****KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**  
**MIDSEMESTER EXAMINATION DECEMBER 2018**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**BSc. COMPUTER SCIENCE YR II**  
**CSM 477 - DATA COMMUNICATIONS****

****DECEMBER 2018**  
**Time allowed: 20 minutes****

****Circle the correct answer on the question paper****

### **SECTION A**

1. Routing delay from a source to destination depends on  
   a) the number of nodes within the network  
   **b) the bandwidth of the intermediate network link**  
   c) the error rate of each network link  
   d) the parity bit and the error rate
2. **\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ are some of the metrics used by routing protocols.**  
   **a) Path length and bandwidth**  
   b) Grooming and concentration processes  
   c) Fiber optic cables and modems  
   d) TCP/IP protocols and network usage

3. **Demodulation is a means for**  
**a) extracting data from an analogue/digital from a source to a destination**  
b) eliminating noise and interference from a transmitted signal  
c) extracting information from radio frequency signal from a source to a destination  
d) shielding electromagnetic and digital signals from a source or a destination

4. **A series of bits containing data and control information including source and destination node address formatted for transmission from one node to another**  
**a) serially transmitted signals**  
b) parallel transmitted signals  
c) concentrated packets

5. **In a typical transmission of a signal of 15 bits from a source to a destination, the total number of information bits was 12. Calculate the channel efficiency of the transmission.**  
a) 0.8  
**b) 0.2**  
c) 1.25  
d) 22.25

6. **A parity bit is added to a data packet for the purpose of**  
a) error detection  
b) noise reduction  
c) eliminating attenuation  
**d) reducing crosstalk**

7. **The strength of an analogue signal is normally reduced after transmission through a long distance. This signal can be boosted up to its original strength by a**  
**a) repeater**  
b) concentrator  
c) grooming equipment  
d) a strong magnetic field

8. **Optical fibers work on the principle the core refracts the light and guides the light along its path**  
**a) The cladding reflects any light back into the core and stops light from escaping through it - it bounds the medium**  
**b) The optical fiber cannot be spliced**  
**c) A glass fibre absorbs all the data**  
**d) The core refracts the light and the cladding reflects the light**

9. **Delay distortion can be introduced by hardware media propagation**  
**a) It is caused by the variation of the frequency of the velocity of propagation through it**  
b) It is caused by communication with the Central Processing unit  
c) It is caused during the detection of errors to prevent loss of data  
d) It is caused by the management of connectivity and routing between host and network

10. **Transmission through metallic conductors is normally affected by distortion, and becomes more pronounced as the conductor length increases to compensate for distortion,**

11. **Signal noise can be introduced by**  
a) Signal transmission through metallic conductors  
b) Transmission through media with a high attenuation rate  
c) Communication through guided media  
d) Signal distortion introduced by hardware media

12. **A step-index fiber in an optical transmission mode has**  
a) Large core and the light rays reflect off the cladding  
b) A small core and the light rays reflect into the cladding  
c) A large core and some light rays reflect off the cladding and others take a direct path

d) A small core the light rays are reflected at an angle greater than the refractive index

13. **The point-to-point protocol (PPP) can be used to**  
**a) encapsulate and transmit Internet Protocol (IP) datagram**  
b) authenticate servers  
c) identify switched signals  
d) decapsulate switched signals

14. **A major source of jitter noise lies in the**  
a) Process of transmission through channels with small bandwidth  
**b) Process of digital regeneration through repeaters**  
c) Choice of multiplexing techniques  
d) The type of downlink and uplink procedures in use

15. **A transmitted signal that has been groomed will contain signals**  
**a) of same type and free from empty packets**  
b) That will not require multiplexing techniques to transmit  
c) That will not need any modem to transmit  
d) That will need fiber optic cables and wireless equipment to transmit

16. **Which of the following cannot cause a routing delay when signals are transmitted from a source to a destination?**  
a) Bandwidth of the channel  
b) The total number of nodes within the network  
**c) The type of multiplexing technique used**  
d) The location of the transmitter

17 **In multicast transmission, the message is directed to**  
a) Peer-to-peer links only  
**b) A group of hosts that can choose to participate**  
c) All hosts on the internet that can participate  
d) Dedicated hosts only

18 **When a receiver is synchronized with a transmitter**  
**a) Accurate data transfer becomes possible and it must know exactly when a packet begins and how much time elapses between bits**  
b) The transmission medium does not take part in the transmission  
c) Both the transmitter and the receiver are not affected by node delay or transmission delay  
d) The transmitted signal is not affected by noise or attenuation

1. **In a graded-index optical transmission mode**  
   **a) The light rays are gradually bent back into the core path due to gradual change in the core refractive index**  
   b) The light rays reflect through the core completely  
   c) The light rays are never reflected  
   d) The light rays are transmitted by fast by fiber optic cables
2. **A simple mode optical transmission has**  
   **a) A separate distinct refractive indexes for the cladding and the core**  
   b) The light rays reflect off the cladding  
   c) The light rays are never reflected  
   d) The light rays are refracted through an angle greater than the refractive index of the wire

21. **Network bridge**  
a) Reduces the size of the collision domain by micro-segmentation in a non-switched network  
b) Do not reduce the size of the collision domain in a non-switched network  
c) Multiplexes all transmitted signals  
d) Do not minimize bandwidth usage

22. **The data link layer is concerned with**  
a) Fragmentation of data into frames  
b) Reassembly of frames using frequency division multiplexing  
c) Physical addressing, physical link management, and flow control  
d) Compression of packets into bytes

23. **The presentation layer performs functions such as**  
a) Keeping track of individuals to remote servers  
b) Translation of data configuring to cross-platform standards into formats understood by the local machine

### ****21. Dynamic routers use routing protocols which enable the router to:****

a) Reach agreement with other routers about the network topology  
b) Calculate routes  
c) Assign MAC addresses to nodes at both the source and destination  
d) Distribute routing updates to other routers

### ****22. \_\_\_\_\_\_ is an advantage of using FM signal transmission.****

a) Immunity to noise on the transmission medium  
b) Modification of the amplitude  
c) Using only one frequency  
d) The signal power is improved

### ****23. The degree of noise reduction in a twisted pair cable (shielded and unshielded) is determined by:****

a) Thickness of the wire  
b) The number of twists per meter  
c) The conductivity of the wire  
d) The resistance of the wire to transmission impairments

### ****24. An unshielded twisted pair cable is used on:****

a) Ethernet 10BaseT cabling system  
b) Token ring cabling system  
c) 10G-15R cabling system  
d) Multi-protocol transmission only

### ****25. A step-index optical transmission mode has:****

a) A large core and the light rays reflect off the cladding  
b) A small core and the light rays reflect into the cladding  
c) A large core so that the light ray reflects off the cladding and others take a direct path  
d) A small core and the light rays reflect at an angle greater than the refractive index

### ****26. In graded-index optical transmission mode:****

a) The light rays are gradually bent toward the core path due to gradual change in the core refractive index  
b) The light rays reflect through the core completely  
c) The light rays are never reflected  
d) The light rays are transmitted by four/fiber optic cables

### ****27. A Simple mode optical transmitter has:****

a) A separate distinct refractive index for the cladding and the core  
b) The light rays travel off the cladding  
c) The light rays are never reflected  
d) The light rays are refracted through an angle greater than the refractive index of the wire

### ****28. In a router transmission, hold-down timers use triggered updates to reset the hold-down timer when:****

a) Another update is received indicating the network status has changed  
b) There are no signals to transmit  
c) All the nodes along the transmission link are faulty  
d) The message arrives at the destination out of sequence

### ****29. An optical fiber cable has noise immunity to:****

a) Radio Frequency Interference (RFI) and electromagnetic interface (EMI)  
b) Thermal noise  
c) Jitter noise  
d) Induced noise from satellite equipment

### ****30. \_\_\_\_\_\_ is a disadvantage of using an optical fiber cable.****

a) Physical vibration shows up as a signal loss  
b) Large physical arc of the cable  
c) Large refractive index  
d) Immunity to crosstalk

### ****31. Signal transmission by AM radio is an example of:****

a) Light wave propagation  
b) Ground wave propagation  
c) Ionospheric propagation  
d) Line of site propagation

### ****32. \_\_\_\_\_\_ operates in the frequency range of 300kHz - 85MHz.****

a) Ground wave propagation  
b) Light wave propagation  
c) Ionospheric propagation  
d) Satellite propagation

### ****33. Microwaves operate at high frequencies of 3MHz – 10MHz due to:****

a) High transmission properties  
b) Large bandwidth  
c) Size of the elements that make up the microwave  
d) Wide area coverage

### ****34. Microwaves can carry large quantity of information because:****

a) They operate at high frequency  
b) They transmit both analogue and digital signal  
c) They can transmit at high altitude

### ****35. Satellites can carry high quantity of information because:****

a) They can transmit minute signals with low frequency  
b) They operate at a high temperature  
c) They transmit both analogue and digital signals  
d) They are placed in the orbit of the earth

### ****36. \_\_\_\_\_\_ is the shadow that a satellite transmits.****

a) Transmission spectrum  
b) Footprint  
c) Downlink  
d) Uplink

### ****37. In message switching, it is not necessary to establish a:****

a) Dedicated line  
b) Call set up  
c) Call initiation  
d) Session

### ****38. Which of the following is not part of the switching process in PSTN?****

a) Circuits disconnect  
b) Interference from external  
c) Circuits establishment  
d) Call set-up

### ****39. The communication between a satellite in space and a receiver on earth is an example of:****

a) Broadcast communication and downlink transmission  
b) Full duplex multicast transmission  
c) Full duplex and multicast transmission  
d) Half duplex and broadcast

### ****40. The communication between a radio station and their listeners is an example of:****

a) Simplex transmission  
b) Half duplex transmission  
c) Full duplex transmission  
d) An asynchronous transmission

### ****41. A transmission conveys messages in:****

a) Frame by frame  
b) One bit at a time  
c) One packet at a time  
d) One byte at a time

### ****42. A carrier frequency of a signal is chosen for processors such as:****

a) Signal strength  
b) Signal frequency spectrum and transmission channels  
c) Signal bandwidth  
d) Signal switching and bandwidth

### ****43. In a source route bridging:****

a) Single-route frames are used to make up most of the network traffic while all-route frames are used to find routes  
b) End-route frames are mostly used while all route frames are used to find IP address of the destination  
c) The forwarding database is normally empty  
d) Forwarding database is used to send frames sent across the network

### ****44. Frequency modulation is less affected by noise and it is preferable to amplitude modulation because the information is contained in:****

a) Frequency and time  
b) Frequency  
c) Frequency and phase  
d) Frequency and amplitude

### ****45. In a message switching process, it is not necessary to establish a:****

a) Dedicated line  
b) Call set up  
c) Call initiation  
d) A modem within the setup

### ****46. Signals undergoing circuit switching does not require:****

a) Transmission medium  
b) Dedicated line  
c) Decoders  
d) Modems

### ****47. Which of the following is not a disadvantage of transmitting signals using a microwave?****

a) It suffers attenuation by solid objects, birds, trees, rain, snow, and fog  
b) Signals are refracted by atmosphere, thus causing beam to be projected away from receiver  
c) It is affected by cross talk  
d) It is affected by the downlink bandwidth

### ****48. Microwave transmission is a line-of-sight transmission, therefore:****

a) The transmit station must be in visible contact with the receive station  
b) The transmission station must be shielded away from the receive station  
c) The receiving station must be elevated above the ground  
d) The transmission speed must be low

### ****49. Signal communication between a radio station and its listeners is an example of:****

a) Simplex communication  
b) Half duplex communication  
c) Full duplex communication  
d) Terrestrial communication

### ****50. Which of the following is not part of the process of switching in a PSTN?****

a) Interference from external sources  
b) Traffic congestion  
c) Circuit disconnect  
d) Traffic division of data

SECTION B

Here is a clean version of the questions from the provided image:

### **ONE QUESTION ONLY FROM THIS SECTION**

1. **Aerial height of a parabolic dish of diameter 1.6m**  
   A parabolic dish with a diameter of **1.6m** is placed on top of a building **100m above sea level**. It is required to transmit signals from this dish to another location in Accra, which also has an aerial height of **160m** and a diameter of **1.6m**.
   1. **Calculate the range between the two dishes.** (6 marks)
2. **Signal Gain Calculation**
   1. **Calculate the signal gain "G" for each of the two dishes.** (6 marks)
   2. Take **k**, the factor that takes into consideration the curvature of the earth, as **1.33**, and the wavelength as **1.8**.
3. **Time Division Multiplexing (TDM)**
   1. Explain what is meant by the term **Time Division Multiplexing (TDM)** and **carrier frequency** as used in data communication. (4 marks)
4. **Wireless Transmission Medium**
   1. **State four advantages and four disadvantages of using a wireless transmission medium.** (8 marks)

**Transmission Delay Calculation**  
a) A receiver receives a signal **14ms late** from a source due to a **transmission delay of 35ms**.

* 1. How long would it take if **Time Division Multiplexing** is used in the transmission of the signal? (4 marks)

b) **Differentiate between Frequency Division Multiplexing and Time Division Multiplexing.** (4 marks)