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Provincial Department of Education, Northern Province

கல்விப் பொதுத் தராதரப் பத்திர (உயர்தர மூன்றாந் தவணை)ப் பரீட்சை, 2026
General Certificate of Education (Adv. Level 3rd Term) Exam, 2026

தகவல் தொடர்பாடல் தொழினுட்பவியல் I
Information & Communication Technology I

G 12	20 E	I

Three hours

Instructions:

- *Answer **all** the Questions.*
- *Write your **Index Number** in the space provided in the answer sheet.*
- *Instructions are also given on the back of the answer sheet. Follow those carefully.*
- *In each of the questions **1** to **40**, pick of the alternative from 1,2,3,4,5 **which is correct or most appropriate and mark your response on the answer sheet with a cross (x) in accordance with the instructions given on the back of the answer sheet.***
- *Use of calculator is **not allowed***

1. Who invented the first mechanical calculator to perform addition, subtraction, multiplication, and division?

   (1) John Naphier (2) Charles Babbage (3) Pascal

   (4) Ada (5) Gottfried Wilhelm Von Leibniyz

2. Which of the following is a false statement?

   (1) Information is obtainedby processing data.

   (2) Data has its maximum value at the time it is created.

   (3) Data validation greatly reduces the errors in data input.

   (4) Sensors are widely used in automated data entry.

   (5) Information has its maximum value at the time it is created.

3. When filling out applications online for Advanced Level examinations in schools, one of the inputs provided is a student's identity card number, which must consist of exactly 12 digit number. Which data validation methods can be used for this input?

   A – range check B – type check C – length check D – format check

   (1) A,B only (2) A,C only (3) B,C only

   (4) B,C,D only (5) A,B,C,D all are correct

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4. ..... is the economic and social inequality related to the access, use or impact of information and communication technologies. Which of the following is the appropriate term to fill the gap?

(1) Plagiarism (2) Theft (3) Privacy (4) Digital Divide (5) Cyberbullying

5. Which of the following statements is true regarding the history of computers?

(1) Charles Babbage designed the Adding Machine (Pascaline).

(2) UNIVAC was an electronic computer built using thousands of vacuum tubes.

(3) The use of the mouse and keyboard was introduced in second-generation computers.

(4) Very Large Scale Integrated (VLSI) circuits were used in third-generation computers.

(5) Machine language was used in second-generation computers.

6. What is the main difference between DRAM and SRAM?

(1) DRAM is faster and more expensive than SRAM.

(2) DRAM has lower density, while SRAM has higher density.

(3) DRAM must be refreshed periodically, whereas SRAM does not require refreshing.

(4) SRAM must be refreshed periodically, whereas DRAM does not require refreshing.

(5) SRAM is used in main memory, while DRAM is used in cache memory.

7. Consider the following statements:

A – BIOS is an application software.

B – Utility software is an example of firmware.

C – Spyware is an example of malware.

Which of the above is/are true?

(1) A only (2) B only (3) C only (4) B and C only (5) All A, B, and C

8. Which of the following is NOT a step in the Fetch-Execute cycle?

(1) Fetching the instruction (2) Decoding the instruction (3) Executing the instruction

(4) Storing in temporary cache (5) Outputting the result

9. What is the correct binary equivalent of decimal 35.375_{10}?

(1) 110001.110 (2) 101011.011 (3) 100011.011 (4) 100011.110 (5) 110001.011

10. Which of the following are correct

A. 126_{10} :- 1111110_2
B. 76_8 :- 111101_2
C. $A5C_{16}$:- 101001011100_2

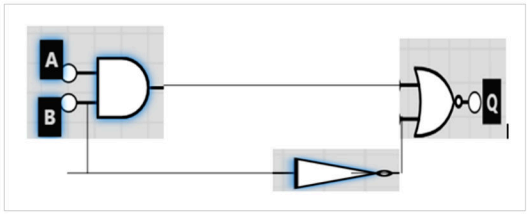
(1) I and III Only (2) I and II Only (3) II and III Only

(4) III Only (5) All I, II,III

11. Which of the following is the answer for (111000101 XOR 11001100).

(1) 111001101 (2)11110110 (3) 000110010 (4) 011000100 (5)100001001

12. Consider the following logic circuit. When B = 1, what would definitely be the output at Q?



(1) A (2) $\bar{A}$ (3) B (4) $\bar{B}$ (5) O

13. Simplified Boolean expressions help to obtain simpler circuits. Which of the following is a simplified form of $X + \bar{X}Y$?

(1) X (2) Y (3) XY (4) $\bar{X}Y$ (5) X + Y

14. What is the most simple Boolean expression that can be obtained through the given Karnaugh map?

C \ AB	00	01	10	11
0	1	0	0	1
1	1	0	1	1

(1) $\bar{B}$ (2) B + $\bar{A}$C (3) $\bar{B}$ + AC (4) B + ABC (5) BC + AB

15. What is the primary purpose of an SR-Latch in digital circuits?

(1) To perform mathematical addition
(2) To act as a temporary 1-bit memory cell
(3) To amplify weak signals
(4) To convert AC to DC
(5) To count the number of clock pulses

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16. In an SR-Latch built with NOR gates, what happens when both S and R inputs are set to 0?

(1) The output becomes 1
(2) The output becomes 0
(3) The output remains in its previous state
(4) The output toggles continuously
(5) The output enters an invalid state

17. Which of the following is a function of the Basic Input Output System (BIOS) in a computer?

(1) It provides physical interfaces for various devices.

(2) It provides the programs (drivers/routines) for the Central Processing Unit (CPU) to communicate with other devices.

(3) It provides memory space to load applications from the hard disk.

(4) It provides the electrical power for the computer to operate.

(5) It provides the necessary memory space for the computer.

18. Consider the following statements regarding Dynamic Random Access Memory (DRAM):

A – It is used as register technology.

B – It has a lower speed compared to Static Random Access Memory (SRAM) technology.

C – Its density is higher than that of Static Random Access Memory (SRAM) technology.

Which of these is/are correct?

(1) A only (2) B only (3) C only (4) B and C only (5) All A, B, and C

19. In an Operating System, what is the process of moving a process from main memory to secondary memory in order to bring another process into main memory called?

(1) Paging (2) Swapping (3) Fragmentation (4) Context switching (5) Scheduling

20. Are the following statements regarding IP addresses correct?

A. IPv4, IPv6, and ISDN are types of IP addresses.

B. A MAC address used to identify a device.

C. 172.16.0.0 - 172.31.255.255 is a private IP address range.

(1) A only (2) B only (3) C only (4) A and B only (5) A and C only

21. Which of the following statements are true?

A. TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are found in the Transport Layer.

B. Network Interface Card (NIC) and HUB are found in the Data Link Layer.

C. HTTP, SMTP, DNS, and DHCP are found in the Application Layer.

(1) A only (2) B only (3) C only (4) A and B only (5) A and C only

22. A computer in a network has been assigned the IP address **192.200.15.35** and the Subnet mask **255.255.255.192**. Which of the following is the first IP address for a host computer in this network?

(1) 192.200.15.5 (2) 192.200.15.75 (3) 192.200.15.1

(4) 192.200.15.63 (5) 192.200.15.10

23. A Local Area Network (LAN) has **1,012** network devices. What is the most suitable subnet mask for this LAN?

(1) 255.255.255.192 (2) 255.255.255.128 (3) 255.255.255.0

(4) 255.255.254.0 (5) 255.255.252.0

24. Consider the following statements regarding IPv4:

A. Class B has more networks than Class A.

B. Class C has more networks than Class B.

C**.** The usable part of an IP address is divided into user parts and administrative parts.

Which of the above statements is/are incorrect?

(1) A only (2) C only (3) A, B only (4) A, C only (5) All A, B, C

25. What is the Binary form for 23.456?

(1) 011101.0111 (2) 010110.0101 (3) 0011111.0111

(4) 010111.0111 (5) 010111.1110

26. If the IP address of a Class A network is **125.134.112.66** and the subnet mask is **255.255.224.0**, what will be the first network address?

(1) 125.134.96.0 (2) 125.134.112.0 (3) 125.134.112.66

(4) 125.134.0.0 (5) 125.134.96.78

27. Which protocol is used to send Email?

(1) HTTP (2) FTP (3) SMTP (4) SNMP (5) TELNET

28. What is the meaning of Bandwidth?

(1) Data volume (2) Data transfer speed (3) Storage capacity

(4) Memory (5) Processor speed

29. What is the main difference between TCP and UDP?

(1) TCP is faster (2) UDP is connection-based (3) TCP is reliable

(4) UDP performs error correction (5) Both are the same

30. A sales company has decided to sell products based on special discounts. The programmer develops a partial program to calculate the discounts on products for easy purchase. To test it, the program reads the barcode and displays the discount.

Which is the most suitable testing method for this?

(1) Unit Testing (2) Integration Testing (3) Acceptance Testing

(4) Black Box Testing (5) White Box Testing

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31. A company has decided to replace its decision management system with a new system. Initially, a part of the new system is implemented, and then it is gradually expanded. On May 4th, the old system was completely stopped, and the new system was implemented on the same day.

which type of implementation method was used in the system change?

(1) Pilot and Direct (2) Pilot and Parallel (3) Phased and Direct

(4) Phased and Parallel (5) Direct Method

32. Match the following system development models with their descriptions:

1. Spiral Model	A. It is iterative development process suitable for static or dynamic requirements
2. Agile Model	B. Iterative development process and feedback to modify requirements.
3. Prototyping Model	C. Most suitable for complex requirements.

(1)
1.A
2.B
3.C

(2)
1.C
2.B
3.A

(3)
1. C
2. A
3. B

(4)
1.B
2.C
3.A

(5)
1. A
2. C
3. B

33. Which of the following statements about a Data Flow Diagram (DFD) is incorrect?

(1) Data is transformed from a process to a data store.

(2) Data is transformed from one process to another process.

(3) Data transfer from one external entity to another external entity is represented by a dashed line.

(4) Data is transformed from one data store to another data store.

(5) Data is transformed from a data store to a process.

33. Which of the following systems uses a database of expert knowledge to provide advice or make decisions?

(1) Content Management System

(2) Expert System

(3) Knowledge Management System

(4) Executive Support System

(5) Decision Support System

34. Column A and B list some descriptions related to an information system.

Column A		Column B	
A1	Transaction Processing System (TPS)	B1	Provides services to administrative users of an organization
A2	Management Information System (MIS	B2	Provides services to operational-level users of an organization
A3	Executive Support System (ESS)	B3	Provides services to strategic-level users of an organization

Which of the following shows the correct matching among the above?

(1) A1 -B2, A2 -B1, A3 -B3

(2) A1 -B3, A2 -B1, A3 -B2

(3) A1 -B1, A2 -B2, A3 -B3

(4) A1 -B1, A2 -B3, A3 -B2

(5) A1 -B2, A2 -B3, A3 -B1

35. Which diagram is created in the system design phase that has the following characteristics?

- Describes the data flow between the main components of the system
- Represents a high-level view of system processes
- Provides more detail than the context diagram

(1) Document Flow Diagram (2) Logical Data Model Diagram

(3) Low-Level Data Flow Diagram (4) Level 1 Data Flow Diagram

(5) High-Level Data Flow Diagram

37. Which of the following are characteristics of a custom-developed software system when compared to commercial off-the-shelf (package) software?

A – Development process takes a long time
B – Includes many features that may never be used
C – High cost
D – Difficult to modify

1. A and B only 2. B and C only 3. C and D only 4. A and C only 5. B and D only

38. A school has decided to develop a new system to record student attendance using a computer. First, they gather requirements from teachers and administrators. In this case at which stage of the System Development Life Cycle (SDLC) does this occur?

1. System Testing 2.System Implementation 3.System Maintenance

4.Coding of the solution 5.Requirements Analysis

39. Consider the following system types:

A – In an ecosystem, living organisms interact with the external environment.

B – A software system operates without accepting external changes or updates.

C – A completely closed glass bottle where no air enters or leaves.

Which of the above can be considered closed systems?

1. A only 2. A and C only 3. A and B only 4. B and C only 5. All A, B and C

40. Consider the following system functions.

A – An online shopping system provides a user login facility.

B – A school conducts teaching and learning activities to enable all students to go to university.

C – A hospital system generates reports about patients' diseases.

Which of the above can be considered **non-functional requirements** of a system?

1. A only 2. B only 3. A and C only 4. A and B only 5. All A,B and C

***

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தகவல் தொடர்பாடல் தொழினுட்பவியல் II
Information & Communication Technology - II

G 12	20 E	II

Two hours

- *This question paper comprised of two parts,* ***Part A and part B****. The time allotted for* ***both parts is two hours.***
- *Additional Reading time 10 minutes*
- *Use of calculator is* ***not allowed.***

❑ **PART A: Structure Essay**

- Answer all the questions on this paper itself. Write your answer in the space provided for each questions. Note that the space provided is sufficient for your answer and that extensive answer is not excepted.

❑ **PART B: Essay**

- This parts contains three questions of which, two are to be answered . Use the papers supplied for this purpose.
- At the end of the time allotted for this paper, tie the two part together so the Part A is on Top of the Part B before handing them over the supervisor.
- You are permitted remove only Part B of the questions paper from examination Hall.

Index Number : …….

For Examiner's' Use Only

For The second Paper		
Part	**Question No**	**Marks**
A	1	
	2	
	3	
	4	
B	5	
	6	
	7	
	8	
	9	
	10	
Total		

Final Marks

Number	
Words	

Code Number

Marking Examiner 1	
Marking Examiner 2	
Marks Checked by	
Supervised by	

Part A – Structured Essay
Answer all four questions on this paper itself.

Do not write In this column

1.

a. Calculate the value of (47_{10} - 35_{10}) using 8-bit **One's Complement** representation. Show your calculations clearly.

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b. Calculate the value of (47_{10} - 35_{10}) using 8-bit **Two's Complement** representation. Show your calculations clearly.

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c. Write down the steps required to convert the Two's Complement value obtained in part (ii) into standard decimal form.

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d. State two advantages of representing data in Two's Complement form for internal computer processing.

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e. Provide the correct results for the **bitwise AND** operation and the **bitwise OR** operation between the two binary numbers 11001101_2 ,00101110_2

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2.

Do not write In this column

a. Mention the layers of the OSI network reference model responsible for each of the following functions.

1	Sending data to the correct computer using the MAC Address.	
2	Converting data into Packets.	
3	Sending and receiving data as Bits (0s and 1s).	
4	Providing services such as HTTP/HTTPS and File Transfer (FTP).	
5	Performing Data Encryption and Compression.	
6	TCP and UDP protocols operate here.	

b. Choose the most appropriate term from the list provided to fill in the blanks in each of the following statements.

List: (Trojan horse, Symmetric Encryption, CIDR, DNS, Phishing, UDP, Multiplexing, Asymmetric Encryption, NAT, TCP)

(i) Converting private IP addresses within a local area network (LAN) into public IP addresses is called.....

(ii) The method used to utilize IP addresses efficiently and create sub-networks (Subnets) is.....

(iii) The method of securing data using both a Public key and a Private key is.....

(iv) Malicious software (Malware) that steals computer data or causes damage without the user's knowledge is.....

(v) The **Connectionless** protocol used for fast data transfer, even though it has lower reliability, is.....

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(vi) ..... Is a technology that combines multiple data signals to travel through a single communication medium at the same time.

Do not write In this column

c. Assume Ravi needs to send a private message **"HELLO"** to Vimal. Before sending, Ravi changes **"HELLO"** to **"JGNNQ"**.

(i) What is **the Encryption Key** used for this?

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(ii) In another communication using the same security scheme, if Vimal receives **"EQORWVGT"** from Ravi, what was Ravi's original message?

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d. Computer A sends the data **1101010** by adding an **Even Parity Bit**, resulting in **11010100**. Due to a change in the communication channel, Computer B receives the data as **11010101**. State whether Computer B will detect the error or not, with a brief explanation.

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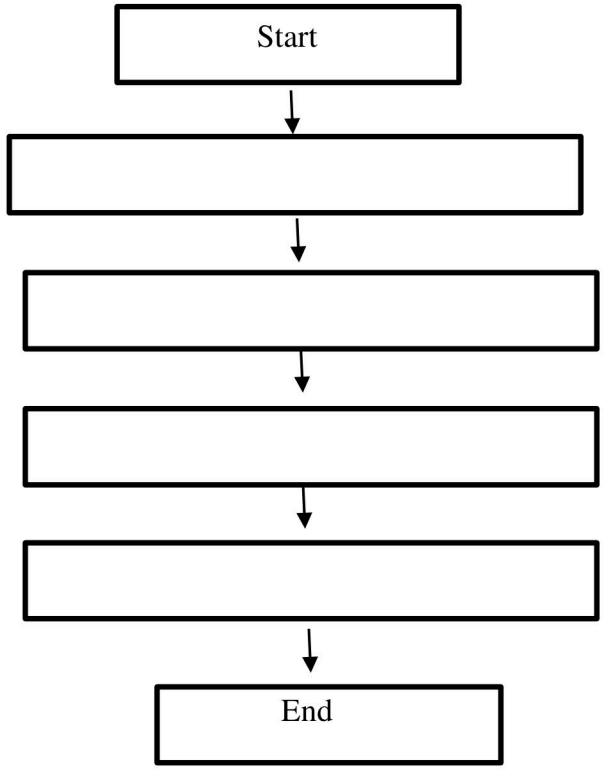
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3.

Do not write In this column

a. Write the steps involved in the process of Fetch Execute cycle in order inside the boxes.



b. For process scheduling, a process uses the seven-state process transition model. Fill in the table below with the possible next states that the given process can move to from its current state, along with the conditions required for those transitions.

Current State	Next Possible State	Condition for Transition
Ready State	1	
	2	
Running State	1	
	2	
Blocked State	1	
	2	

Do not write In this column

c. The following descriptions are related to process management. Write the appropriate terms from the list given below.

List: {Multiprogramming, Context Switch, Swapping, Scheduling, Dynamic Loading , Process, Memory, Process Management, Process Control Block (PCB)}

Descriptions:	**Appropriate terms:**
i. A program that is currently being executed.	……
ii. A process is temporarily moved from memory to secondary storage, and later brought back into memory for continued execution.	……
iii. To ensure that the CPU is always executing a process, tasks are arranged in an orderly manner to improve CPU utilization.	……
iv. To make efficient use of memory, a process is not loaded into memory until it is actually needed.	……

d. A computer has a Virtual Memory Address Space of 18 bits, in which 8 bits are used for the Page Address.

(i) Based on the above address structure, calculate the number of pages that can be formed.

……

……

……

(ii) Consider the virtual memory address: 010111010100111101

Find the Page number and Displacement (offset)

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4.

The following question is based on a hospital information system used by a government hospital.

Do not write In this column

a. Define the term information system.

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b. Using your definition from (a), demonstrate that the hospital's patient management system qualifies as an information system. In your answer refer to its components.

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c. The hospital currently uses a manual paper-based system. Identify three drawbacks of the manual system that would justify moving to a computerized system.

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d. Classify each of the following requirements of the hospital information system as functional or non-functional.

(i) A doctor shall be able to view a patient's full medical history.

……

(ii) The system shall respond to any search query within 2 seconds.

……

(iii) Patient data shall be accessible only to authorized medical staff.

……..

e. State one feasibility concern (other than technical) that the hospital management should consider before commissioning the new system. Explain why it is relevant.

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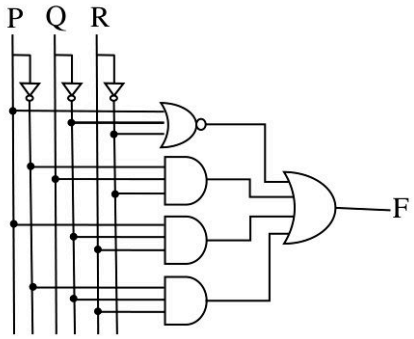
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தகவல் தொடர்பாடல் தொழினுட்பவியல் II Information & Communication Technology - II	G 12	20 E	II

Part II B

**Answer any two questions only.*

5. a. (i) Write the Boolean expression for the output **F** of the circuit shown below.



(ii) Simplify the Boolean expression of the output **F** that obtained in above part (i) using Boolean algebraic system. And clearly indicate the Boolean lows that used in the simplification.

b. A machine is controlled by four sensors, P, Q, R, S. If sensors P and Q are in the **active state** (digit level 1) **and** any of the other two sensors are in the **active state**, the alarm system is brought to the **active state** (digit level 1) and starts to operate.

(i) Draw a truth table, representing the operation of the warning system of the above machine.

(ii) Write the Boolean expression for the operation of the warning system from the truth table in SOP form.

(iii) Map the expression obtained above in Karanugh Map and Simplify.

(iv) Construct the logical circuit corresponding to the simplified equation, you obtained above part(iii) .

Past Papers Wiki

6. a. Fill in the blanks A, B, and C with appropriate terms:

In the OSI model, the protocols responsible for the transportation of data packets are identified as …**A**.. and ….**B**….. Among them, **A** guarantees data delivery by using the ….**C**… method.

b. When using the internet, users may face various types of threats. List **three** such threats.

c. Draw a detailed diagram of a network where four computers, one server, one network printer and a switch are connected using a **star topology**. Label all the components used in your diagram.

d. Give one example for each of the following:

(i) A **Class B** private IP address

(ii) A CIDR-encoded IP address

(ii) An IP address in CIDR notation *(0.5 mark)*

e. Match each OSI layer labeled A to D with the correct description labeled 1 to 4.

*(**Note:** Use only the given labels in your answer.)*

OSI Layers:
A – Application Layer
B – Transport Layer
C – Network Layer
D – Data Link Layer

Descriptions:
1 – Performs routing of data packets and determines paths
2 – Splits data into segments and ensures reliable delivery
3 – Provides network services to user applications
4 – Manages the physical transmission of data

f. Kamal wants to send a confidential message **ADD** to Nimal. Before sending, Kamal converts it to **CFF**. Write the encryption key used by Kamal in this communication.

g. Assume that the IP address block **192.168.60.0/25** is given to you to allocate among five departments named S1, S2, S3, S4, and S5, which require 30, 14, 62, 6, and 2 usable host IP addresses respectively.

For each department's subnet, provide the following details in a table:

Department Name	**Network Address**	**Subnet Mask**	**First Usable IP Address**	**Last Usable IP Address**	**Broadcast IP Address**

7.

a. Write the steps involved during Context Switching in an Operating System.

b. Suppose you have a computer system that uses 17-bit virtual addresses, allowing a virtual address space from 0 to 128 KB. This computer has only 32KB of physical memory, and the page size of this system is 4KB.

If the above 17-bit virtual address consists of page number bits and offset bits:

(i) How many **frames** are created in the physical memory of this computer?

(ii) Write down the number of bits allocated for the **offset** and the number of bits allocated for the **page number** in the virtual address.

(iii) What is the necessity/purpose of a **Page Table** when using virtual memory and physical memory?

c. Give two differences between the **NTFS** and **FAT32** file systems.

d. Explain the function/role of the **Process Control Block (PCB)** during a **context switching** operation.

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