Royal College – Colombo 07

Screening Test - August 2020
Grade 13

Information & Communication Technology - II

20 E II

Three hours

Part A- Structured Essay

- **Answer all the questions this paper itself.**

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01. (a) (i) Draw the expected output of the following HTML code segment when rendered by a web browser.

```
<!DOCTYPE html>
<html>
<head><title> Railway Accidents </title></head>
<body>
<h1> <center>Railway Accidents in Sri Lanka</center></h1>
<!--Reasons for Accidents-->
<p>According to the Railway department of Sri Lanka, there have been
<b><i>180 causalities </i></b>
</br>
 These happened during the period January 1 <sup>st</sup> of 2019
to  December 31 <sup> st </sup> of 2019
 </p>
</body></html>
```

(ii) Draw the expected output of the following HTML code segment when rendered by a web browser.

```
<!DOCTYPE html>
<html>
<body>
<u> Several Types of illegal Drugs </u>
<ol start= 2>
<li>Heroin</li><li>Cannabies</li><li>Harshi</li><li>Cocaine</li><li>
Marjuana</li></ol>
<dl><dt> Drug Addiction Statistics</dt>
<dd>
<ul type="circle">
<li>Heroin- 50,000 </li>
<li>Marjuana- 200,000 to 300,000 </li></ul>
</dd></dl>
 </body></html>
```

(b) (i) Consider the following HTML code segment:

```
<body>
<h1> Introduction to IOT </h1>
<h3> Microcontrollers </h3>
<img src=" D:\Pictures\Microcontrollers.jpg" alt="A microcontroller">
<p>A microcontroller is a compact integrated circuit designed to govern a specific operation
in an embedded system. </p>
</body>
```

Element Name	Attribute	Attribute Value
h1	*color* *text-align* *font-family*	*Blue* *center* *Times New Roman*
img	*width* *height* *border-radius*	*150px* *auto* *50%*

Write down the internal styles required to apply the styles mentioned in the following table for the elements *h1* and *img* in the above code segment.

……

……

……

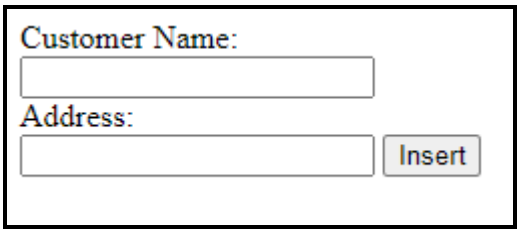
……

(c)(i) State two types of dynamic web pages.

……

……

(ii) The following php code is to save data into 'name' and 'address' fields of the table name 'customers' in the MYSQL database called 'company_db'.User name and password to login to "company_db' are 'company 'and 'cm@123' respectively. Complete the following code segment to save data from the below form.




```
<?php
$conn = mysqli_connect("localhost", "……..", "……..", "……..");
if(isset($_POST['……..']))
{
$cname=$_POST['……..'];
$address=$_POST['……..'];
$sql = "INSERT INTO users (Customer_Name,Address)
VALUES ('$cname','$address')";
If (mysqli_query(....., $sql))
{
echo "Records inserted successfully.";
}
else
{
echo "ERROR: Could not able to execute $sql. " . mysqli_error($conn);
```

```
}
}
mysqli_close($conn);
?>
<html>
<head></head>
<body>
<form method ="……." action="#">
Customer Name:</br>
<input type="text" name="Customer_Name"/></br>
Address:</br>
<input type="text" name="Address"/>
<input type="submit" name="Save" Value="……."
</from>
</body>
<html>
```

02. (a) Fill in the blanks with correct technical term from the list below which is related to Artificial Intelligence.

List= {Face Recognition, Sensors, Acutators, Self-Interested Agents, Rational Agents, Expert Systems, Genetic Algorithm, Kansei Engineering, Learning Agents, Multi-Agent System, Reflex Agents, Benevolent Agents}

(i) ……. is a tool translating customers feelings into concrete product parameters and provide support for future product design.

(ii) A simple …….is a type of intelligent that performs action based on current situation.

(iii) Arrival Management system for airport is an example for ……

(iv) An agent can be anything that perceives its environment through …… and act upon that environment through ……...

(v) ……are used in medical diagnosis and financial advice.

(b) (i) Write the output of following python bit wise operations

Operations	Output
12>>2	
10^14	
~5	

(ii) A text file contains one student's details (name and marks of three subjects). Suppose you need to read that file and add two more subject marks (50 and 60) to the list and write new list and the total of his marks to that file as below.

Saman, 90, 92, 88

Data.txt

```
f=open("D:/Data.txt","a")
f1=open("D:/Data.txt","r")

tot=0

line=f1.read()                    <-- X

a=line.strip().split(',')
print(a)                          <-- A
a.append('50')
a.append('60')

for x in range(1,6):
    tot=tot+int(a[x])

f.write(str(a))                   <-- B
f.write('\n Total is: ')
f.write(str(tot))

f.close()
f1.close()
```

The python program to accomplish that task has been given above.

(i) What will happen if the file mode is 'w' instead of 'a'?

……

(ii) Write the outputs of the python commands labeled as 'A' and 'B'?

……

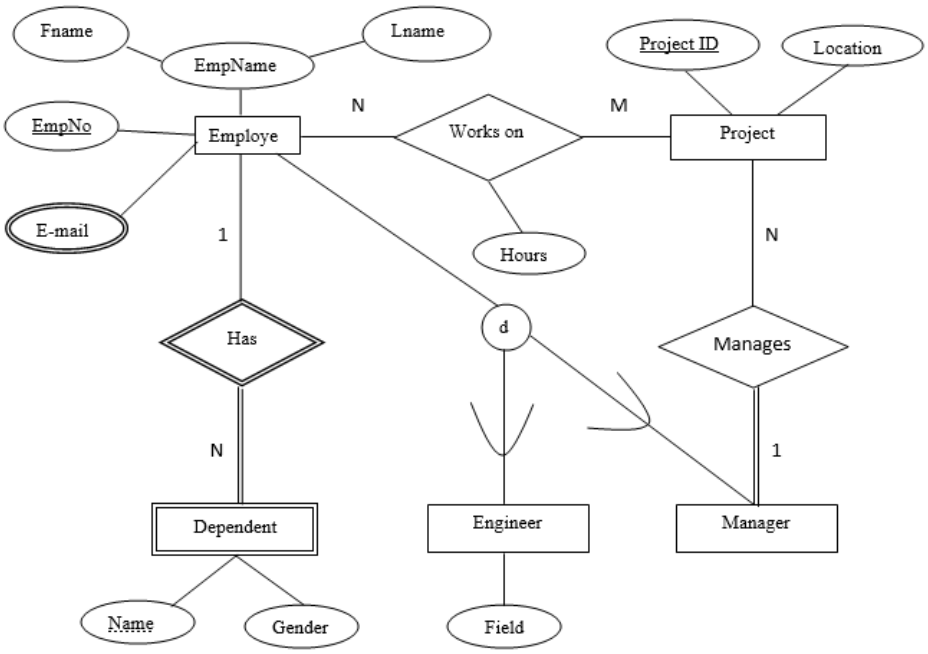
(iii)What is the use of strip()? Is it necessary to use it in this program? Give reasons.

……

(iv)How to modify the python command labeled as X to display the name of the student only.

……

03. (a) Consider the following Enhanced Entity Relationship (EER) diagram which represents the information about projects conducted by employees attached to a company.



(i) Briefly explain specialization in the superclass entity 'Employee'.

……

……

(ii) Briefly explain why the 'E-mail' attribute is shown using a different symbol compared to other attributes.

……

(iii) The following relational schema is constructed using the ER diagram shown above. In each of the tables, some of the field names are missing. Complete the missing field names and specify all primary keys and foreign keys.

Employee (……)

Project (……)

E-mail (……)

Workson (……)

Dependent (……)

Engineer (……)

Manager (EmpNo)

(b)The given model can be used to describe the data flow in a network. The layers are labeled from A to D.

A
B
C
D

(i) Name the given model.

……..

(ii)If layer B corresponds roughly to the transport layer in OSI model, Name the rest of the given layers.

A-……

B-……

C-……...

D-……...

(iii)Name two protocols in layer A.

……

(iv)In which layer the ICMP protocol can be found.

……

04. (a) The operating system allows the computer to manage the main function of allocating space to the desired functionality. A swapping and paging process is used whenever needed.

(i)What is a process? What are the attributes of a process?

……

……

……

……

(ii)What is the relationship between threads and processes?

……

……

……

(b) A particular computer is referred to for 2 bytes, and it uses a virtual memory address space of 32 bits. When the computer replicates a blocked action and sends it to the computer, it costs 64KB for the process. This function uses the physical memory address of 512 Byte pages and 16 bits to access the main page again.

(i) What is the total capacity of this computer?

……

……

(ii)What is the maximum count of "full page "for page table?

……

(iii)What is the range of addresses used for real memory?

……

(iv)What is the proportion of physical frames used here?

……

(v) What is the address range of the physical memory?

……

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Part B- Essay

- **Answer any four questions only.**

01. A robot machine is used to detect the density of population of insects of a farm. The robot functions on three sensors A, B and C (Active state of sensor=1)

    Robot has been programmed to function depend on the input of the sensor 'A'.

- If sensor 'A' gets an active signal all inputs of the circuit will be sent to a XOR gate
- If sensor 'A'=0, all inputs will be sent through XNOR gate

  (***Output of three input XNOR gate will be '1' when all inputs are o and when even number of inputs are 1***)

Robot will work in the following situations,

- When XOR gate output 1 and,
- When XNOR gate output 1

(a) Draw a truth table to express the function of the robot and derive a Boolean expression in SOP.

(b) Simplify the above expression using Boolean algebra, Construct the logical circuit to represent the function of robots only using one OR gate and two NAND gates.

02.(a)What is STAR connectivity in the computer network? Give two advantages and disadvantages of STAR connectivity.

(b) Write down the relevant **network address** and the **subnet mask** for a host with the IP Address 194.168.0.1/26?

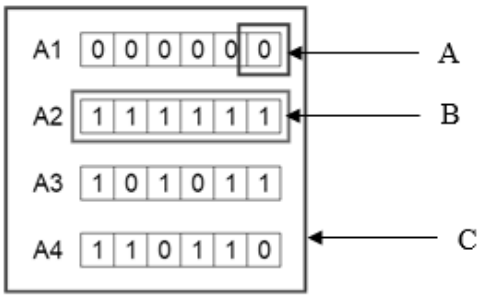
Assume that we need to make four subnets from the above address block (194.168.0.1/26) for four buildings. Write down relevant network address, subnet mask and the allocation range of IP addresses for each building using the following table format to present your answer.

Building	**Network Address**	**Subnet Mask**	**IP address Range**
A			
B			
C			
D			

03.(a) In nature, organisms' genes tend to evolve over successive generations to better adapt to the environment. The genetic algorithm is a heuristic optimization method inspired by the procedures of natural evolution. Genetic algorithms operate on a population of individuals to produce better and better approximations.

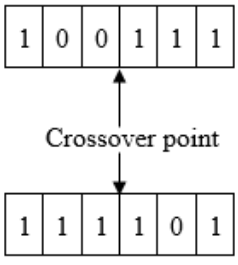
A state diagram for the feature selection process with the genetic algorithm is depicted next

(i) In the initialization step we define the population of genetic algorithm. Given below is visual representation of the initialization. Identify A, B and C.



(ii) Briefly describe what goes under selection step.

(iii)Consider the following parents of the genetic algorithm and draw their offsprings.



(iv) Explain what mutation in genetic algorithm using A6 | 1 | 1 | 1 | 1 | 0 | 1 | offspring.

(v) Write down one of the reasons to happen termination in the above genetic algorithm.

(b) **Photogenie** is a photographic company which owns a website that contains large free stock of photos, images and ability to download creative files as well.

(i)What is the type of provider applicable to this company?

(ii)Briefly explain how to use ecommerce market place to improve their business.

(iii)Pavan is a wildlife photographer and sells artistic photos to this company for years. What is the business type between him and the company?

(iv)Pavan was advised to wear an e-wallet to do his transactions more conveniently. Explain what an e-wallet is?

04.(a) Write outputs of following python programs. If it outputs an error clearly mention with the reason

I.
```
x=0
while x>5:
   print(x)
   x=x+1
```

II.
```
list=[10,5,6,1,6,5,2]
print(list.pop(1))
```

III.
```
for a in range(1,20,3):
      if(a==10):
            break
      elif(a%2==0):
            continue
      else:
            print(a,end=",")
```

IV.
```
a=10
def displayNo(a,b):
   b=20
   print(a+b)
displayNo(a,b)
```

V.
```
for x in 'python':
      print(x)
```

(b) Draw a flowchart to display numbers of a list in reverse order.

Eg: **Input list= [10, 5, 20, 90, 45, 80]**
Output list= [80, 45, 90, 20, 5, 10]

(c) Write a python program to above flowchart and write its output to the text file, ReversedList.txt

05. Consider the following relations for an order-processing database application

I. **Customer (<u>CustomerID</u>, Name, Address)**

II. **Order (<u>Order_No</u>, Date, CustomerID, Order_Amount)**

III. **Order_Item (<u>Order_No, Item_No,Unit_</u>Price,Quantity)**

IV. **Warehouse (<u>Warehouse_ID</u>,City)**

- All the Primary Keys are underlined.
- Here order amount refers to total amount of an order.; Date is the date the order was placed.
- Assume that an order can be shipped from several warehouses.
- Customer can have more than one order and can order more than one item.

(a) In which Normal Form do the above relations given in I, II, III, IV above exist? Justify your answer.

(b) Convert the above relations to the next Normal Form from the current Normal Form which you have stated in 5(a) .(Present contents relevant to the labels P to W indicated in the following table as your answer.)

Relation No.	**Next Normal Form**	**Relation/s in Next Normal Form**
I	P	T
II	Q	U
III	R	V
IV	S	W

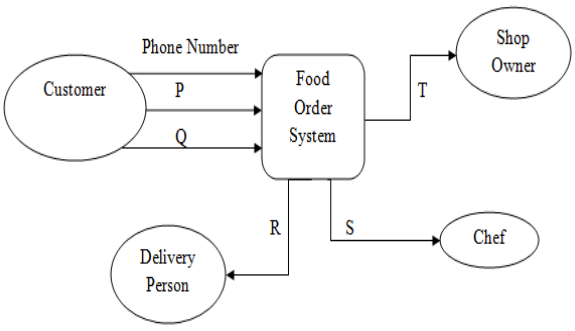
(c) Draw an Entity Relationship (ER) diagram to depict the above relations by identifying the relationships, key attributes, other attributes, and cardinality.

(d) It is necessary for the order-processing database to keep details of shipment. Create a relation called "Shipment", including the details **Ship_Date.**

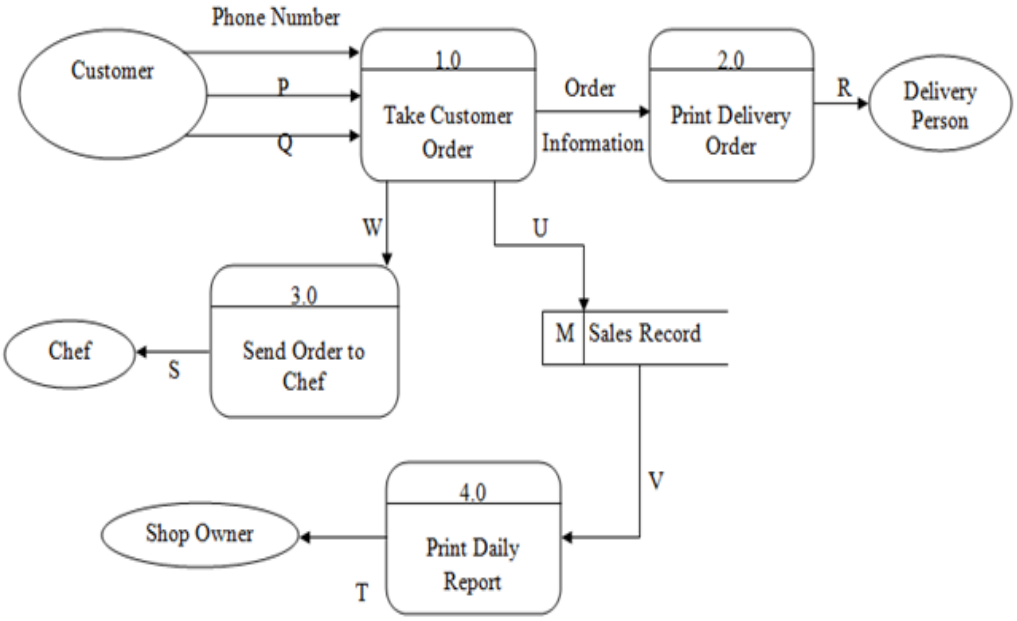
(e) Write and SQL statement to select all Customer Addresses who ordered the Item **No = 134.**

06. In **Covid-19** pandemic period "**Foodienator**" started accepting orders for Sri Lankan traditional foods via phone calls and doorstep delivery. When customers call "**Foodienator**" on the phone, and the telephone operator records phone number, address, and Customer order, once the order is taken, the total, including tax and delivery, is calculated. Then the order is given to the chef. Drivers who make deliveries give customers a copy of the receipt and coupon (if any). Daily totals are kept for the shop owner to check gross profit of the day.

(a) (i) The context diagram of the above activities, with missing information P, Q, R, S and T is given below. Name P, Q, R, S, and T.



(ii) Level 1 of the DFD for the context diagram is shown below. Identify U, V and W Labels.



(b)

(i) It is necessary to identify functional and nonfunctional requirements before implementing a project. Write 2 problems you face when you identify them incorrectly.

(ii)Briefly explain the key difference between functional and non-functional requirements as used in system development life cycle.

(iii)The following list includes some functional and non-functional requirements of a proposed Library Management System.

A- Enable to add new books to library book collection.
B- The System should work on any operating system.
C- Admin should be able to delete members due to some specific rules.
D- Admin should confirm returns of books borrowed by users.
E- The system should have different language versions.
F- System will have different type of users and every user have access constraints.
G- The system should accommodate high number of books and users without any fault

Identify and write down the labels of the non-functional requirements in **A** to **G** relevant to library system.

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