) Partite

(B) Doublegraph

(C) Bipartite

(D) Bisects

97. If you want to convert a recursive algorithm to non-recursive one, which data structure is most likely to be used ?

(A) Array

(B) Stack

(C) Queue

(D) Tree

98. A circuit less connected graph with n vertices has

(A) n edges

(B) (n – 1) edges

(C) n^2 edges

(D) 2n edges

99. In a linear search

(A) Search starts at the middle and goes to left or right depending on the case

(B) Search starts at the beginning of the list and check every element in the list until either search successful or list ends

(C) Computes a hash value and compares

(D) Search is randomly carried out

100. When representing any algebraic expression E in a 2-tree, which uses only binary operations:

(A) The variables and operations in E will appear only in internal nodes

(B) The operations in E will appear as external nodes and variables in internal nodes

(C) The variables in E will appear as external nodes and operations in internal nodes

(D) The variables and operations in E will appear only in external nodes

ROUGH WORK

