



**G.C.E. (A/L) Examination – July 2016**  
**Conducted by Field Work Center, Thondaimanaru**

**In Collaboration with the Zonal Education Office, Jaffna**  
**Information & Communication Technology (ICT)**

**Grade - 12 (A/L) 2017**

**Part - I**

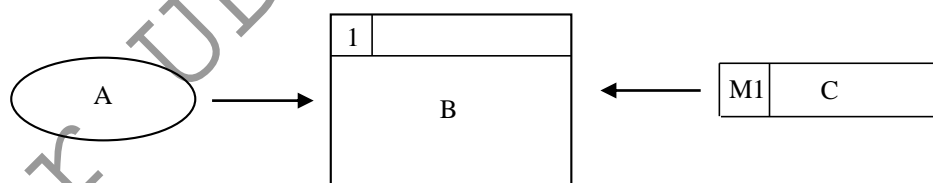
**Time: 3 Hours**

**Answer all the questions**

1. Who invented ABC computer?  
(1) Charles Babbage (2) Blaise Pascal (3) Ada Lovelace  
(4) John V. Atanasoff (5) John Von Neumann
2. Program in execution is called.  
(1) Process (2) Instruction (3) Procedure  
(4) Function (5) Coding
3. Which of the following is considered as the first stage of waterfall model?  
(1) Coding (2) System analysis and specification  
(3) System implementation (4) System testing  
(5) System maintenance
4. Data flow diagrams that concentrate on the movement of data between processes are referred to as.  
(1) Data diagram (2) Data model (3) Flow model  
(4) Flow diagram (5) Process model
5. The system software and application software are respectively.  
(1) MS Powerpoint, Unix (2) Unix, Linux (3) Adobe Reader, Linux  
(4) MS Windows, Mac OS X (5) Fedora Linux, Adobe Flash MX
6. What is the type of network that allows you to connect your mobile phone to your personal computer?  
(1) LAN (2) WAN (3) PAN (4) Internet (5) Ethernet
7. The simplified result of the Boolean function  $f(x, y) = \overline{(x + y)} \cdot \overline{(x \cdot y)}$  is.  
(1)  $x$  (2) 1 (3)  $y$  (4)  $\bar{x}$  (5)  $xy$
8. The binary equivalent of  $37_{10}$ .  
(1) 110010 (2) 100001 (3) 101011 (4) 110000 (5) 101011
9. The output of the Boolean function  $f(x, y, z) = (x + \bar{y}) \cdot (z + \bar{x}) \cdot (y + \bar{z})$  is 0 when.  
(1)  $x = 1, y = 1, z = 0$  (2)  $x = 1, y = 0, z = 1$  (3)  $x = 1, y = 1, z = 1$   
(4)  $x = 0, y = 1, z = 1$  (5)  $x = 0, y = 1, z = 0$

[See page two]

10. In data communication, ADSL stands for.  
 (1) Asynchronous Division System Line (2) Asynchronous Divert Subscriber Line  
 (3) Asynchronous Dual Subscriber Line (4) Asynchronous Digital System Line  
 (5) Asynchronous Digital Subscriber Line
11. The result that would be obtained when the python statement `print (3%2+2*3-1)` is executed.  
 (1) 2 (2) 5 (3) 4 (4) 6 (5) 3
12. Which of the following has the fastest data access?  
 (1) Virtual memory (2) Read only memory (3) Cache memory  
 (4) Hard disk (5) Random access memory
13. Program translator for the low level computer programming is called.  
 (1) Assembler (2) Compiler (3) Linker  
 (4) Loader (5) Interpreter
14.  $AC_{16} + 67_8 =$   
 (1)  $E3_{16}$  (2)  $AB_{16}$  (3)  $75_{16}$  (4)  $2A_{16}$  (5)  $11_{16}$
15. In which of the following stage of the system development life cycle the user training about the system is provided?  
 (1) System design (2) System testing (3) System implementation  
 (4) System maintenance (5) Coding
16. Consider the following systems.  
 A – Bicycle B – Human nervous system C – Human blood circulatory system  
 Which of the above is/are the closed system(s)?  
 (1) A only (2) B only (3) B, C only (4) A, B only (5) A, C only
17. Consider the following data flow diagram (DFD) based on structured system analysis and design methods (SSADM).



A, B and C are respectively.

- (1) Process, external entity, data store (2) External entity, data store, process  
 (3) Data store, external entity, process (4) Data store, process, external entity  
 (5) External entity, process, data store
18. In an operating system, which of the following is not a fundamental process state?  
 (1) Ready state (2) Terminated state (3) Running state  
 (4) Blocked state (5) Waiting state

[See page three]

19. Which of the following is correct about a table in a relational database?

- (1) A table should consist of a primary key.
- (2) A table should consist of an alternate key.
- (3) A table can have only one candidate key.
- (4) A table may have null value.
- (5) Primary key in a table should be always in first column.

20. BCD equivalent of  $73_{10}$ .

- (1) 01010011      (2) 01110011      (3) 11101010      (4) 11100001      (5) 10101010

21. In an operating system, copying a process into a hard disk is called.....

- (1) Swapping      (2) Context switching system      (3) Process
- (4) Paging      (5) Offset

22. Two's complement of  $(+13_{10})$  and  $(-8_{10})$  are respectively.

- (1) 11011001 and 10000110      (2) 00010111 and 11111001      (3) 00001101 and 11111000
- (4) 10011001 and 11000111      (5) 11101001 and 00000011

23. Which of the following is a valid identifier for naming function in python programming?

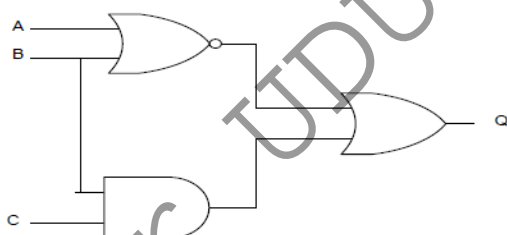
- (1) *if*      (2) *a - b*      (3) *hello*      (4) *x#y*      (5) *for*

24. What is the output of the following python program?

```
a=1
while a < 5:
    a = a+1
    print (a, end = ' ')
```

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

25. Consider the following logic circuit.



What is the result Q of the logic circuit?

- (1)  $\bar{A} \cdot \bar{B} + BC$
- (2)  $\bar{A} + \bar{B} + AC$
- (3)  $A + \bar{B}\bar{C}$
- (4)  $\bar{A}B + C$
- (5)  $\bar{A}B + BC$

26. Consider the followings.

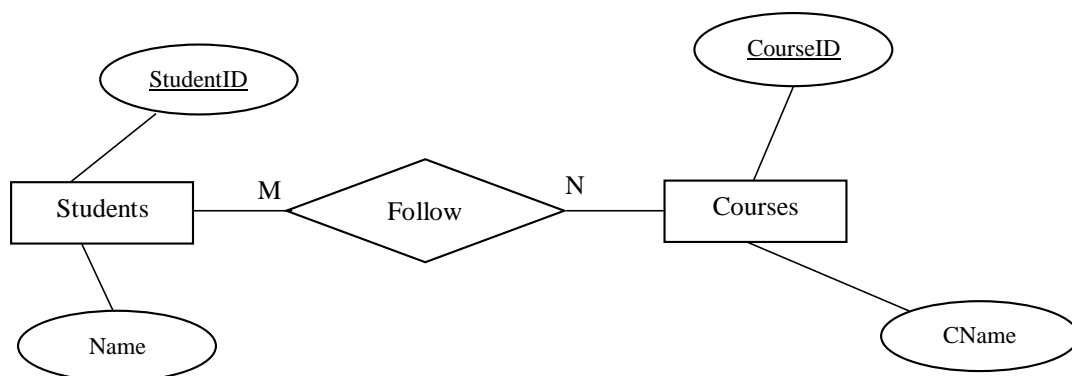
- A – Guaranteed for security of money.
- B – Guaranteed for quality of products.
- C – The e-commerce site is open for customers always.

Which of the above is/are the benefit(s) of the e-commerce?

- (1) A only      (2) B only      (3) C only      (4) A, B only      (5) A, B, C all

[See page four]

27. Consider the following ER diagrams.



Which of the following data tables could be obtained if this ER diagram is mapped into tables?

A – Students (StudentID,Name)

B – Courses (CourseID, CName)

C – Follow (StudentID, CourseID)

D – Follow (Name, CName)

(1) A only

(2) B only

(3) A, B only

(4) A,B,C only

(5) A,B,C,D all

28. Which of the following python function is syntactically correct?

(1) def greet()  
    print ("Python")  
    greet()

(2) def greet():  
    print ("Python")  
    greet()

(3) def greet():  
    print ("Python")  
    greet()

(4) def greet()  
    print ("Python")  
    greet()

(5) def greet():  
    print ("Python"):  
    greet():

29. In data communication, which of the following is/are the characteristic(s) of ADSL?

A – Transmitting voice and data

B – Digital communication

C – Download speed is higher than upload speed

Which of the above is/are correct?

(1) A only

(2) B only

(3) C only

(4) A,B only

(5) A,B,C all

30. Consider the following statements regarding data table given below.

LecturerId	LecturerName	Address	TelephoneNo
L_001	Roshan	Colombo	0716547334
L_004	Nimalka	Kandy	0764553363
L_002	Ragu	Jaffna	0776454536

A – Number of records in this table are four.

B – Degree of this table is four.

C – Cardinality of this table is three.

Which of the above is/are correct?

(1) A only

(2) B only

(3) C only

(4) B, C only

(5) A,B,C all

[See page five]

31. Consider the following statements regarding user requirements of an automated teller machine (ATM).

A – “User should be able to insert ATM card into the machine” is a functional requirement.

B – “User should be able to get money from the machine” is a non-functional requirement.

Which of the following is correct?

- (1) Statement A and Statement B are both correct.
- (2) Statement A and Statement B are both incorrect.
- (3) Statement A is correct but and Statement B is incorrect.
- (4) Statement A is incorrect and Statement B is correct.
- (5) It cannot be determined about Statement A and Statement B.

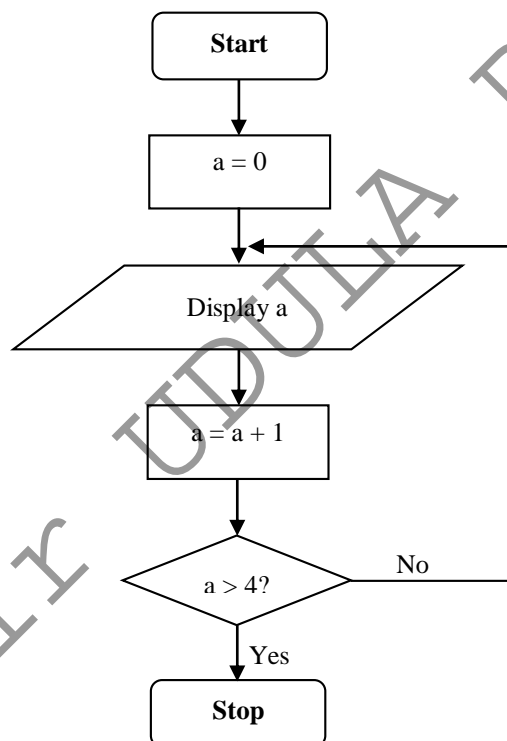
32. Operating system generally used in a mobile phone is best described as.

- (1) Real-time operating system
- (2) Single user operating system
- (3) Multiuser operating system
- (4) Embedded operating system
- (5) Single user-multitasking operating system

33. Which of the following is not considered as an automatic data capturing method?

- (1) OCR
- (2) Keyboard
- (3) OMR
- (4) MICR
- (5) Sensor

34. What is the output of the following flowchart?



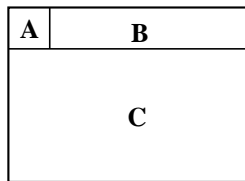
- (1) 0 1 2 3
- (2) 1 2 3
- (3) 0 1 2 3 4 5
- (4) 0 1 2 3 4
- (5) 1 2 3 4

35. “.....is considered as a traditional software process model”.

- (1) Waterfall model
- (2) Incremental development model
- (3) Spiral model
- (4) Rapid application development - RAD
- (5) Object-oriented model

[See page six]

36. In structured system analysis and design methods (SSADM), the labels A, B and C represent respectively for a process used in data flow diagram.



- (1) Identifier, process, role      (2) Role, identifier, process      (3) Process, identifier, role  
(4) Identifier, role, process      (5) Role, process, identifier
37. What is the output of the following python program?

```
n = 4
fact = 1
i = 2
while i <= n:
    fact = fact*i
    i = i+1
print (fact)
```

- (1) 6      (2) 120      (3) 24      (4) 2      (5) 1
38. Consider the following statements regarding entity integrity in a relational database.
- A – It is represented in individual relations.  
B – It represents that the primary key cannot be null value.  
C – It is represented between two relations.

Which of the above is/are correct?

- (1) A only      (2) B only      (3) C only      (4) A, B only      (5) A, C only
39. Expert system is based on.
- (1) Transaction processing system      (2) Management information system  
(3) Automated system      (4) Agent system  
(5) Artificial intelligence system

40. The age limit is represented from 19 to 22 when students are registered for University entrance via the website.

Which of the following data validation method is most appropriate for this situation?

- (1) Type check      (2) Range check      (3) Numeric check  
(4) Format check      (5) Presence check

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[See page seven]

## Part II – A Structured Questions

Answer all the questions

(1)

(a) Write down  $9_{10}$  and  $(-13_{10})$  in the form of two's complement method using 8 - bits.

(b) Use two's complement 8 - bits method to calculate  $9_{10} - 13_{10}$ . Show your methods.

(c) Explain how you would convert the result obtained in (b) above into the decimal form.

(d) Explain the following e-commerce models each by using separate examples.

	e-commerce model	Explanation / example
(i)	B2C	
(ii)	C2C	
(iii)	B2B	
(iv)	G2C	

[See page eight]

(2) Consider the following three data tables.

Employee		
<u>EmpId</u>	EmpName	Salary
E01	James	50000
E02	Jack	60000
E03	Henry	45000
E04	Tom	55000

Department	
<u>DeptId</u>	DeptName
D001	Sales
D002	Marketing
D003	Finance

EmpDept	
<u>EmpId</u>	<u>DeptId</u>
E01	D001
E02	D002
E01	D002
E03	D001
E04	D003

(a) Draw the ER diagram.

(b) What is the type of relationship between entities? Justify your answer.

(c) What do you mean by the degree of a relationship?

(d) What is the degree of the relationship in the ER diagram drawn in (a)?

[See page nine]



(3)

(a) Compare the characteristics of the following two methods for communication technologies.

	CDMA	GSM
(i)		
(ii)		
(iii)		

(b) A computer system contains a byte addressable memory and it uses 32-bits addresses. What is the maximum usable size of this memory in Giga Bytes? Show your work clearly.

(c)

Consider the following scenario.

A school library uses school library information system. It registers for members. In addition, it registers the details of new books obtained for library. Librarian requests to the system in order to register for members and books. The membership details are entered into the member file. The book details are entered into the book file. Draw the segment of the data flow diagram (DFD) for the above mentioned scenario.

[See page ten]

**(4)**

**(a)** Write down the output for the following python program.

```
s = "paracetamol"
for c in s:
    if c == 'a': break
    print (c, end=' ')
```

**(b)** Write down the output of the program given in **(a)** by using 'continue' instead of using 'break'.

**(c)** What is the value of 'sum' after the following python program has been executed?

```
i = 0
sum = 0
while i < 9:
    if i%4 == 0:
        sum = sum + i
    i = i + 2
```

**(d)** Rewrite the python program given in part **(c)** using a 'for' loop without using any break statements and without introducing any more variables.

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*[See page eleven*

(1)

- (a) Apply De Morgan's Law to the following expression and simplify the result. Show the stages of your working.

$$\overline{\overline{A} B + A}$$

(b)

A systems designer has developed a system to control front door light in a house. A lamp outside a front door comes on automatically when it is dark and someone stands on the doormat outside the front door. A pressure sensor under the mat changes from OFF (0) to ON (1) when someone stands on the doormat. The light sensor is ON (1) when it is light and OFF (0) when it is dark. A switch is to be added to the circuit for manual switch on / off (light switch ON manually - 1, light switch OFF manually - 0)

The light can be turned on **manually**, or by the use of a **pressure sensor**, so long as a light sensing unit indicates that it is **dark**.

- (i) Obtain the Boolean expression to implement the above logic given.
- (ii) Construct a truth table to represent the above Boolean expression obtained in (b-i).
- (iii) Draw a logic circuit for the above Boolean expression obtained in (b-i) by using only AND, OR and NOT gates.
- (iv) Obtain a Boolean expression in the form of standard SOP using the truth table or other method.

(2)

- (a) State two characteristics of program translators such as assembler and compiler.
- (b) Give main flow control structures used in a structured programming language. Show how these flow control structures can be represented by using a flow chart. [See page twelve]

(c)

The following Python program contains one error that will be detected by the python interpreter and three other errors that may cause failure at runtime. For each of the four errors, give

- the number of the line of code where it occurs.
- the kind of error in that line of code.
- the way in which the error should be corrected.

```
01 count = 0
02 sum = 0
03 finished = False
04 while not finished:
05     number = input("Enter a number: ")
06     if number<0:
07         finished = true
08     else:
09         sum = sum + number
10     print("average ="; sum / count)
```

[See page twelve]

(3)

Consider the following scenario.

A publishing company produces books on various subjects. The books are written by authors who specialize in one particular subject. Subjects are uniquely identified by SubjectId. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more book publications. Every book require some items for publication. These items are supplied by suppliers. Suppliers are uniquely identified by SupplierId. One supplier can supply many items. Items are uniquely identified by ItemId. Shop owner buys books from the publisher. Shop owner can buy many books but one book can be bought by one shop owner only. Publishers publish Books. Books are uniquely identified by BookId. Author, Editor, Shop Owner and Publisher are uniquely identified by their names.

Construct a single ER diagram for the above mentioned scenario and identify attributes and associate them with entity or relationship types and mark primary key attributes for each entities. State any assumptions necessary to support your design.

(4)

A patient joins the doctors by submitting a patient application form. A new patient record is created and stored in the patient records store. A patient makes an appointment by providing their patient details. An appointment card is given to the patient after they have made the appointment. The appointment details are stored in the database. A receptionist makes a telephone appointment for a patient by entering their patient details. A receptionist also cancels appointments for a patient by entering their cancellation details. A doctor will see a patient. When they see a patient list of appointments and patient's records will be sent to the doctor. A doctor may want to issue a prescription details into the system and a prescription be issued to the patient.

Draw a context diagram to show the overview of the *Doctor's Appointment System-DAS* described above. Clearly indicate external entities and data flows in the diagram.

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[End