



General Certificate of Education (Adv. Level) Examination Sixth Term - 2021

Conducted by Field Work Center (FWC), Thondaimanaru
Information & Communication Technology (ICT)

தகவல், தொடர்பாடல் தொழினுட்பவியல் I
Information & Communication Technology I

Two Hours

20

E

I

Gr. 13 (2021)

Part - I

Instructions:

- ❖ Answer all questions.
- ❖ Write down your index number on the space provided.
- ❖ In each of the questions 1 to 50, pick one of the alternatives (1),(2),(3),(4),(5) which is correct or most appropriate. Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- ❖ No use of calculators.

1. Which of the following devices can be used to read the answers marked as shaded circles in a multiple-choice question paper?
(1) Digitizer (2) Plotter (3) Lightpen (4) Scanner (5) MICR
2. Which of the following statement is true about computers which were developed in the past?
(1) Transistors were used in first generation computers
(2) Assembly language was used as a programming language in first generation computers
(3) Vacuum tubes were used in second generation computers
(4) Integrated circuits were used in third generation computers
(5) Assembly code cannot be executed in third generation computers
3. Which of the following statements is **false** with respect to the CPU?
(1) Cache memory holds data that can be readily accessed by the CPU
(2) ALU and CU are two principal parts of the CPU
(3) Control Unit sends signals to the CPU components to perform sequenced operations
(4) ALU determines which actions are to be carried out according to the values in a Program Counter (PC) register and a status register
(5) ALU operations are controlled by the CU
4. “..... is an economic and social inequality with regard to access to, use of, or impact of information and communication technologies”.
Which of the following is the most appropriate to fill the blank in?
(1) Plagiarism (2) Piracy (3) Digital divide (4) Privacy (5) Phishing

[See page 2]

5. Consider the following statements.

A - Source code is available and it is free to use, modify or redistribute these type of software

B - Source code is not available and user should have the permission given by owner of the software to use this type of software

C - It is given to users always in free of charge

Which of the above is /are considered correct about open source software?

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

6. What is the decimal value of the binary number 0.010101?

- (1) 5/64 (2) 13/64 (3) 17/64 (4) 21/64 (5) 31/64

7. Which of the following is equivalent decimal value of Two's complement value of 11000110?

- (1) -85 (2) -58 (3) -56 (4) -78 (5) -68

8. Consider the following statements.

A - Latches and flip-flops are the basic elements for storing information

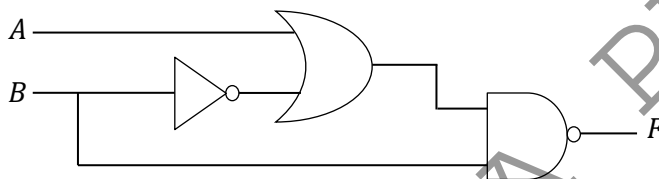
B - SR flip flop has two outputs one output being the inverse or complement of the other, and two inputs

C - SR flip flop is designed with the help of two NOR gates and also two NAND gates

Which of the above is /are correct?

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

9. Consider the following logic circuit.



Which of the following(s) is /are the equivalent Boolean expressions of the output F of this logic circuit?

A - $\overline{(A + B)} + \bar{B}$

B - $(\bar{A} + B) + \bar{B}$

C - $\overline{(A \cdot B)}$

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

10. Consider the following Karnaugh map.

| AB \ C | 0 | 1 |
|--------|---|---|
| 00 | 1 | 1 |
| 01 | 0 | 0 |
| 11 | 0 | 1 |
| 10 | 1 | 1 |

Which of the following simplified Boolean expression is represented by the Karnaugh map given above?

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

11. In operating system, with ① , only one process can execute at a time; meanwhile all other processes are waiting for the processor. With ② , more than one process can be running simultaneously each on a different processor.

Which of the following is most appropriate to fill the blanks in ① and ② respectively?

- (1) Multiprocessing, Multiprogramming
- (2) Multiprogramming, Uniprocessing
- (3) Multiprogramming, Multiprocessing
- (4) Uniprogramming, Multiprocessing
- (5) Multiprogramming, Uniprocessing

12. In operating system, what is a page fault?

- (1) It is an spelling error in a page in memory
- (2) It is a reference to a page which is in another program
- (3) It always occurs whenever a page is accessed
- (4) It is an access to a page not currently in memory
- (5) It always occurs whenever a page is accessed

13. A process is selected from the queue by the scheduler, to be executed.

- (1) Blocked, short term
- (2) Wait, long term
- (3) Ready, short term
- (4) Ready, long term
- (5) Waiting, medium term

14. What is waiting time?

- (1) The total time in the blocked and waiting queues
- (2) The total time spent in the ready queue
- (3) The total time spent in the running queue
- (4) The total time from the completion till the submission of a process
- (5) The total time spent for the booting up

15. Consider the following statements about fiber optics table.

A - It contains very lower attenuation

B - It contains very lower usable bandwidth

C - It contains more resistance for electro magnetic interferences

Which of the above is /are correct?

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

16. The amplitude modulation technique is used to change only.

- (1) The amplitude
- (2) The frequency
- (3) The phase
- (4) The frequency and phase only
- (5) The amplitude, frequency and phase

17. Consider the following table.

| No. | Characteristics |
|-----|-----------------------|
| ① | Unreliable |
| ② | Connection-oriented |
| ③ | Unordered messages |
| ④ | No congestion control |

Which of the above can be the characteristic(s) of UDP?

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

18. Which OSI layer performs code conversion, code formatting and encryption?

- (1) Presentation
- (2) Session
- (3) Network
- (4) Application
- (5) Physical

19. Which of the following application layer protocol that uses UDP as the transport protocol?

- (1) HTTP (2) DNS (3) SMTP (4) HTTPS (5) POP

20. Which of the following is correct about data encryption?

- (1) It is the process of correctly identifying the parties involved in a communication by each party
- (2) In secret key encryption, two different keys are used to encrypt and decrypt data
- (3) In public key cryptography, each public party is given a separate key to encrypt data
- (4) Private key cryptography is more practical than public key cryptography
- (5) Reversed usage of keys in public key encryption enables digital signature

21. Which of the following would be functional requirement of a students information system for a private tuition institute?

- (1) System should have user-friendly interfaces
- (2) Teachers should be able to evaluate online tests
- (3) Students should be able to edit the teaching materials
- (4) System should withstand user errors
- (5) Student login has to be expired after one year

22. Which of the following is incorrect statement about off-the-shelf software in comparison with custom software?

- (1) Software is designed to the exact user's requirements
- (2) Changes or maintenance can be made quickly
- (3) More reliable because off-the-shelf software is well tested before its been sold
- (4) Less expensive
- (5) Too many features, most are not used by users

[See page 5

23. Consider the following three statements related to software process models.

- Customer satisfaction by early and continuous delivery of valuable software
- Adapting changing requirements, even in late development
- Delivering working software frequently (for example, monthly)

Which of the following software model satisfies the above statements?

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

24. Consider the following statements.

A - Context diagram in a DFD illustrates a systems interface to the business and outside world including other information system

B - DFD shows what kind of information will be input to and output from the system; how the data will advance through the system, and where the data will be stored.

C - DFD represents data model of a system

Which of the above is/ are correct?

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

Consider the following relations to answer the questions from 25 to 27.

teacher (*teacher_id*, *teacher_name*, *date_of_birth*, *author_id*)

book (*book_id*, *book_name*)

author (*author_id*, *author_name*, *email_address*)

authorOfbook (*author_id*, *book_id*)

publisher (*publisher_id*, *publisher_name*, *contact_number*, *email*)

publisherOfbook (*publisher_id*, *book_id*)

Where *teacher_id*, *book_id*, *author_id* and *publisher_id* are the unique attributes of the teacher, book, author and publisher relations respectively.

25. Which of the following is correct statement about the relations given above?

- (1) *teacher_id* is the part of the primary key of teacher relation
- (2) *author_id* in teacher relation can be null value
- (3) *author_id* and *book_id* in *authorOfbook* relation can be null value
- (4) *book_id* is a candidate key of *publisherOfbook* relation
- (5) *author_name* in *author* relation is a candidate key

26. The following SQL is executed on the database relations given above.

SELECT * FROM teacher WHERE author_id is NOT NULL;

Which of the following is correct about the SQL?

- (1) Output can not be an empty table
- (2) teacher and author tables are used to obtain the output
- (3) *author_name* attribute is in the output
- (4) *publisher_name* attribute is in the output
- (5) output can contain the records in the teacher table in which *author_id* consists of values

[See page 6]

27. Consider the following statements about data definition language (DDL) which is used to create the table publisherOfbook by maintaining data integrity.

A - It contains foreign key constraint

B - It contains primary key constraint

C - It contains domain constraint

Which of the above is/ are syntactically correct?

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

28. Consider the following relation.

Student (index_no, student_name, date_of_birth, hobbies)

Where index_no is a unique attribute and hobbies take multiple values.

Which of the following is / are correct table/s when Student table is converted to first normal form?

- (1) Student (index_no, student_name, date_of_birth) and hobby (index_no, hobbies)
(2) Student (index_no, student_name, date_of_birth) and hobby (hobbies)
(3) Student (index_no, student_name, date_of_birth, hobby1, hobby2)
(4) Student (index_no, student_name, date_of_birth) and hobby (index_no, hobby1,hobby2)
(5) hobby (index_no, hobbies)

29. Which of the following SQL command is a type of DML(data manipulation language)?

- (1) drop (2) grant (3) update (4) create (5) alter

30. Which of the following SQL can be used to create a table 'Person' with a primary key constraint for the field 'personID'?

- (1) CREATE TABLE Person (personID int(5) PRIMARY_KEY, name VARCHAR(30), age int(3));
(2) CREATE TABLE Person (personID int(5), name VARCHAR(30), age int(3) PRIMARY KEY);
(3) CREATE TABLE Person (personID int(5) PRIMARY KEY, name VARCHAR(30), age int(3));
(4) CREATE TABLE Person (personID int(5), name VARCHAR(30), PRIMARY KEY, age int(3));
(5) CREATE TABLE Person (PRIMARY KEY personID int(5), name VARCHAR(30), age int(3));

Consider the following Python program to answer questions 31 and 32.

```
a = [51,12,37,4,15,61]
b = a[0]
for k in range(1,6):
    if b > a[k]:
        b = a[k]
print(b)
```

31. What is the output of this Python program?

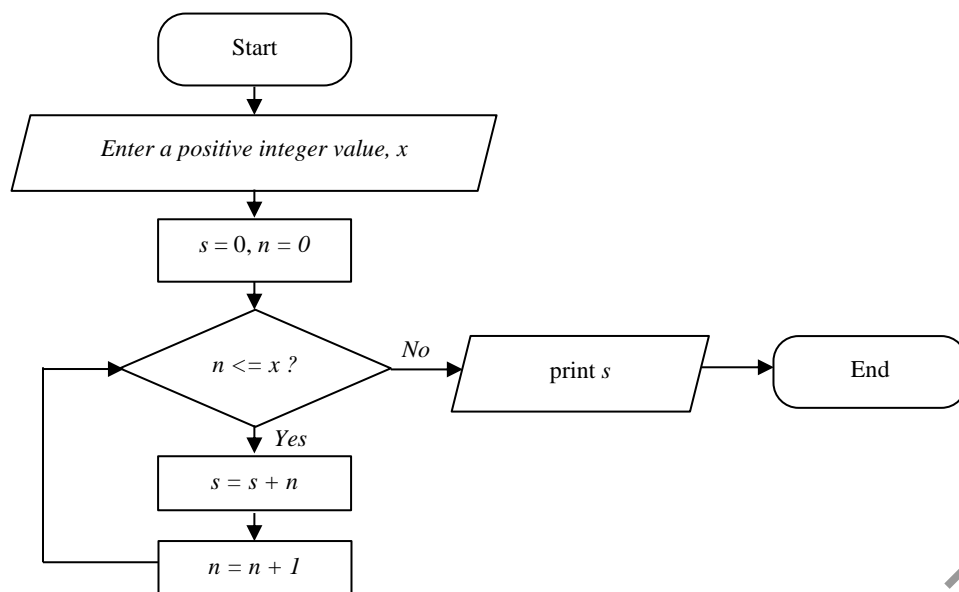
- (1) 51 (2) 4 (3) 12 (4) 61 (5) 15

32. What will be the output if the Python statement if b > a[k]: is changed to if b < a[k]: ?

- (1) 51 (2) 4 (3) 12 (4) 61 (5) 15

[See page 7

33. Consider the following statements about the algorithm given by the flowchart below.



A - If $x = 0$, the output would be also 15

B - If x obtains negative values, algorithm will generate only negative values

C - If $x = 0$, algorithm expects five inputs further

Which of the above is /are correct regarding this algorithm?

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

34. Which of the following Python program(s) is / are equivalent to the algorithm given in (33) above.

I

```

x = int(input("Enter a number:"))
s = 0
n = 0
while n <= x:
    s = s + n
    n = n + 1
print(s)
  
```

II

```

x = int(input("Enter a number:"))
s = 0
n = 1
while not (n >= x):
    s = s + n
    n = n + 1
print(s)
  
```

III

```

x = int(input("Enter a number:"))
s = 0
n = 0
while not (n > x):
    s = s + n
    n = n + 1
print(s)
  
```

- (1) I only (2) II only (3) III only (4) I,III only (5) I,II,III all

[See page 8

35. Consider the following Python program.

```
x = 200
def myfunc():
    global x
    x = 300
    x = 100
myfunc()
x = 50
print(x)
```

What would be the output of this program when it is executed?

- (1) 200 (2) 300 (3) 100 (4) 50 (5) error message

36. Consider the following Python statements.

A - `a, b = [], ()`
B - `c = [[[[[]]]]`
C - `d = true`
D - `e = 2e-2`

Which of the above is/ are the valid Python statement(s)?

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

37. In the following Python program, what would be the output if the user input is given as 60?

```
var = 5
while var > 0:
    print(var, end=' ')
    var = var - 1
if var == 3:
    break
```

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

38. What would be the output after the Python statement `print(~4+5^2-1)` is evaluated?

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

39. Consider the following statements about errors in computer programming.

A - Syntax error is also called compile-time error
B - Syntax error reveals error messages
C - Logical error reveals error messages
D - Run-time error is also called semantic error

Which of the above is / are correct?

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

[See page 9]

40. Consider the following HTML code.

` Visit ebooks `

- A - ① is replaced by “_blank”, it opens the document in a new window
 B - ① is replaced by “_parent”, it opens the document in the parent frame
 C - ① is replaced by “_self”, it opens the document in the same window

Which of the above is / are correct?

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

41. Consider the following HTML code and its output.

| HTML Code | Output | | | | | | | | | |
|---|--|------|--|-----|------|-------|----|-----|---------|----|
| <pre><1 border="1"> <2> <3 colspan="2"> Name </3> <3> Age </3> </2> <2> <4> Jill </4> <4> Smith </4> <4> 43 </4> </2> <2> <4> Eve </4> <4> Jackson </4> <4> 57 </4> </2> </1></pre> | <table><tr><th colspan="2">Name</th><th>Age</th></tr><tr><td>Jill</td><td>Smith</td><td>43</td></tr><tr><td>Eve</td><td>Jackson</td><td>57</td></tr></table> | Name | | Age | Jill | Smith | 43 | Eve | Jackson | 57 |
| Name | | Age | | | | | | | | |
| Jill | Smith | 43 | | | | | | | | |
| Eve | Jackson | 57 | | | | | | | | |

①, ②, ③ and ④ are respectively.

- (1) <table>, <tr>, <th>, <td>
 (2) <table>, , <th>, <td>
 (3) <table>, <tr>, , <td>
 (4) , <tr>, <th>, <td>
 (5) <table>, <td>, <th>, <caption>

42. Which of the following CSS code is correct to define margin for a text?

- (1) `p {text-margin: 100px 20 px 50 px 70px;}`
 (2) `p {margin-text: 100px 20 px 50 px 70px;}`
 (3) `p {margin: 100px 20 px 50 px 70px;}`
 (4) `p {top-margin: 100px 20 px 50 px 70px;}`
 (5) `p {marginright: 100px 20 px 50 px 70px;}`

43. Which of the following syntax can used to comment for a CSS code?

- (1) / (2) # (3) /* */ (4) \\ (5) !

44. Consider the following PHP statements.

- A - `<?php echo "Welcome"; ?>`
B - `<?php ECHO "PHP"; ?>`
C - `<?php PRINT "Web Server"; ?>`
D - `<?php print "Apache"; ?>`

Which of the above statement(s) is/are correct?

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

45. Consider the following statements about http methods.

- A - GET requests remain in the browser history
B - GET requests cannot be bookmarked
C - POST requests have no restrictions on data length
D - GET requests should never be used when dealing with sensitive data

Which of the above statement(s) is/are incorrect?

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

46. Consider the following PHP script.

```
<?php
    $cars = array("Volvo", "BMW", "Toyota");
    $arrlength = count($cars);
    for($x = 0; $x < $arrlength; $x++)
    {
        echo $cars[$x];
        echo "<br>";
    }
?>
```

What would be the output if the above PHP script is executed on a web browser?

- (1) 3 (2) Volvo BMW Toyota (3) Volvo BMW
(4) Volvo BMW Toyota (5) Volvo Toyota

47. In e-commerce, "..... is the management of the flow of goods and services and includes all processes that transform raw materials into final products".

Which of the above statement(s) is/are correct?

- (1) Competitive advantage
(2) Supply chain management (SCM)
(3) Online revenue model
(4) Online market place
(5) Shopping cart

48. Consider the followings.

- A - Security and privacy issues
- B - Expensive to implement
- C - Possible access of personal and sensitive information
- D - Efficient resource utilization

Which of the above can be the limitations of IoT (Internet of Things) implementation?

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

49. Consider the following statements about quantum computing.

- A - Quantum computing is made up of qubits
- B - The power of quantum computers grows exponentially with more qubits
- C - All the fourth generation computers are based on qubits

Which of the above is /are correct statement(s)?

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

50. Consider the following statements about software agents.

- A - Buyer agents travel around a network (e.g. the Internet) retrieving information about goods and services
- B - Personal agents may check users' e-mail, sort it according to the users' order of preference, and alert them when important emails arrive
- C - The software agents may keep track of company inventory levels, observe competitors' prices and relay them back to the company, watch stock manipulation by insider trading and rumors, etc.

Which of the above is /are correct statement(s)?

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



General Certificate of Education (Adv. Level) Examination

Sixth Term - 2021

Conducted by Field Work Center (FWC), Thondaimanaru

Information & Communication Technology (ICT)

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தகவல், தொடர்பாடல் தொழினுட்பவியல் II
Information & Communication Technology II

Three Hours

20

E

A

Gr. 13 (2021)

Part – II A Structure Questions

Write down answers for all questions on this sheet itself

1.

- (a) Give the expected outputs of the following HTML code segments in the box given below when it is rendered by a web browser.

```
<html>
<head>
  <title> Table </title>
</head>
<body>
  <table>
    <caption> Customer Contacts </caption>
    <tr>
      <th> Customer </th>
      <th colspan="2"> Contacts </th>
    </tr>
    <tr>
      <td> Niyas </td>
      <td> 0114434344 </td>
      <td> 0776553535 </td>
    </tr>
    <tr>
      <td> Varun </td>
      <td> 0212224233 </td>
      <td> 0777678557 </td>
    </tr>
  </table>
</body>
</html>
```

Output

(b) You are required to write CSS code segments for the external stylesheet according to the following additional requirements for this table designing. Write down the answer in the corresponding box given below.

Do not
write in
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column

(i)

| | |
|---|--|
| <i>Table background colour</i> | <i>Green</i> |
| <i>Contents / headings of the Table</i> | <i>Center</i> |
| <i>Table border</i> | <i>Red, 2pixels thickness, solid type border</i> |

CSS code

(ii) Assume that the file name of the external stylesheet is “styles.css”. What is the external stylesheet inside the <head> section of the above code given in above (a)(i)? (write down the answer in the following box).

External stylesheet

(iii) Write down an inline CSS code for the caption given in the table above to satisfy the following requirements.

| | |
|-----------------------|--------------|
| <i>Font alignment</i> | <i>Right</i> |
|-----------------------|--------------|

CSS code

(c) Consider the following PHP script. This code is used to delete records from a database. Write down the suitable terms for the labels given from ① to ⑥ above by choosing from the following list.

Do not
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```
<?php
$conn=new ①('localhost','admin','K#_1p3as','employees');
if($conn->②)
{
    ③ ("Connection failed:".$conn->connect_error);
}
$sql="④ from employee where empid='e04' ";
if($conn->⑤($sql)==TRUE)
{
    echo "Record deleted.";
}
else
{
    echo "Record not deleted".$conn->error;
}
$conn->⑥;
?>
```

| Labels | Terms from the list |
|--------|---------------------|
| ① | |
| ② | |
| ③ | |
| ④ | |
| ⑤ | |
| ⑥ | |

List: [query, die, close(), mysqli, delete, connect_error]

2.

(a) Consider the following Python program.

```
L = [11, 5, 17, 18, 23, 50]
for i in L:
    if i % 2 == 0:
        L.remove(i)
L.sort()
print(L)
```

(i) Write down the output of this Python program.

.....

(ii) State the purpose of this Python program briefly.

.....

(b) The following Python code is used to update records in a database. They are not given in the correct execution order. Write down the code line number in the correct execution order in the blanks given below (write down only the labels).

| No. | Lines of source code |
|-----|--|
| A | <code>conn.commit()</code> <code>print(ex.rowcount, "record(s) updated.")</code> |
| B | <code>ex.execute("UPDATE employee SET empid='e06' WHERE empid='e05'")</code> |
| C | <code>ex = conn.cursor()</code> |
| D | <code>import mysql.connector</code> <code>conn = mysql.connector.connect(host="localhost", user="root", password="admin", database="myDB")</code> |

1.....
 2.....
 3.....
 4.....

(c) Consider the following statements about data communication and computer networks. Choose the suitable words to fill the blanks in from the list given below.

[list : Amplitude modulation, Parity bit, Ethernet, Circuit switching, Modem, Medium Access Control (MAC), bandwidth, Pure ALOHA, Frequency modulation, IP, Distortion]

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- (i) In any broadcast network, the stations must ensure that only one station transmits at a time on the shared communication channel. It is determined by
- (ii) Frequency difference of a data channel is called its
- (iii) Amplitude of carrier signal varies according to the amplitude of modulating signal. The frequency or phase of the carrier signal remains unchanged in
- (iv) is used as the simplest form of error detecting code in which a bit is added to a string of binary code to ensure that the total number of 1-bits in the string is even or odd.
- (v) The user can transmit the data frame whenever the station has the data to be transmitted by using
- (vi) There is a dedicated communication path between two devices (end-to-end). Data are travelling in the same path. This technology is called

3.

- (a) The following table stores details of employees and the projects they work on and for how long. The Primary Key is (EmpID+ProjID).

Workload

| <u>EmpID</u> | <u>EmpName</u> | <u>ProjID</u> | <u>ProjName</u> | <u>HoursPerWeek</u> |
|--------------|----------------|---------------|-----------------|---------------------|
| E01 | Smith | P02 | Database | 10 |
| E01 | Smith | P01 | Web Portal | 5 |
| E02 | Robinson | P02 | Database | 20 |

- (i) Explain why the above table is not in second normal form (2NF).

.....

.....

.....

.....

- (ii) Transform the table given into the second normal form.

.....

.....

.....

.....



(b) Match each of the given phrases from **(i)** to **(vi)** relating to e-commerce with the most suitable item from the list given below:

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column

List: [subscription as a revenue model, PayPal, SET, data mining, affiliate revenue model, shopping cart, FTP, online service provider, competitive advantage]

Phrases:

- (i)** It can be an Internet service provider, an email provider, a news provider, an entertainment provider, a search engine, an e-commerce site, an online banking site, a health site, an official government site, social media, etc.
- (ii)** It enables you to earn revenue by marketing or offering another product for sale on your site. For example, you may reference a book you read and recommend your customers get a copy for themselves.
- (iii)** It is a protocol for securing credit card transactions over insecure network such as the Internet.
- (iv)** It is a form of business intelligence and data analysis and frequently adopted by large-scale e-commerce businesses to aid with marketing and product development.
- (v)** It is an e-commerce payment intermediary allowing payments and money transfers to be made through the Internet.
- (vi)** It is an e-commerce software on a web server that allows visitors to an Internet site to select items for purchase.

Write down the most matching phrase in the table below.

| | |
|--------------|--|
| | |
| (i) | |
| (ii) | |
| (iii) | |
| (iv) | |
| (v) | |
| (vi) | |

(c)

(i) State any two possible ways to bridge digital divide among Sri Lankan community.

Do not
write in
this
column

(ii) Consider the following steps in spiral software process model. They are not given in the correct order of software development steps.

- ① - Development and testing.
- ② - Plan next iteration.
- ③ - Determining objectives and constraints.
- ④ - Identify and resolve risks.

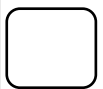
Write down the characters from ① to ④ in correct order of software development steps in the blanks given below (write down only the labels).

- 1.....
- 2.....
- 3.....
- 4.....

4.

(a) State each of the following statements regarding operating system whether it is **True**, if it is correct, or **False**, if it is incorrect.

- (i) Compaction is a technique for overcoming external fragmentation.
- (ii) Dynamic loading means that loading a routine only when it is called and an unused routine is never loaded.
- (iii) Paging is a memory management technique in which system stores and retrieves data from secondary storage for use in main memory.
- (iv) The run time mapping from virtual to physical addresses is done by a hardware device called "harddisk".
- (v) CPU fetches the instruction from memory according to the value of main memory.
- (vi) Fragmentation is the process of consolidating fragmented files on the user's hard drive.



Write down answers in the following blanks.

- (i)
- (ii)
- (iii)
- (iv)
- (v)
- (vi)

- (b) Compute the virtual page number and offset for a 4-KB page and for an 8 KB page for the decimal virtual address: **20000**

| | Page number | Offset |
|-----|-------------|--------|
| 4KB | | |
| 8KB | | |

- (c) Consider a logical address space of 256 pages with a 4 KB page size, mapped onto a physical memory of 64 frames.

- (i) How many bits are required in the logical address?

.....

- (ii) How many bits are required in the physical address?

.....

- (d) In operating system, write down two principal events that cause processes to be created.

.....

.....

.....



General Certificate of Education (Adv. Level) Examination
Sixth Term - 2021
Conducted by Field Work Center (FWC), Thondaimanaru
Information & Communication Technology (ICT)

தகவல், தொடர்பாடல் தொழினுட்பவியல் II
Information & Communication Technology II

ICT

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E

B

Gr. 13 (2021)

Part – II B

Answer any four questions only.

- (5) A manufacturing process is controlled by a built in logic circuit which is made up of AND, OR and NOT gates only. The process receives a stop signal ($S = 1$) depending on certain conditions, shown in the following table:

| Input | Binary values | Conditions in process |
|-------|---------------|-------------------------------------|
| A | 1 | Volume > 1000 litres |
| | 0 | Volume \leq 1000 litres |
| B | 1 | Temperature > 750°C |
| | 0 | Temperature \leq 750°C |
| C | 1 | Speed > 15 meters/second (m/s) |
| | 0 | Speed \leq 15 meters/second (m/s) |

A stop signal ($S = 1$) occurs when:

either volume, $A > 1000$ litres and speed, $C \leq 15$ m/s or temperature, $B \leq 750^\circ\text{C}$ and Speed, $C > 15$ m/s.

- (a) Write down the Boolean expression for the output of this logic circuit.
(b) Draw the logic circuit for the Boolean expression obtained in (a) using AND, OR and NOT gates only.
(c) Construct the truth table for the Boolean expression obtained in (a).
(d) Write down the Boolean expression obtained in (a) in SOP (Sum-Of-Product) standard.
(e) Re-draw the logic circuit given above using NAND gates only.

(6)

- (a) State two physical characteristics of fiber optic cables that make them more suitable for high speed digital data transmission than copper cables.
- (b) Subnetting a larger physical computer network may have a lot of benefits. Write down two of them.
- (c) Consider the following scenario.

A garment factory has four local area networks (LANs) for each of its departments such as production, accounting, sales and IT departments. Each department consists of the number of computers as follows in the table given.

| Departments | Number of computers in each department |
|-------------|--|
| Production | 46 |
| Accounting | 34 |
| Sales | 32 |
| IT | 35 |

An IP block 222.1.1.0/26 is given to the network administrator. The network administrator is required to allocate IP addresses for all nodes in each department. Four subnets are to be setup for this purpose and this network is connected to a public IP address for the Internet usage of the employees. Each department is situated in different building in an area. Each department has a network printer separately. A firewall is installed for network security and four switches, network cables, proxy server and DHCP server are given to the network administrator for this purpose. IT department is connected directly to the Internet.

Draw a network diagram for this scenario. Show all the IP addresses, network connectivity devices and servers clearly.

Use the following table as a help to allocate IP addresses.

| Departments | Network address | Broadcast address | Subnet mask | Usable IP address range |
|-------------------|------------------|-------------------|------------------------|-------------------------------|
| <i>Production</i> | <i>222.1.1.0</i> | <i>222.1.1.63</i> | <i>255.255.255.192</i> | <i>222.1.1.1 - 222.1.1.62</i> |
| <i>Accounting</i> | | | | |
| <i>Sales</i> | | | | |
| <i>IT</i> | | | | |

(7)

(a) “Elektrons”, a well-known electronics store in Sri Lanka, now successfully conducts its sales through its 150 physical branches island wide. It has developed its own e-commerce web portal with the intention of expanding its business to e-commerce.

(i) Which e-commerce model is “Elektrons” selling electronics goods to its customers through e-commerce web portal?

(ii) Write down two benefits that “Elektrons” can obtain when it sells electronics goods to its customers through the e-commerce web portal.

(iii) “Elektrons” allows some other businesses to sell electronics through its e-commerce portal. State one of the advantages and disadvantages that “Elektrons” would obtain by this operation.

(iv) In view of what has been said above (iii), specify two online revenue models in which “Elektrons” can generate income.

(v) When a customer orders for more than one electronics goods, he / she want to add all the electronics goods in one place on e-commerce site. What facility should be available for this purpose in the e-commerce site?

(vi) Write down one advantage of the facility you mentioned in (v) above in addition to the facility indicated in (v) above?

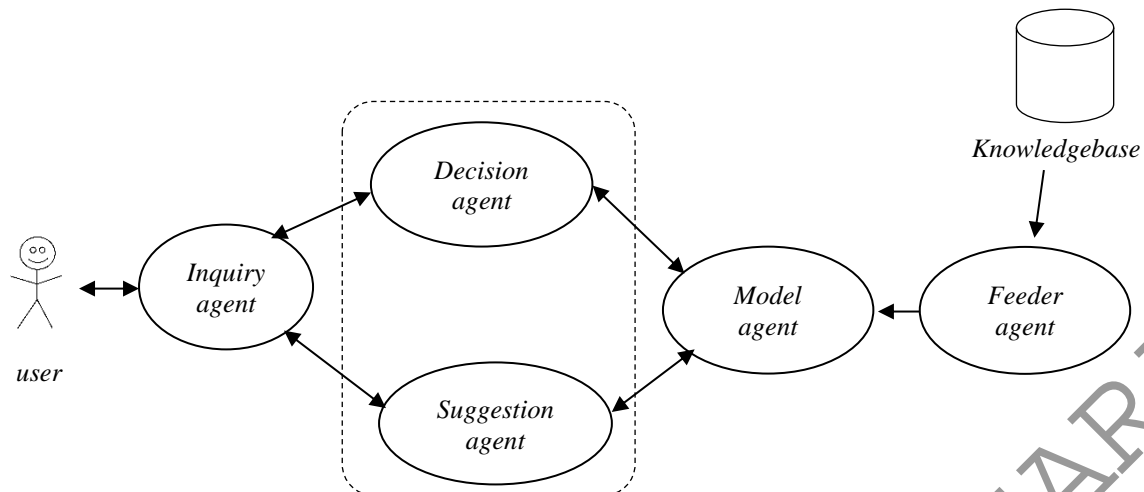
(b) A diagram of a multi-agent system for the bank credit scoring is given below. The interaction between agents and system users is represented. One of the goals of this system is to classify people according to loan perspectives, bad or good client.

Inquiry agent interacts with the final end-user, receives classifying and suggestive requests and passes them to the available Suggestion and Decision agents.

Feeder agent is responsible to monitor the data sources environment and retrieve new data to the system. Then it must pass the data into the model agent.

Suggestion agent uses the available knowledge to look for more advantageous solutions to incomplete evaluation requests. It receives the model created by a Model agent and uses it to perform searches in the decision model, in order to obtain the most advantageous situations for the request presented.

The Decision agent waits for requests from other models to perform its own tasks. Decision agent is able to respond to requests from other agents requesting an evaluation of an individual with the complete list of attributes filled. Each response to requests carries the predicted value.



Answer the following questions using the diagram given above.

- (i) Write down name(s) of self-autonomous software agent(s).
- (ii) “Inquiry agent is a self-autonomous agent”. Is this statement correct? Justify your answer.
- (iii) Write down one possible advantage of using agent application for credit scoring when evaluating the credit status of a customer.
- (iv) Write down one possible disadvantage of using agent application for credit scoring.

(8)

(a) Consider the following scenario.

The “PharmaGreen” of pharmacies has offered to give you its database design. Patients are identified by a PatientID and their names and ages must be recorded. Doctors are identified by a DoctorID. For each doctor, name and specialty must be recorded. For each drug, the trade name and formula must be recorded. The trade name identifies a drug uniquely. Each pharmacy has a name, address, and phone number. Every doctor has at least one patient. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it.

- (i) Draw an ER diagram for the above scenario (If there are any assumptions you made, indicate them clearly).
- (ii) How would your design change if each drug must be sold at a fixed price by all pharmacies?

- (b) Consider the following two data tables and based on the tables given, write down the SQL statements for the followings.

Employee Table

| <u>empID</u> | empName | address | salary | deptID |
|--------------|---------|---------|--------|--------|
| 1 | Sarvan | Jaffna | 80000 | 2 |
| 2 | Nimlaka | Colombo | 70000 | 1 |
| 3 | Perera | Galle | 90000 | 2 |
| 4 | Roshan | Colombo | 75000 | 3 |
| 5 | Alwis | Kandy | 65000 | 1 |

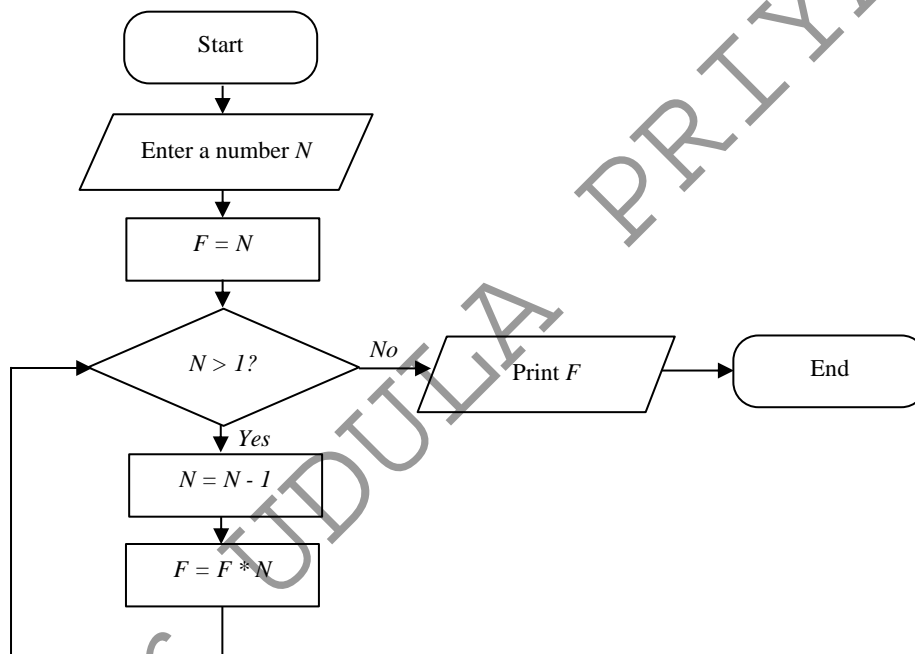
Department Table

| <u>deptID</u> | deptName |
|---------------|------------|
| 1 | Accounting |
| 2 | IT |
| 3 | Marketing |

- (i) Displaying names of employees who works in IT department.
- (ii) Finding total salary for all the employees.
- (iii) Adding a new column "Location" in the department table.

(9)

- (a) Consider the following flowchart representing an algorithm.



- (i) If the user enters the value 5, what would be the output of this flowchart?
 - (ii) Write down the purpose of this algorithm.
- (b) When a user enters a positive integer, all the factors of that number should be displayed (for example, when the user enters the value 20, then it should be displayed its factors as 1 2 4 5 10 20).
- (i) Draw a flowchart for this problem.
 - (ii) Write down a Python program for this algorithm drawn in (i) by using a user-defined function "calc_factors" (**hint:** Output should be displayed as "Enter positive integers" when user enters 0 or negative values. You are required to include writing Python code for this validation also).

(10)

(a) A bakery is implementing a new system for customers to order online. They choose 50 customers and ask them to try the new system, and provide feedback. The bakery can then identify issues and address them prior to implementing systems for thousands of users.

(i) Which system implementation (deployment) strategy is the most appropriate to implement this system?

(ii) Give one supportive reason for choosing your answer in **(i)** above.

(b) Consider the following scenario.

A popular school in a city of our country introduces an online examination system for their students in the pandemic period. This system will help students enable sit for examination and obtain marks and results for each examination they sit via online from home. Some of the functional and non-functional requirements of this system are given below.

(A) The database shall be able to accommodate a minimum of 10,000 records of students.

(B) The candidate shall be able to login the website and take his examination.

(C) The students should be able to view their results immediately after completion of the examination.

(D) The system shall be able to support use of multiple 1000 students at a time.

(E) The system shall be able to automatically validate students against the database of the particular school before sitting examination.

(F) Teachers should be able to assign examination in the system.

(G) Students should be able to change the initially assigned login password immediately after the first successful login.

(H) The system should be able to load within three seconds when every student enters into the website.

Classify the user requirements of the online hotel reservations system as functional or non-functional requirements separately mentioned above (it is sufficient to write only their labels).

(c) Consider the following scenario about order-processing system for goods made by customer.

Customers first give their details to the receptionist counter. A new customer form is filled in the receptionist counter and the customer details are stored in customer file. Customer filled form is given to the customer. Customer gives order for goods to the order counter with the customer filled form. This order form is filled at order counter. Order form is sent to the sales counter where order details are processed and order form details are sent to order file. Filled order details are sent to invoice counter where invoice is prepared and request for stock is sent to warehouse and finally invoice is given to the customer.

Draw a level -1 data flow diagram for the order-processing system clearly.
