

भारत मौसम विज्ञान विभाग
सूचना संचार एवं उपकरण प्रशिक्षण केंद्र, नई दिल्ली
(विश्व मौसम संगठन का क्षेत्रीय प्रशिक्षण केंद्र, नई दिल्ली)
Advanced Training Course in Meteorological Instrumentation
& Information System (Batch No – XV)

Final Exam: Paper –II

Date: 27.08.2025

Max. Marks -100

Time: - 10:30-13:30

RADAR TECHNOLOGY AND RADAR METEOROLOGY

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

(1 × 10 = 10 Marks)

- i. IMD at present monitors a network of _____ DWRs across India.
- ii. 30 dBm = _____ W.
- iii. The Doppler effect relates the shift in frequency to the _____ velocity of the target.
- iv. In super-refraction, the radar beam bends _____ toward the Earth's surface.
- v. The Radar transmits Horizontal and Vertical Polarized electromagnetic waves is called _____.
- vi. A Radar antenna is generally a parabolic dish antenna that is very sensitive with _____ gain.
- vii. According to the Nyquist Sampling Theorem, the sampling rate must be at least _____ the highest frequency of the signal.
- viii. The most common wavelength used for RF transmission in C-band Radars is _____ Centimetre.
- ix. Limitation of Radar observations beyond Range of 500 kms is mainly due to _____.
- x. 0dBm = _____ W.
- xi. If the radar shows a nearby storm in a particular direction but there is nothing outside, it is probably a _____.
- xii. PCAPPI stand for _____.

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

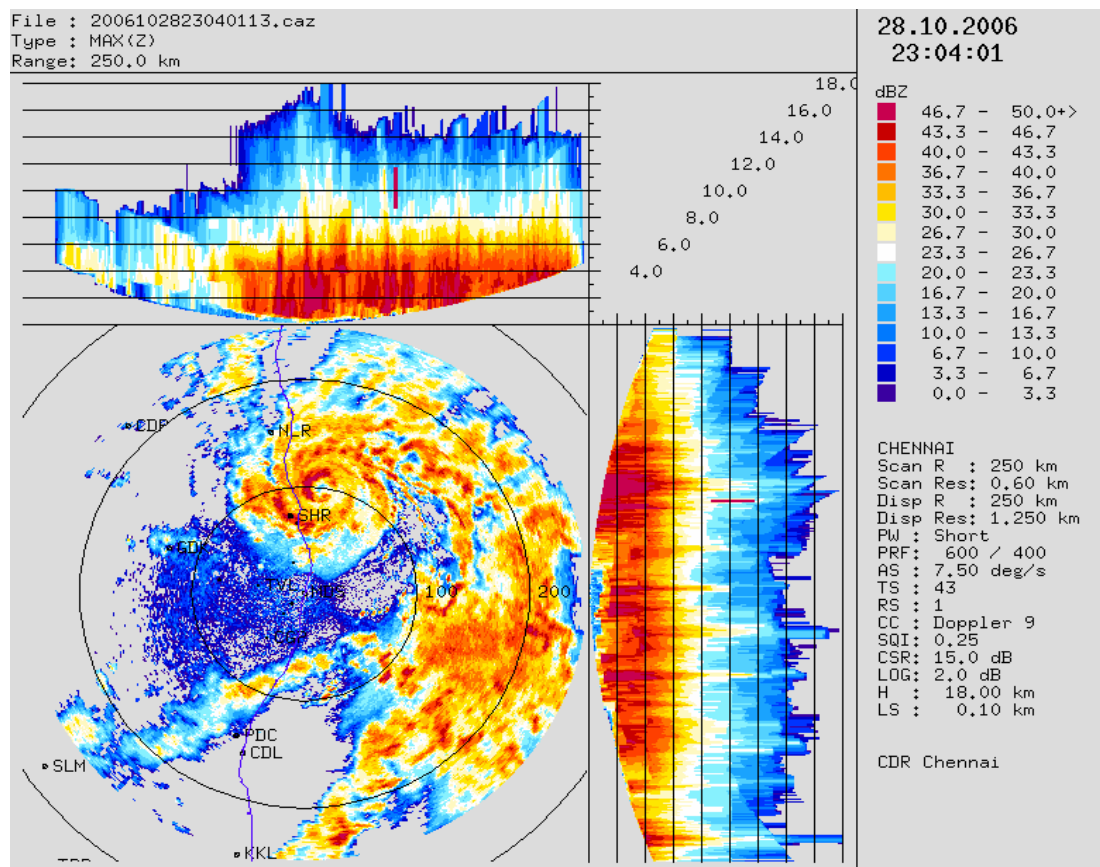
(2 × 5 = 10 Marks)

- i. Solid-state devices are bulkier and less reliable than microwave tubes.
- ii. Waveguides are preferred over coaxial cables at microwave frequencies due to lower losses.
- iii. Dual polarization radar measurements help in distinguishing hydrometeor types such as hail and graupel.
- iv. The Doppler effect is used in radar systems to measure the temperature of the target.
- v. Phased array radars can steer the radar beam electronically without moving the antenna.
- vi. Weather radar calibration is only necessary during the installation phase.
- vii. Dual-polarization radar can measure the differential phase shift to estimate rainfall rate.

1. (C) Short Answer type Questions: (Answer any 2)

(2.5 × 2 = 5 Marks)

- i. Explain Max Z Product?
- ii. Define uses of VVP2 products?
- iii. Extract 4 informations from the doppler product below?



OPERATION AND MAINTENANCE OF WEATHER RADARS

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

(1 × 10 = 10 Marks)

- The process of aligning an antenna to true north involves using _____ to ensure accurate orientation.
- Regular calibration is essential to ensure the _____ and _____ of measurement instruments.
- Always follow the _____ guidelines when working with electrical measurement tools to avoid accidents.
- A multimeter can measure various electrical parameters such as voltage, current, and resistance using the _____ principle.
- A spectrum analyzer measures the magnitude of an input signal versus _____ within a specified frequency range.
- The SI unit of Radar reflectivity factor (Z) is _____.
- Return loss of a antenna can be measured by using which instrument _____.
- Oscilloscope measure the magnitude of any signal versus _____ with in a specific timing range.
- Pulse width of long pulse in KLYSTRON Radar is _____ micro seconds.
- Cloud height can be measured through _____ Product.
- Precipitation is estimated from _____ products of DWR.
- _____ have least attenuation with respect to DWR spectrum band.

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

(2 × 5 = 10 Marks)

- Using a compass is the most accurate method to align an antenna to true north.
- An oscilloscope can display frequency spectra of signals.
- Radar systems that operate in the X-band frequency range are more susceptible to atmospheric attenuation and signal absorption compared to radar systems in the S-band.
- The Nyquist limit in radar velocity measurements can be exceeded by using higher- frequency radar waves.

- v. Polarimetric Radars are more accurate to make rainfall measurements compared to non polarimetric DWRs.
- vi. DWRs take a photograph of cloud and present it as Reflectivity product image.
- vii. Weather radars generally have beam width of 10 degrees or more.

2. (C) Short Answer type Questions: (Answer any 2)

(2.5 × 2 = 5 Marks)

- i. What is Doppler Dilemma explain?
- ii. Write at least 4 measuring and testing instruments used in Radar and describe their role briefly?
- iii. Write about difference between CAMC & in-house maintenance?

WEB DESIGNING & ARTIFICIAL INTELLIGENCE

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

(1 × 10 = 10 Marks)

- i. PHP is acronym for :
 - a. Hypertext Preprocessor
 - b. Pretext Hypertext Preprocessor
 - c. Personal Home Processor
 - d. None of the above
- ii. SPA is acronym for :
 - a. Single Page Application
 - b. Source Page Application
 - c. Simple Page Application
 - d. Single Paragraph Application
- iii. Which tag is used to display the unordered list?
 - a.
 - b. <DL></DL>
 - c.
 - d.
- iv. HTML stands for
- v. Javascript is side scripting language.
- vi. The division 5 / 2 in Python 3 yields the result _____.
- vii. The method to list all files and folders in a directory is _____.
- viii. The extension for a common file format used in meteorology for storing weather data is _____.
- ix. In Python, a list can be modified because it is a _____ type.
- x. Classification algorithms in AI predict _____ labels for data instances.
- xi. In Python 3, to output the word Hello, you write: _____
- xii. Python 3 is known for its emphasis on code _____.

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

(2 × 5 = 10 Marks)

- i. PHP doesn't support database?
- ii. HTML is used for development of web pages?
- iii. In Python 3, print always requires parentheses.
- iv. Lists in Python 3 are mutable, meaning their contents can be changed.
- v. In meteorology, machine learning algorithms such as classification can help identify weather types.
- vi. The method fit() is used in scikit-learn to train a model on training data.
- vii. Python uses indentation to define code blocks instead of braces or keywords.

3. (C) Short Answer type Questions: (Answer any 2)**(2.5 × 2 = 5 Marks)**

- i. Write down different database used in Geospatial Application?
- ii. What are the components of Remote sensing?
- iii. What are the components of GIS ?

LINUX**4. (A) Fill in the blanks: (Answer any 6)****(1 × 6 = 6 Marks)**

- i. The file that stores password information for users in an encrypted format is _____.
- ii. The command to create a new user in Linux is _____.
- iii. The command to list the current processes running on the system is _____.
- iv. File permissions in Linux are represented as rwx, which stands for _____, _____, and _____ respectively.
- v. The command to display messages from the kernel ring buffer after system boot is _____.
- vi. To check disk space usage on a partition, the Linux command used is _____.
- vii. To assign the permission rwxr-xr-- using numeric notation, the chmod command is written as _____.

4. (B) Write True or False with justification: (Answer any 3)**(2 × 3 = 6 Marks)**

- i. The command passwd [username] is used to delete a user account.
- ii. The chmod command can be used to change file ownership.
- iii. Sticky bit on a directory ensures only the owner of a file can delete or rename it.
- iv. The nohup command allows processes to be terminated immediately after logout.
- v. The /etc/fstab file configures automatic mounting of file systems at boot time.

4. (C) Short Answer type Questions: (Answer any 1)**(3 × 1 = 3 Marks)**

- i. Mention two key features of Linux and What is the purpose of the /etc/group file in Linux?
- ii. How does the chmod command modify file permissions, and what is the difference between symbolic and numeric (octal) notation?

LINUX SERVER MANAGEMENT**5. (A) Fill in the blanks: (Answer any 4)****(1 × 4 = 4 Marks)**

- i. The log file that records failed login attempts and authentication issues is typically _____.
- ii. To add a new normal user in Linux, the command is _____.
- iii. To check the status of the 'ssh' service using system daemon, the command is _____.
- iv. The Linux tool used to copy files securely between computers using SSH is _____.
- v. The configuration file typically used to schedule recurring tasks such as backups in Linux is called _____.
- vi. The utility used to display real-time information about CPU, memory usage, and processes in an interactive way is _____.

5. (B) Write True or False with justification: (Answer any 3)**(2 × 3 = 6 Marks)**

- i. RAID 0 provides fault tolerance by mirroring data across two or more disks.
- ii. Changing the default SSH port from 22 to another port can help reduce exposure to automated attacks.
- iii. The tool 'top' in Linux is used to display network statistics and monitor network traffic statistics.
- iv. In vsftpd configuration, setting anonymous enable=NO disables anonymous FTP logins.
- v. Incremental backups save only the files that have changed since the last full backup.
