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අධ්‍යයන පොදු සහතික පත්‍ර ( උසස් පෙළ ) විභාගය 2022 - උපකාරක ප්‍රශ්න පත්‍රය 03  
General Certificate of Education (Adv. Level) Examination 2022- Model Paper 03

කොරකුරු හා සන්නිවේදන තාක්ෂණය - II  
Information & Communication Technology - II

20

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II

පැය තුනයි  
Three Hours

## Part A – Structured

Answer all the four questions in this paper itself.

- (1) (a). Draw the expected output from the following HTML code segment, when rendered by a web browser.

```
<html>
<body>
<table border=1>
<tr><th>Product</th><th>Flavors</th></tr>
<tr><td rowspan=3>Milk</td><td>Almond</td></tr>
<tr><td>Mango</td></tr>
<tr><td>Chocolate</td></tr>
<tr><td colspan=2>Recomended Flavors</td>
</table>
</body>
</html>
```

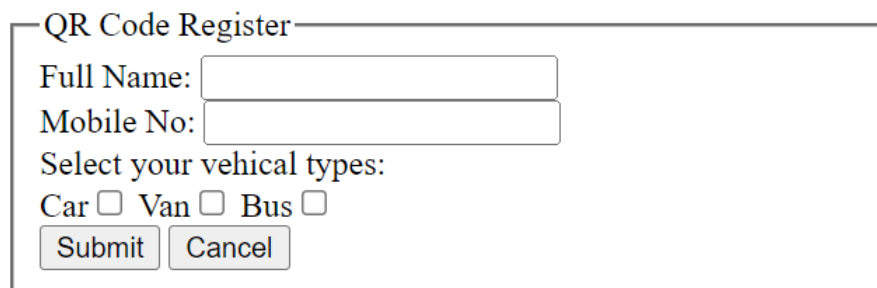
**Note :** Consider the edges of the dotted box below as the part that displays the web browser

- (b). Fill in the following blanks considering the style rule given below according to the format used in cascade style sheets (CSS).

```
h3{font-family : "sans serif";}
```

Selector : .....  
Property : .....  
Value : .....

- (c). Below is an HTML code and the output when it is rendered by a web browser. Fill in the relevant blanks in that HTML code to get the desired output.



```
<html>
<head><title> QR Code Registration </title>
</head>
<body>
<form ...1.....="register.php" ...2.....="post">
<...3.....>
<legend> QR Code Register </legend>
Full Name: <input type="...4....." name="name"/>
<br>
Mobile No: <input type="...4....." name="mobile"/>
<br>
Select your vehical types:
...5.....
Car<input type="...6....." name="n1">
Van<input type="...6....." name="n2">
Bus<input type="...6....." name="n3">
<br>
<input type="submit" name="Submit" value="Submit"/>
<input type="reset" name="Cancel" value="Cancel"/>
</...3.....>
</form>
</body>
```

(d) CSS is used to make websites more beautiful when using HTML code. The following code is formatted using CSS stylesheets.

(i) Write in the box next to the color that each row of the following will output according to the given style rules

```
<html>
<head>
  <style>
    h1,h2{
      color:red;
      text-align:center;}
    p{
      color:blue;
      text-align:left;}
  </style>
</head>
```

```
<body>
```

```
<h1>CSS Introduction</h1>
```

1.

```
<p>CSS stands for Cascading Style Sheets
```

2.

```
<h2>Why CSS</h2>
```

3.

```
<p style="color:black;text-align:center;">CSS saves a lot of
work.</p>
```

4.

```
<h1 style="color:green;text-align:left;">CSS with HTML</h1>
```

5.

```
</body>
```

```
</html>
```

(ii) Does each line output a different color? So write the reasons for output in different colors.

.....

.....

.....

(2). Consider the following python code segment.

```
t=0
n=1
while n<=5:
    t=t+n
    print(t,end=' ')
    n=n+1
```

(a). Write down the output of the above code snippet.

.....

(b). Rewrite the above code using the range() function.

.....  
.....  
.....  
.....  
.....  
.....  
.....

(c). Write down the output of the following code snippet.

```
myNums=[2,1,3,5,4,6]  
for num in myNums:  
    if 0==(num%2):  
        print(num)
```

.....  
.....  
.....

(d) Write down the row/rows that will be executed within the iteration.

.....  
.....  
.....

(e) Modify and rewrite the above program to get the sum of the odd numbers in the given list..

**Note:** Use a new variable/variables as you wish

.....  
.....  
.....  
.....  
.....  
.....

(3). **“An e-business application is an e-commerce application.”**

(a). Do you agree with this statement? Explain your answer with reasons.

.....

.....

.....

(b). If a software agent is used instead of a salesperson in a B2B business transaction, write down a meaningful and appropriate behaviour (Proactive) that is characteristic of that software agent.

.....

.....

.....

(c ). **“ Digital products (eg software) are best sold online. And buying them as a buyer can also be advantageous. ”**

(i). Write two reasons why you agree with this statement

.....

.....

.....

(ii). Write a reason why you disagree with this statement.

.....

.....

.....

(d). Put the letter **T** if the following sentences are true and the letter **F** if they are false in the space provided in front of them.

I. E-commerce refers to transactions over the internet and the scope of e-business is much wider than that..	.....
II. B2C business is a type of business where a business provides goods and services to its customers over the Internet and is the most common form of e-commerce that provides various goods and services to consumers worldwide.	.....
III. Online service providers provide online services ranging from news, search engines, banking, health services, entertainment, social networks etc.	.....
IV. In an e-commerce application, providing financial services, making payments securely by exchanging information, facilitating transactions etc. takes place at its front end..	.....

(e) Select and name the income model used in the following cases from the list below.

**List:** [Transaction Fee Revenue Model, Sales Revenue Model, Advertising Revenue Model, Subscription Revenue Model, Commission Revenue Model]

i. Gaining a profit a company selling books through an e-commerce website

.....

ii. An organization that sells goods through a website advertises on its website to promote the sale of goods of other related businesses.

.....

iii. Allow businesses to sell goods and services to a third party through their website and charge a percentage of the sale as a fee.

.....

(4).

(a)

i. When a signal is transmitted over a long distance through a physical medium, the signal undergoes various changes. Name 3 such transmission barriers

.....  
.....  
.....  
.....  
.....

ii. Name 2 threats that can affect data transfer in the Internet

.....  
.....  
.....

iii. Write an advantage of using a digital signature as a secure method in data communication..

.....  
.....

iv. Fill in the following blanks regarding a data exchange between A and B using asymmetric key encryption.

When A sends a message to B, A's ..... is used to ..... it, and A's ..... is used to ..... the message once it reaches B.

(*encrypt, decrypt, public key, private key*)

- (b). Choose from the given words the names given to data units as they pass through the following layers of the ISO-OSI model

Transport layer	
Network layer	
Data Link Layer	
physical layer	

*Bit  
segment  
frame  
packet*

- (c). The functions performed by each layer in the Open System Interconnection (OSI) model of data communication are shown in the table below. Choose and write the corresponding layer name from the given list below.

i	Transfers data between nodes in the network by converting logical memory addresses to physical memory addresses	
ii	Identifying and correcting errors during data transfer to Ensure complete data transfer between communication terminals	
iii	Data conversion, encryption, compression is done before sending	
iv	The sending and receiving of data is primarily performed by identifying the availability of resources necessary for data communication and ensures the integrity and privacy of data between the receiver and the sender.	
v	Acts as an interface to communication media and communication hardware, allowing the physical movement of data across computer networks.	
vi	Establish, maintain and terminate connection between data sender's and receiver's device applications	
vii	Determines the best path for data to travel from sender to receiver. It also controls the blockages in the network	

**List - (presentation Layer, Application Layer, Physical Layer, Data Link Layer, Transport Layer, Network Layer, Session Layer)**

## Part B – Essays

This section consists of six (06) questions. Answer only four (04) of these questions.

- (1) The logic circuit in device “x” will light the bulb F if it takes three binary inputs (A, B, C) and divides the equivalent decimal value by 2 or 3 or 7 without remainder. (ie the input from A, B, C is 1,0,0 =  $(4_{10})$  then the bulb lights up) . Also, when inputs A, B, C receive 0, 0, 0, the bulb does not light.

Note: Light the Bulb is represented by a logic value 1, and bulb not lighting is represented by a logic value 0.



- Construct a truth table for the logic circuit inside the ABC device
- Complete the Kano map (k-map) below with reference to the truth table above

		AB			
		01	11	10	00
C	0				
	1				

- Get the Simplified Sums of Products (SOP) statement with reference to the Kano map. For this, clearly indicate the loops/groups you will create in the Kano map.
- Get the simplified expression of Products Of Sum of (POS) / group(s) with Kano map. For this, in the Kano map, clearly indicate the loops that you will create.
- Design a logic circuit for the simplified POS statement in (IV) above using only NOR gates.

- (2) PQR Garment Manufacturing Company has 06 divisions namely Production, Packaging, Institutions, Accounts, Exports and Warehousing. These are numbered as A01, A02, A03, A04, A05 and A06 respectively. Computers and devices are provided for administrative work in each of these sections.

divisions	Number of Computers and devices
A01	25



A02	22
A03	28
A04	18
A05	20
A06	27

The top management wishes to install a computer network to enable communication between all departments of the PQR Institute and this has been informed to the Network Administrator of the Institute.

The network administrator is expected to obtain the Class C IP address pool 192.248.120.0/24 and subnet it in such a way that IP addresses are allocated to each sector.

- (a)
- How many IP addresses are there in the IP address pool?
  - What are the first and last IP addresses in the IP address range?
  - How many host bits are used for subnetting?
  - Show separately the network addresses, broadcast addresses, subnet Mask and host range assigned to each sector after subnetting. Use the following table format for that.

Division	Network ID	Broadcast IP	Subnet Mask	Host Range
A01				
A02				
A03				
A04				
A05				
A06				

- (b) After setting up the network, any employee had access to the Internet from any computer in his organization.
- What is the mechanism used by the network administrator to distribute Internet connectivity to all the computers in the organization at an optimal level?
  - Also the network administrator decides to dynamically assign IP addresses to the entire network. What method should he use for this?

- (iii) Most of the company managers were of the opinion that ADSL connection is more suitable for getting Internet service connection for the company. Mention 02 advantages of ADSL connection.

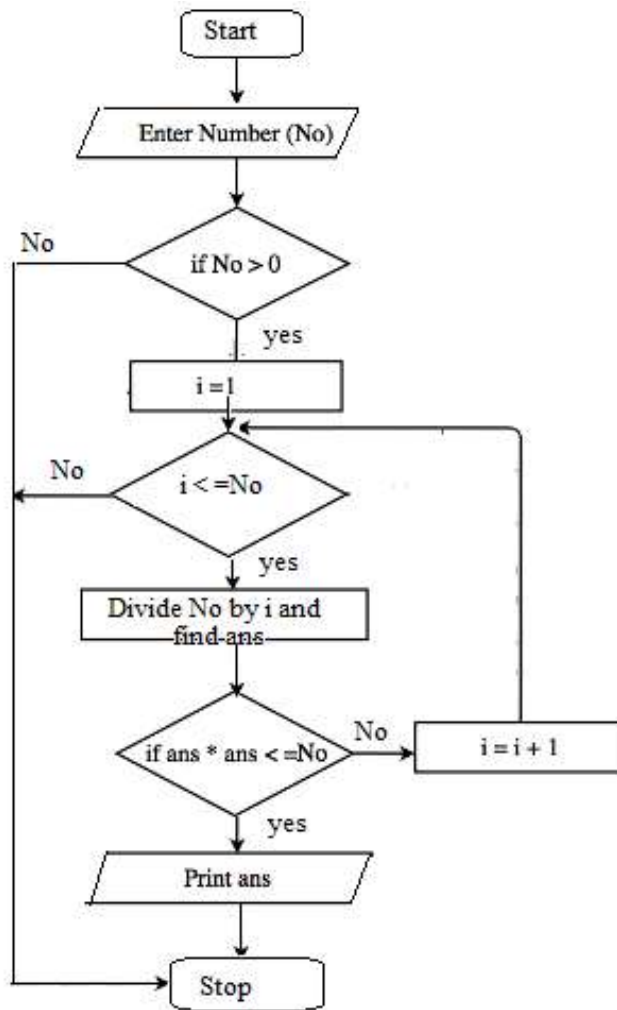
(3) Lanka Health Hospital aims to become the leading healthcare provider in South Asia and plans to further expand their services to promote Sri Lanka as a healthy tourism destination. Lanka Health Hospital is planning to implement online e-health care apps for patients to register for their medical tests, booking doctor appointments and make payments. Lanka Health's future goal is to develop an agent system to enable its customers to receive efficient service related to diagnostic reports and support their medical consultants with real-time patient reports. Furthermore, Lanka Health Hospital also aspires to be a "green hospital" that uses zero paper.

- a. What type of business revenue model is used for this?
- b. Write three functions performed in the above e-marketing process.
- c. What type of e-commerce business is applicable to the above mentioned business?
- d. What is the impact of e-commerce on human life?
- e. What does a "green hospital" mean? Write two characteristics found in it.
- f. Explain with diagrams how the below scenario can be improved using intelligent agent technology.

The patient connects to the Interface Agent and the Interface Agent connects to the Smart Agent of the system. Two other sub-agents check the patient data file PDB and provide the required data to the Smart Agent and the reports and conclusions processed by the Smart Agent are provided to the Interface Agent. And the analysis of expert knowledge base is also done to provide conclusions.

(4) Consider the flow chart given below.

- (i). If the values of -5,6,10,2 are given for No respectively, state the output related to the flow chart..



(ii). Write down the purpose of the flowchart.

(iii). Write the Python code related to the flowchart.

- (5) Each hotel within the Holiday Inn star class hotel network has a unique hotel number, name and star rate and there are many rooms within a hotel.

There is a room number and type for a room. One room can be booked per package. The same package may apply to several rooms. A package has a package number and a price.

The hotel offers many facilities. One facility is provided by one hotel only. A facility number and name are used to identify a facility.

There is a fixed location for every hotel and there is a number and address related to that location. Address consists of two parts, city and street.

(a) Draw a Entity Relationship Diagram for the above description.

(09 Marks)

(b) The management of the Holiday Inn star class hotel chain decided to provide every facility to every hotel according to a discussion held about the progress of the hotel chain. Draw only the part of the Entity Relationship Diagram that changes according to that decision. (2 marks)

(c) Below is a logical Relationship diagram for a particular database. Based on that, answer the following questions.

Orderproduct (productNo,ProductDate,SupplierNO,SupplierName)

(i) In which normalization form does the Orderproduct table exist? Explain the reason for your answer (2 marks)

(ii) Turn the Orderproduct table to the next form of normalization. (2 marks)

(6) (a) A certain government hospital has decided to install an automated system in order to provide services to patients more efficiently in the face of the COVID epidemic situation. In the current situation, it is difficult but necessary to provide services to a large number of patients by following hygienic methods, so the installation of this system is very important. It has been an urgent matter. Until this new system starts functioning properly, the existing system should also be implemented continuously.

(i) Indicate the appropriate system development methodology for creating this information system under the above situation. Explain your answer.

(ii) From the following list of requirements, identify two functional requirements and a nice to have non-functional requirement, and mention their labels separately.

(A) Patient registration under unique patient identification number.

(B) Any user request shall be responded to within 2000 milliseconds.

(C) Being able to obtain a history of the patient's diagnosis.

(D) The system should be capable of connecting 1000 users at a time.

(E) Training period of one month should be provided for the entire hospital staff.

(F) Patients should be allowed to obtain information about clinics.

(G) Being able to get patient feedback on the service..

(iii) Suggest a suitable method for installing this system and give reasons for your answer.

(b) Clinical patient examination in a hospital is described below in three main steps.

- Patient Registration

The doctor examines the patient and prepares the report. The receptionist updates the patient database file based on the report and gives a patient number and clinic number for the patient. The receptionist uses the clinic\_db file to get the clinical information..

- Clinic administration

The clinic control panel updates the clinic\_db file and sets the schedule for the clinic hours. The monthly clinic schedule is updated to the clinic schedule file. By providing the patient number, the patient can get the relevant clinic time.

- Clinic

The patient attends the clinic with the patient number and the clinic number at their own time. The doctor related to the clinic takes the history of the patient through the patient database. Later, the patient is diagnosed and treatment is recommended. The doctor updates the patient database on patient's details and recommended treatment..

Draw the following diagrams using standard symbols:

(i) Context Diagram

(ii) Level 1 DFD