2 New syllabus: Paper I

008329

AL/2020/20/E-I (NEW)

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NEW

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2020
General Certificate of Education (Adv. Level) Examination, 2020

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தகவல், தொடர்பாடல் தொழினுட்பவியல் I
Information & Communication Technology I

20 E I

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

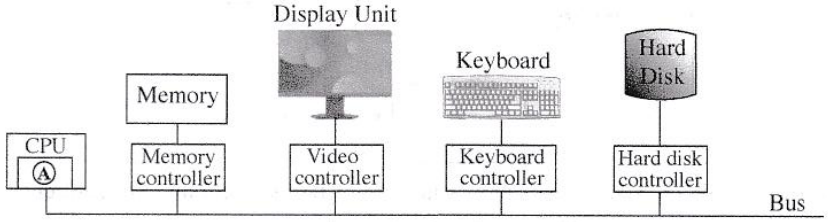
- ✻ *Answer* ***all*** *the questions.*
- ✻ *Write your* ***Index Number*** *in the space provided in the answer sheet.*
- ✻ *Instructions are also given on the back of the answer sheet. Follow those carefully.*
- ✻ *In each of the questions* **1** *to* **50**, *pick one of the alternatives from* (1),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

1. A computer processor will operate fastest when the data that it wants is in the
(1) cache memory. (2) hard disk. (3) magnetic tape.
(4) main memory. (5) optical disk.

2. Which of the following hardware components will lose data when the power to a computer is switched off?
A – registers
B – cache memory
C – main memory
(1) A only (2) A and B only (3) A and C only
(4) B and C only (5) All A, B and C

3. Computer has evolved from the early main frames to the relatively small smart devices with high computing power used today. Which of the following inventions contributed to reduce the physical size of computers?
(1) bus (2) integrated circuits (3) registers
(4) solid state memory (5) vacuum tube

4. Consider the following diagram showing some hardware component connections on a computer system:



The **hardware** part within the CPU indicated by Ⓐ in the above diagram has a set of registers that has the memory translation maps of the currently running process. When given an input *virtual address* of the current process it outputs the relevant *physical address* (if any).

The Ⓐ in the above diagram denotes the
(1) arithmetic and logic unit (ALU). (2) control unit. (3) L1 cache memory.
(4) memory management unit. (5) page table.

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5. Consider the two binary numbers P = 10110001 and Q = 01001110. If $X = P$ OR Q and $Y = P$ AND Q, what will be the values of X and Y respectively?

(1) 01001110, 10110001
(2) 10110001, 00000000
(3) 10110001, 11111111
(4) 11111111, 00000000
(5) 11111111, 10110001

6. What is the 2's complement of decimal –12?

(1) 00001100 (2) 00110011 (3) 11110011 (4) 11110100 (5) 11111011

7. Which of the following is true about 2's complement?

(1) An extra bit is used to represent the sign.
(2) Makes it possible to build low-cost, high-speed hardware to perform arithmetic operations.
(3) Addition and subtraction are used as two different operations.
(4) Usually represented in hexadecimal number system.
(5) Used in first generation computers to perform logic operations.

8. Consider the character representations in Table 1 and Table 2 given below:

Table 1:

අ	ආ	ඇ	ඈ
0D85	0D86	0D87	0D88

Table 2:

அ	ஆ	இ	ஈ
0B85	0B86	0B87	0B88

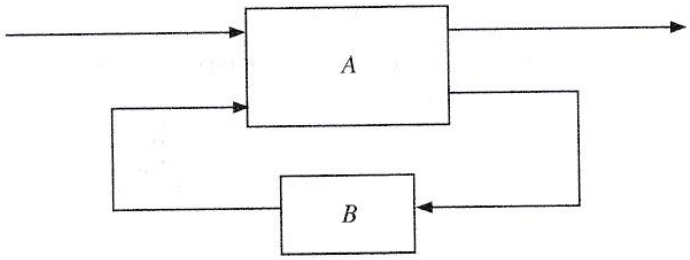
In which of the character encoding systems given below, the above characters in Table 1 and Table 2 are represented?

(1) Both Tables 1 and 2 : in ASCII
(2) Both Tables 1 and 2 : in UNICODE
(3) Table 1: in ASCII, Table 2: in UNICODE
(4) Table 1: in EBCDIC, Table 2: in ASCII
(5) Table 1: in UNICODE, Table 2: in ASCII

9. Which of the following is the most simplified expression equivalent to $A\overline{B}\overline{C} + B\overline{C} + \overline{A}\overline{B}C + BC$?

(1) $A\overline{B}\overline{C} + \overline{A}\overline{B}C + B$ (2) $\overline{B}(A\overline{C} + \overline{A}C) + B$
(3) $\overline{C}(A\overline{B} + B) + C(\overline{A}\overline{B} + B)$ (4) $A\overline{C} + \overline{A}C + B$
(5) $\overline{A}\overline{C} + B$

10. A block diagram of a sequential logic circuit is shown below, with one block labelled as "A" and the other labelled as "B".



Which of the following statements about the above block diagram are correct?

I – The block A is a combinational logic circuit.
II – The block B is a memory element.
III – Only the block A can be implemented using logic gates.

(1) Only I (2) Only II (3) Only I and II
(4) Only I and III (5) All I, II and III

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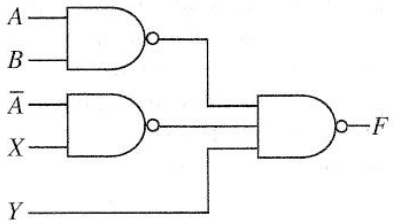
11. Consider the following logic circuit consisting of NAND gates:



If the required output of the above circuit is $AB + \overline{A}\overline{B} + \overline{C}$, then what should the inputs X and Y be?

(1) $X = B$ and $Y = C$ (2) $X = B$ and $Y = \overline{C}$ (3) $X = \overline{B}$ and $Y = C$
(4) $X = \overline{B}$ and $Y = \overline{C}$ (5) $X = \overline{C}$ and $Y = B$

12. The *operating system* (OS) is another program that runs on the computer that has some special responsibilities. Memory management, file management and input/output management are some of these responsibilities. What is another important responsibility of the OS?

(1) backup management (2) cache memory management
(3) compiler management (4) process management
(5) system clock management

13. When the number of *processes* started by a user on a single-processor computer increases, what happens to the response time of each process as perceived by the user and the memory management related work of the operating system respectively?

(1) Both the response time and the memory management related work increase.
(2) Response time decreases while the memory management related work increases.
(3) Response time increases while the memory management related work decreases.
(4) Both the response time and the memory management related work decrease.
(5) There is no change in either of them.

14. Which of the following is **not** a responsibility of the *operating system*?

(1) allocating physical memory to processes
(2) deciding which process to run
(3) keeping track of the usage of compiled program files on a hard disk
(4) keeping track of which parts of physical memory are in use, which are free
(5) swapping processes between physical memory and disk

15. In a computer, the size of a user program could exceed the size of physical memory. Also, only the demanded areas of programs are kept in physical memory.

The above are due to which of the following?

(1) the use of cache memory
(2) the use of contiguous file allocation
(3) the use of a file allocation table (FAT)
(4) the use of memory management unit (MMU)
(5) the use of *pages*, *frames* and *page tables*

16. Which of the following statements regarding *compilers* and *interpreters* are correct?

A – A compiler transforms an entire high-level language program into its machine code.
B – An interpreter converts each high-level program statement into the relevant machine code during the program run.
C – Compiled codes usually run faster than interpreted codes.

(1) A only (2) A and B only
(3) A and C only (4) B and C only
(5) All A, B and C

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17. Which of the following statements regarding *guided* and *unguided* media are correct?

A – Guided media transmission supports higher data speeds than unguided media transmission.
B – Guided media is subjected to less interference than unguided media.
C – Unguided media transmission is more secure than guided media transmission.
D – Unguided media transmission uses low bandwidth than guided media transmission.

(1) A, B and C only
(2) A, B and D only
(3) A, C and D only
(4) B, C and D only
(5) All A, B, C and D

18. What is the process carried-out in the *modulation* technique in data transmission?

(1) encoding information in transmitted signal
(2) encoding signals in transmitted information
(3) extracting information from the transmitted signal
(4) extracting signal from the transmitted information
(5) transfer information with minimum distortion

19. Which of the following statements about *bus topology* are **incorrect**?

A – Computers and network devices are connected to a single cable.
B – All traffic flows are either clockwise or anticlockwise.
C – Bandwidth is shared among the nodes.
D – Each node is connected to two of its neighbours.

(1) A and B only
(2) A and D only
(3) B and C only
(4) B and D only
(5) C and D only

20. Consider the following statement with a blank.

A Media Access Control (MAC) address is usually represented in ..... numbers.

Which of the following is suitable to fill the blank?

(1) binary (2) decimal (3) hexadecimal (4) natural (5) octal

21. You are requested to create 16 subnets with a Class C IP. Which subnet mask is suited to create the subnet?

(1) 255.255.255.240
(2) 255.255.255.248
(3) 255.255.255.250
(4) 255.255.255.252
(5) 255.255.255.224

22. Which of the following statement/s regarding the *testing* of a system are correct?

A – Black-box testing involves detailed checking of each line in the code.
B – Unit-testing helps to uncover errors in the codes.
C – System testing should not be performed prior to unit-testing.

(1) A only
(2) B only
(3) C only
(4) A and C only
(5) B and C only

23. Which of the following indicate *functional requirements*?

A – The users should be allowed to update their contact addresses and phone numbers.
B – Any user request must be responded within 2 ms.
C – The system must be easy to change.

(1) A only
(2) B only
(3) C only
(4) A and C only
(5) All A, B and C

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24. The following details are given about a software project:

A – requirements are fixed (not allowed to change throughout the complete project)
B – must deliver the complete software product at once
C – detailed descriptions and specifications must be prepared for each activity within the project

What is the most suitable software process model for this project?

(1) Agile
(2) Prototype
(3) Rapid Application Development
(4) Spiral
(5) Waterfall

25. Which of the following statements on Data Flow Diagrams (DFD) is **incorrect**?

(1) Context diagram is a DFD with the highest level of abstraction.
(2) All data stores in a system must be represented in the context diagram.
(3) Data flows are used to link the other components in DFDs.
(4) Elementary processes are not decomposed further.
(5) External entities in DFDs act as sources or recipients of data.

26. What is the correct SQL statement to delete a database called 'ALdb'?

(1) delete ALdb;
(2) delete database ALdb;
(3) drop ALdb;
(4) drop database ALdb;
(5) remove database ALdb;

27. Which of the following statement/s about a relation in the Second Normal Form (2NF) are true?

A – It can have a composite key.
B – It should be in the First Normal Form (1NF) as well.
C – All non-key attributes are fully functionally dependent on the primary key.

(1) B only
(2) C only
(3) A and B only
(4) B and C only
(5) All A, B and C

28. Which of the following statement/s regarding the *logical database schema* are true?

A – It is a blueprint for a database.
B – It contains data and information.
C – It formulates all the constraints that are to be applied on the data.

(1) A only
(2) A and B only
(3) A and C only
(4) B and C only
(5) All A, B and C

29. Consider the following SQL statement:

Alter table subject add primary key (Subject_Id);

Which of the following is **incorrect** about the above SQL statement?

(1) It adds a primary key constraint to the table named *subject*.
(2) The table named *subject* should already exist.
(3) The field *Subject_Id* should not be null.
(4) A table named *subject* is created with a primary key named *Subject_Id*.
(5) The values of the field *Subject_Id* should not be repeated in *subject* table.

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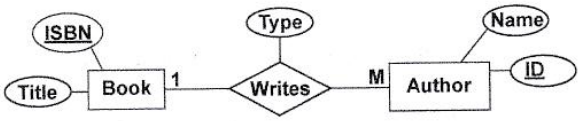
- Consider the following scenario about 'authors' and 'books' to answer the questions **30** and **31**.

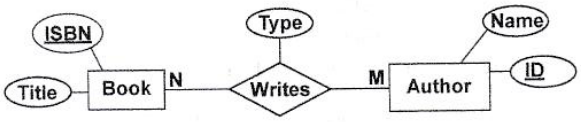
  "An author can write books. A book has a title and a code called ISBN which is unique. A book can be written by either one or several authors. An author has a name and a unique ID. An author can have a type as either chief author or a co-author for a particular book."

30. Which of the following is the most suitable Entity Relationship (ER) representation for the above scenario?

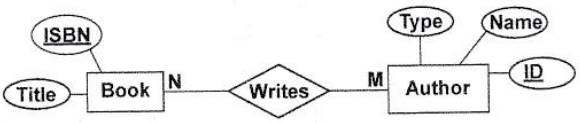
(1)



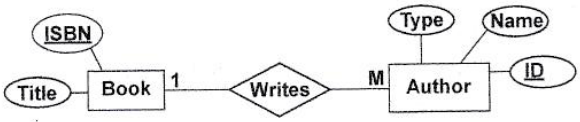
(2)



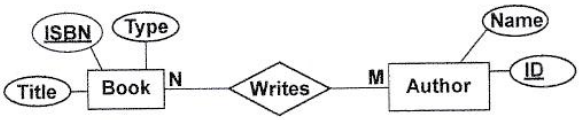
(3)



(4)



(5)



31. How many tables can be derived initially, when mapping the entity relationships in the above scenario to a relational schema?

(1) 1 (2) 2 (3) 3 (4) 4 (5) 5

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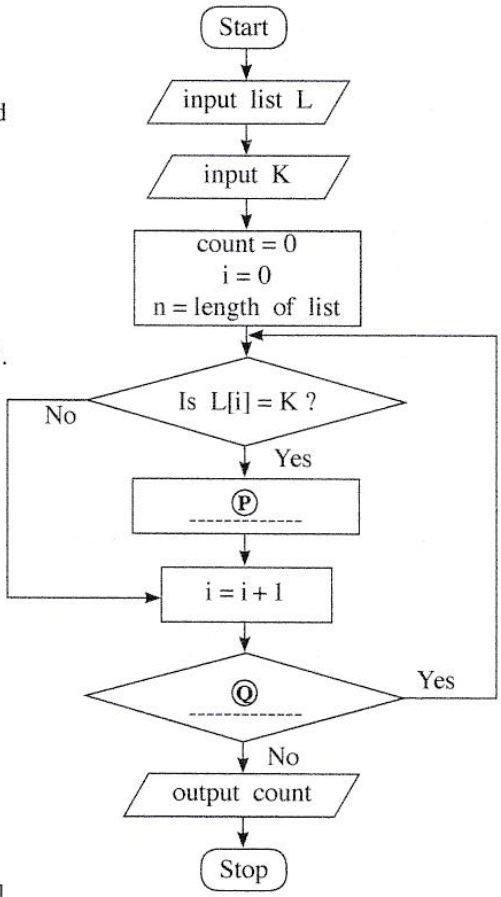
- The questions **32 – 34** are based on the algorithm expressed by the flowchart below. The algorithm takes a list L of items and an item K as inputs and is expected to output the number of items in L that are equal to K. List indices start at 0. Note that two entries, labelled as Ⓟ and Ⓠ, in the flowchart are blank (unspecified).

32. For the algorithm to function correctly, what should be inserted at the blank Ⓟ?
(1) n = n-1
(2) n = n+1
(3) count = count + 1
(4) count = count + i
(5) count = count + n

33. For the algorithm to function correctly, what should be inserted at the blank Ⓠ ?
(1) Is i < n?
(2) Is i = n?
(3) Is count < n?
(4) Is count < K?
(5) Is n > 0?



34. Consider the following python programs I, II and III.

I
```
L = [int(x) for x in input().split()]
K = int(input())
count = 0
for i in range(len(L)):
      if (L[i]== K):
            count = count + 1
print(count)
```

II
```
L = input().split()
K = input()
count = 0
n = len(L)
for i in range(n):
      if (L[i]== K):
            count = count + i
print(count)
```

III
```
L = [int(x) for x in input().split()]
K = int(input())
count = i = 0
while ( i < len(L)):
      if (L[i]== K):
            count = count + 1
print(count)
```

Which of the above python programs implement the given algorithm?
(1) Only I (2) Only II (3) Only I and II
(4) Only I and III (5) All I, II and III

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35. What would be the output of the following Python code, if the input was 17?

```
n = float(input())
m = (n // (n % 5)) ** 3
print(m)
```

(1) 24.0 (2) 25.5 (3) 512.0 (4) 614.125 (5) an error message

36. Suppose that S is a string, L is a list and T is a tuple in a Python program. The length of each is 10. Consider the following Python statements:

I S[2] = '2'
II L[2] = '2'
III T[2] = '2'

Which of the above three statements will generate an error?

(1) Only I (2) Only II (3) Only I and II
(4) Only I and III (5) All I, II and III

37. What would be the output of the following Python code segment?

```
S = "corona virus pandemic"
V = "aeiou"
count = 0
for i in range(len(S)):
        if (S[i] in V):
                count = count + 1
print(count)
```

(1) 0 (2) 5 (3) 8 (4) 19 (5) 21

38. What would be the output when the following Python code is executed?

```
x = 1
def myfunc(p, q):
      global x
      p, q = q, p
      x = x + p
myfunc(x,3)
print(x)
```

(1) 1 (2) 2 (3) 3 (4) 4 (5) an error message

39. What would be the output of the following Python code, if the input was 100?

```
n = int(input())
if (n > 0):
      m = "Z"
      if (n > 10):
            if (n > 100):
                  m = "A"
            elif (n < 50):
                  m = "B"
            else:
                  m = "C"
      else:
            m = "D"
print(m)
```

(1) A (2) B (3) C (4) D (5) Z

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40. What would be the output of the following Python code?

```
x = 1
y = 100
while (x < 100):
      y = y - x
      x = x + 1
      if (x + y) < 90:
            break
print(y)
```

(1) 100 (2) 85 (3) 79 (4) 72 (5) 7

41. Consider the following Python program:

```
f1 = open("inFile.txt", "r")
f2 = open("outFile.txt", "w")
checkString = "No"
for line in f1:
      if (checkString not in line):
          f2.write(line)
f1.close()
f2.close()
```

Which of the following statements are correct about the above program?

A – The content of the input file (inFile.txt) is checked in a loop, one line at a time.
B – The total content of one file is written onto another file.
C – If either of the two files does not exist, the program will stop and exit while executing the first two lines of the code.

(1) Only A (2) Only B (3) Only A and B
(4) Only A and C (5) All A, B and C

42. Which of the following HTML tags are used to define a *definition* list?

(1) <dl>, <dd>, <li> (2) <dl>, <dt>, <dd> (3) <dl>, <td>, <dd>
(4) <dl>, <th>, <dd> (5) <dl>, <th>, <td>

43. Which HTML tag is used to include a caption for a *fieldset* grouping in a form?

(1) <caption> (2) <head> (3) <label> (4) <legend> (5) <title>

44. What is the expected output of the following PHP code block?

```
<?php
      $one = "Welcome";
      $two = "2020";
echo $one.$two ;
?>
```

(1) Welcome.2020 (2) Welcome2020 (3) Welcome 2020
(4) Welcome;2020; (5) Welcome.2020;

45. Which of the following affects **least** to the downloading speed of a web page?

(1) capability of the web browser
(2) number of hyperlinks in the web page
(3) number and size of images in the web page
(4) processing power of the server computer that stores the web page
(5) the bandwidth of the internet connection which is used to access the web page

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46. Which of the following statements is true about the code given below?

```
<style>
      .title {
      text-align: center;
      color: blue;
      }
</style>
```

(1) This defines internal styles and uses the CSS 'class' concept.
(2) This defines internal styles and uses the CSS 'group' concept.
(3) This defines inline styles and uses the CSS 'group' concept.
(4) The styles defined inside the code can be used only for one type of element.
(5) This is an example of the CSS 'Id' concept and the name of the Id is 'title'.

47. Consider the following HTML code line:

```
<a href="#PartA"> Go to Part A </a>
```

Which of the rows in the following table describes the outcome of the above code line?

	Displayed as a hyperlink	To which the hyperlink connects to
(1)	#PartA	new web page named "Go to Part A"
(2)	#PartA	part of the same page named with Id "Go to Part A"
(3)	Go to Part A	new web page named "#PartA"
(4)	Go to Part A	part of the same web page named with Id "#PartA"
(5)	Go to Part A	part of the same web page named with Id "PartA"

48. Which of the following statements related to *e-commerce* are true?

A – A particular product may be available at different prices at different e-commerce sites.
B – Payment option at the receipt of goods allows customers to verify the quality of their purchases made through the e-commerce site.
C – Additional charges can be included as delivery and service fees over and above the stated price.

(1) A only (2) B only (3) C only
(4) A and C only (5) All A, B and C

49. Consider the following:

A – Cloud formation in the sky
B – The evolution of living species
C – How neurons function in the human brain

Which of the above could be used in *bio-inspired computing*?

(1) A only (2) B only (3) C only
(4) A and C only (5) B and C only

50. Which of the following statements about *quantum computing* are correct?

A – In quantum computing, principles of quantum physics are applied.
B – Quantum bits (qubits) are used in quantum computing as the information unit.
C – Quantum computers emit radiation fatal to human users.

(1) A only (2) B only (3) C only
(4) A and B only (5) All A, B and C

* * *

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