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இலங்கைப் பரீட்சைத் திணைக்களம்
**Department of Examinations,Sri Lanka**

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2023(2024)
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தகவல், தொடர்பாடல் தொழினுட்பவியல்	**I**	
Information & Communication Technology	**I**	

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இரண்டு மணித்தியாலம்
Two 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 **50,** pick one of the alternatives 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 calculators is **not allowed.**

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1. Which of the following statements are correct?
   A – Word processors and spreadsheet software belong to the category of *utility software.*
   B – A *compiler* is an example for a program translator.
   C – It is illegal to use a proprietary software without obtaining its license.
   (1) *A* only   (2) *B* only   (3) *C* only
   (4) *A* and *B* only   (5) *B* and *C* only

2. Personal information of students and their exam marks are input to a Student Information System. Marks for a subject range from 0 to 100. A student has to study a collection of compulsory and optional subjects and sit for the relevant examinations.
   Which of the following are suitable data validations for the above system?
   A – A *presence check* for the marks of all subjects taken/not taken by the student
   B – A *range check* to check whether an input exam mark is within the range 0 and 100
   C – A *data type check* to ensure that the input made for the telephone number of the student contains only digits
   (1) *A* only   (2) *B* only   (3) *A* and *B* only
   (4) *A* and *C* only   (5) *B* and *C* only

3. The existing book management system in a school library is used with a computer, a monitor, a keyboard and a mouse. The school management wants to minimize the time taken presently for book lending/returning. Which of the following is most suitable for this purpose?
   (1) Using a digitizer   (2) Using an external hard disk
   (3) Using a touch screen   (4) Using a magnetic stripe reader
   (5) Using bar code technology

4. Listed below are some phrases about the internal operation of three printers:
   A – a moving print head striking an ink ribbon against the paper
   B – toner attracting to what is printed on a cylinder which is then transferred to paper
   C – nozzles spraying ink onto paper
   Which of the following correctly matches *dot matrix*, *inkjet* and *laser* printers to the above phrases?
   (1) A – dot matrix,   B – laser,   C – inkjet
   (2) A – dot matrix,   B – inkjet,   C – laser
   (3) A – inkjet,   B – dot matrix,   C – laser
   (4) A – laser,   B – dot matrix,   C – inkjet
   (5) A – laser,   B – inkjet,   C – dot matrix

[*See page two*

5. Which of the following will cause the CPU to execute a different set of instructions?
   A – a context switch
   B – an interrupt
   C – user selecting the shutdown option in the computer

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

6. A program runs fastest when the data it requires are in the
(1) hard disk.   (2) L1 cache.   (3) L2 cache.
(4) magnetic tape.   (5) main memory.

7. What is the correct binary equivalent of decimal 13.125_{10}?
(1) 1100.001   (2) 1100.100   (3) 1101.001   (4) 1101.100   (5) 1101.101

8. Which of the following are equivalent to octal 674_8?
   A – 110 111 100_2
   B – 444_{10}
   C – $2BC_{16}$

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

9. The address of an instruction was shown as 5A1 in hexadecimal. What is that address in decimal?
(1) 41   (2) 1441   (3) 1457   (4) 2641   (5) 23056

10. A document contains 2048 characters including spaces and line-breaks. How many bits are needed to encode this document in ASCII also using the parity bits?
(1) 2048   (2) 2048 x 2   (3) 2048 x 7   (4) 2048 x 8   (5) 2048 / 8

11. What is the correct 2's complement binary representation of decimal -49_{10} using 8-bits?
(1) 00110001   (2) 01100010   (3) 10011110   (4) 11001111   (5) 11100010

12. Consider the following logic circuit in which **X** indicates a two-input logic gate.
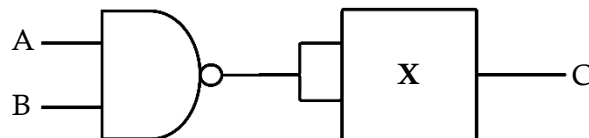
Which of the following should **X** be so that when A = 0 and B = 1, the output C would be 0?
   I   – a NAND gate
   II   – a NOR gate
   III – an XOR gate

(1) I only   (2) I and II only   (3) I and III only
(4) II and III only   (5) All I, II and III

13. Which of the following is the simplified form of the Boolean expression $X(\overline{X} + Y)$?
(1) X   (2) Y   (3) XY   (4) $\overline{X}Y$ (5) X + Y

14. A program in execution in a computer is called a *process*. Which of the following is a possible state transition sequence of such a process?
(1) New → Ready → Running → Terminated
(2) New → Blocked → Terminated
(3) New → Ready → Blocked → Running → Terminated
(4) New → Running → Ready → Running → Terminated
(5) New → Blocked → Ready → Running → Terminated

15. Amara powers on the computer and starts a spreadsheet application. Then he also opens a web browser. Which of the following are possible execution sequences on the processor of his computer?

(1) BIOS ⟶ OS ⟶ spreadsheet process ⟶ OS ⟶ web browser process ⟶ OS ⟶ ...

(2) BIOS ⟶ spreadsheet process ⟶ OS ⟶ web browser process ⟶ OS ⟶ spreadsheet process ⟶ ...

(3) BIOS ⟶ spreadsheet process ⟶ web browser process ⟶ OS ⟶ ...

(4) BIOS ⟶ OS ⟶ spreadsheet process ⟶ web browser process ⟶ OS ⟶ ...

(5) BIOS ⟶ OS ⟶ spreadsheet process ⟶ web browser process ⟶ spreadsheet process ⟶ web browser process ⟶ ...

16. Which of the following statements are true?

A – A *firewall* acts as a packet filter inspecting all the packets entering a network.

B – A malware that misleads the users by disguising itself as a standard program is termed a Trojan Horse.

C – A strong password should have a combination of uppercase and lowercase letters, numbers and symbols of sufficient length.

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

(4) *A* and *B* only   (5) All *A, B* and *C*

17. Which of the following statements are true?

A – One of the uses of encryption is to ensure confidentiality of transmitted data.

B – Every user needs to have a pair of dissimilar keys when using Asymmetric Key Encryption.

C – Users must share a common key when exchanging information using Symmetric Key Encryption.

(1) *A* only   (2) *A* and *B* only   (3) *A* and *C* only

(4) *B* and *C* only   (5) All *A, B* and *C*

18. Which of the following is considered as an erroneously received byte in an *even parity system*?

(1) 01010101   (2) 10010011   (3) 10110010

(4) 11011001   (5) 11010111

19. Match the **Devices** labelled from **A** to **E** to the corresponding **Descriptions** labelled from **1** to **5**.

Device	Description
A. Client	**1** – stores network programs and data files for the users to access
B. Hub	**2** – a connecting device between Local Area Networks (LAN) and Wide Area Networks (WAN)
C. Router	**3** – when a message is received, this transmits it only on the port to which the destination computer is attached
D. Server	**4** – requests services and content from other computers
E. Switch	**5** – when a message is received, this broadcasts it on all ports to all attached hosts

(1) **A** – 1, **B** – 5, **C** – 4, **D** – 2, **E** – 3

(2) **A** – 2, **B** – 4, **C** – 3, **D** – 5, **E** – 1

(3) **A** – 3, **B** – 2, **C** – 1, **D** – 4, **E** – 5

(4) **A** – 4, **B** – 5, **C** – 2, **D** – 1, **E** – 3

(5) **A** – 5, **B** – 1, **C** – 2, **D** – 3, **E** – 4

20. Select the answer containing the correct replacements for Ⓐ and Ⓑ in the following paragraph:

In the Internet, a host is identified by its IP address. In IPv4, each IP address consists of _____Ⓐ_____ bits to identify a host. The newer version named IPv6 consists of _____Ⓑ_____ bits in an IP address.

(1) Ⓐ = 32, Ⓑ = 48   (2) Ⓐ = 32, Ⓑ = 128   (3) Ⓐ = 48, Ⓑ = 32

(4) Ⓐ = 48, Ⓑ = 128   (5) Ⓐ = 128, Ⓑ = 32

21. Which of the following statements regarding DNS (Domain Name System) are correct?

    A – It maps web addresses to IP addresses and vice versa.

    B – HTTP uses the services provided by the DNS.

    C – DNS maintains a hierarchy of domain names.

(1) *A* only   (2) *A* and *B* only   (3) *A* and *C* only

(4) *B* and *C* only   (5) All *A, B* and *C*

22. Which of the following statements regarding IP addresses are correct?

    A – In class C networks, first octet value ranges from 192 through 223.

    B – IPv4 can assign addresses up to 4 million devices.

    C – 192.168.0.0 – 192.168.255.255 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

23. If Suresh wants to send an encrypted message to be read only by Amara using *asymmetric key encryption*, then

(1) Suresh should encrypt his message using his public key.

(2) Suresh should encrypt his message using his private key.

(3) Suresh should encrypt his message using Amara's public key.

(4) Suresh should encrypt his message using Amara's private key.

(5) Suresh should encrypt his message using both private and public keys of Amara.

24. Choose the option containing most suitable deployment types for the following systems:

    A – A new system to replace an existing air traffic control system at an airport

    B – A system for the customers of an island-wide supermarket chain to order goods online

    C – A system for the public to enter comments regarding the service experienced by them at an office

(1) *A* – direct,   *B* – direct,   *C* – parallel

(2) *A* – direct,   *B* – pilot,   *C* – parallel

(3) *A* – parallel,   *B* – pilot,   *C* – direct

(4) *A* – parallel,   *B* – parallel,   *C* – parallel

(5) *A* – parallel,   *B* – parallel,   *C* – pilot

25. Which of the following is a *non-functional requirement* for an e-commerce site?

(1) Being able to add items to the shopping cart

(2) Being able to make payments online

(3) Being able to view the items based on item category

(4) Each item to be shown with a small image and a description

(5) The e-commerce site to be accessible through popular web browsers

26. During which of the following is an application tested by its developers in a setting that closely resembles its intended deployment hardware, software, and network configuration environment?

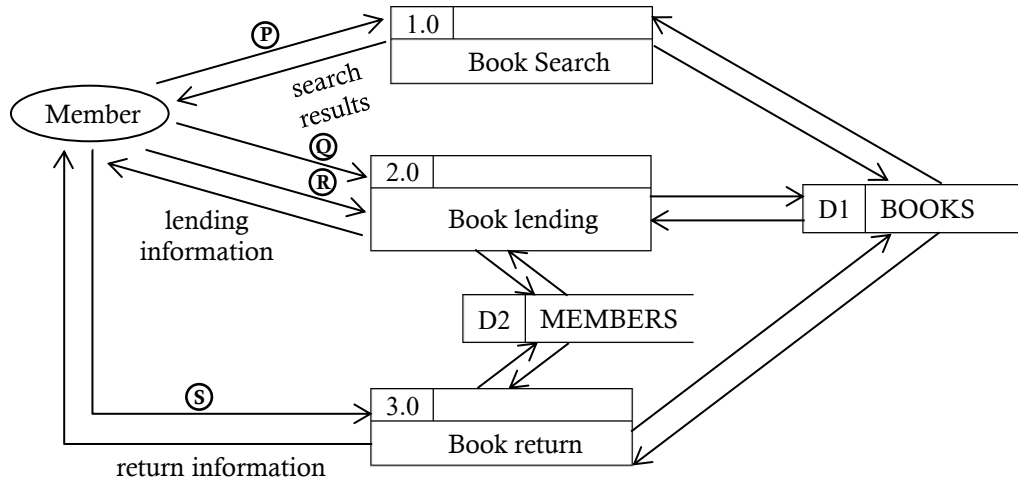(1) Acceptance testing   (2) Integration testing   (3) Parallel testing

(4) System testing   (5) Unit testing

27. A company considers developing a new software application for its use. The application is expected to re-engineer internal processes, improve collaboration, and enhance productivity. However, during the feasibility analysis, it was identified that the new software may face some resistance from employees who are accustomed to the existing processes. Which component of the feasibility study would have helped to get that information?

    (1) economic feasibility   (2) legal feasibility

    (3) operational feasibility   (4) schedule feasibility

    (5) technical feasibility

28. Select the option which includes most suitable replacements for the labels Ⓟ to Ⓢ in the following Data Flow Diagram of a library management system.

    (1) Ⓟ – keyword,   Ⓠ – member ID,   Ⓡ – book details,   Ⓢ – book details
    (2) Ⓟ – keyword,   Ⓠ – keyword,   Ⓡ – book details,   Ⓢ – member ID
    (3) Ⓟ – keyword,   Ⓠ – keyword,   Ⓡ – book details,   Ⓢ – keyword
    (4) Ⓟ – member ID, Ⓠ – keyword,   Ⓡ – member ID,   Ⓢ – member ID
    (5) Ⓟ – member ID, Ⓠ – member ID, Ⓡ – book details,   Ⓢ – book details

29. Which of the following is **incorrect** about the waterfall model of software development?

    (1) It allows developers to collect and implement requirements throughout the project.
    (2) It is not an iterative model.
    (3) It is suitable for software with well defined requirements.
    (4) It is easy to estimate the resources needed for a project.
    (5) No working product is available until the latter stages of the project.

30. In addition to the required features, which of the following should also be considered when a government institution selects a Commercial Off-The-Shelf (COTS) software to be implemented island wide?

    A – cost to deploy, maintain, upgrade and modify
    B – ease of integration with existing systems
    C – after sales service from the vendor

    (1) *A* only   (2) *A* and *B* only   (3) *A* and *C* only

    (4) *B* and *C* only   (5) All *A, B* and *C*

31. Match the given **entity attributes** labelled from **A** to **D** to the corresponding **descriptions** labelled from **1** to **4**.

Entity attribute			Description	
A	Composite attribute	**1**	an attribute that cannot be broken down into smaller components	
B	Simple attribute	**2**	an attribute that can be broken down into component parts	
C	Multivalued attribute	**3**	an attribute whose values can be calculated from related attribute values	
D	Derived attribute	**4**	an attribute that may take more than one value	

(1) A-2, B-1, C-3, D-4   (2) A-2, B-1, C-4, D-3
(3) A-3, B-4, C-2, D-1   (4) A-4, B-2, C-3, D-1
(5) A-4, B-3, C-1, D-2

32. Consider the following **Employee** Relation:

Employee_ID	Employee_Name	Salary
1001	John	60000
1002	Hari	55000
1003	Mahas	70000
1004	Sarath	65000
1005	Rajah	75000

What would be the output of the following SQL query when it is applied on the **Employee** relation?

SELECT COUNT(*)
FROM Employee
WHERE Salary > ANY (SELECT Salary FROM Emplyoee);

(1) 3   (2) 4   (3) 5   (4) 6   (5) 10

33. Consider the given SQL statements to create two database tables named **LENDING** and **STUDENT**:

```
CREATE TABLE LENDING
 (BOOK_NUMBER VARCHAR(10) NOTNULL,
  BOOK_NAME VARCHAR(20) NOTNULL,
  AUTHOR VARCHAR(25) NOTNULL,
  DESCRIPTION VARCHAR(75) NOTNULL,
  ISSUED_DATE DATE,
  STUDENT_ID CHAR(5) NOTNULL,
  PRIMARY KEY(BOOK_NUMBER));

CREATE TABLE STUDENT
 (STUDENT_ID CHAR(5) NOTNULL,
  NAME VARCHAR(25) NOTNULL,
  BIRTHDAY DATE NOTNULL,
  ADDRESS VARCHAR(25) NOTNULL,
  PROVINCE CHAR(10),
  PRIMARY KEY(STUDENT_ID));
```

Which of the following statements are correct?
    A – STUDENT_ID is a foreign key in the LENDING table.
    B – It is compulsory to input data to the DATE data type fields in both tables.
    C – STUDENT_ID can contain only five English letters.
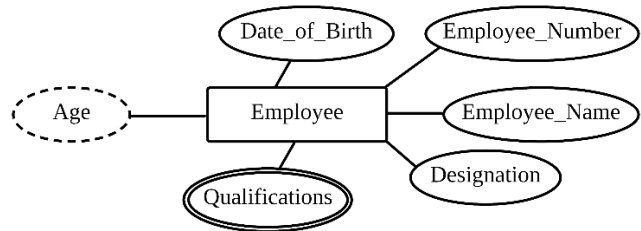
(1) *A* only   (2) *A* and *B* only   (3) *A* and *C* only
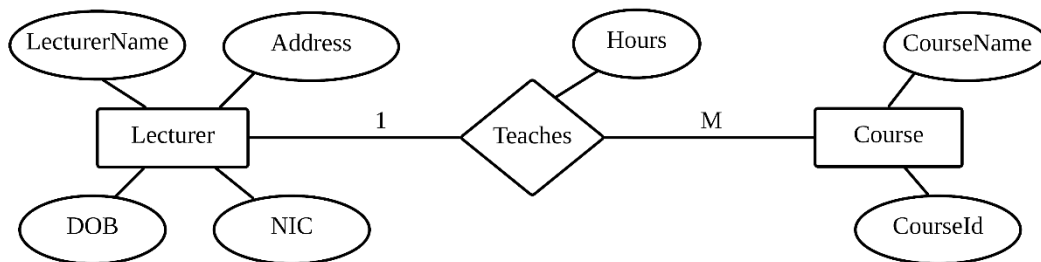(4) *B* and *C* only   (5) All *A, B* and *C*

34. When the **Employee** entity of the following diagram is represented in a database which of the following should **not** be included?

(1) Date_of_Birth
(2) Designation
(3) Employee_Name
(4) Employee_Number
(5) Qualifications

35. Which of the listed relations will be obtained if the following ER diagram is correctly mapped into the relational model?

    A – Lecturer(NIC, LecturerName, DOB, Address)
    B – Lecturer(NIC, LecturerName, DOB, Address, CourseId)
    C – Teaches(NIC, CourseId, Hours)
    D – Course(CourseId, CourseName, Hours, NIC)

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

36. Which of the following gives a correct matching between ER diagram components and the relational model?

(1) Entity ⟶ Field, Attribute ⟶ Table, Unique attribute ⟶ Primary key, Multivalued attribute ⟶ Table

(2) Entity ⟶ Table, Attribute ⟶ Field, Unique attribute ⟶ Primary key, Multivalued attribute ⟶ Table

(3) Entity ⟶ Table, Attribute ⟶ Field, Unique attribute ⟶ Table, Multivalued attribute ⟶ Primary key

(4) Entity ⟶ Table, Attribute ⟶ Primary key, Unique attribute ⟶ Primary key, Multivalued attribute ⟶ Table

(5) Entity ⟶ Table, Attribute ⟶ Table, Unique attribute ⟶ Primary key, Multivalued attribute ⟶ Primary key

● Consider the following relations to answer questions **37** and **38**.
    adviser (adId, adName, adGender, adNIC, adPhone)
    farmer (farmerId, farmerName, farmerAddress, farmerPhone)

    task (taskId, taskName, farmerId, startDate, endDate)
    advises (adId, taskId, startDate, endDate)

Note: adNIC – The National Identity Card number of an adviser

37. Which of the following statements are correct?
    A – One farmer can have many tasks.
    B – One adviser can advise many tasks.
    C – For one task, a farmer can have many advisers.

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

38. Which of the following statements are correct with respect to the given relations?

      A – All relations are in 3rd normal form.

      B – The startDate attribute in the **task** relation is a derived attribute.

      C – adNIC is a candidate key in the **adviser** relation.

(1) *A* only   (2) *A* and *B* only   (3) *A* and *C* only

(4) *B* and *C* only   (5) All *A, B* and *C*

39. What would be the output of the following Python code, if a = 10, b = 4, and c = 7?

```
ans = a % b + c // (a-b)
print(ans)
```

(1) 3   (2) 5   (3) 7   (4) 9   (5) 11

40. What would be the value of the **'result'** variable after executing the following Python code?

```
def func1(a,b):
        return a+b

def func2(a,b):
        return a*b

result = func1(3,func2(2,4))
```

(1) 11   (2) 12   (3) 14   (4) 15   (5) 20

41. What would be the output of the following Python code, when it gets executed?

```
def modify_string(input_string):
        input_string += "  World"
text = "Hello"
modify_string(text)
print(text)
```

(1) Hello   (2) Hello Hello

(3) Hello World   (4) World

(5) World Hello

42. What would be the output of the following Python code?

```
original_list = [1, 2, 3, 4, 5]
new_list = original_list.copy()
new_list.clear()
original_list.append(6)
print(original_list)
print(new_list)
```

(1) [ ]   (2) [6]

    [ ]   [ ]

(3) [6]   (4) [1, 2, 3, 4, 5, 6]

    [6]   [ ]

(5) [ ]

    [1, 2, 3, 4, 5, 6]

43. How many '*'s does this program output?

```
i = 7
while i>0:
    i -= 3
    print('*')
    if i<=2:
        break
    else:
        print('*')
```

(1) 1　　　　　(2) 3　　　　　(3) 5　　　　　(4) 7　　　　　(5) 9

44. Which of the data structures among *Dictionary, List* and *Tuple* in Python could be used to store a collection of key-value pairs where the keys must be unique?

(1) Dictionary only　　　　　(2) List only　　　　　(3) Tuple only
(4) Dictionary and List only　　　　　(5) List and Tuple only

45. What would be the output of the following python code?

```
for i in range(1, 4):
    for j in range (1, i + 1):
        print(j * i, end=' ')
    print()
```

(1) 1　　　　　(2) 1　　　　　(3) 1　　　　　(4) 1 2 3　　　　　(5) 1 2
　　2 2　　　　　　2 4　　　　　　2 4　　　　　　2 4 6　　　　　　2 4 6
　　3 3 3　　　　　3 6　　　　　　3 6 9　　　　　　3 6 9　　　　　　3 6 9 12

46. Consider the following code fragment in an HTML file:

```
<style>
    body {
        color: yellow;
        font-family: Arial, Cambria;
    }
    .highlight {
        color: red;
    }
</style>
```

What happens if one applies the class 'highlight' to a <div> element within <html> and </html> tags in the above file?

(1) The <div> element's text will turn red.
(2) The <div> element's text will turn yellow.
(3) The <div> element's font size will increase.
(4) The <div> element's font type will change to Cambria.
(5) The <div> element's border colour will change to red.

47. Which of the following statements regarding Search Engine Optimization (SEO) are correct?
　　A – Meta tags on web pages help SEO.
　　B – It increases the visibility of a web page in search engines.
　　C – Powerful computers should be used to create SEO friendly web pages.

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

48. Consider the following HTML code line related to a form:

```
<form method="post" action="process.php">
```

The "action" attribute in it

(1) specifies the data type of the form.

(2) specifies the server file that handles the data in the form.

(3) controls the form's alignment on the web page.

(4) declares the form as a PHP script.

(5) shows the process.php file on the screen.

49. Saman's father is a carpenter. He wants to showcase his father's work on a website. Which of the following hosting options should Saman use in order to do it with a price that he can afford?

(1) Hosting it on a server that presents other websites also (shared hosting)

(2) Hosting it on a Virtual Private Server (VPS)

(3) Hosting it on a server dedicated to Saman (dedicated hosting)

(4) Using an e-Commerce website

(5) Using the services of a well known cloud service provider

50. What is the primary role of a sensor in an IoT device?

(1) To provide outputs and change a state of the environment

(2) To ensure interoperability of devices

(3) To detect a state change in the environment

(4) To make decisions based on predetermined rules

(5) To generate graphics for the user interface

✱ ✱ ✱