Question Booklet No.	Question Booklet Series : **A**

AUAT — 2024

2-Year M. Tech. in Computer Science & Engineering (P25)

(TEST BASED ON MCQ)

Full Marks : 100	Duration : 2 Hours

Roll No. of the Candidate : _____

Date of Examination : _____

Name of Examination Centre : _____

Signature of the Candidate : _____

Signature of the Invigilator on Verification

IMPORTANT INSTRUCTIONS

Candidates should read the below instructions carefully and follow them accordingly.

1. The Question Booklet has paper seal pasted on it. Please do **NOT** open the Question Booklet until you are asked to do so by the Invigilator.

2. The candidates must check immediately after breaking the seal that the Question Booklet contains **100 Multiple Choice Questions** in two parts (Part—I and Part—II).

3. Answer of questions of Part—I and Part—II both will have to be given on the **OMR Answer Sheet** provided for this purpose. Fill up the necessary fields that are intended for you by writing and/or shading appropriately. Otherwise the **OMR Answer Sheet *cannot*** be evaluated and will liable to be rejected. Question numbers progress from **1** to **100** continuously with alternative answers being shown as [A], [B], [C] and [D] for each question. Record your response by completely darkening the corresponding bubble. While responding, you should consider the best alternative answer and shade only one bubble with **black/blue ball point pen only**. For each correct response you will be awarded **1** mark. There will be negative marking for wrong responses. For each wrong response, **–0·25** mark will be awarded. Multiple responses against one **MCQ** will be treated as a wrong response.

4. On leaving the examination hall, candidates must submit the **OMR Answer Sheet**. They are allowed to keep the Question Booklet with them.

5. **OMR Answer Sheet** will be processed by electronic means. Any untoward/irrelevant remarks, folding or putting stray notes on the answer sheet, any damage to the answer sheet will lead to the rejection of the same and the sole liability shall remain with the candidate.

6. Rough Work may be done at the end of the Question Booklet.

7. No candidate will be allowed to leave the examination hall before completion of the examination.

8. Use of any Electronic device like Mobile, Programmable Calculator etc. is strictly prohibited.

DO NOT OPEN THE SEAL UNTIL INSTRUCTED TO DO SO

PART—I

(Core Subject)

1. The curvature of a function $f(x)$ is zero. Which of the following functions could be $f(x)$?

[A] $ax + b$

[B] $ax^2 + bx + c$

[C] $\sin(x)$

[D] $\cos(x)$

2. A fair dice is rolled 6 times. What is the probability of seeing 4?

[A] 4/6

[B] 3/6

[C] 0

[D] 1/6

3. If the critical region is evenly distributed, then the test is referred as

[A] two-tailed

[B] one-tailed

[C] three-tailed

[D] zero-tailed

4. Which of the following is the advantage of using the Gauss Jordan method?

[A] Additional calculations

[B] No labor of back substitution

[C] More operations involved

[D] Elimination is easier

5. If $W = xy + yz + z$, find directional derivative of W at $(1,-2,0)$ in the direction towards the point (3, 6, 9).

[A] – 0·6

[B] – 0·7

[C] – 0·8

[D] – 0·9

6. In C language, FILE is of which data type?

[A] int

[B] char *

[C] struct

[D] None of the mentioned

7. Which is the ***correct*** way to generate numbers between minimum and maximum (inclusive)?

[A] Minimum + (rand()% (maximum – minimum)/1)

[B] Minimum + (rand()% (maximum – minimum) + 1)

[C] Minimum * (rand()% (maximum – minimum))

[D] Minimum – (rand()% (maximum + minimum))

8. Which of the following data structures is more appropriate for implementing quick sort iteratively?

[A] Deque

[B] Queue

[C] Stack

[D] Priority queue

9. What is the maximum number of keys that a B+-tree of order 3 and of height 3 have?

[A] 3

[B] 80

[C] 27

[D] 26

10. What is the hash function used in linear probing?

[A] H(x) = key mod table size

[B] H(x) = (key + F(i2)) mod table size

[C] H(x) = (key + F(i)) mod table size

[D] H(x) = X mod 17

11. Which of these adjacency matrices represents a simple graph?

[A] $[[1,0,0],[0,1,0],[0,1,1]]$

[B] $[[1,1,1],[1,1,1],[1,1,1]]$

[C] $[[0,0,1],[0,0,0],[0,0,1]]$

[D] $[[0,0,1],[1,0,1],[1,0,0]]$

12. Which one of the following is the ***correct*** formulae to find the parent node at index I?

[A] $(I-1)/K$

[B] $(I+1)/K$

[C] $(I*1)/K$

[D] $(I-2)/K$

13. What are two exception classes in hierarchy of Java exceptions class?

[A] Runtime exceptions only

[B] Compile-time exceptions only

[C] Runtime exceptions and other exceptions

[D] Other exceptions

14. Which of the following is a characteristic of an object?

[A] Encapsulation

[B] Inheritance

[C] Polymorphism

[D] Identity

15. A software system's performance suffers because it creates too many heavy-weight objects. Which design pattern could be implemented to reduce the number of objects and improve performance?

[A] Singleton

[B] Flyweight

[C] Prototype

[D] Builder

16. What does the Liskov Substitution Principle (LSP) state?

[A] Subclasses should be substitutable for their base classes

[B] Objects should be replaceable with instances of their subtypes

[C] Both [A] and [B]

[D] Neither [A] nor [B]

17. Consider that the page fault service time in a computer is 10 ms and the average money access time is 20 ns. If, in case, it generates a page fault every 10^6 memory accesses, then what would be the effective access time for this memory?

[A] 30 ns

[B] 21 ns

[C] 35 ns

[D] 23 ns

18. A process executes the following code : "for (i = 0; i < n; i++) fork();". The total number of child processes created is

[A] n

[B] $2^n - 1$

[C] 2^n

[D] $2^{(n+1)} - 1$

19. A multilevel page table is preferred in comparison to a single level page table for translating virtual address to physical address because

[A] it reduces the memory access time to read or write a memory location

[B] it helps to reduce the size of page table needed to implement the virtual address space of a process

[C] it is required by the translation lookaside buffer

[D] it helps to reduce the number of page faults in page replacement algorithms

20. Assume a relation X (M, N, O, P, Q) that has the following functional dependencies : $MNO \rightarrow PQ$ and $P \rightarrow MN$. The total number of superkeys of X would be

[A] 12

[B] 10

[C] 7

[D] 2

21. _____ command is used in SQL to issue multiple CREATE TABLE, CREATE VIEW and GRANT statements in a single transaction.

[A] CREATE CLUSTER

[B] CREATE PACKAGE

[C] CREATE SCHEMA

[D] All of the mentioned

22. Which of the following represents a query in the tuple relational calculus?

[A] $\{\ \}\{P(t) \mid t\}$

[B] $\{t \mid P(t)\}$

[C] $t \mid P(\ ) \mid t$

[D] All of the mentioned

23. Which JDBC driver Type(s) can be used in either applet or servlet code?

[A] Both Type 1 and Type 2

[B] Both Type 1 and Type 3

[C] Both Type 3 and Type 4

[D] Type 4 only

24. If a multivalued dependency holds and is not implied by the corresponding functional dependency, it usually arises from which one of the following sources?

[A] A many-to-many relationship set

[B] A multivalued attribute of an entity set

[C] A one-to-many relationship set

[D] Both a many-to-many relationship set and a multivalued attribute of an entity set

25. _____ which increases the number of I/O operations needed to write a single logical block, pays a significant time penalty in terms of write performance.

[A] RAID level 1

[B] RAID level 2

[C] RAID level 5

[D] RAID level 3

26. A sorting technique is called stable, if

[A] it takes O (n log n) time

[B] it maintains the relative order of occurrence of non-distinct elements

[C] it uses divide and conquers paradigm

[D] it takes O (n) space

27. Consider the following array of elements :
⟨89, 19, 50, 17, 12, 15, 2, 5, 7, 11, 6, 9, 100⟩.
The minimum number of interchanges needed to convert it into a max-heap is

[A] 4

[B] 5

[C] 2

[D] 3

28. Which of the following is an NP complete problem?

[A] Hamiltonian cycle

[B] Travelling salesman problem

[C] Calculating chromatic number of graph

[D] Finding maximum element in an array

29. Which of the following is similar to Euclidean distance?

[A] Manhattan distance

[B] Pythagoras metric

[C] Chebyshev distance

[D] Heuristic distance

30. What is the running time of an unweighted shortest path algorithm whose augmenting path is the path with the least number of edges?

[A] $O(|E|)$

[B] $O(|E||V|)$

[C] $O(|E|2|V|)$

[D] $O(|E|\log|V|)$

31. Which of the following states that work expands to fill the time available?

[A] CASE tools

[B] Pricing to win

[C] Parkinson's law

[D] Expert judgement

32. Function Point Computation is given by the formula

[A] FP = [count total * 0·65] + 0·01 * sum(Fi)

[B] FP = count total * [0·65 + 0·01 * sum(Fi)]

[C] FP = count total * [0·65 + 0·01] * sum(Fi)

[D] FP = [count total * 0·65 + 0·01] * sum(Fi)

33. Which grammar rules violate(s) an operator grammar's requirements?

I. $P \rightarrow Q\ R$

II. $P \rightarrow QsR$

III. $P \rightarrow \varepsilon$

IV. $P \rightarrow QtRr$

here P, Q, R are non-terminals, while r, s, t are terminals.

[A] I only

[B] I and III only

[C] II and III only

[D] III and IV only

34. Which one of the following represents the strings in X_0?

[A] $10\left(0^* + (10)^*\right)1$

[B] $1\left(0^* + (10)^*\right)^* 1$

[C] $10\left(0^* + (10)^*\right)^* 1$

[D] $10(0+10)^* 1 + 110(0+10)^* 1$

35. In the context of abstract-syntax-tree and control-flow-graph, which one of the following is ***true***?

[A] In both AST and CFG if node N2 be the successor of node N1

[B] For any input program, neither AST nor CFG will contain a cycle

[C] The max number of successors of a node in an AST and a CFG depends on the input program

[D] None of the mentioned

36. Given the following expression grammar: $E \rightarrow E*F|F+E|F, F \rightarrow F-F|id.$ Which of the following is ***true***?

[A] * has higher precedence than +

[B] – has higher precedence than *

[C] + and – have same precedence

[D] + has higher precedence than *

37. If a link transmits 4000 frames per second, and each slot has 8 bits, what is the transmission rate of the circuit using Time Division Multiplexing (TDM)?

[A] 500 kbps

[B] 32 kbps

[C] 32 bps

[D] 500 bps

38. In IPv4 Addresses, classful addressing is replaced with

[A] Classless Addressing

[B] Classful Addressing

[C] Classful Advertising

[D] Classless Advertising

39. How many octets are dedicated to OUI (Organizationally Unique Identifier) in 48 MAC address space?

[A] 5

[B] 3

[C] 2

[D] 4

40. When can we detect a collision, if the hash values are same for two inputs, that is $H(x) = H(y)$?

[A] When $x < y$

[B] When $x > y$

[C] When $x = y$

[D] When $x ! = y$

41. Which of the following operations can be used to zoom in or out around any axis on a three-dimensional object from its original position?

[A] Rotation

[B] Shearing

[C] Scaling

[D] Translation

42. In outcode can have _____ bits for two-dimensional clipping and _____ bits for three-dimensional clipping.

[A] 4, 6

[B] 6, 8

[C] 2, 4

[D] 1, 3

43. The two-dimensional rotation equation in the matrix form is

[A] P' = P + T

[B] P' = R * P

[C] P' = P * P

[D] P' = R + P

44. Which gray-level transformation increases the dynamic range of gray-level in the image?

[A] Negative transformations

[B] Contrast stretching

[C] Power-law transformations

[D] None of the mentioned

45. Which of the following facts is ***correct*** for an image?

[A] An image is the multiplication of illumination component and reflectance component

[B] An image is the subtraction of reflectance component from illumination component

[C] An image is the subtraction of illumination component from reflectance component

[D] An image is the addition of illumination component and reflectance component

46. Region of Interest (ROI) operations is generally known as

[A] masking

[B] dilation

[C] shading correction

[D] None of the mentioned

47. Which type of machine learning algorithm falls under the category of 'unsupervised learning'?

[A] Linear Regression

[B] K-means Clustering

[C] Decision Trees

[D] Random Forest

48. A 3-input neuron is trained to output a zero when the input is 110 and a one when the input is 111. After generalization, the output will be zero when and only when the input is

[A] 000 or 110 or 011 or 101

[B] 010 or 100 or 110 or 101

[C] 000 or 010 or 110 or 100

[D] 100 or 111 or 101 or 001

49. An IoT network is a collection of _____ devices.

[A] signal

[B] machine to machine

[C] interconnected

[D] network to network

50. Which of the following protocols does the secure digital card application use?

[A] XMPP

[B] SPI

[C] MQTT

[D] HTTPS

51. Which of the following stages of cryptography are the readable non-encrypted data?

[A] Plain text

[B] Encryption

[C] Cipher text

[D] Decryption

52. Which of the following is/are symmetric based algorithms?

[A] Block

[B] Block cipher

[C] Blowfish

[D] All of the above

53. For any primal problem and its dual,

[A] optimal value of objective function is same

[B] dual will have an optimal solution if primal does too

[C] primal will have an optimal solution iff dual does too

[D] Both primal and dual cannot be infeasible

54. The coefficient of slack\surplus variables in the objective function are always assumed to be

[A] 0

[B] 1

[C] M

[D] –M

55. Priority queue discipline may be classified as

[A] pre-emptive or non-pre-emptive

[B] limited

[C] unlimited

[D] finite

56. Which of the following standard algorithms is ***not*** Dynamic Programming based?

[A] Bellman-Ford Algorithm for single source shortest path

[B] Floyd Warshall Algorithm for all pairs shortest paths

[C] 0-1 Knapsack problem

[D] Prim's Minimum Spanning Tree

57. We can show that the clique problem is NP-hard by proving that

[A] CLIQUE $\leq$ P 3 – CNF_SAT

[B] CLIQUE $\leq$ P VERTEX_COVER

[C] CLIQUE $\leq$ P SUBSET_SUM

[D] None of the above

58. The total numbers of states and transitions required to form a moore machine that will produce residue mod 3 are

[A] 3 and 6

[B] 3 and 5

[C] 2 and 4

[D] 2 and 5

59. Which of the following can accept even palindrome over {a, b}?

[A] Push down Automata

[B] Turning machine

[C] NDFA

[D] All of the mentioned

60. Which of the following options is ***incorrect***?

[A] A language L is regular if and only if $\sim$L has finite number of equivalent classes

[B] Let L be a regular language. If $\sim$L has k equivalent classes, then any DFA that recognizes L must have atmost k states

[C] A language L is NFA-regular if and only if it is DFA-regular

[D] None of the mentioned

61. Input to Lexical Analyser is

[A] Source code

[B] Object code

[C] Lexeme

[D] None of the mentioned

62. If a node is locked in _____ the subtree rooted by that node is locked explicitly in shared mode, and that explicit locking is being done at a lower level with exclusive-mode locks.

[A] intention lock modes

[B] shared and intention-exclusive (SIX) mode

[C] intention-exclusive (IX) mode

[D] intention-shared (IS) mode

63. How many AND gates are required to construct a 4-bit parallel multiplier, if four 4-bit parallel binary address are given?

[A] Four 2 – input AND gates

[B] Eight 2 – input AND gates

[C] Sixteen 2 – input AND gates

[D] Two 2 – input AND gates

64. BCD adder can be constructed with 3 IC packages each of

[A] 2 bits

[B] 3 bits

[C] 4 bits

[D] 5 bits

65. If the instruction Add R1, R2, R3 is executed in any system which is pipelined, then the value of S is (where S is term of the basic performance equation)

[A] 2

[B] ~ 1

[C] ~ 7

[D] 2

66. The number successful accesses to memory stated as a fraction is called as

[A] access rate

[B] success rate

[C] hit rate

[D] miss rate

67. Both the CISC and RISC architectures have been developed to reduce the

[A] cost

[B] time delay

[C] semantic gap

[D] All of the mentioned

68. In a game, a fair coin is tossed 6 times. Each time the coin comes up tails, *A* will pay ₹15 but if each time heads come up, *A* will pay nothing. Determine the probability that *A* will win ₹45 by playing the game?

[A] 5/16

[B] 4/31

[C] 3/7

[D] 12/65

69. Which of the following techniques is an analysis of the relationship between two variables to help provide the prediction mechanism?

[A] Standard error

[B] Correlation

[C] Regression

[D] None of the above

70. Let G be simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph. Then the number of bounded faces in any embedding of G on the plane is equal to right is

[A] 6

[B] 5

[C] 4

[D] 3

PART—II

(Islamic History and Culture, General English & General Knowledge)

71. As-salamu alaykum means
আস-সালামু আলাইকুম-এর অর্থ
[A] How are you?
[B] Peace be upon you
[C] Wish you good luck
[D] Glory be to Allah

72. Which of the following is/are ***true***?
নিম্নের কোনটি/কোনগুলি **সঠিক**?
[A] Muhammad (PBUH) is the last Prophet of Islam
[B] Islam existed since the beginning
[C] All Prophets practiced and propagated Islam
[D] All of the above

73. The *Holy Qur'an* can be read by
'পবিত্র কুরআন' পড়তে পারেন
[A] only scholars
[B] only rich people
[C] only men
[D] everybody

74. The prayer at the evening is called
সন্ধ্যাবেলার নামাযকে বলা হয়
[A] Asr
[B] Maghrib
[C] Tahajjud
[D] None of the above

75. The number of most notable companions of Prophet Muhammad (PBUH) is
নবী মুহাম্মদ (সা.)-এর বিশেষভাবে উল্লেখযোগ্য সাহাবীর সংখ্যা হল
[A] 1
[B] 4
[C] 40
[D] 313

76. One who receives revelation in the form of message but not book is called a
বার্তা আকারে যিনি ঐশী প্রত্যাদেশ পান, অথচ গ্রন্থাকারে নয়, তিনি হলেন একজন
[A] Prophet but not messenger
[B] messenger but not Prophet
[C] Prophet as well as messenger
[D] neither Prophet nor messenger

77. The name of the second last Prophet is
দ্বিতীয় শেষ নবীর নাম হল
[A] David
[B] Moses
[C] Jesus
[D] Ahmad

78. Who is called the 'Father of Kitten'?
'ছোট বিড়ালের পিতা' কাকে বলা হয়?
[A] Abu Hurairah
[B] Abu Ubaida
[C] Talha
[D] Zubair

79. The first martyr in Islam is
ইসলামের প্রথম শহীদ হলেন
[A] Hasan
[B] Husain
[C] Sumayya
[D] Yasir

80. The meal taken for breaking the fast is called
রোযা সমাপ্ত করতে যে খাবার খাওয়া হয় তাকে বলা হয়
[A] Shari
[B] Iftar
[C] Lunch
[D] Dinner

81. A Prophet is called _____ in Arabic.

একজন নবীকে আরবীতে _____ বলা হয়।

[A] Nabi

[B] Rasul

[C] Wahi

[D] None of the above

82. Which gates are opened during the month of Ramadan?

রমজান মাসে কোন্ দরজাগুলো খোলা হয়?

[A] Gates of Hell

[B] Gates of Heaven

[C] Gates of Light

[D] Gates of Mosque

83. What Muslims must perform before offering salah (prayers)?

সালাত (নামায) পড়ার আগে মুসলমানদের কি করতে হয়?

[A] Wearing of skull-cap

[B] Wearing of perfume

[C] Wudu (ablution)

[D] Clipping of nails

84. Allah (s.w.t.) has _____.

আল্লাহ (সুবহানাহু ওয়া তায়ালা)-এর _____ আছে।

[A] a son

[B] a partner

[C] no partner

[D] a daughter

85. What did the Prophet Muhammad (SAW) mention about the status of a Mother?

নবী মুহাম্মদ (সা.) মায়েদের মর্যাদা সম্পর্কে কী উল্লেখ করেছেন?

[A] Mothers are not important at all

[B] Paradise is beneath the feet of a mother

[C] Mothers are bad women

[D] None of the above

86. The Islamic Calendar is based on the _____.

ইসলামিক ক্যালেন্ডার _____-এর উপর ভিত্তি করে।

[A] planets

[B] solar

[C] moon

[D] sun

87. When will the Day of Judgement occur?

বিচার দিবস কখন ঘটবে?

[A] Year 7000

[B] Year 2050

[C] Year 2060

[D] Only Allah knows

88. What is dry ablution called?

শুকনো ওযুকে কি বলে?

[A] Wudhu

[B] Tayammum

[C] Ghusl

[D] None of the above

89. What is one unit of prayer called?

নামাযের একককে কী বলা হয়?

[A] Fard

[B] Rakah

[C] Juz'

[D] Sunnah

90. What is the name of the cloth worn by men for Hajj and Umrah?

হজ ও ওমরার জন্য পুরুষদের পরিধান করা কাপড়ের নাম কী?

[A] Haram

[B] Ihram

[C] Qamis

[D] Izaar

91. Choose the correct alternative :

[A] Oats is a healthier alternative

[B] Oats is a healthier alternatives

[C] Oats is healthier alternatives

[D] Oats are healthier alternatives

92. Fill in the blank with the ***correct*** alternative.

The ____ young neighbour greeted my parents.

[A] amicable

[B] amiable

[C] inimical

[D] enviable

93. Identify the antonym of the word 'GARRULOUS'.

[A] Innocuous

[B] Loquacious

[C] Jabbering

[D] Reticent

94. Choose the noun form of the word 'GLORIOUS'.

[A] Glory

[B] Glorify

[C] Glorified

[D] Glorifying

95. Fill in the blank with the ***correct*** alternative.

The boys failed to achieve a _____ victory in the match.

[A] decided

[B] decisive

[C] deceived

[D] divisive

96. Which State is called the 'Rice Bowl of India'?

কোন্ রাজ্যকে 'ভারতের চালের বাটি' বলা হয়?

[A] Kerala

[B] Karnataka

[C] Andhra Pradesh

[D] Tamil Nadu

97. When was the Battle of Haldighati fought?

হলদিঘাটির যুদ্ধ কবে হয়েছিল?

[A] 1550

[B] 1576

[C] 1650

[D] 1701

98. Which among the following is the first national park in India?

নিচের কোনটি ভারতের প্রথম জাতীয় উদ্যান?

[A] Dachigam National Park

[B] Rohila National Park

[C] Pench National Park

[D] Jim Corbett National Park

99. Which of the following is the highest award for literature in West Bengal?

নিচের কোনটি পশ্চিমবঙ্গের সাহিত্যের সর্বোচ্চ পুরস্কার?

[A] Rabindra Puraskar

[B] Nazrul Puraskar

[C] Bankim Puraskar

[D] Ananda Puraskar

100. Who was the first Chief Justice of the Calcutta High Court?

কলকাতা হাইকোর্টের প্রথম প্রধান বিচারপতি কে ছিলেন?

[A] Phani Bhushan Chakravartti

[B] William Hunter

[C] Barnes Peacock

[D] Romesh Chandra Mitra

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK