



G.C.E. (A/L) Examination – March 2019
Conducted by Field Work Centre, Thondaimanaru.
In Collaboration with
Northern Provincial Education Department

Grade: - 12(2020)

Information & Communication Technology

Time: 3.00 hours

Part I

Instructions:

- Answer **all** the questions.
- Write your **Index Number** in the space provided in the answer sheet.
- In each of the questions 1 to 40, 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 (×) in accordance with the instructions given on the back of the answer sheet.
- Use of calculators is **not allowed**.

01. Which of the followings is correct regarding evolution of computing devices?

1. EDVAC was developed by Maurice Wilkes.
2. ENIAC was designed by John Mauchly and Gottfried Wilhelm von Leibniz.
3. UNIVAC was introduced by Howard Aiken.
4. EDVAC was the first full size stored program digital computer.
5. The Pascaline was introduced by Charles Babbage.

02. When the grade 11 progress report of a student is given in grade 13. Which of the followings qualities of data is it related to?

1. Timely
2. Understandable
3. Relevant
4. Accurate
5. Complete

03. The G.C.E (A/L) 2018 result was released in December 2018. When will this result be higher value of information for the students who sat for the exam?

1. During the period of viewing result sheet in schools.
2. During the period of viewing the results in websites.
3. During the period of knowing the results from friends.
4. During the period of publishing the results in department of examination website.
5. During the period of informing to students by teacher through telephone.

04. Birth month of a person that is considered by the numeric value and that lie between 1 to 12. Which validation types used here?

1. Presence and format check
2. Range and format check
3. Range and data type check
4. Length and range check
5. Data type and length check

05. Which of the following storage device that has highest data access time?

1. Internal hard disk
2. External hard disk
3. Compact disc
4. Register
5. Random access memory

06. Consider the following statements regarding ROM:

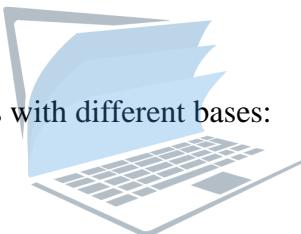
- A – ROM stores essential programs such as the program that boots the computer by computer system developers.
- B – Able to write new data or program in ROM by users.
- C – ROM capacity is more compare to RAM in most computers.
- D – ROM is a non-volatile memory.

Which of the above statement/s is/are true?

1. A, C only.
2. A, D only.
3. A, C, D only.
4. A, B, D only.
5. All of the above.

07. Consider the following numbers with different bases:

- A – 12.2_8
- B – 1010.01_2
- C – $A.4_{16}$



Which of the above statement/s is/are equivalent/s to Decimal 10.25?

1. A only.
2. A, B only.
3. B, C only.
4. A, C only.
5. All of the above.

08. $101_2 + 633_8 =$

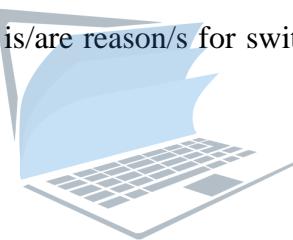
1. $1A0_{16}$
2. 191_{16}
3. 200_{16}
4. $19F_{16}$
5. 1916_{16}

09. Two's complement of (-9) and (+6) respectively,

1. $11110110_2, 11111001_2$
2. $11110110_2, 11111010_2$
3. $11110111_2, 11111010_2$
4. $11110110_2, 00000110_2$
5. $11110111_2, 00000110_2$

10. Which of the following is the input device that is used to input data efficiently?
1. Keyboard
 2. Magnetic stripe reader
 3. Flatbed scanner
 4. Mouse
 5. Joystick
11. The area of law that deals with protecting the rights of those who create original works is called,
1. Software piracy.
 2. Copyright.
 3. Plagiarism.
 4. Stealing.
 5. Privacy.
12. Which one is correct regarding off the shelf software?
1. It is developed for particular requirements.
 2. Cost is always high.
 3. Failure is high.
 4. Always satisfied user's requirements.
 5. Cost of production share among buyers.
13. Consider the following truth table:
- | A | B | A OR B | A XNOR B | NOT B | $((A \text{ OR } B) \text{ AND } (\text{NOT } B)) \text{ XOR } A \text{ XNOR } B$ |
|---|---|--------|----------|-------|---|
| 0 | 0 | 0 | 1 | 1 | <i>K</i> |
| 0 | 1 | 1 | 0 | 0 | <i>L</i> |
| 1 | 0 | 1 | 0 | 1 | <i>M</i> |
| 1 | 1 | 1 | 1 | 0 | <i>N</i> |
- Which is the correct order of values for the labels K,L,M and N?
1. 1,0,1,0
 2. 1,0,1,1
 3. 0,1,0,1
 4. 1,0,0,1
 5. 0,0,1,1
14. Which is the following is the output F that denotes the following logic circuit?
1. $\bar{P} + \bar{Q}$
 2. $P + \bar{Q}$
 3. $\bar{P} + Q$
 4. 1
 5. 0
-
15. Number of processes completed per unit time is called,
1. Turnaround Time
 2. Waiting Time
 3. Response Time
 4. Throughput
 5. Average Waiting Time

16. Which of the following scheduler is related to swapping?
1. Long term scheduler
 2. Very long term scheduler
 3. Mid-term scheduler
 4. Short term scheduler
 5. very short term scheduler
17. If a virtual memory using 12bits for their addressing, what is the range of unique addresses?
1. $1 - 2^{12}$
 2. $0 - (10^{12}-1)$
 3. $1 - (10^{12}-1)$
 4. $0 - (2^{12}-1)$
 5. $1 - 10^{12}$
18. Consider the following statements:
- A – OS decides to let another task run.
 - B – A higher priority process comes.
 - C – Process time out.
- Which of the above statement/s is/are reason/s for switch the process from running state to ready state?
1. C only.
 2. B, C only.
 3. A, B only.
 4. A, C only.
 5. All of the above.
19. Consider the following statements regarding FAT and NTFS:
- A – NTFS is more secure compare to FAT.
 - B – Maximum length of file name is limited in NTFS.
 - C – FAT, support to Unicode.
- Which of the above statement/s is/are true?
1. A only.
 2. B only.
 3. A, C only.
 4. B, C only.
 5. All of the above.
20. Consider the following statements with blanks:
- A – Multiprogramming, P CPU utilization.
 - B – Time-sharing, Q user response time.
- Which of the followings are the correct terms for the labels P and Q respectively?
1. Maximizes, maximizes.
 2. Minimizes, maximizes.
 3. Maximizes, minimizes.
 4. Minimizes, minimizes.
 5. Minimizes, maximizes then minimizes.



21. Sub process of a process is called,
1. Context Switching
 2. Process Control Block
 3. Thread
 4. Program Counter
 5. Task
22. Which of the followings is the correct statement regarding simple batch processing system?
1. Single user system.
 2. No operating system.
 3. Use of high-level languages.
 4. Programmer/User acts as the operator and interacted with the hardware.
 5. Paper Tapes for the program and I/O.

23. Which of the following is **not** an example for Real time operating system?
1. Airline ticket reservation.
 2. Playing games in the Computer.
 3. Credit card payments.
 4. Pre-paid mobile usage.
 5. Payroll

24. Which of the following is the simplified result of the Boolean expression

$$A \cdot B + A \cdot \bar{C} + \bar{A} \cdot \bar{B} \cdot C$$



1. 0
2. 1
3. $\bar{A} \cdot \bar{B} \cdot \bar{C}$
4. $\bar{A} \cdot (\bar{B} + \bar{C})$
5. $\bar{A} + (\bar{B} \cdot \bar{C})$

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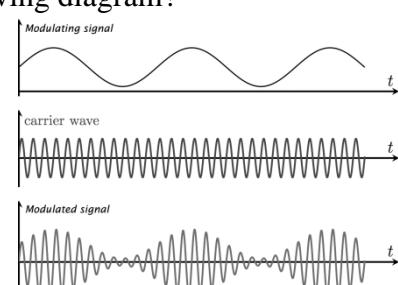
25. Which of the followings is simplified Boolean expression that represents the k-map?

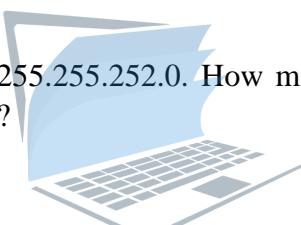
1. $y \cdot z + w \cdot \bar{z} + x \cdot z$
2. $z \cdot (y + \bar{w} + x)$
3. $z \cdot (y + w + \bar{x})$
4. $y \cdot z + \bar{w} \cdot \bar{y} \cdot z + w \cdot x \cdot \bar{y} \cdot z$
5. $x \cdot z + \bar{w} \cdot z + w \cdot \bar{x} \cdot y \cdot z$

	$\bar{y}\bar{z}$	$\bar{y}z$	yz	$y\bar{z}$
$\bar{w}\bar{x}$	0	1	1	0
$\bar{w}x$	0	1	1	0
$w\bar{x}$	0	1	1	0
wx	0	0	1	0

26. Which modulation type is shown through the following diagram?

1. AM (Amplitude Modulation)
2. FM (Frequency Modulation)
3. PM (Phase Modulation)
4. ASK (Amplitude Shift Keying)
5. FSK (Frequency Shift Keying)



27. Which of the followings is the protocol that is used to prevent data collision in the Ring topology?
1. CSMA/CD
 2. Token Ring
 3. ALOHA
 4. Slotted ALOHA
 5. Telnet
28. Consider the following IP addresses:
- A – 10.120.15.87
B – 172.15.90.174
C - 172.31.121.5
D – 192.169.10.128
- Which of the above are examples for private IP addresses?
1. A, C only.
 2. B, D only.
 3. A, C, D only.
 4. B, C, D only.
 5. All of the above.
29. A LAN uses the subnet mask 255.255.252.0. How many different IP addresses can be assigned to devices in this LAN?
- 
1. 254
 2. 510
 3. 2046
 4. 1022
 5. 4094
30. Presentation layer of OSI reference model provides,
1. Routing data packets forward.
 2. Error detection and error correction.
 3. Responsible for application services.
 4. Data encryption and decryption.;
 5. Flow control.
31. Which of the following device is related to data link layer?
1. Hub
 2. Router
 3. Repeater
 4. Network Switch
 5. Cables
32. Which of the statement is correct regarding IP addresses, MAC address and subnet mask?
1. IPV4 address is 128 bit long.
 2. MAC address is 32 bits long.
 3. 255.255.255.0 is a class C IP address.
 4. 256 IP addresses are available with 192.200.159.0/24.
 5. 255.255.255.252 is a class C default subnet mask.

33. Local Area Network (LAN) has 160 network devices. What is the most appropriate subnet mask for this computer network?

1. 255.255.255.128
2. 255.255.254.0
3. 255.255.255.192
4. 255.255.252.0
5. 255.255.255.0

34. Consider the following statements regarding ISDN and ADSL:

- A – Upload and download speeds are same in both.
B – Both provide digital communication.
C – ISDN transfer data at high speed compare to ADSL.

Which of the above statement/s is/are true?

1. B only.
2. C only.
3. A, C only.
4. B, C only.
5. All of the above.

35. Consider the following statement:

'Any signal is a combination of many sinusoidal waves, which have different frequencies. Therefore, the signal wave components travel with different velocities and reach the destination at different times'

Which of the followings is the data communication impairment which is described in the above statement?

1. Noise
2. Distortion
3. Cross talk
4. Attenuation
5. Bending loss

36. Respiratory system is,

1. Natural open.
2. Natural close.
3. Artificial open.
4. Artificial close.
5. Natural hybrid.

37. Consider the following models,

- A – Network
B – Spiral
C – Hierarchical
D – Prototyping

Which of the above model/s is/are software process model?

1. A, C only.
2. B, D only.
3. A, B, D only.
4. B, C, D only.
5. All of the above.

38. Consider the following:

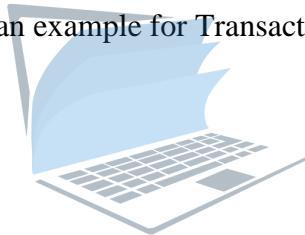
- A – Knowledge base
B – Inference engine
C – User interface

Which of the above is/are basic component/s of expert system?

1. A only.
2. A, B only.
3. A, C only.
4. B, C only.
5. All of the above.

39. Which of the followings is **not** an example for Transaction processing system?

1. Sales order records
2. Airline ticket reservation
3. Joomla
4. Payroll
5. Employee records



40. Consider the following table:

Column A	Column B
(X) Content Management System	(P) Computer applications that use artificial intelligence.
(Y) Smart system	(Q) Make decisions based on the available data in a predictive or adaptive manner, by means of sensing, actuating and controlling.
(Z) Expert system	(R) Computer applications that support the creation and modification of digital content.

Which of the following is the correct matching with Information system given in the column A to description in the column B?

1. (X) → (Q), (Y) → (P), (Z) → (R)
2. (X) → (P), (Y) → (R), (Z) → (Q)
3. (X) → (R), (Y) → (Q), (Z) → (P)
4. (X) → (Q), (Y) → (R), (Z) → (P)
5. (X) → (R), (Y) → (P), (Z) → (Q)



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Information & Communication Technology II

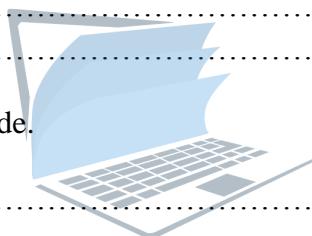
Part 11(A)

Write answer for all questions.

01.

- a. Give data processing steps in order?

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- b. Define the term Digital divide.

.....
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- c. Show that the negative of 00011011_2 is 11100101_2 . Note that both numbers are represented in two's complement form.

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- d. Write down the four standards methods that are used to represent characters on computers and give how many bits are used in each method?

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

02.

- a. An operating system uses seven state process transition model for process scheduling. From which of the states can a process directly move into the swapped out & waiting state? Fill the following table with the correct state come from and condition for transitions.

State	States move from	Condition
Swapped out and waiting		

- b. If a computer system is bit addressable and uses 32 bit addresses to access any bit in its memory,

- i. Write down the minimum number of bits required for an address?

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.....

- ii. Write down the number of unique addresses formed?

.....
.....

- iii. What is the maximum usable size of its memory in Mega Bytes (MB)?

.....
.....

03.

- a.

- i. Provide a suitable definition for a system.

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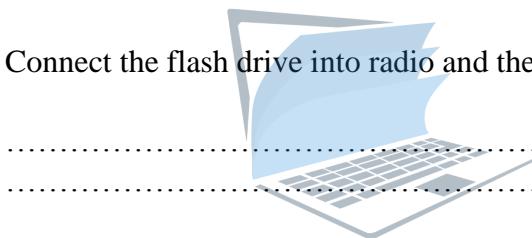
- ii. Using the definition suggested in (i) above, show that a radio is a system.

- iii. "Radio is a close system." Do you agree? Justify your answer.

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

- iv. State whether following requirements are essential functional / nice to have functional / essential nonfunctional / nice to have nonfunctional.

1. Connect the flash drive into radio and then listen the song from flash drive.



2. Radio has two speakers.

b.

What are the main components of a computer system and give an example for each.

.....

04.

- a. Given below is part of the output screen after executing ‘ping’ command.

```
C:\Users\Admin>ping www.google.com

Pinging www.google.com [172.217.167.164] with 32 bytes of data:
Reply from 172.217.167.164: bytes=32 time=118ms TTL=250
Reply from 172.217.167.164: bytes=32 time=117ms TTL=250
Reply from 172.217.167.164: bytes=32 time=117ms TTL=250
Reply from 172.217.167.164: bytes=32 time=117ms TTL=250

Ping statistics for 172.217.167.164:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 117ms, Maximum = 118ms, Average = 117ms
```

Consider the above to answer the questions below.

- i. Write down the usage of ping command?

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

- ii. What is the IP address of the server that hosts the website www.google.com?

.....
.....

- iii. Identify the class of the IP address obtained in (ii) above.

.....
.....

- iv. What is meant by time in the above result?

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

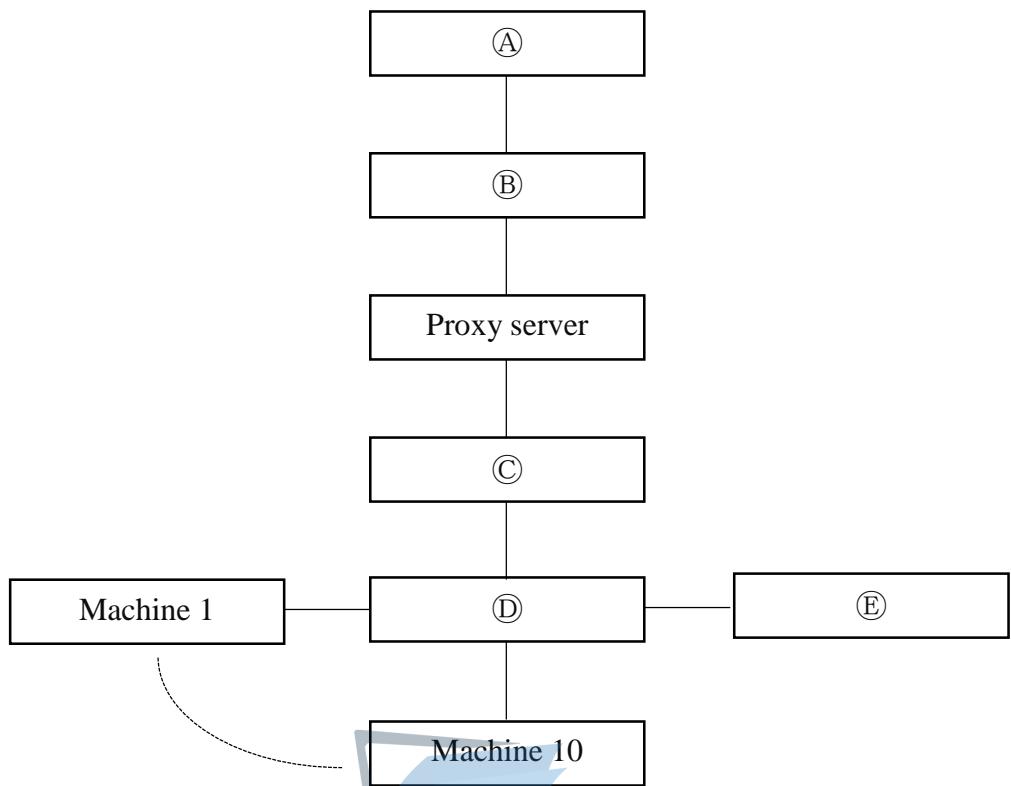
- v. What does the abbreviation TTL mean in the above result?

.....
.....

b.

There are 10 computers connected in the local area network in an institution. Consider cables and network switch is provided to connect the computers in the network. IP addresses are assigned automatically to the computers in the network. The administrator allows all the computers to access the Internet through a proxy server. Institution installs a device that control input, output data in the network.

Consider the following incomplete network diagram with labels to show the logical arrangements of a computer network of the institution.



Choose and write down the correct terms from the list given below for labels Ⓐ, Ⓑ, Ⓒ, Ⓓ and Ⓔ.

List: {Router, Network Switch, Firewall as hardware, Internet Service Provider, DHCP Server}

- Ⓐ
 Ⓑ
 Ⓒ
 Ⓓ
 Ⓔ

Part II (B)

Answer the two questions only

- 01.** A student wants to design a digital circuit to turn on a battery powered lamp automatically when there is a mains electricity failure at night. In addition, the circuit must have a facility for it to be turned on at any time by pressing a button.

A block diagram of his circuit, having three inputs and one output, is shown in the figure 1.

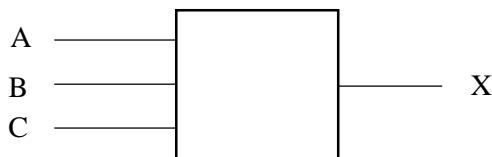


Figure 1

Assume that he has the means to generate the three inputs A, B and C with logic values (0 and 1) as follows.

A = 0 when the button is not pressed

A = 1 when the button is pressed

B = 0 during day time

B = 1 at night

C = 0 when there is a mains electricity failure

C = 1 when mains electricity is available

The circuit is to be designed so that the lamp will be on when $X=1$ and off $X=0$.

- (a) Construct the truth table for the output X.
(b) Give the Boolean expression for the output X.
(c) Simplify the Boolean expression got in (b) by using the Boolean algebraic laws.
(d) Using the simplified expression in (c) above, construct a logic circuit for the system using, two inputs 4 NOR gates only.

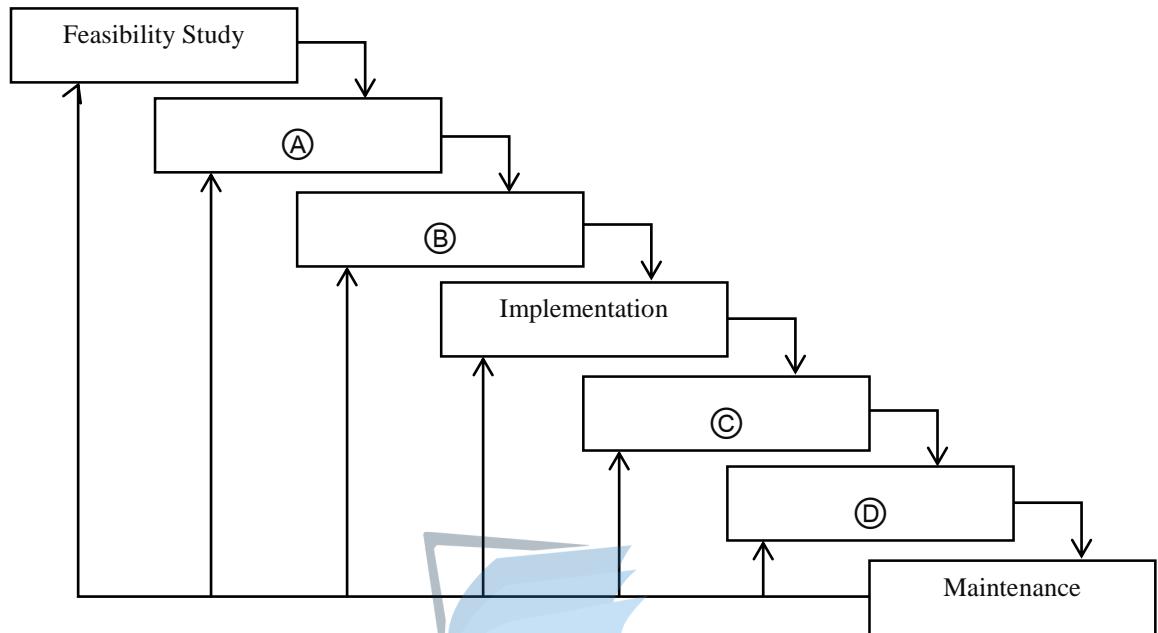
02.

- (a) Write the answers to the following questions that are related to file management by the operating system.
- Write down the three main ways to allocate disk space to files by operating system?
 - List out five file attributes.
 - Give two methods of file security?

(b) The waterfall model is a sequential process model used in software development.

Write the answers to the following questions based on the waterfall model.

(i) Consider the following waterfall model diagram with incomplete stages.



Write down the terms denoted by the labels Ⓐ, Ⓑ, Ⓒ & Ⓓ.

- (ii) Write down the main four feasibility study?
(iii) Write two features of waterfall model that is not specified in the description above.

03.

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- (a) What are the basic components of Data communication?
(b) Draw the diagram on the following topologies and give two differences between them.
- Bus topology
 - Ring topology
- (c) 192.168.1.96 is the IP address and 255.255.255.192 is the subnet mask of a computer in Local Area Network.
- (i) How many subnets can be formed?
 - (ii) How many hosts can be connected to a subnet?
 - (iii) What is the network address of the given IP address?
 - (iv) What is the broadcast address of the given IP address?
 - (v) What is the IP address range usable to the host in the given IP address of the subnet?

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