**General Certificate of Education (A/L) Mock Examination - 2, February 2020**

# Information Communication Technology - Paper II

**Username :.....** **Class :ISM / Shakthi** *(cross the unnecesary)*

**First Name:.....** **Last Name:.....**

***Duration : Three hours***

***Important:***

* This paper consist of **8** pages.
* This question paper comprises of two parts, Part **A** and Part **B**.
  The time alloted for **both parts** is **three hours**.
* Use of calculators is **not** allowed.

***Part A : Structured Essay:***

* Answer **all** the questions on this paper itself.
* Note that **space provided is sufficient** for your answers and that extensive answers are not expected.

***Part B : Essay:***

* This part consist of six questions and only **four** questions should be answered.
* At the end of the time allotted for this paper, tie the **two parts together** so that **Part A** is on **top** of **Part B** before handing them over to the Supervisor.

***For Examiner's Use Only:***

| For the Second Paper | | |
|---|---|---|
| Part | Ques. Nos. | Marks |
| A | 1 | |
| | 2 | |
| | 3 | |
| | 4 | |
| B | | |
| | | |
| | | |
| | | |
| **Total** | | |

| Final Marks | |
|---|---|
| **In numbers** | |
| **In words** | |

## Part -A

01. Consider the Student entity used with in an institute.

Student(stdNo, name, gender, projNo, pName, status)

Following are the functional dependencies with in the above table structure.

- status functionally depends on stdNo and projNo
- name and gender functionally depends on stdNo
- pName functionally depends on projNo

*Note - stdNo and projNo fields allow duplicate entries.

(a) How many attributes required to be taken at minimum to create a primary key for the above table?

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**(1 Mark)**

(b) Re-write the logical table structures including the primary keys and foreign keys after normalizing the Student table.

**(5 Marks)**

(c) Design an ER for the above table structures.

**(4 Marks)**

***[Total = 10 marks]***

***contd.....to page 2***

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02. (a) Consider the following Python code

```
n=int(input())
x=n
while(n>0):
    if n<x:
        x=n
    n=int(input())
print(x)
```

(i) What is the output of the above code if the inputs are 4, 6, 3, 2, 8, -1 on each input prompt respectively?

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***(1 mark)***

(ii) What is the purpose of the above Python code?

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***(2 marks)***

(b) A Computer memory which has a total capacity of 4GB, has memory frames of 16KB. Compute the total number of frames in the physical memory.

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***(3 marks)***

(c) Write a SQL statement to delete a column named contact and to insert a column named age which accepts integer entries higher than 10 with in a table named student.

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***(4 marks)***

***[Total = 10 marks]***

***contd.....to page 3***

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03. (a) Following PHP Code uses a database named 'abc_inst' and a table named 'student' which has two fields 'name' and 'class' to insert the data 'John' and '12NatA' respectively. The username and the password to access the database are 'root' and 'usbw' respectively. Complete the PHP code to achieve the above.

```
<?php
    $conn = new mysqli('localhost',..................... , ............................ , ............................);
    if($conn->connect_error){
        die("Connection Failed : ".$conn->connect_error)
    }
    $sql  =  ..............................................................................................................
    ..............................................................................................................
    if($conn->query(.........................)==true){
        echo "Record Inserted";
    }else{
        echo "Error". $conn->error;
    }
    $conn->close();
?>
```

***(5 marks)***

(b) What is the purpose of the following PHP code included the above code?

```
if($conn->connect_error){
    die("Connection Failed : ".$conn->connect_error)
}
```

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***(3 marks)***

(c) Provide an example for each of the following

(i) Client Side Web Language

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(ii) Server Side Web Language

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***(2 marks)***

***[Total = 10 marks]***

***contd.....to page 4***

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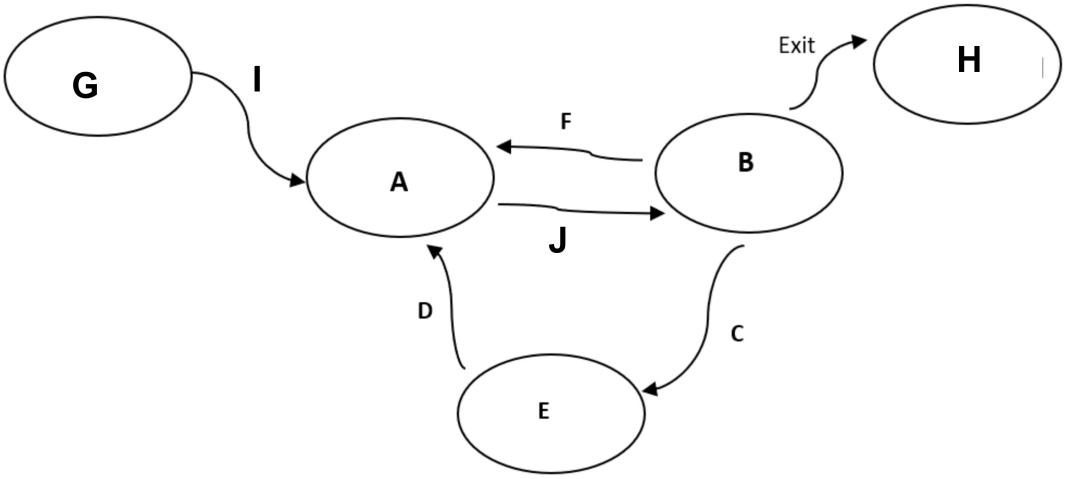
04. The state transition that could occur in a process running on a computer with a multi-tasking operating system is shown in the following diagram.




(a) Write the transitions or the states represented by the labels A to F.

A- ----------

B- ----------

C- ----------

D- ----------

E- ----------

F- ----------

G- ----------

H- ----------

I- ----------

J- ----------

***(10 marks)***

***[Total = 10 marks]***

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**Part - B**

01. A student is developing an embedded circuit to lit a bulb(F), called: Intelligent Bulb.

Its functionality depends on three components: time counter(A), body temperature identification sensor(B) and movement sensor(C).

Reaching time counter, to the pre-defined time is indicated as logical value 1

Activation of body temperature sensor is indicated as logical value 1

Activation of the movement sensor is indicated as logical value 1

Main sensors are activated in the above sequence and, the bulb is lit independently from each sensor based on the above process as follows:

- The bulb is lit(on) when the time counter reaches, the pre-defined time
- The bulb is lit, on the activation of the body temperature sensor.
- The bulb is lit, on the activation of the movement sensor.
- The bulb is automatically off when movement sensor is deactivated.
- If all three sensors are in the same logical state, system ignores that state (bulb off).

(a) Write the Boolean expression, in unsimplified SOP form, to represent the state when the bulb is automatically lit.

**(1 mark)**

(b) Simplify the above Booelan expression only using laws of Boolean algebra.

**(4 marks)**

(c) Design the circuit for the simplified expression using only NOR gates.

**(5 marks)**

(d) Design a full adder ciruit using two half adders.

**(5 marks)**

***[Total = 15 marks]***

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02. The government has decided to conduct all the government examinations, online. A website named e-exam.lk has been launched for this and all who want to appear for any examination, should register in this website. All examination fees can be paid online and those who sit for the examination online will get 50% discount from examination fees.

a) Suggest two security precautions which should have in a web site that conduct online examinations?

**(2 marks)**

b) What is the electronic business model into which such service can be categorized?

**(1 mark)**

c) Write two features of such service, in order to categorize into that model?

**(4 marks)**

d) Write two benefits which can be obtained by the examination authority?

**(4 mark)**

e) Users can do many examination related frauds through online examination system. Write two technical and non-technical strategies to prevent such mal practices.

**(4 marks)**

***[Total = 15 marks]***

03. Consider the following Python list which consist of numbers.

nums = [9,6,7,5,1,4,3,2,8]

Write a program in Python to implement the Bubble sort in order to sort the above list.

***[Total = 15 marks]***

04. A Software Development Company undertakes projects to be developed by a team of Software Engineers who are working under the company. Each Software Engineer is categorized as either Junior or Senior. When storing the details of a Software Engineer, EPF Number, Name, Contact Number and Qualifications are considered.

Senior Software Engineers are paid a salary and Junior Software Engineers are paid a fee. A Senior Software Engineer is assigned as a supervisor for a group of Software Engineers where each Software Engineer will be assigned a supervisor to monitor their tasks.

A Group of Software Engineers can be assigned to a Project, while a Project can be assigned Many Software Engineers. A Project has a name, deadline, requirements, cost and a started date. Each Project has assigned a Project Manager who is a Senior Software Engineer who will be additionally paid a fixed Project Management Fee per month. A Project Manager can be assigned to many ongoing Projects. A Project is uniquely identified by a number.

Design an **Enhanced Entity Relationship Diagram** for the above scenario.

***[Total = 15 marks]***

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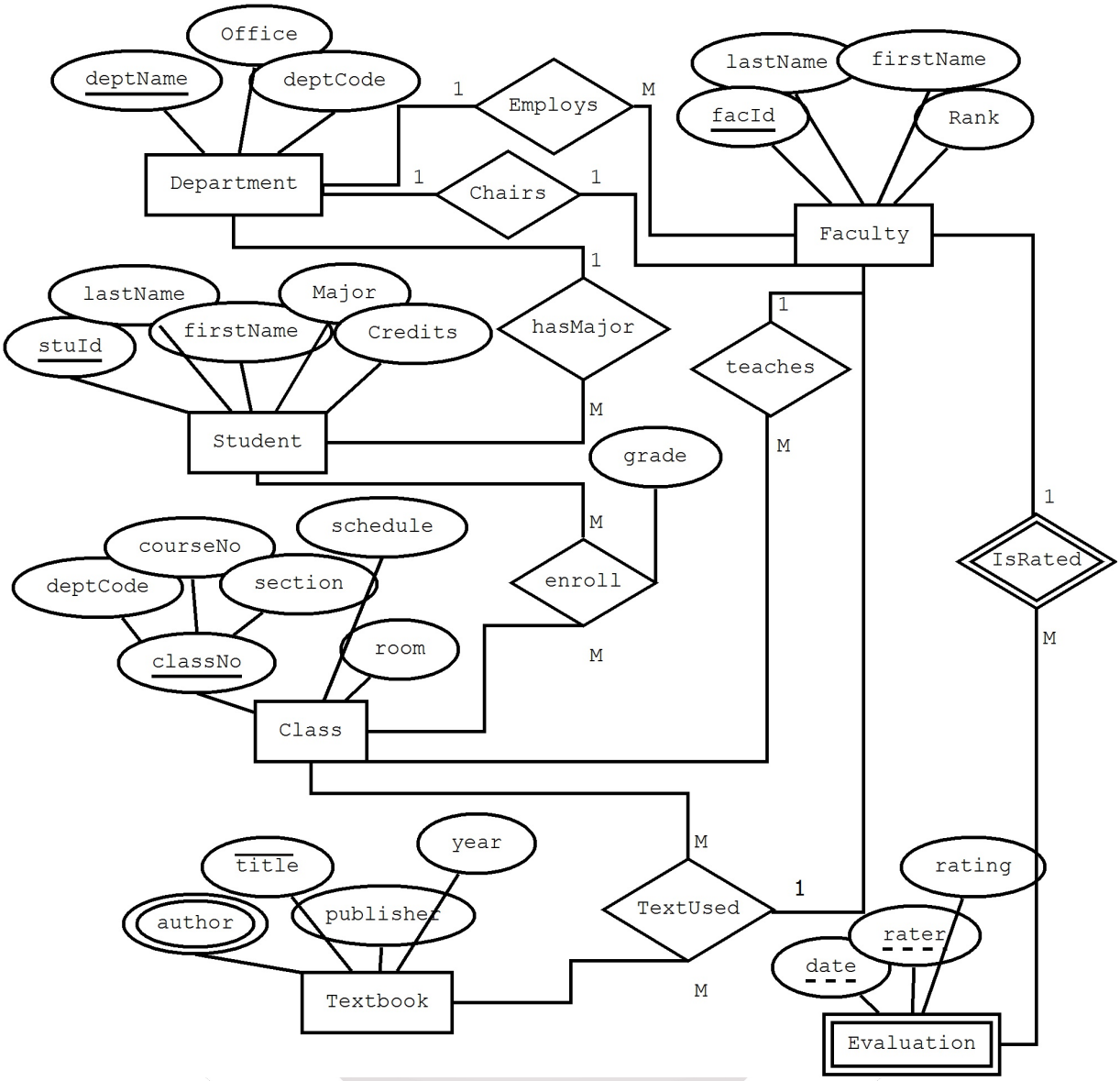
05.

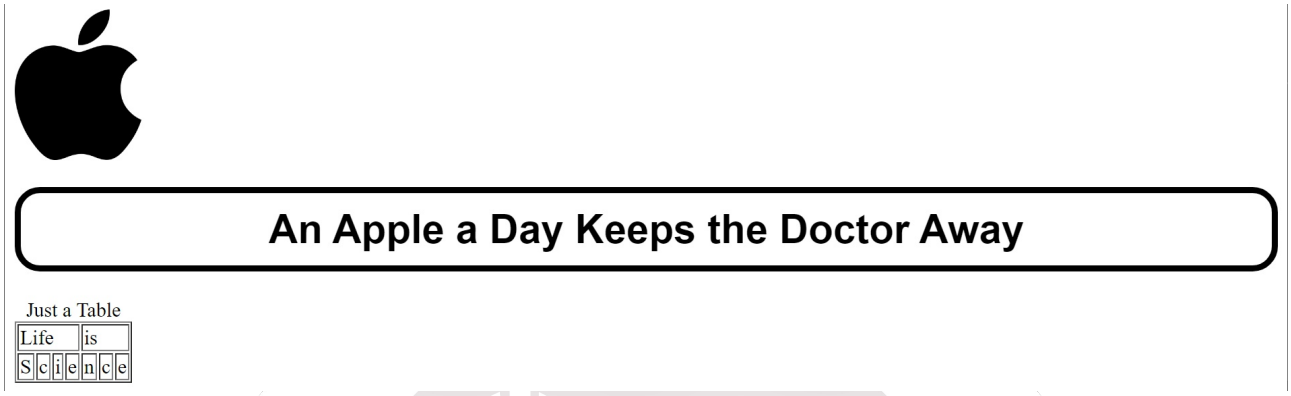



Write the logical table structures for the above ER diagram including the primary and foreign keys.

***[Total = 15 marks]***

***contd.....to page 8***

06. Consider the following HTML Page (index.html) rendered by a web browser.




The above web page has three main elements <img>, <h2> and <table> included with in <body>. The web page is linked to a CSS document named "style.css" which is stored in the same location. The image is stored as "apple.png" with in a sub folder named "img". If the image cannot be rendered or blocked by the browser then the text "No Apple" is displayed.

The <img> and <h2> elements are assigned the ids "myapple" and "slogan" respectively to be used in the CSS file. The <h2> element displayed above has a border of 5 pixels with the rounded corners of 20 pixels. The space between the text and the border with in <h2> element, is 10 pixels. The width of the image is set to 100 pixels. All of the above styles should be included with in style.css file and should be applied only to the respective elements.

i) Write the code for the above HTML file.

***(9 marks)***

ii) Write the code for style.css file

***(6 marks)***

***[Total = 15 marks]***

***END***

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