

AL/2022/20/S-II

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Western Province Education Department  
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மேல் மாகாணக் கல்வித் திணைக்களம்  
Department of Education - Western Province

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අධ්‍යයන පොදු සහතික පත්‍ර ( උසස් පෙළ ) විභාගය 2022- උපකාරක ප්‍රශ්න පත්‍රය 02  
General Certificate of Education (Adv. Level) Examination 2022- Model Paper 02

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

20

S

II

පැය තුනයි  
Three Hours

**A – Structured Essays**

Answer all the **four** questions in **this** paper

- ( a ). To render the web page shown below Insert the most appropriate and correct codes into the required HTML code spaces. Note that the information in the completed form refers to the " info.php " file.

**Student Information Form**

**Personal Information**

Name With Initials:

Gender:  
 Male  Female

Date Of Birth:

```

<html><body>
<h1>Student Information Form</h1>
<form .....="....." method="get">
<fieldset>
<.....><h2>Personal Information</h2></.....>
<DL>
<.....>Name With Initials:</.....><.....><input type="text" name="init" size="30">
</.....> <br>

```

```

<.....>Gender: </.....>
<.....><input type="....." name="....." value="male" .....="checked">
Male
<input type="....." name="....." value="female">Female</.....><br>
<DT>Date Of Birth:</DT><DD><input type="....." name="dob"></DD><br>
<input type="....." value=".....">
</DL>
</fieldset>
</form></body></html>

```

```

<body>
<h2 class="new">Devices</h2>
<ol><li> Input Devices</li>
<ul><li>Key board</li><li>Mouse</li></ul>
<li>Output Devices</li><li>Storage
Devices</li></ol>
</body>

```

## Devices

- a. Input Devices
  - Key board
  - Mouse
- b. Output Devices
- c. Storage Devices

Internal CSS to be applied to the elements of the HTML codes required to get the output given above ) write down.

NB “ **Comic Sans MS** ” font has been used for **all the words** shown here .

```

<head>
  <style type="text/css">
    .....
    .....
    .....
    .....
  </style>
</head>

```

(c). PHP codes used to retrieve data from a database created using MySQL and display it on the screen  
A few are listed below. Indicate exactly what each code is used for.

(I). `$conn = new mysqli ($servername, $username, $password, $database);`

.....

(II). `if($conn===false){  
    die("Error : connection failed.".mysqli_connect_error());}  
else{  
    echo "Connected Successfully";}`

.....

.....

2. ( a ). Below are two Python functions created by a student with the goal of obtaining similar outputs. A function created using a for loop, and the function created using the while loop is denoted as B.

```
def funcno():
    x=0
    for y in range (0,11,2):
        x=y+y
        print (x)
funcno()
```

A

```
def funcno():
    x=0
    y=0
    while True:
        if y<10:
            print (x)
            y=y+2
            x=y+y
        else:
            break
funcno()
```

B

I. outputs of these functions identical when run ? Unequal?

.....

II. Whether your answer is “ equal ” or “ unequal ” clearly separate the outputs.

A	B

III. In function B , print(x) , x = y+y Correctly indicate the difference in output when applied after the line.

.....

.....

.....

.....

.....

(b). When running the following Python code, fix any agent rule errors and display the output in front.

Python code	Correct Python code if there are errors	output
I. <code>s=20//5*2**3#6</code>		
II. <code>a=[23,4.5, sunil,8]</code> <code>print (a[1:3])</code>		
III. <code>for x in 'Python':</code> <code>print ( x.capitalize ())</code>		
IV. <code>d=23,2e2,56</code> <code>print(d[1]+d[2])</code>		

3. ( a ). Consider the given facts regarding the doctors working in a hospital, the patients being treated there and the wards where they stay. (Here are not the connection procedures.)

Doctor - DoctorID, DoctorName, Address, Mobileno, Qualification

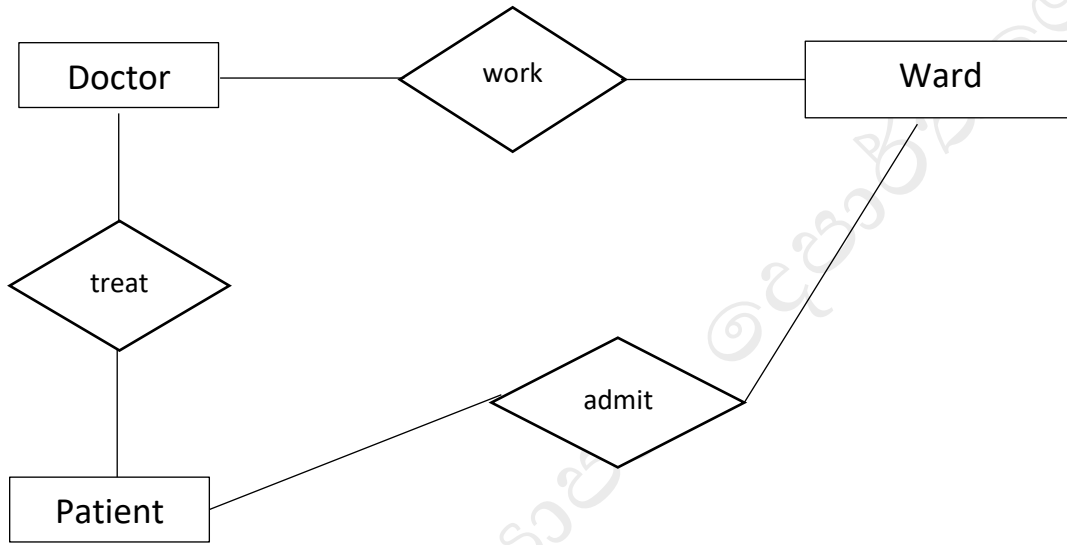
Patient - PNo, Name, Age, Telno

Ward - WardID, NoOfBed

- DoctorID for Doctor, PNo for Patient and WardID for Ward are uniquely assigned.
- Every doctor is scheduled Only one ward is served and there are several doctors in one ward.
- Each patient is treated by several doctors.
- One ward accommodates a large number of patients, and the doctors in the ward examine them daily and prescribe the appropriate medicines.

- At the time of admission, the patient's mobile phone number or home phone number should be given to the hospital.
- The name of the medicine prescribed by the respective doctor for each patient ( Drug ) , and the date ( Date ) is written by the doctor on the card.
- Every practicing doctor has several educational qualifications and those qualifications Recorded as Phd , Master, or Degree .

I. Study the above facts and and complete the incomplete ER diagram. The nature, characteristics, and importance should be stated correctly.



II. Build the correct relational schema according to the ER diagram above .

.....

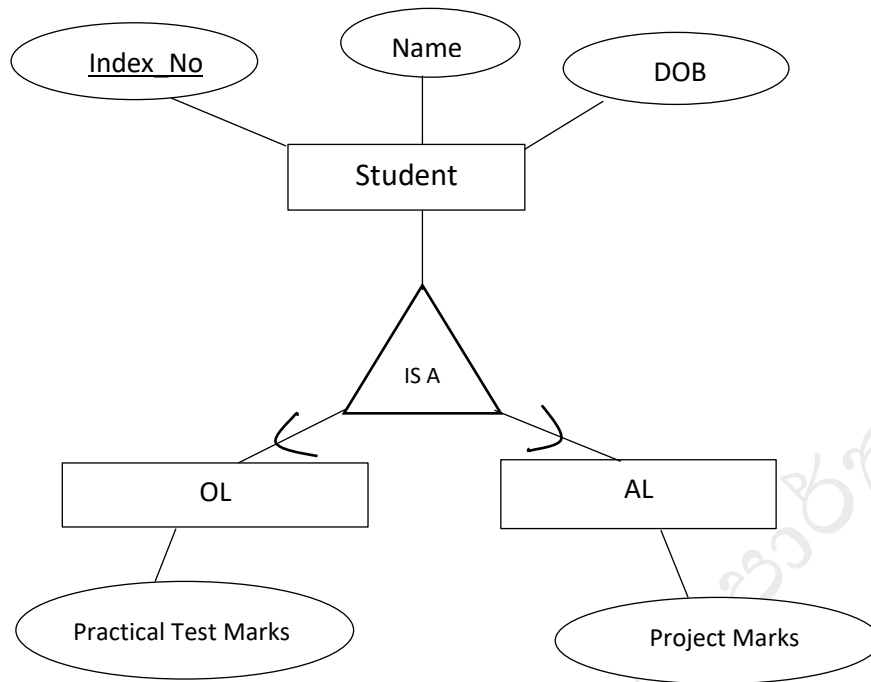
.....

.....

.....

III. Indicate the SQL query required to be output with the name of the relevant doctor, the name of the patient and the date of the drug prescribed by the doctors to each patient.

(b). The following detailed entity relationship diagram ( Enhance Entity Relationship Diagram-EER Diagram ) Answer the following questions with consideration.



I. According to the characteristics shown in the Enhance Entity Relationship Diagram , what are the specific names of the physical bodies called Student , OL , AL ?

.....

.....

.....

II. Generalization and specialization ( Specialization ) Briefly explain with the help of above diagram.

.....

.....

.....

4. ( a ) Below are two processes performed by a student after booting the single processor computer. Consider the two processes as process A and process B.

A. To listen to a song, open the relevant file, list the required songs , run through the software.

B. To type a letter, open the word processing software and start it.

The computer operating system implements context switching between the two processes, and uses process control block to maintain important information. process A

The process control block of process B is called PCB-A and the process control block PCB-B of process B keeps the data records.

- I. State 2 important pieces of information contained in the operational control segment.

.....

.....

.....

.....

- II. Accordingly, what are the current operating conditions of the two processes?

process A .....

process B .....

- III. While typing, the operating system displayed a message that a song was finished downloading. By what name does the operating system call this event?

.....

- IV. diagram below shows the operation of the context switch for the two processes at the time mentioned in ( III ) above. Below is the most appropriate word for the spaces a – e in the diagram Select and write from the list.

Current State in PCB A, save state into PCB B, Interrupt or System call, save state into PCB A, reload state from PCB A, Executing, reload state from PCB B, Current State in PCB B, Idle, Open the word document, Waste time

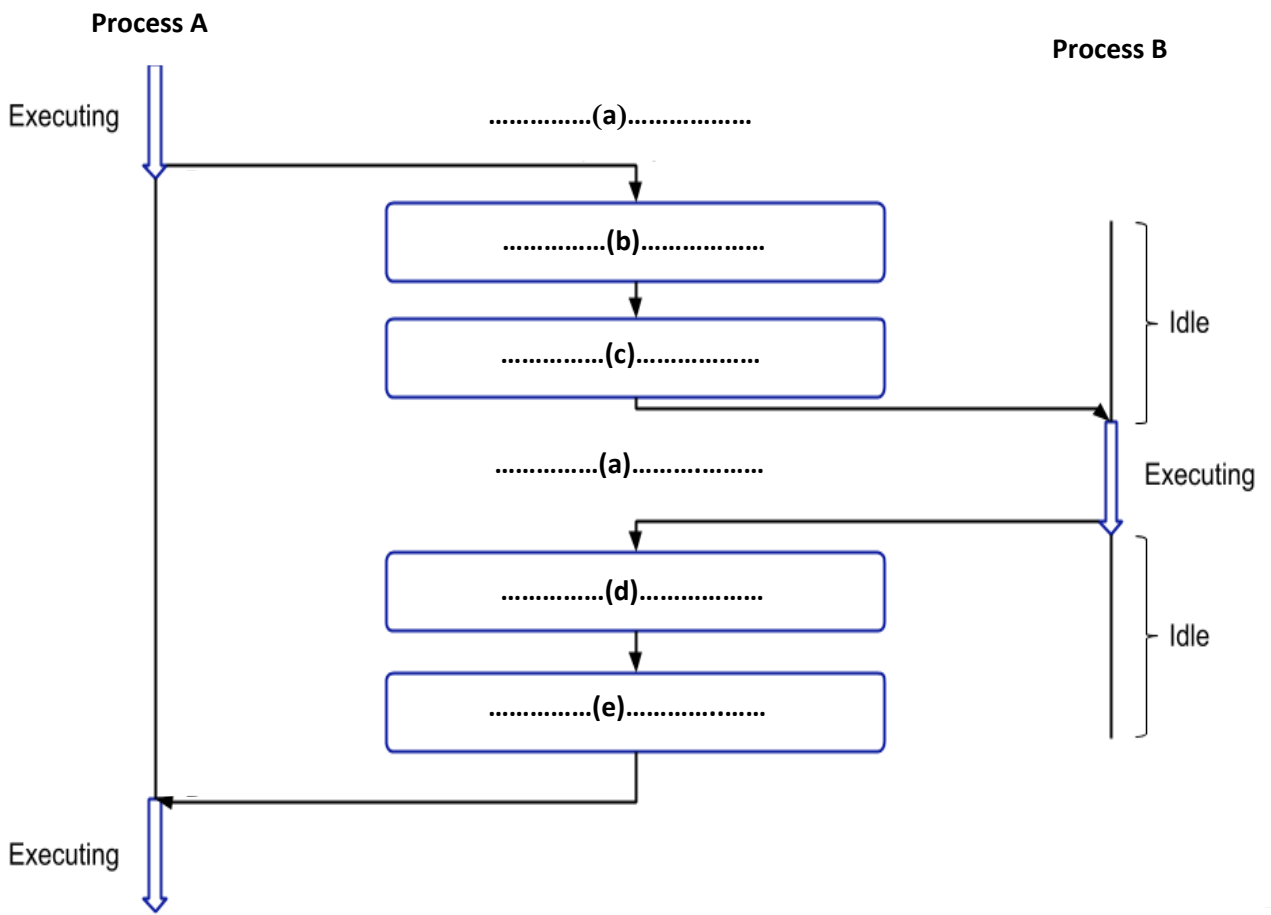
(a).....

(b).....

(c).....

(d).....

(e).....



(b). The computer has 24 bits of virtual memory space. Its 10 bits are used for offset.

I. How many bits are required for page number and offset?

Page no .....  
 Offset .....

II. What are the total number of pages in the virtual memory ?

.....  
 .....

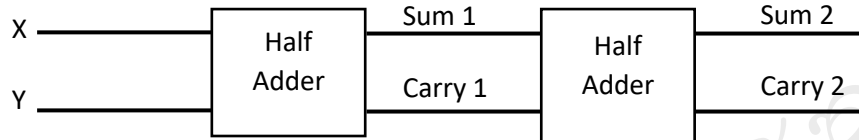
III. How much virtual memory space does this computer have?

.....  
 .....

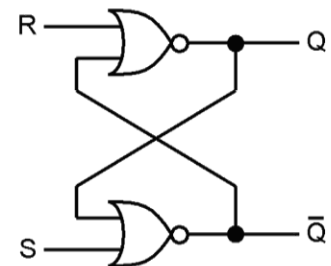
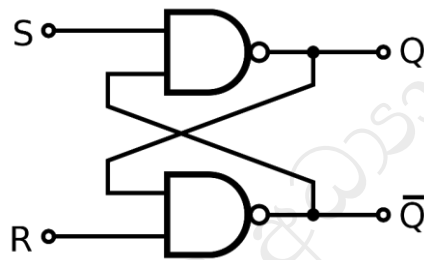
Section B – Essays

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

- (1) (a) Draw the truth table for XOR gate and obtain an SOP statement for it. Assume that the inputs are A and B.
- (b) expressions x and y for sum 1 and carry 1 related to the Half Adder in the circuit shown below. Use only NOT,AND,OR guides for those expressions.
- (c) Using the expressions you obtained for sum1 and carry1 above, obtain the expressions for sum2 and carry2 and simplify them using Boolean rules.



- (d) (i) For the following two circuits the inputs are given as  $S = 1$  and  $R = 0$  at some instant. Then if the inputs are given as  $S = 1$  and  $R = 1$ , what will be the values of the outputs Q and Q'?



- (ii) For the above two circuits, the inputs were given as  $S = 1$  and  $R = 0$  at some instant. Then if the next inputs are given as  $S = 1$  and  $R = 1$  then what will be the values of outputs Q and Q' ? Write the following table on the answer sheet and answer it

NAND uses SR Flipflop		NOR use SR Flipflop	
Q		Q	
Q'		Q'	

- (2) The educational institution called City Campus consists of five faculties namely Information Technology, Engineering, Management, Social Sciences and Law. Computers and devices have been provided to these faculties for administrative and academic purposes as shown in the table below. Each faculty is expected to network its computers and devices with each other for the purpose of data exchange.

Faculty	Number of computers and devices ( No. of Devices)
Information Technology (IT)	55
Engineering	52
Management	25
Social Science	20
Law	45

For the purpose of sharing data between all the faculties, the Faculty of Information Technology is expected to configure all the subnets using the IP address group 212.176.34.0/24 and provide Internet connection to other faculties through its faculty. For this, the Faculty of Information Technology hopes to use the computers in its faculty as Server Computers as needed and other necessary devices are to be purchased.

- (a) the IP address group 212.176.34.0/24 , complete the IP ranges of each subnet according to the table below.

faculty (Faculty)	Network address (Network ID)	Broadcast address (Broadcast IP)	Subnet Mask	Host range (Host Range)
Information Technology (IT)				
Engineering				
Management				
Social Science				
Law				

- (b) Create the logic diagram of the proposed network of City Campus Institute. State your assumptions.
- (c) City Campus said that it is necessary to confirm the validity and authenticity of the research information and other important documents in the exchange of research information and other important documents with the higher education institutions of other countries and to make the data unreadable in data communication and communicate in a secure manner. declared. What method do you suggest for this?

(3) Over the years you developed a friendship with Nisha, the owner-operator of an upscale coffee shop. As a result of recent government regulations to manage the current pandemic, Nisha has decided to close the retail side of her business and move it online. She needs your help as the friendly neighborhood digital marketing consultant.

- (a) What type of e-commerce business applies to the above description ?
- (b) What is the business revenue model used for e-commerce store ?
- (c) Write three functions performed in the above e-marketing process.
- (d) Mention three methods that can be used by planned e-business to make online payments.
- (e) The agent software of the website maintained by Nisha's Coffee Shop above identifies the user need and provides services for the users. Here the Search Agent and its two Sub-Agents according to customer authenticity The product description is obtained through and displayed to the customers. Draw a diagram of a suitable agent service system for this.
- (f) Write an advantage of using multi-agent technique in the above system.

(4) ABC company pays annual bonus to its employees and needs to code a computer program to calculate the bonus.

While calculating the bonus, the type of employee is first determined based on the employee number. The first character of the employee number determines the type of employee as "E" is permanent and "C" is contract. If an employee's service period is less than one year or working on contract basis, the bonus is not entitled. Permanent employees Classified into three grades I, II and III. Bonuses for employees They are awarded on the basis of the bonus mark and grade they belong to in the evaluation.

Bonus points	Grade	Bonus
80 or more	1	Three times the basic salary.
80 or more	11 or 111	Double the basic salary
4 Greater than or equal to 0	1	Double the basic salary
4 Greater than or equal to 0	11 or 111	Same as basic pay
Under 40	1,11,111	Bonuses are not eligible.

- (a) Draw the flowchart to see the bonus due to an employee.
- (b) Write the Python program related to the flowchart.

(5) (a) Customers can place orders with the largest pizza delivery company in Sri Lanka. When placing an order, a unique number is given to the user and in addition name, phone number and address are also recorded. One order is made for one customer only. An order has an order number, order description, type, value.

Each order is prepared by several cooks. A cook has an employee number, a name, and a type. One cook processes several orders during the day.

Transporting an order is the responsibility of the company's drivers. One order is transported by one driver and one driver transports several orders during his duty hours. Company drivers have a driver number, name and phone number.

(i) Above Pizza In the institution database managing system design For Draw the ER diagram.

(ii) In the institution drivers have Vehicles one or a several have possible while one of in a vehicle belonging to is one of a driver to only \_ Each vehicle has a vehicle number and type. Add this detail to the ER diagram drawn in ( i ). (02 Marks)

(b) Below is a table showing the data of students studying in a university. Based on that, answer the following questions.

Student

StudentID	Name	ProfID	ProfName	Grade
S001	Saman	P01	Sahan	5
S002	Kamal	P02	Chathura	4
S002	Kamal	P01	Sahan	5
S003	Anil	P03	Perera	6

(i) At which Normal Form is the above table available?

(ii) What is the reason for that?

(iii) Convert this table to the next Normal Form?

(6)

Below is a description of an ATM system.

When the user wants to withdraw money from an ATM machine, he must insert the ATM card first.

- The validity of the card is checked by the burning process. The database named "Card db" is used for this purpose. If the card is valid, the process will send a message to enter the pin number. If not, the card will be withdrawn. After the user enters the pin number, the validation process checks the pin number for accuracy. The Customer db database is used for this. If the pin number is valid, enter the required amount and if not, it will tell you to try again.

- After the user enters the required amount, the transaction process checks whether the amount is available. For that, the database called "Accounts db" is used. If the required amount of money can be provided, this process will provide the required amount of money, otherwise it will give the message that the transaction cannot be completed. After the required amount is paid, the

details of the transaction are sent to the customer through a text message. Then “Transfer db” and “Transactions db” are updated. At the end of the month, the monthly report is prepared and sent to the Branch manager using "Transfer db".

i) Draw the context diagram for the above system

ii) Draw the first level data flow diagram for that system.

b) Write 3 functional requirements and 2 non-functional requirements related to ATM system.