

තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology තොරතුරු හා සන්නිවේදන තාක්ෂණය Information and Communication Technology



Multiverse Victory Project - 2024

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2024 අගෝස්තු
General Certificate of Education (Adv. Level) Examination, August 2024

තොරතුරු හා සන්නිවේදන තාක්ෂණය I
Information & Communication Technology I

20

E

I

Model Paper
09

පැය දෙකයි
Two hours

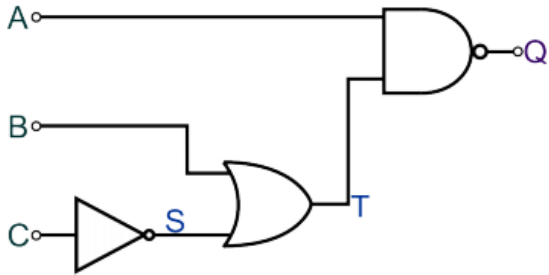
Instructions:

- Answer **all** the questions.
- Write your **Index Number** in the space provided in the answer sheet.
- Instructions are also given on the back of the answer sheet. Follow those carefully.
- In each of the questions **1 to 50**, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct or most appropriate** and mark your response on the answer sheet with a cross (X) in accordance with the instructions given on the back of the answer sheet.
- Use of calculators is **not allowed**.

1. Which of the following is true about primary storage?
(1) It is a part of the CPU
(2) It allows very fast access to data
(3) It is relatively more expensive
(4) all of the above
(5) none of the above
2. Software instruction intended to satisfy a user's specific processing needs are called _____.
(1) system software (2) process software (3) documentation
(4) application software (5) none of the above
3. Which is the device that converts computer output into a form that can be transmitted over telephone line?
(1) teleport (2) multiplexer (3) concentrator
(4) modem (5) all of the above
4. The two's complement of the binary number 010110101_2 is _____.
(1) 101001000_2 (2) 101001011_2 (3) 011001010_2
(4) 101001010_2 (5) 101001000_2
5. How is -32_{10} represented in eight-bit two's complement notation?
(1) 11100010 (2) 11101110 (3) 11110100
(4) 11100000 (5) 11101010



6. The Boolean Expression $(A+B)(\bar{B}+C)(C+A)$ can be simplified as _____.
- (1) $(A+B)(\bar{B}+C)$ (2) $(\bar{A}+B)(\bar{B}+C)$ (3) $(A+\bar{B})(\bar{B}+C)$
 (4) $(A+\bar{B})(B+C)$ (5) $(A+\bar{B})(B+\bar{C})$
7. The Boolean Expression $\bar{A}.B + \bar{A}.B.C + \bar{A}.\bar{B}.\bar{C} + A.\bar{B}.\bar{C}$ can be simplified as _____.
- (1) $(A.B) + (\bar{B}.\bar{C})$ (2) $(\bar{A}.B) + (\bar{B}.\bar{C})$ (3) $(\bar{A}.B) + (\bar{B}.C)$
 (4) $(\bar{A}.B) + (\bar{B}.C)$ (5) $(A.\bar{B}) + (B.\bar{C})$
8. The output (Q) of given logic gate is equal to _____.



- (1) $(\bar{A}+\bar{B})(\bar{A}+B)$ (2) $(\bar{A}+\bar{B})(\bar{A}+C)$ (3) $(A+\bar{B})(\bar{A}+B)$
 (4) $(A+B)(\bar{A}+\bar{C})$ (5) $(A+\bar{B})(A+\bar{C})$
9. A full-adder has _____.
- (1) no carry-in. (2) no carry-out. (3) three outputs.
 (4) a carry-in. (5) all of the above

10. A computer system supports 32-bit virtual addresses as well as 32-bit physical addresses. Since the virtual address space is of the same size as the physical address space, the operating system designers decide to get rid of the virtual memory entirely. Which one of the following is true?
- (1) Efficient implementation of multi-user support is no longer possible
 (2) The processor cache organization can be made more efficient now
 (3) Hardware support for memory management is no longer needed
 (4) CPU scheduling can be made more efficient now
 (5) All of the above

11. What is the swap space in the disk used for?
- (1) Saving temporary html pages
 (2) Saving process data
 (3) Storing the super-block
 (4) Storing device drivers
 (5) None of the above

12. Consider a machine with 1GB physical memory and a 32-bit virtual address space. If the page size is 4KB, what is the number of entries in the page table? Assume single level of paging.
- (1) 2^{12} (2) 2^{18} (3) 2^{20}
 (4) 2^{22} (5) 2^{15}



13. Which of the following statements is false?

- (1) Virtual memory implements the translation of a program's address space into physical memory address space
- (2) Virtual memory allows each program to exceed the size of the primary memory
- (3) Virtual memory increases the degree of multiprogramming
- (4) Virtual memory reduces the context switching overhead
- (5) Virtual memory is an area of a computer system's secondary memory storage space

14. Identify the correct statement(s).

- (1) Typically, each process has an associated page table.
- (2) Drawback of paging: Each page table may consist of millions of entries.
- (3) Inverted Page table: Only one page table is in the system.
- (4) Demand paging: Never bring a page into memory until it is required.
- (5) All of the above

15. You are given an old router to practice for your CCNA. Your boss Dave has spent a lot of time teaching you subnetting. Now he challenges you to apply your knowledge. He hands you a note that says: "Given the subnetted address space of 192.168.1.0 /29, give the E0 interface the first valid IP in the eighth subnet. Give the S0 interface the last valid IP in the twelfth subnet. The Zero Subnets are available. You have 10 minutes. Go."

Which two of the following are the correct IP and Mask configurations?

- (1) E0: 192.168.1.1 255.255.255.0
- (2) E0: 192.168.1.56 255.255.255.248
- (3) E0: 192.168.1.57 255.255.255.248
- (4) S0: 192.168.1.254 255.255.255.0
- (5) S0: 192.168.1.95 255.255.255.248

16. Julie's IP address is 192.168.1.21 255.255.255.240. Joost's IP is 192.168.1.14/28. Their computers are connected together using a crossover Ethernet cable. Why can't they ping each other?

- (1) The subnet masks are different
- (2) They can. This is another trick question.
- (3) Because they are in different subnets.
- (4) Because the router does not support subnetting.
- (5) Because it should be a straight-through cable.

17. How many hosts are on the network 172.16.41.0/27?

- (1) 65,534
- (2) 32
- (3) 254
- (4) 30
- (5) 27

18. What is the broadcast ID of the seventh subnet created using 172.16.0.0/28?

- (1) 172.16.111.0
- (2) 172.16.0.0
- (3) 172.16.0.7
- (4) 172.16.0.96
- (5) 172.16.0.111

~ 3 ~



19. How many subnets are created by the address 192.168.1.0 255.255.255.248?

- (1) 1 (2) 2 (3) 8
 (4) 16 (5) 32

20. Given the mask 255.255.254.0, how many hosts per subnet does this create?

- (1) 254 (2) 256 (3) 512
 (4) 510 (5) 2

21. Which one of the following refers to the copies of the same data (or information) occupying the memory space at multiple places?

- (1) Data Repository (2) Data Inconsistency (3) Data Mining
 (4) Data Redundancy (5) None of the above

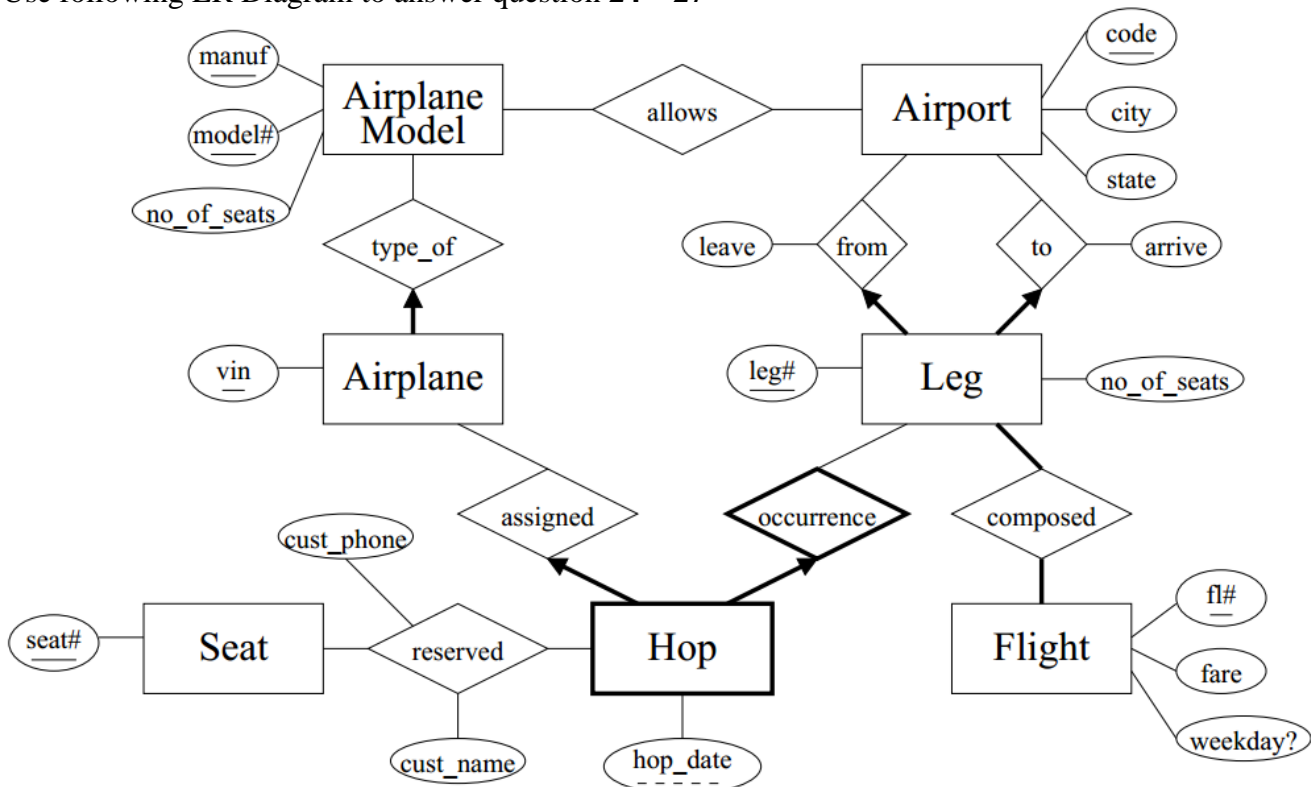
22. In the relation model, the relations are generally termed as _____.

- (1) Tuples (2) Attributes (3) Rows
 (4) Tables (5) Fields

23. Which of the following keys is generally used to represents the relationships between the tables?

- (1) Primary key (2) Foreign key (3) Secondary key
 (4) Candidate key (5) None of the above

Use following ER Diagram to answer question 24 – 27



24. How do we know the flight (fl#) to which a hop belongs?

- (1) We cannot know from the diagram as written because there is a mistake: Hop ought to have an attribute fl#.
 (2) By the logic of the E-R diagram, it does not make sense to ask which fl# to which a Hop belongs. Hop and Flight are not related.



(3) A Hop is associated with an Airplane. An Airplane is associated with at most one Flight. Hence, we know the Flight to which a Hop “belongs” via its Airplane.

(4) A Hop is associated with a Leg (via occurrence). We see fl# is the key of Flight. Hence, we know the Flight to which a Hop “belongs” via the Leg that they have in common.

(5) By the logic of the E-R diagram, we do not know the Flight’s fl#, because a Hop can be associated with many flights.

25. How do we know what airport (code) hop leaves from?

(1) We cannot know from the diagram as written because there is a mistake: Hop ought to have an attribute from code.

(2) By the logic of the E-R diagram, it does not make sense to ask which Airport (code) a Hop departs from. Hop and Airport are not related.

(3) A Hop is associated with Airplane. A given Airplane only leaves from one given Airport. Hence, we know the Airport from which a Hop departs via the Airplane.

(4) A Hop is associated with Leg (via occurrence). A Leg leaves from a given Airport. Hence, we know which Airport the Hop leaves from.

(5) By the logic of the E-R diagram, we do not know the Airport’s code a Hop departs from, because a Hop can be associated with many airports (via from).

26. Which of the following seems to be a logical problem with the E-R design (in Figure 1)?

(1) More than one customer may be assigned to a given Seat for a given Hop.

(2) A given Hop may be assigned to more than one Airplane.

(3) A given Leg may be assigned to more than one Airplane.

(4) Different Airplane Models probably have different numbers of Seats; the design does not capture this.

(5) A Flight can be composed of at most two Legs (“non-stop” flights).

27. Are we assured by the logic of the E-R diagram that the airplane assigned to a Hop (an occurrence of a scheduled Leg) is, in fact, allowed to take off from, and to land at, the airports for which the leg is scheduled to leave and arrive?

(1) Clearly yes.

(2) Clearly not.

(3) It depends on one’s interpretation of the diagram. Under one evident interpretation, the answer would be “yes”. Under another, “no”.

(4) In the model, all airplanes are allowed at all airports.

(5) Oddly, the diagram assures this for the departure airport, but not the arrival airport.

28. Attributes are _____.

(i) properties of relationship

(ii) attributed to entities

(iii) properties of members of an entity set

- (1) i (2) i and ii (3) i and iii
 (4) iii (5) i , ii and iii

29. Entities are identified from the word statement of a problem by _____.

- (1) picking words which are adjectives
 (2) picking words which are nouns
 (3) picking words which are verbs
 (4) picking words which are pronouns
 (5) all of the above

30. Relationships are identified from the word statement of a problem by _____.

- (1) picking words which are adjectives
 (2) picking words which are nouns
 (3) picking words which are verbs
 (4) picking words which are pronouns
 (5) all of the above

Use the following tables to answer the questions from 31 – 38.

Student_Details

Student_ID (PK)	First_Name	Last_Name	Age	Email
1001	John	Smith	20	john.smith@example.com
1002	Jane	Doe	22	jane.doe@example.com
1003	Alice	Johnson	24	alice.johnson@example.com
1004	Bob	Brown	19	bob.brown@example.com
1005	Charlie	Davis	21	charlie.davis@example.com

Course_Details

Course_ID (PK)	Course_Name	Duration (Months)	Fees (USD)
C101	Introduction to AI	6	1000
C102	Data Science	8	1200
C103	Web Development	6	900
C104	Cybersecurity	9	1500
C105	Cloud Computing	5	800

31. Which of the following statements correctly describes the concept of 1st Normal Form (1NF) in a relational database?

- (1) A table is in 1NF if it has a primary key.
 (2) A table is in 1NF if all the non-key columns are dependent on the primary key.
 (3) A table is in 1NF if it contains no duplicate rows and each cell contains only atomic (indivisible) values.
 (4) A table is in 1NF if it has no repeating groups and all non-key attributes are fully functional dependent on the primary key.



(5) A table is in 1NF if all columns contain unique values.

32. Given the "Student Details" and "Course Details" tables, which of the following conditions must be satisfied for a table to be in 2nd Normal Form (2NF)?

- (1) The table must be in 1NF and all non-key columns must be dependent on the entire primary key.
- (2) The table must be in 1NF and must have a composite primary key.
- (3) The table must be in 1NF and must have no partial dependencies.
- (4) The table must be in 1NF and all non-key columns must be dependent on a part of the primary key.
- (5) The table must be in 1NF and must have no transitive dependencies.

33. In the "Student Details" table, which column(s) act as the primary key?

- (1) First Name
- (2) Student_ID
- (3) Email
- (4) First Name and Last Name
- (5) Last Name

34. Which of the following best describes the relational schema for the "Student Details" table?

- (1) Student_Details(Student_ID, First Name, Last Name, Age, Email)
- (2) Student_Details(First Name, Last Name, Age, Email)
- (3) Student_Details(Student_ID, First Name, Last Name, Age)
- (4) Student_Details(Student_ID, Last Name, Age, Email)
- (5) Student_Details(Student_ID, First Name, Age, Email)

35. Considering the "Course Details" table, which of the following statements is true if the table is in 2nd Normal Form?

- (1) The table is in 2NF because Course_ID is a primary key and there are no composite keys.
- (2) The table is in 2NF because all attributes are functionally dependent on Course_ID.
- (3) The table is in 2NF because all non-key attributes are fully dependent on the primary key, Course_ID.
- (4) The table is in 2NF because it does not have any repeating groups.
- (5) The table is in 2NF because it has no partial and transitive dependencies.

36. Which of the following statements about 1st Normal Form (1NF) is/are correct?

- I. A table is in 1NF if it contains no repeating groups or arrays.
 - II. A table is in 1NF if each cell contains only a single value.
 - III. A table is in 1NF if all the non-key columns are dependent on the primary key.
- (1) I only
 - (2) II only
 - (3) I and II only
 - (4) II and III only
 - (5) I, II, and III

37. Which of the following statements about 2nd Normal Form (2NF) is/are correct?

- I. A table is in 2NF if it is in 1NF and all non-key attributes are fully functionally dependent on the primary key.
 - II. A table is in 2NF if it contains no partial dependencies.
 - III. A table is in 2NF if it contains no transitive dependencies.
- (1) I only
(2) I and II only
(3) II and III only
(4) I, II, and III
(5) I and III only

38. Which of the following statements about primary keys and relational schema is/are correct?

- I. A primary key uniquely identifies each row in a table.
 - II. In the "Student Details" table, the "Student_ID" column acts as the primary key.
 - III. A table can have multiple primary keys.
- (1) I only
(2) I and II only
(3) II and III only
(4) I and III only
(5) I, II, and III

39. The register which contains the data to be written into or read out of the addressed location is known as

- (1) index register (2) memory address register (3) memory data register
(4) program counter (5) none of the above

40. The register which keeps track of the execution of a program and which contains the memory address of the next instruction to be executed is known as _____.

- (1) index register (2) memory address register (3) instruction register
(4) program counter (5) none of the above

41. Which of the following is used as storage locations both in the ALU and in the control section of a computer?

- (1) accumulator (2) register (3) adder
(4) decoder (5) all of the above

42. The process of copying data from a memory location is called _____.

- (1) reading (2) writing (3) controlling
(4) booting (5) none of the above

43. A program written in machine language is called _____ program.

- (1) object (2) computer (3) assembler
(4) high level (5) none of the above

44. The computer device primarily used to provide hardcopy is the _____.

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- (1) CRT (2) line printer (3) computer console
(4) card reader (5) none of the above

45. Which one of the following can produce the final product of machine processing in a form usable by humans?

- (1) storage (2) control (3) input device
(4) output device (5) none of the above

46. In the binary number 110.101, the fractional part has the value _____.

- (1) 0.625 (2) 0.125 (4) 0.875
(3) 0.5 (5) 0.75

47. Which of the following is not an advanced rule governing data flow diagramming?

- (1) To avoid having data flow lines cross each other, data stores may be repeated on a DFD.
(2) Composite data flows on one level cannot be split into component data flows at the next level.
(3) At the lowest level of DFDs, new data flows may be added to represent data that are transmitted under exceptional conditions.
(4) The inputs to a process must be sufficient to produce the outputs from the process.
(5) None of the above

48. Data cannot flow between two data stores because _____.

- (1) it is not allowed in DFD
(2) a data store is a passive repository of data
(3) data can get corrupted
(4) they will get merged
(5) none of the above

49. The characteristics of well-designed system are

- a) Practical b) Effective c) Secure d) Reliable e) Flexible f) Economical

- (1) a, b, c and d
(2) a, c, d and e
(3) a, b, c, d and e
(4) a, b, c, d, e and f
(5) a, b, c, f

50. _____ gives defining the flow of the data through and organization of a company or series of tasks that may or may not represent computerized processing.

- (1) System process
(2) System flowchart
(3) System design
(4) Structured System
(5) System implementation



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