



General Certificate of Advanced Level Examination
Term – 3, 2022
Conducted by Field Work Center (FWC), Thondaimanaru
Information & Communication Technology (ICT)

Do not write
in this
space

தகவல் தொடர்பாடல் தொழினுட்பவியல் II
 Information & Communication Technology II

A

20

E

II

Gr. 12 (2022)

Part – II A

Answer all questions

1.

(a)

(i) Give 23_{10} in the form of 8-bits two's complement.

.....

(ii) Give -16_{10} in the form of 8-bits two's complement.

.....

(iii) Calculate $23_{10} - 16_{10}$ in the form of 8-bits two's complement.

.....

(iv) State two advantages of two's complement method.

.....

(b)

(i) Write down any two in major types of cloud computing.

.....

(ii) Suggest briefly any two ways applicable to reduce digital divide among Sri Lankan people.

.....

2.

(a) State whether each of the following statements regarding data communication and computer networks is **True** or **False**.

(i) UDP (User Datagram control Protocol) creates a virtual circuit between sender and receiver.

(ii) Frequency is remained unchanged while amplitude and phase are changed in frequency modulation.

(iii) IP (Internet Protocol) is a connection-oriented protocol.

(iv) In computer network, flow control functions in application layer of the OSI network reference model.

(v) Proxy server traslates data packets received from private IP addresses into the public IP address.

(vi) The main goal of using network switch is to connect two computer networks together.

(vii) CIDR (Classless Inter-domain routing) allows the efficient allocation of the IP addresses.

(viii) In NRZ (Non-Return to Zero) encoding system, voltage changes from low to high or high to low in the middle of the signal.

No.	True / False	No.	True / False
(i)		(v)	
(ii)		(vi)	
(iii)		(vii)	
(iv)		(viii)	

(b) If an address of a network is 193.5.6.0. Its usable number of hosts is 14.

(i) What is the subnet mask of this network?

.....

(ii) What is the maximum subnets?

.....

.....



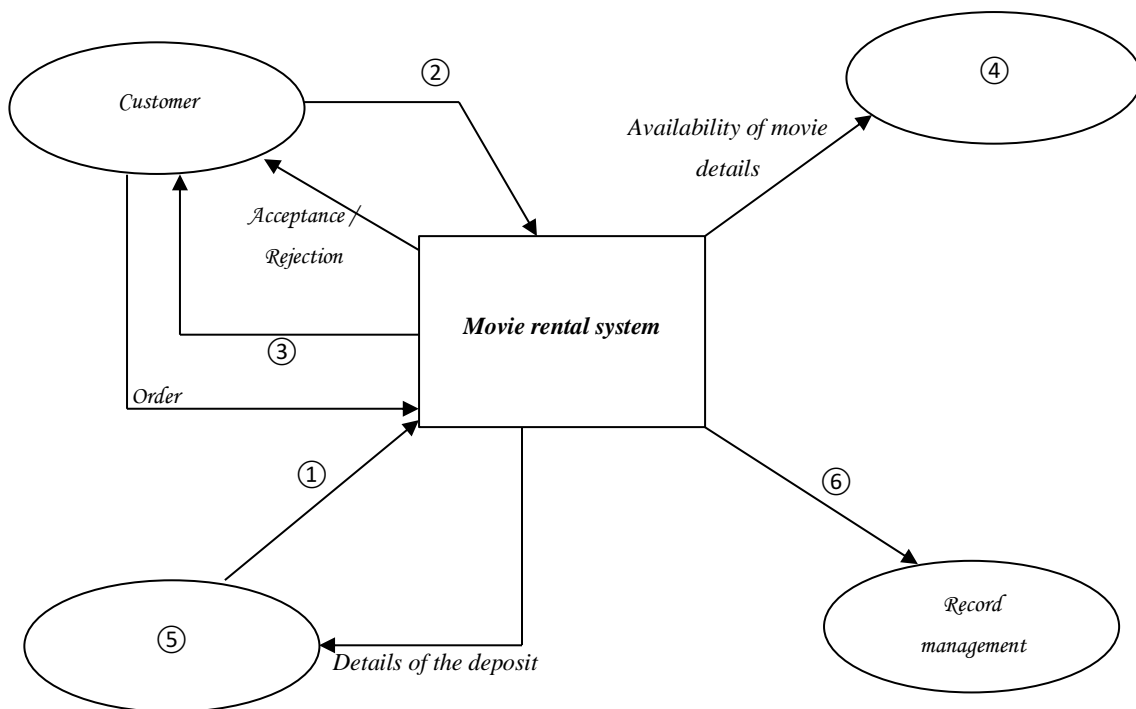
(c) In computer networks, draw the OSI network reference model.

Do not write
in this
space

3.

(a) Consider the following context diagram illustrating the movie rental system of a shop.

A shop offers the service of renting movies to its customers. A customer can submit a request to receive the movie. While the request is accepted, the system will check whether the movie has it in the store or not. Wherever the film is in the shop, the payment for the film will be made by the customer. At the same time, the customer will receive an invoice and the DVD of the film in question. All the details of the movie rental for the rent are recorded in a record management system. The details of the deposit and the details of the payment are sent to the payment details system. Order from the customer will not be accepted by the system unless there is a specific movie in the shop.



Write down the spaces given in the context diagram in the following spaces using appropriate words / phrases.

- ①
- ②
- ③
- ④
- ⑤
- ⑥

(b) Fill in the blanks of the sentences given below from the following list as appropriate. Write down the numbers in the list at spaces.

Lists: [① - Whitebox testing, ② - Spiral model, ③ - Prototyping model, ④ - Waterfall model, ⑤ - Blackbox testing, ⑥ - RAD model, ⑦ - Integration testing]

- (i) is a sequential (linear) process model used in software development.
- (ii) is a combination of iterative development process.
- (iii) is an initial version of a software system that is used to demonstrate concepts, try out design options, and find out more about the user requirements.
- (iv) in which software structures (codes) will be tested. During this process, the programs will be tested. This requires knowledge of how the software works.
- (v) in which the new system being developed will be tested by the end users with the help of developers using actual data.

(c) Consider the following scenario.

A school has a new system to manage student athletics. The old system is manual system. A new system is introduced to manage students, their teams, seasons, and their coaches. At first, the new system simply manages teams. Then the new system manages seasons (and school years), slowly the new system is increased to manage coaches, players and finally events. At the end of the implementation, the new system is managing everything related to student athletics and the old manual system is removed from the usage.

(i) Which deployment method is mostly appropriate to implement this system?

.....

(ii) Write down one advantage of system deployment method as given in (i) above.

.....

.....



4.

(a) An application running in the computer uses 101000111011010101 bits virtual memory. If the number of pages is 128,

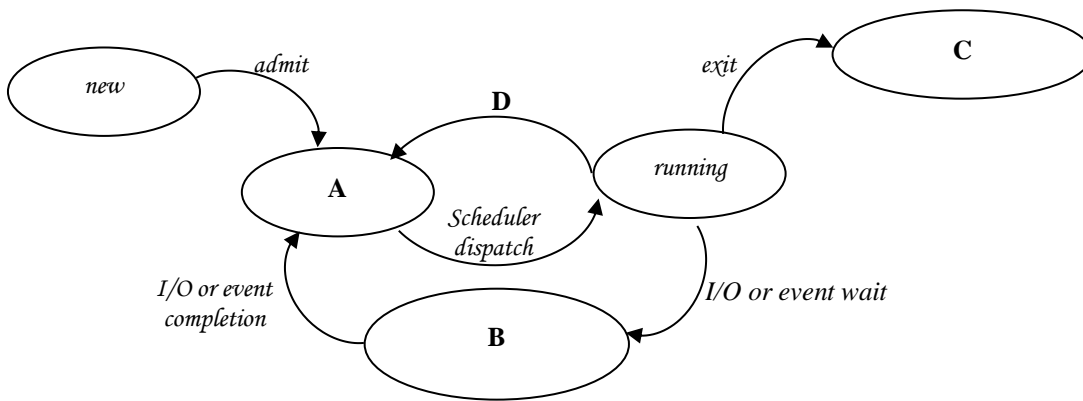
(i) How many bits are required for a page?

.....

(ii) What is offset /displacement?

.....

(b) Consider the following process transition diagram of the multitasking operating system.



Write down appropriate terms / phrases for the labels A,B,C and D in the following table.

A	
B	
C	
D	

(c) Write down two characteristics of contiguous file allocation.

.....

(d) Write down one advantage of using virtual memory in modern operating systems.

.....





Information & Communication Technology ICT தகவல் தொடர்பாடல் தொழினுட்பம் Information & Communication Technology ICT தகவல் தொடர்பாடல் தொழினுட்பம் Information & Communication Technology ICT தகவல் தொடர்பாடல் தொழினுட்பம்

General Certificate of Advanced Level Examination
Term – 3, 2022
Conducted by Field Work Center (FWC), Thondaimanaru
Information & Communication Technology (ICT)

தகவல் தொடர்பாடல் தொழினுட்பவியல் II
Information & Communication Technology II

B

20

E

II

Gr. 12 (2022)

Part – II B

Answer any two questions only.

(5) Consider the following scenario.

A digital logic circuit is set up for an automatic door system. The automatic door has two sensors A and B on both sides of the door. The door opens when at least one of these sensors is activated. The door system, using a manual switch C, starts (switch on-logical value-1) or stops (switch off-logical value-0). The door will not open until the switch on. Output F of the logic circuit will be for opening door (switch on-logical value-1) or not-opening (switch off-logical value-0).

- Construct a truth table for this system.
- Write down Boolean expression in SOP form using the truth table.
- Simplify the Boolean expression you obtained in (i) above using Karnaugh map.
- Draw logic circuit for this simplified Boolean expression using AND, OR, NOT logic gates only.
- Draw the logic circuit again for this Boolean expression obtained in (b) above using NOR gates only.

(6)

- Compare and contrast bus topology and star topology (one comparison is enough).
- Write down one advantage of variable length subnet mask (VLSM) in allocating IP addresses to computers rather than fixed length subnet mask (FLSM).
- Consider the following scenario.

A wood furniture manufacturing company that uses five Local Area Networks (LANs) for its production, marketing, accounting, sales and information technology departments. Each department has the number of computers as shown in the table below.

Departments	Number of computers in each department
Production	15
Marketing	12
Accounting	14
Sales	22
Information Technology	25

An IP block 196.1.1.0 /27 is given to the network administrator. The network administrator is required to allocate IP addresses for all nodes in each department. Five subnets are to be setup for this purpose and further this network is connected to a public IP address for the Internet usage of the employees. IT department is connected directly to the Internet. 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 five switches, network cables, proxy server and DHCP server are given to the network administrator for this purpose.

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

(ii) Allocate IP addresses for all computers, printers and servers using the following table as a help. Use fixed length subnet mask (FLSM) for this purpose.

Departments	Network address	Broadcast address	Subnet mask	Usable IP address range
Production				
Marketing				
Accounting				
Sales				
Information Technology				

(7)

(a) Some of the functional and non-functional requirements of the automated teller machine (ATM) are given below.

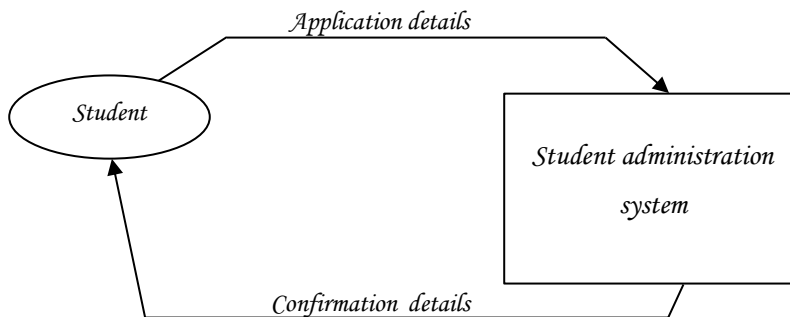
- (A) The ATM shall be able to perform 10000 money transactions in a second.
- (B) A customer shall be able to deposit his / her money
- (C) A customer shall be able to withdraw his / her money
- (D) The user interface of the ATM should be able to be easy-to-use for customer
- (E) A customer shall be able to know his / her money balance
- (F) The ATM shall be able to check the validity of the ATM card of customers
- (G) Three chances shall be able to provide for customers while they enter their four digit secret code
- (H) The ATM shall be able to check the account number of customers

Classify the user requirements of the automated teller machine (ATM) whether the functional or non-functional requirements separately mentioned above (it is sufficient to write only their labels).

(b) At a university, students can choose to study and register for their degree. Consider the following scenario regarding the corresponding student administration system.

Students first submit their application details to the receptionist counter. The university checks that the course is available. Course details are obtained from course file for this. The student enrollment process takes place on the basis of whether the particular course is accepted or rejected. Enrolment details are then sent to the course file. As well as specific student details are stored in the student file. Eventually the student registration details are sent to the registrar's unit where the student registration is confirmed. Confirmation details are eventually provided to students.

The context diagram for this system is given as follows.



Draw Level -1 Data Flow Diagram (DFD) for the student administration System using SSADM clearly.
