UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	:	**INTRODUCTION TO DATA COMMUNICATION AND NETWORKING**
COURSE CODE	:	**ITT300**
EXAMINATION	:	**JUNE 2019**
TIME	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of three (3) parts : PART A (30 Questions)
   PART B (8 Questions)
   PART C (3 Questions)

2. Answer ALL questions from all three (3) parts :

   i) Answer PART A in the Objective Answer Sheet
   ii) Answer PART B and PART C in the Answer Booklet. Start each answer on a new page.

3. Do not bring any material into the examination room unless permission is given by the invigilator.

4. Please check to make sure that this examination pack consists of :

   i) the Question Paper
   ii) an Answer Booklet – provided by the Faculty
   iii) an Objective Answer Sheet – provided by the Faculty

5. Answer ALL questions in English.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 11 printed pages

PART A

1. A _____ is a set of rules that govern data communication

   A. procedure
   B. policy
   C. manual
   D. protocol

2. The _____ allows both stations to transmit and receive data simultaneously.

   A. full-duplex mode
   B. half-duplex mode
   C. simplex mode
   D. double mode

3. " Less cabling is required because it uses multipoint connections ".
   The above statement refers to _____ topology.

   A. star
   B. ring
   C. mesh
   D. bus

4. In telecommunication, two broad categories of transmission media are _____.

   A. shielded and unshielded
   B. guided and unguided
   C. omnidirectional and unidirectional
   D. multicast and unicast

5. _____ cable consists of a metal shield that encases each pair of insulated conductors.

   A. Twisted-pair
   B. Shielded twisted-pair
   C. Coaxial
   D. Fiber-optic

6. _____ is a fiber optic connector which is used for connecting cable to networking devices.

   A. Subscriber channel (SC) connector
   B. Straight-tip (ST) connector
   C. BNC T connector
   D. MT-RJ connector

7. Layer 5 of the OSI layers lies between transport and _____ layer.

   A. data link
   B. network
   C. session
   D. presentation

8. The physical layer translates logical communication request from the _____ into hardware specific operation.

   A. application layer
   B. transport layer
   C. network layer
   D. data link layer

9. There are four level of addresses used in an internet employing TCP/IP protocols. Which of the following is responsible for process-to-process delivery?

   A. Physical addressing
   B. Specific addressing
   C. Port addressing
   D. Logical addressing

10. Which of the following is a **TRUE** statement about data and signal?

    A. Digital data refers to information that is continuous.
    B. Analog data refers to information that has discrete states.
    C. Analog signal can only exist in a form of periodic or non-periodic.
    D. Digital signal cannot exist in periodic form because it is not useful for data transmission.

11. A composite signal contains frequencies of 150Hz, 200Hz, 250Hz, 450Hz and 500Hz. What is the bandwidth?

A. 150Hz
B. 250Hz
C. 350Hz
D. 500Hz

12. What is delay or also known as latency?

A. The time required for a bit to travel from source to the destination.
B. The time needed for each intermediate or end device to hold the message before it can be processed
C. How long it takes for an entire message to completely arrive at the destination from when the first bit is sent out from the source
D. How fast we can actually send data through a network

13. In data communication our goal is to send _____.

A. bit
B. data
C. data element
D. signal element

14. _____ is the smallest entity that can represent a piece of information.

A. Zero
B. Bit
C. Data element
D. Signal element

15. What is the type of address for the destination address of 1A:01:02:01:2C:4B?

A. Unicast
B. Multicast
C. Broadcast
D. Anycast

16. Which of the following is **NOT TRUE** about 10Base-T?

A. Use a bus topology with an external transceiver
B. Also known as Twisted-Pair Ethernet
C. The maximum length of the transceiver cable is defined as 100 meters
D. Use twisted cable as a medium of transmission

17. In Fast Ethernet, 100Base-TX uses _____ and 100Base-FX uses _____.

A. four wires CAT 3 UTP cable, two wires fiber cable
B. two wires CAT 5 UTP cable, two wires fiber cable
C. two wires CAT 5 UTP cable, four wires CAT 3 UTP cable
D. two wires fiber cable, two wires CAT 5 UTP cable

18. _____ is used for accessing the channel and acknowledging frames in IEEE 802.11.

A. Control
B. Management
C. Data
D. Address

19. In IEEE 802.11, when the address flag is _____, it shows that a frame is going to destination from a distribution system.

A. 0 1
B. 1 0
C. 0 0
D. 1 1

20. An Asynchronous connectionless link (ACL) is used when _____.

A. data integrity is more important than avoiding latency
B. data security is more important avoiding reliability
C. avoiding latency is more important than data integrity
D. avoiding reliability is more important than data security

21. A gateway _____.

A. is a computer that operates in all seven layers of the OSI model
B. cannot discriminate between the intended signal and noise
C. is used to create connections between stations in a physical star topology
D. connects the wires coming from different branches

22. A two-layer switches perform at the _____ and _____ layer.

A. physical; data link
B. network; transport
C. transport; session
D. data link; network

23. Which of the following statements is **NOT TRUE** about FDM?

A. An analog technique that can be applied when the bandwidth of a link (in hertz) is greater than the combined bandwidth of signals to be transmitted.
B. Signal is generated by each sending device to demodulate different carrier frequency.
C. Modulated signals are combined into a single composite signal that can be transported by the link.
D. Channels are separated by unused bandwidth (guard band) to prevent signal from overlapping.

24. _____ is designed to use the high data rate capability of fiber optic cable.

A. Frequency Division Multiplexing
B. Wavelength Division Multiplexing
C. Synchronous Time Division Multiplexing
D. Statistical Time Division Multiplexing

25. In the _____ method, stations do not have to be physically connected in a ring, the ring can be a logical one.

A. polling access
B. token passing access
C. random access
D. Carrier Sense Multiple Access (CSMA)

26. In the _____ method, each station listen to the medium (check state of medium) before sending.

A. Carrier Sense Multiple Access (CSMA)
B. polling access
C. token passing access
D. controlled access

27. In the _____ access method, if the station finds the line is busy, it will waits for a random period of time and sense the line again.

A. non-persistent
B. 1-persistent
C. p-persistent
D. controlled

28. Membership in a VLAN is based on the following characteristics **EXCEPT** _____.

A. Port numbers.
B. The number of backbone switch.
C. MAC addresses.
D. IP addresses.

29. Which the following statements is **TRUE** about Backbone Networks?

A. Backbone Networks connects LANs and WANs on the Internet and has a routing table that is used for making decisions about the route.
B. In a backbone network, no station is directly connected to the backbone; the stations are part of LAN, and the backbone connects the LANs.
C. Backbone Networks normally a computer that operates in all five layers of the Internet or seven layers of OSI model.
D. Backbone Networks takes an application message, reads it, and interprets it.

30. Routers function as _____.

A. a bridge with many ports and a design that allows better (faster) performance
B. a three-layer device that routes packets based on their logical addresses
C. a multiport repeater
D. a local area network configured by software, not by physical wiring

(Total : 30 marks)

PART B

QUESTION 1

a) What is the equivalent of 500 kHz in milliseconds?

(2 marks)

b) Define period, frequency and phase.

(3 marks)

QUESTION 2

a) Find the bit rate if an analog signal carries 5 kbps per signal element and 100 signal elements are sent per second.

(2 marks)

b) Given **00100101** as a data stream. Draw the graphs of NRZ-L and Manchester schemes respectively.

(4 marks)

QUESTION 3

Five voice channels are to be multiplexed together with each channel occupying a 2KHz bandwidth.

a) Draw the diagram if the multiplexing process uses guard bands of 250Hz between each channel.

(2 marks)

b) Determine the minimum bandwidth of the link.

(2 marks)

QUESTION 4

a) Interpret **TWO (2)** characteristics of the omnidirectional antenna in wireless transmission waves.

(2 marks)

b) Complete the bands of wireless communication in the following table:

Band	Range	Propagation	Application
VLF	3 – 30 kHz		Long-range radio navigation
	300 kHz – 3 MHz	Sky	AM radio
HF		Sky	
UHF	300 Mhz – 3 GHz	Line-of-sight	
SHF	3 – 30 GHz		Satellite communication

(3 marks)

QUESTION 5

Illustrate and interpret the procedure of polling access method for sending and receiving data.

(5 marks)

QUESTION 6

Illustrate a diagram to show the difference between Single-Secondary Communication with Multiple-Secondary Communication in Bluetooth.

(6 marks)

QUESTION 7

Find the row and column parity bits for the following dataword using Two-Dimensional Parity Check and show the complete codeword. Assume odd parity is used.

1001011 1110011 0111111 1110111

(5 marks)

QUESTION 8

Change the following IP addresses from binary notation to dotted-decimal notation and classify the class of each address.

a) 10000001 00001011 00001011 11101111

(2 marks)

b) 01101111 00111000 00101101 01001110

(2 marks)

(Total : 40 marks)

PART C

QUESTION 1

We have five sources, each creating 100 characters per second. If the interleaved unit is a character and 1 synchronizing bit is added to each frame:

a) Find the data rate for each source

(1 mark)

b) Find the duration of each characters in each source

(1 mark)

c) Find the frame rate

(1 mark)

d) Find the duration of each frame

(1 mark)

e) Find the number of bits in each frame

(1 mark)

f) Find the data rate of the link

(1 mark)

g) Draw and label the scenario above.

(4 marks)

QUESTION 2

a) To implement secure data communication between two devices, a researcher tries to use cyclic coding technique to prove the codeword generation. The sample data 1101011001 is used for this experiment. Next, the divisor in polynomial form $X^4 + X^3 + 1$ is chosen for the first trial. You need to help the researcher to determine the codeword.

(5 marks)

b) Next, for the second trial the researcher tries to use the checksum technique to produce the codeword. Again, you need to help the researcher to determine the codeword by using the following:

10101111, 11111001 and 00011101

(2 marks)

c) For third trial, the researcher tries to use hexadecimal numbers in the Checksum Technique to generate the codeword. For the last time, you need to help the researcher to determine the codeword by using the following set of number (3A15, 4F27, 211B, 6C6A).

(3 marks)

QUESTION 3

ABC Networks Sdn. Bhd. hired a new network administrator from UiTM. On the first day, he needs to solve a few pending issues related to the organization network setup. For a start, the administrator receives the following IP address and subnet mask:

IP address: 198.172.3.5
Subnet mask: 255.255.255.224

With that information, he needs to:

a) Find the netid and hostid for the given address.

(2 marks)

b) Give the subnet mask in slash notation.

(1 mark)

c) Find the number of subnets.

(2 marks)

d) Calculate the number of hosts in each subnet.

(2 marks)

e) Find the first and last address in subnet 1.

(3 marks)

(Total : 30 marks)

END OF QUESTION PAPER