

भारत मौसम विज्ञान विभाग
सूचना संचार एवं उपकरण प्रशिक्षण केंद्र, नई दिल्ली
(विश्व मौसम संगठन का क्षेत्रीय प्रशिक्षण केंद्र, नई दिल्ली)

**Advance Training Course in Meteorological Instrumentation
& Information System (Batch No – XIII) /**

Direct Recruited Scientist Course (Instrumentation) Batch - II

Final Exam: Paper –I

Max. Marks -100

Date: 11.03.2024

Time: - 10:30-13:30

DIGITAL AND WIRELESS COMMUNICATION SYSTEMS

1. (A) Fill in the blanks: (Answer any 10)

(1 × 10 = 10 Marks)

- i. 1G & 2G Mobile technologies were optimized for _____ communications.
- ii. First Generation Mobile communication technology uses _____ Communication.
- iii. Full form of LTE in relation to 4G Technology is _____.
- iv. Full form of GSM is _____.
- v. Full form of GPRS is _____.
- vi. Full form of FSK is _____ and PCM is _____.
- vii. Full form of QAM is _____.
- viii. In FSK Modulation technique, _____ of carrier signal is varied according to Amplitude of the baseband Signal.
- ix. _____ technique is used by AWS for satellite communication.
- x. Quantization is used in which Modulation technique-
 - a. Pulse Code Modulation
 - b. Phase shift Keying
 - c. Amplitude Shift Keying
 - d. All of Above
- xi. WIMAX full form is _____.
- xii. QAM is combination of _____ which are out of phase by 90 degrees with each other.

1. (B) Short Answer type Questions: (Answer any 5)

(2 × 5 = 10 Marks)

- i. Describe function of MUX and DEMUX.
- ii. Give two Advantages of Digital signals over Analog Signals. - [1 mark for each point]
- iii. Examples of 3 types of Modulation techniques are _____.
- iv. Full form of BTS and MSC in Mobile Communication system is _____.
- v. What is Baseband Signal?
- vi. What is SNR?
- vii. LTE uses _____ technique to achieve high data rates.

ANTENNA AND WAVE PROPAGATION

2. (A) Fill in the blanks: (Answer any 10)

(1 × 10 = 10 Marks)

- i. The frequency and phase of the carrier remains _____ in amplitude modulation.
- ii. The highest frequency at which a vertical signal will be returned to earth is known as the _____.
- iii. _____ Frequency band is used for ground to aircraft communications.
- iv. The wavelength of S-band Radar is _____.
- v. _____ antenna can achieve circular polarization.
- vi. If beam width of the antenna increases, then directivity _____.
- vii. The frequency band used for ground to aircraft communications _____.
- viii. Write formula to estimate range for line of sight communication.
- ix. The carrier signal is a _____ frequency signal in modulation techniques.
- x. What The circuit which is used to produce the amplitude modulation is _____.
- xi. The frequency range of operation of _____ is around 30 MHz.
- xii. The ratio of maximum power density in the desired direction to the average power radiated from the antenna is called as _____?

2. (B) Short Answer type Questions: (Answer any 5)

(2 × 5 = 10 Marks)

- i. Write short note on folded Dipole Antenna.
- ii. For an AM system the total power of modulated signal is 600W and that of carrier is 400W, calculate the modulation index.
- iii. Calculate range of line of sight communication for standard atmosphere when $h_t = 52$ m and h_r is 13 m.
- iv. Define Critical Frequency. What is relation between Critical frequency and Maximum usable frequency?
- v. What is the value of maximum usable frequency when the incident angle is 60° and the critical frequency is 4.5MHz?
- vi. What are the different types of feeds.
- vii. Calculate the power developed by an amplitude modulated wave in a load resistance of 100Ω , if the peak voltage of carrier wave is 100V and modulation index is 0.4.

NETWORKING DEVICES AND SECURITY SYSTEMS

3. (A) Fill in the blanks: (Answer any 10)

(1 × 10 = 10 Marks)

- i. WAN stands for _____.
- ii. The standard protocol of internet is Ethernet. (True / False)
- iii. Layer 6 in OSI model is _____.
- iv. A server cannot work on a workstation computer. (True / False)
- v. DNS denotes _____.
- vi. The function of Router is _____.
- vii. Ipv4 address is _____ bits long.
- viii. Firewall operates at _____ Layer.
- ix. In 10gb distribution switch gb stands for _____.
- x. A Hub connects two WANs. (True / False)
- xi. In a network, a machine is identified by unique address called _____.
- xii. Fibre optics cable works on _____ principle.

3. (B) Write True or False with justification: (Answer any 5)

(2 × 5 = 10 Marks)

- i. IP address is a sequence of four digit numbers separated by coma.
- ii. A LAN is connected to large geographical area.
- iii. MAC address is 32 bit physical address of machine.
- iv. Speed of LAN is less than WAN.
- v. Router and switch both operates on data link layer and network layer only.
- vi. The standard protocol of internet is Ethernet.
- vii. A server cannot work on a workstation computer.

GTS AND WMO/GTS DATA PROCEDURE

4. (A) Fill in the blanks: (Answer any 10)

(1 × 10 = 10 Marks)

- i. AMSS receive, check and forward automatically, meteorological data and products according to the _____ standards.
- ii. _____ is a major part of WMO information system (WIS).
- iii. MPLS stands for _____.
- iv. In a network a machine is identified by unique address called _____.
- v. GTS denotes _____.
- vi. Mirror RTH is situated at _____.
- vii. BUFR stands for _____.
- viii. RTH stands for _____.
- ix. Numerical modeling data used in IMD originally in which format _____.
- x. ASCII stands for _____.
- xi. Basic comparison in LAN, MAN & WAN.
- xii. NET CDF format _____.

4. (B) Short Answer type Questions: (Answer any 5)

(2 × 5 = 10 Marks)

- i. CIPS Data Centre Working based on WINDOWS Operating System (True/ False with justification)
- ii. AMSS located at 6 different locations (True/ False with justification)
- iii. TRANSMET System is not GUI of AMSS (True/ False with justification)
- iv. GTS is the communication and data management component in WWW of WMO (True/ False with justification)
- v. Explain file naming convention of WMO Header.
- vi. Define GTS data format.
- vii. Main differences between Leased line & VPN.

CONCEPT OF NETWORKING AND IMD NETWORKS

5. (A) Fill in the blanks: (Answer any 10)

(1 × 10 = 10 Marks)

- i. Establish secure communication channels using _____
- ii. Optimize traffic distribution through _____
- iii. Facilitate automatic IP address assignment using _____.
- iv. Organize networks efficiently by implementing _____.
- v. Patch cords are used to establish _____ connections between devices
- vi. We measure bandwidth in _____
- vii. The default HTTP and HTTPS ports for the Web server are port ____ and _____
- viii. Common troubleshooting commands, such as _____ and _____, help identify and rectify network
- ix. RJ45 stands for _____
- x. LIU stands for _____
- xi. UTP and STP cables stands for _____ and _____ respectively.
- xii. Optical Fiber Cables transmit data using _____ and are known for their low signal attenuation.

5. (B) Write True or False with justification: (Answer any 5)

(2 × 5 = 10 Marks)

- i. Spyware is a type of Malware.
- ii. Endpoint security focuses on protecting High end devices such as servers and applications.
- iii. Network security involves protecting computer networks and data from unauthorized access, attacks, and damage.
- iv. Bandwidth refers to the minimum amount of data that can be transmitted over a network in a given time.
- v. Configuring policies on a firewall involves defining rules for controlling traffic and access.
- vi. AAA servers ensure secure and controlled access to network resources.
- vii. Define Host, Hub?
