Year of Advt: 2023   Date of Exam: 13-April-2024

Booklet Serial No.   70461

| **SERIES : I** |

DO NOT BREAK THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

QUESTION BOOKLET

Subjects : General English, General Aptitude and Computer Science

Full Marks : 300   **Time Allowed : 2½ Hours**

Read the following instructions carefully before you begin to answer the questions.

INSTRUCTIONS TO CANDIDATES

1. This Booklet contains **150 questions** to be answered in a separate OMR Answer Sheet using Black Ballpoint Pen in the following three Parts :

Part—A	:	General English	:	50 questions
Part—B	:	General Aptitude	:	25 questions
Part—C	:	Computer Science	:	75 questions

2. **All** questions are compulsory.

3. You will be supplied the Answer Sheet separately by the Invigilator. You must complete the details of particulars asked for.

4. Answer must be shown by completely blackening the corresponding circle in the Answer Sheet against the relevant question number by Black Ballpoint Pen. OMR Answer Sheet without marking Series shall not be evaluated.

   Example :

   Suppose the following question is asked :

   The Capital of Meghalaya is
   (A) Guwahati
   (B) Kohima
   (C) Shillong
   (D) Delhi

   You will have four alternatives in the Answer Sheet for your response corresponding to each question of the Question Booklet as below :

   Ⓐ Ⓑ Ⓒ Ⓓ

   In the above illustration, if your chosen response is alternative (C), i.e., Shillong, then the same should be marked on the Answer Sheet by blackening the relevant circle with a Black Ballpoint Pen only as below :

   Ⓐ Ⓑ ● Ⓓ

   The example shown above is the only correct method of answering.

5. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any one question.

6. There will be NOT be any negative marking for wrong answers.

7. The Answer Sheet must be handed over to the Invigilator before you leave the Examination Hall.

8. No Rough Work is to be done on the Answer Sheet. Space for Rough Work has been provided in the Question Booklet.

SEAL

PART—A : GENERAL ENGLISH

(*Marks* : 100)

Each question carries **2** marks :

Directions (Q. Nos. 1–5) : In these questions, out of the four alternatives given, choose the one which is opposite in meaning to the underlined word.

1. The whole audience showed a <u>disdainful</u> attitude during the match.

   (A) sneering   (B) respectful

   (C) mocking   (D) cheerful

2. Poisonous gases emitted from factories <u>contaminate</u> the air we breathe in.

   (A) sanctify   (B) immigrate

   (C) taint   (D) purify

3. They are going to <u>embark upon</u> a mountaineering expedition.

   (A) launch

   (B) analyze

   (C) break off

   (D) conclude

4. I am still <u>dubious</u> about that plan.

   (A) certain   (B) doubtful

   (C) docile   (D) faithful

5. Emma tried to make herself as <u>inconspicuous</u> as possible.

   (A) noticeable

   (B) high-profile

   (C) exposed

   (D) open

Directions (Q. Nos. 6–10) : In these questions, some of the sentences have errors and some have none. Find out which part of a sentence (A), (B) or (C) has an error and select that part as an answer. If there is no error, then (D) is the answer.

6. (A) She was very

   (B) disheartened with

   (C) the results of the test

   (D) No error

7. (A) It is nice enough restaurant

   (B) but it's not in the same

   (C) league as Rossi's

   (D) No error

8. •(A) We don't usually

   (B) let students take books home

   (C) but I'll bend the rules on this occasion

   (D) No error

9. (A) I was the only one

   (B) in uniform and I stuck

   (C) like a sore thumb

   (D) No error

10. (A) If something that

    (B) you have been looking for

    (C) turns up you find out

    (D) No error

11. He has many qualities of head and heart, but _____ he is very straight-forward person.

    (A) above all

    (B) over all

    (C) over and above

    (D) above means

12. _____ the manager, the stenographer is very efficient.

    (A) In the opinion of

    (B) In the eyes of

    (C) In the mind of

    (D) In the vein of

13. This used to be a rich mining area at one time, but its all _____.

    (A) washed out

    (B) spent out

    (C) played out

    (D) finished up

14. The lawyer _____ the papers of the case again before going to the court room.

    (A) ran over

    (B) filled up

    (C) ran through

    (D) looked into

15. The government has _____ thousands of acres of land as protected wilderness.

    (A) set apart   (B) set aside

    (C) put away   (D) lay aside

16. He was hammering a nail in the wall, and the noise _____ edge.

    (A) set my teeth with

    (B) set my teeth on

    (C) set my tooth on

    (D) set my teeth over

17. Either I accompany you to your room _____ I wait here.

    (A) or   (B) and

    (C) nor   (D) but

18. They had meeting yesterday which their new business partnership _____.

    (A) set the seal on

    (B) set the note for

    (C) settled

    (D) set

19. She has a brother _____ name I can't remember.

    (A) who's   (B) whose

    (C) his   (D) which

20. I stopped her just as she was _____ to leave.

    (A) almost   (B) ready

    (C) going   (D) about

21. A car darted _____ the street.

    (A) past

    (B) across

    (C) over

    (D) on the other side of

22. The keys hung on the wall _____ the door.

    (A) besides   (B) beside

    (C) near   (D) between

23. I play cricket _____ the Lion's Cricket Club every weekend.

    (A) at   (B) on

    (C) in   (D) near

24. I cannot compete _____ the prize in English.

    (A) with   (B) on

    (C) for   (D) to

25. His wealth was equally distributed _____ his three children.

    (A) among   (B) between

    (C) with   (D) amongst

26. Don't pay the bill today. Wait _____ tomorrow.

    (A) until   (B) for

    (C) on   (D) by

27. Can you prepare the dishes _____ I fetch milk from the nearby store?

    (A) as   (B) while

    (C) after   (D) till

28. The antelope swam _____ the river to escape the predators.

    (A) across   (B) over

    (C) under   (D) below

29. The contractor finished the building _____ just eight months.

    (A) at   (B) in

    (C) beyond   (D) on

30. Her performance set a new benchmark _____ ballet dancing.

    (A) to   (B) for

    (C) in   (D) with

Directions (Q. Nos. 31–40) : In these questions, four alternatives are given for the given idioms/phrases. Choose the alternative which best expresses the meaning of the given idiom/phrase.

31. To be even with

    (A) be equal with someone

    (B) to inflict similar trouble or harm someone as they have inflicted on you

    (C) to be caught in the same situation

    (D) to have the same likes or dislikes

32. Hit the sack

    (A) go to sleep

    (B) to hit somebody

    (C) to clean up

    (D) to rest

33. Under the weather

    (A) to be weak

    (B) to be sick

    (C) unhealthy

    (D) to be sad

34. A penny for your thoughts

    (A) tell me what you're thinking

    (B) I'll give you money for your thoughts

    (C) precious thoughts

    (D) happy thoughts

35. Every dog has its day

    (A) every person, however unfortunate, has time of happiness or glory

    (B) every person has the right to live life according to his own terms

    (C) every person has his share of problems

    (D) every person can speak his mind out

36. Add insult to injury

    (A) to make a bad situation better

    (B) to make a bad situation worse

    (C) to turn over or change a situation

    (D) to make a good situation bad

37. Barking up the wrong tree

    (A) to be offended

    (B) to be doubtful about something

    (C) to look for solutions in the wrong place

    (D) to bark at the wrong dog

38. It's a piece of cake

    (A) it's a simple thing

    (B) it's beautiful

    (C) it's easy

    (D) it's sweet

39. The best thing since sliced bread

    (A) a really good invention

    (B) a new start

    (C) a surprise

    (D) something better than sliced bread

40. A storm in a teacup

    (A) a big fuss about a small problem

    (B) a teacup painted with the picture of a storm

    (C) a serious problem

    (D) a trivial problem

Directions (Q. Nos. 41-50) : In these questions, out of the four alternatives given, choose the one which expresses the meaning of the underlined word.

41. When I returned I found that my car had been boxed in.

(A) cooped up

(B) bombarded

(C) surrounded

(D) attacked

42. She has a perforated eardrum.

(A) an infection

(B) a hole

(C) a puncture

(D) a prick

43. He is always the class clown and his teacher says he is incorrigible.

(A) unreformable

(B) repentant

(C) funny

(D) stubborn

44. You need to give me time to digest this report.

(A) chew over

(B) break down

(C) absorb

(D) take up

45. Carol applied for the job just to humour me.

(A) compete with

(B) test

(C) satisfy

(D) indulge

46. She tried to sabotage my chances of getting the job.

(A) destroy

(B) prevent

(C) assist

(D) improve

47. New teachers scramble to get jobs in the best schools.

(A) compete

(B) struggle

(C) climb up

(D) give up

48. He was ostracised by other children at school.

(A) accepted

(B) shunned

(C) admitted

(D) excluded

49. Don't patronise me! I know what I'm doing.

(A) look down on

(B) ignore

(C) hurt

(D) antagonise

50. This will revolutionise the way we do business.

(A) transform

(B) merge

(C) turn

(D) shift

PART—B : GENERAL APTITUDE

(*Marks* : 50)

Each question carries **2** marks :

51. If A = 26, and X-RAY = 40, then WHAT = ?

(A) 54

(B) 56

(C) 60

(D) 62

52. In a code language if TASK is written as WEXQ, then LORD should be written as

(A) OSWJ

(B) OSWI

(C) ORWJ

(D) OSVJ

53. Find the missing number in the following :

6	8	12
7	9	14
85	145	?

(A) 340

(B) 740

(C) 175

(D) 450

54. Find the missing number in the following series :

16, 32, 8, 48, 6, 60, 5, ?

(A) 75

(B) 65

(C) 70

(D) 60

55. Choose the correct matching word :

Haematology : Blood :: Phycology : ?

(A) Diseases

(B) Fungi

(C) Fishes

(D) Algae

56. Location of *B* to the north of *A* and location of *C* is east of *A*. The distances *AB* and *AC* are 5 km and 12 km respectively. The shortest distance (in km) between the locations *B* and *C* is

(A) 60

(B) 13

(C) 17

(D) 7

57. *F* is the mother of *T*. *T* is the sister of *W* who is the only son of *K*. *J* is the brother of *K*. How is the mother of *W* related to *K*?

(A) Mother

(B) Sister

(C) Wife

(D) Niece

58. *M* is poorer than *D*, but not as poor as *K*. *G* is not as poor as *M*. Who is the poorest of all?

(A) *K*

(B) *M*

(C) *G*

(D) *D*

59. If 50 minutes ago it was 45 minutes past 4 o'clock, then how many minutes are there until 6 o'clock?
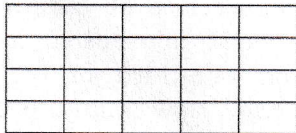
(A) 45

(B) 15

(C) 25

(D) 35

60. The sum of the ages of Robert and his father is 45 years and the product of their ages is 126. What is the age of Robert?

(A) 3 years

(B) 5 years

(C) 8 years

(D) 10 years

61. Iba's salary is ₹ 3,000 more than Banri's salary. The ratio of Iba's salary to Banri's salary is 17 : 15. What is the salary of Banri?

(A) ₹ 27,250

(B) ₹ 22,500

(C) ₹ 26,750

(D) ₹ 25,500

62. How many rectangles are there in the following figure?

(A) 60

(B) 125

(C) 150

(D) 155

63. A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for ₹ 3,200. With the help of C, they completed the work in 3 days. How much is to be paid to C?

(A) ₹ 375

(B) ₹ 400

(C) ₹ 600

(D) ₹ 800

64. A car financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes

(A) 10%

(B) 10·25%

(C) 10·5%

(D) None of the above

65. When a cycle is sold for ₹ 18,700, the owner loses 15%. At what price must that cycle be sold in order to gain 15%?

(A) ₹ 21,000

(B) ₹ 22,500

(C) ₹ 25,300

(D) ₹ 25,800

66. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

(A) 360

(B) 480

(C) 5040

(D) 720

67. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was

(A) 2700

(B) 2900

(C) 3000

(D) 3100

68. A man takes twice as long to row a distance against the stream as to row the same distance in favour of the stream. The ratio of the speed of the boat (in still water) to the stream is

(A) 2 : 1

(B) 3 : 1

(C) 3 : 2

(D) 4 : 3

69. Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7?

(A) 13/90

(B) 12/90

(C) 78/90

(D) 77/90

70. Arrange the words given below in a meaningful sequence :

1. Presentation
2. Recommendation
3. Arrival
4. Discussion
5. Introduction

(A) 5, 3, 4, 1, 2

(B) 3, 5, 4, 2, 1

(C) 3, 5, 1, 4, 2

(D) 5, 3, 1, 2, 4

71. In a certain code language, COMPUTER is written as RFUVQNPC. How will MEDICINE be written in that code language?

(A) MFEDJJOE

(B) EOJDEJFM

(C) MFEJDJOE

(D) EOJDJEFM

72. If 20% of $a = b$, then b% of 20 is the same as

(A) 4% of a

(B) 6% of a

(C) 8% of a

(D) 10% of a

73. Find the missing number in the following series :

3, 5, 5, 19, 7, 41, 9, ?

(A) 71

(B) 61

(C) 79

(D) 69

74. Three numbers are in the ratio of 3 : 4 : 5 and their LCM is 2400. Their HCF is

(A) 200   (B) 120

(C) 80   (D) 40

75. A chef receives 60 orders of pasta and it takes 30 minutes to cook pasta and season one-third of the orders with jalapeno. How many pastas can the chef cook in two hours?

(A) 60

(B) 80

(C) 85

(D) 90

PART—C : COMPUTER SCIENCE

(*Marks* : 150)

Each question carries **2** marks :

76. Which of the following devices is used in the transport layer?

(A) Hub

(B) Repeater

(C) Router

(D) Gateway

77. The total number of wired links required to establish a fully connected mesh network of 5 nodes is

(A) 25

(B) 12

(C) 10

(D) 15

78. Which of the following is a function of the Network Layer in the OSI model?

(A) Routing

(B) Segmentation and reassembly

(C) Error detection

(D) All of the above

79. Match the protocol with the layer of the OSI model where it is used :

I.   SMTP   1. Transport layer

II. UDP   2. Network layer

III. ARP   3. Data-link layer

IV. HDLC   4. Application layer

(A)   I   II   III   IV
      1   4   3   2

(B)   I   II   III   IV
      2   3   1   4

(C)   I   II   III   IV
      4   1   2   3

(D)   I   II   III   IV
      4   2   3   1

80. A bit-stuffing based framing protocol uses 8-bit delimiter pattern of 01111110. If output bit string after stuffing is 01111100101, then the input bit string is

(A) 0111110100

(B) 0111110101

(C) 0111111101

(D) 0111111111

81. In the IPv4 addressing format, the number of networks all allowed under Class B addresses is

(A) 2^{14} (B) 2^7

(C) 2^{21} (D) 2^{16}

82. Which of the following statements is true for Selective Repeat ARQ Protocol?

(A) Next frame is sent only after receiving acknowledgement for the previous frame from receiver.

(B) Only those frames are retransmitted for which negative acknowledgement is received.

(C) All unacknowledged frames are retransmitted.

(D) None of the above

83. Which protocol is used for the following?

I.   Ping

II. Sending email

III. Browsing web

(A) ICMP, SMTP, HTTP

(B) TCP, SMTP, WWW

(C) UDP, POST, HTTP

(D) ARP, TCP, IMAP

84. Which of the following security requirements is satisfied by a digital signature?

(A) Authentication

(B) Integrity

(C) Non-repudiation

(D) All of the above

85. The Advanced Encryption Standard (AES) algorithm with 256 bits key, uses _____ rounds.

(A) 10   (B) 12

(C) 14   (D) 16

86. The 2's complement representation of the decimal −15 is

(A) 11101

(B) 10111

(C) 11111

(D) 10001

87. The simplified SOP (Sum of Product) form of the Boolean expression $(P + Q' + R') \cdot (P + Q' + R) \cdot (P + Q + R')$ is

(A) $(P'Q' + R')$

(B) $(P + Q'R')$

(C) $(PQ' + R)$

(D) $(P'Q' + R)$

88. In the sum of minterms expression,

$$F(P, Q, R, S) = \Sigma(0, 5, 10, 15)$$

and 'don't care conditions'

$$d(P, Q, R, S) = \Sigma(2, 7, 8, 13)$$

the minimal SOP form for F is

(A) $Q'S' + QS$

(B) $PQ'S + PR'S$

(C) $P'QS' + P'S'R' + S'$

(D) $PQR + P'QS' + PQ'S + P'Q'S'$

89. How many 3×8 decoders will be required to construct a 4×16 decoder?

(A) 2   (B) 4

(C) 8   (D) 3

90. A binary ripple counter can be constructed using which flip-flop?

(A) Q flip-flop

(B) J-K flip-flop

(C) S-R flip-flop

(D) None of the above

91. A memory is of the size $4\,K \times 16$. What is the number of address lines required to access the words of this memory?

(A) 4   (B) 16

(C) 12   (D) 10

92. The addressing mode that requires the maximum number of memory access is

(A) immediate

(B) direct

(C) register

(D) memory indirect

93. How many 128×8 RAM chips are needed to provide a memory capacity of 2048 bytes?

(A) 8   (B) 16

(C) 24   (D) 32

94. Which of the following is true for memory-mapped I/O?

(A) Common bus—separate I/O Read and I/O Write lines

(B) Common bus—same Read and Write lines for memory and I/O

(C) Separate bus for I/O

(D) None of the above

95. Consider a 4-segment pipeline which executes 100 tasks in sequence. Assume that the clock cycle is 10 ns. The maximum speedup ratio of the pipelined system is

(A) 1·94   (B) 2·32

(C) 3·88   (D) 0·52

96. _____ is suitable for development environment, while _____ is suited for production environment.

(A) Compiler, interpreter

(B) Compiler, debugger

(C) Interpreter, compiler

(D) Interpreter, debugger

97. _____ is a set of all possible strings over the alphabet set T of length zero or more.

(A) Kleene's closure

(B) Positive closure

(C) Power set

(D) Closure

98. The postfix equivalents of the expressions $A * B + C / D$ and $A * (B + C) / D$ are

(A) $+ * AB / CD$, $ABC + * D /$

(B) $ABCD / + *$, $AB * CD / +$

(C) $ABCD / + *$, $AB * CD / D$

(D) $AB * CD / +$, $ABC + * D /$

99. _____ nodes of the syntax tree represent results of the operations.

(A) Leaf

(B) Interior

(C) Both (A) and (B)

(D) Neither (A) nor (B)

100. _____ moves the code to some parts of the program to reduce their frequency of execution.

(A) Constant propagation

(B) Code hoisting

(C) Loop unrolling

(D) Constant folding

101. Which data structure is defined as a collection of similar data elements?

(A) Array

(B) Linked list

(C) Tree

(D) Graph

102. The position in a queue from which an element is deleted is called as

(A) top   (B) front

(C) rear   (D) mid

103. The running complexity of a linear time algorithm is given as

(A) $O(1)$ (B) $O(n)$

(C) $O(n \log n)$ (D) $O(n^2)$

104. Which operator has the lowest precedence in C?

(A) sizeof

(B) unary

(C) assignment

(D) comma

105. Which operator produces the 1's complement of the given binary value?

(A) Logical AND

(B) Bitwise AND

(C) Logical OR

(D) Bitwise NOT

106. Identify the erroneous expression in C.

(A) $X = y = 2, 4;$

(B) result = + + $a * 8$;

(C) result = $/6$;

(D) result = $a + + - b * 9$;

107. Function declaration statement in C identifies a function with its

(A) name

(B) arguments

(C) data type of return values

(D) All of the above

108. Which operator is used to dereference a pointer?

(A)   (B) *

(C) ->   (D) .

109. Which of the following is the conversion character associated with short integer?

(A) %c   (B) %h

(C) %e   (D) %f

110. Given an integer array arr[]; the ith element can be accessed by writing

(A) $* (arr + i)$

(B) $* (i + arr)$

(C) $arr[i]$

(D) All of the above

111. Which type of linked list contains a pointer to the next as well as the previous node in the sequence?

(A) Singly linked list

(B) Circular linked list

(C) Doubly linked list

(D) All of the above

112. A binary tree of height h has at least h nodes and at most _____ nodes.

(A) $2h$ (B) 2^h

(C) 2^{h+1} (D) 2^{h-1}

113. Pre-order traversal is also called as

(A) depth first

(B) breadth first

(C) level order

(D) in-order

114. The Huffman algorithm can be implemented using a

(A) dequeue

(B) queue

(C) priority queue

(D) None of the above

115. How much time does the AVL tree take to perform search, insert, and delete operations in the average case as well as in the worst case?

(A) $O(n)$

(B) $O(\log n)$

(C) $O(n^2)$

(D) $O(n \log n)$

116. Which data structure is commonly used to store a dictionary?

(A) Binary tree

(B) Splay tree

(C) Trie

(D) Red-black tree

117. A group of logically related characters in the source program is known as

(A) token

(B) lexeme

(C) parse tree

(D) buffer

118. _____ is defined as the replacement of non-terminal symbols in a particular string of terminals and non-terminals.

(A) Production

(B) Derivation

(C) Sentential form

(D) Left factoring

119. The most common non-backtracking shift-reducing parsing technique is known as

(A) LR parsing

(B) LL parsing

(C) Top-down parsing

(D) Bottom-up parsing

120. Implicit type checking is also known as

(A) casts

(B) explicit conversion

(C) manual conversion

(D) coercion

121. Which of the following is **not** true in the context of a symbol table?

(A) It is a compile time data structure

(B) It maps name into declarations

(C) It does not help in error detection and recovery

(D) It contains formal parameter list and return type of each function and procedure

122. Reduction in strength means

(A) replacing runtime computation

(B) removing loop-invariant computation

(C) removing common subexpressions

(D) replacing a costly operation by a cheaper one

123. What is database schema?

(A) A set of rules that governs database transactions

(B) The physical storage structure of a database

(C) A visual representation of the database design

(D) A collection of tables, relationships and constraints

124. Which type of relationship in a database schema involves a single table relating to itself?

(A) Recursive

(B) One-to-One

(C) Many-to-Many

(D) One-to-Many

125. Which normal form ensures that there are no partial dependencies on a composite primary key?

(A) First Normal Form (1NF)

(B) Second Normal Form (2NF)

(C) Third Normal Form (3NF)

(D) Boyce-Codd Normal Form (BCNF)

126. If $A \rightarrow B$ is a functional dependency, what does the Augmentation Axiom state?

(A) If $A \rightarrow B$, then $B \rightarrow A$

(B) If $A \rightarrow B$, then $A \rightarrow C$

(C) If $A \rightarrow B$, then $AC \rightarrow BC$

(D) If $A \supseteq B$, then $A \rightarrow B$

127. Given functional dependencies $A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$, then A^+ is

(A) $\{A, C\}$

(B) $\{A, C, D\}$

(C) $\{A, C, D, E\}$

(D) $\{A, C, D, E, H\}$

128. What does the cardinality of a relationship in an ER diagram indicate?

(A) The number of attributes in the relationship

(B) The degree of the relationship

(C) The number of instances participating in the relationship

(D) The uniqueness of the relationship

129. A weak entity in an ER diagram is

(A) to represent an entity with a composite primary key

(B) to represent an entity with a single-valued attribute

(C) to represent an entity that is dependent on another entity

(D) to represent an entity with a strong relationship

130. In the context of memory management, what is the role of a page table?

(A) To map virtual addresses to physical addresses

(B) To manage the allocation of secondary storage

(C) To store information about the contents of cache memory

(D) To control the execution of processes

131. What is the main advantage of using virtual memory in memory management?

(A) It increases the speed of data access in main memory

(B) It allows processes to exceed the size of physical memory

(C) It reduces the need for secondary storage

(D) It eliminates the need for a memory management unit (MMU)

132. What is the purpose of synchronization in multithreading?

(A) To terminate threads gracefully

(B) To schedule threads for execution

(C) To ensure proper coordination and order of execution among threads

(D) To allocate memory for threads

133. What is the primary goal of the producer-consumer algorithm?

(A) To maximize CPU utilization

(B) To minimize memory consumption

(C) To synchronize the production and consumption of data between threads

(D) To prioritize producers over consumers

134. How does the banker's algorithm decide whether to grant a request or not?

(A) By checking if the requested resources are available and the resulting state is safe

(B) By randomly selecting a process to grant resources

(C) By prioritizing processes with the highest resource usage

(D) By allocating resources in a round-robin fashion

135. What is the purpose of the solution to the dining philosophers problem?

(A) To prevent philosophers from eating

(B) To ensure that philosophers do not use forks

(C) To avoid deadlock and starvation while allowing philosophers to dine

(D) To limit the number of philosophers in the dining hall

136. What is the purpose of a process control block (PCB) in process management?

(A) To store the source code of a program

(B) To manage input/output operations

(C) To store the execution state and information about a process

(D) To control the allocation of CPU time

137. In a pre-emptive scheduling algorithm, when can a running process be interrupted?

(A) Anytime, even if it does not voluntarily release the CPU

(B) Only when it voluntarily releases the CPU

(C) Only at the end of its execution

(D) Only during I/O operations

138. What is the main purpose of version control systems in software engineering?

(A) To generate software documentation

(B) To track changes to source code over time

(C) To automate software testing

(D) To manage software licenses

139. What is the term for a set of activities that ensures that software processes and products conform to requirements?

(A) Software testing

(B) Software documentation

(C) Quality assurance

(D) Debugging

140. What is the purpose of a use case diagram in the unified modeling language (UML)?

(A) To represent the flow of control in a system

(B) To show the interactions between objects in a system

(C) To model the behaviour of a system

(D) To represent the interactions between a system and its external actors

141. What does the term 'refactoring' mean in software development?

(A) Writing new code from scratch

(B) Modifying existing code to improve its internal structure without changing its external behaviour

(C) Testing software after each modification

(D) Documenting code after it has been written

142. What is the main principle of object-oriented programming (OOP)?

(A) Linear programming

(B) Procedural programming

(C) Code reusability and modularity

(D) Functional programming

143. What is the purpose of a constructor in object-oriented programming (OOP)?

(A) To create an instance of a class

(B) To destroy an instance of a class

(C) To initialize the state of an object when it is created

(D) To define the properties of a class

144. What is the purpose of the 'super' keyword in Java?

(A) To reference the current object

(B) To invoke the superclass methods and constructors

(C) To declare a constant variable

(D) To specify the type of a variable

145. What is an abstract class in object-oriented programming (OOP)?

(A) A class that cannot be instantiated and may have abstract methods

(B) A class that is fully implemented and can be instantiated

(C) A class that is used for input and output operations

(D) A class that only contains constants

146. In exception handling, what is the purpose of the 'try' block?

(A) To define a block of code that may throw an exception

(B) To catch and handle exceptions

(C) To declare variables

(D) To terminate the program

147. What is the purpose of the 'throws' clause in a method signature?

(A) To declare variables

(B) To catch and handle exceptions

(C) To specify the exceptions that a method might throw

(D) To terminate the program

148. In C++, can a derived class inherit from multiple base classes?

(A) Yes, through multiple inheritance

(B) Yes, through interface implementation

(C) No, C++ does not support multiple inheritance

(D) No, it violates encapsulation principles

149. What is the purpose of virtual functions in C++?

(A) To declare constants

(B) To create objects

(C) To enable polymorphism and dynamic binding

(D) To perform memory allocation

150. In runtime polymorphism, when is the method to be executed determined?

(A) At compile time

(B) At link time

(C) At runtime

(D) At design time