INDIA METEOROLOGICAL DEPARTMENT

QUESTION BANK

OF

ADVANCED METEOROLOGICAL TRAINING

COURSE (AMTC)

SEMESTER-I & II EXAMINATION

(ELECTIVE SUBJECT-EXTRA QUESTIONS)

BASED ON 173-175 BATCHES

(2013-2015)

PAPER-V: Satellite Meteorology + Radar Meteorology

PART C

India Meteorological Department
Meteorological Training Institute
Advanced Meteorological Training Course,
Batch No. 173-175

(Extra question bank consolidated from batch 173-175, this topic was covered in Sem-II from 173-175)

*** Satellite Meteorology + Radar Meteorology ***

SECTION : Satellite Meteorology

Q1. Fill in the blank

1. ------------ Pixel in satellite represents clouds.

2. _____ mission is planned for studying the convective systems.

3. Absorption band of CO_2 gas present atmosphere is used to derive --------------- profile

4. ATOVS stands for _____.

5. BPSK stands for--------.

6. Carbon dioxide (CO2) spectral bands at _____ and _____ microns give us information

7. DRT a Payload of Kalpana 1 stands for _____.

8. Eye in the cyclone is generally visible when cyclone intensity is -------------than T2.5.

9. Fog can be easily traced in --------------imagery during day time.

10. IAPP stands for _____.

11. Information on water vapour content can be gained from a large number of H_2O lines between ---- and -------- microns.

12. INSAT 3D has advanced payloads of 6 channel _____ and 19 channel _____.

13. LNA stands for ----------.

14. Low clouds can be easily traced using------------------imagery.

15. Megha Tropics satellite was successfully placed into a _____ orbit.

16. MODIS scan the earth in _____ spectrum region.

17. Night time Fog can be easily traced in ---------------.

18. SAN stands for ………..

19. SIDS stands for---------

20. The Advanced Microwave Sounding Unit (AMSU), a 20-channel radiometer, provides information on the _____ and _____ structure of the atmosphere.

21. The central wavelength of the absorption band of O_3 is ------- microns, used to derive total   Ozone in sounder of INSAT-3D.

22. The data rate of INSAT-3D Imager and Sounder is ---------------- Mbps&------------Kbps .

23. The PMMS stand for -- .

24. The radio frequency -------------- of VHRR and -----------of CCD.

25. The Short Wave Infrared Band of INSAT-3D Imager is used to identify the ---------, -------- and ---------- phase in cloud.

26. The term _____ refers to the orientation of the satellite in space.

27. The transmission of DMDD system is through ----------satellite

28. Thunderstorm can be easily detected using ------------ imagery.

29. Water vapour winds are generated on the basis of -------------present in the atmosphere.

30. Which band of INSAT-3D Imager is used to derive Night time FOG product? ------------------- on the temperature structure of the atmosphere.

Q.2   Write whether True/False with justification

1. Black pixel in satellite imagery represents cloudy sky.

2. C.I No is always higher than T Number.

3. Data rate used in LRIT transmission lie between 10KBPS to 256KBPS .

4. Dual frequency of GPS receiver for derivation of IPWV for eliminating ionospheric delay.

5. Dvorak has expressed his views that analysis of a system with T<2.5 is more complex and more subjective.

6. Global coverage of the earth is not possible with LEO satellites with inclined orbits.

7. In a physical retrieval, radiative transfer equation must be used.

8. In CDO Pattern, center lies in cloud free region.

9. Infrared sounding instruments can provide information below the cloud.

10. Infrared sounding instruments provide very high quality information in cloud-free areas.

11. INSAT -3A is a geosynchronous satellite having 3 payloads.

12. INSAT-3D has microwave sounder.

13. It is impossible to derive the Atmospheric Motion Vectors (AMVs) in cloud free areas.

14. LEO satellites can be divided into two general categories.

15. Microwave can provide the very high vertical resolution which the infrared sounders can not deliver.

16. OLR is also used as one of the parameters for declaring on-set of monsoon over Kerala.

17. Orbits of satellite are chosen based on the mission of particular satellite.
    Polar orbiting satellites are generally used for the monitoring of different severe weather Systems.

18. Sea Surface Temperature in a single IR (10.5-12.5 um) is free from any contamination all the time .

19. Terms Roll and Yaw are not associated with altitude of the satellites.

20. The basic function of Antenna Feed is to convert Electromagnetic Wave to electromagnetic   signal.

21. The basic function of down converter is converting from IF to RF.

22. The RF frequency of INSAT-3A is in C-band.

Q.3.   Short Notes

1. Write a short note on DMDD system with block diagram.

2. Write a short note on derivation of IPWV from GPS.

3. Explain in brief about the different cyclonic structures as per Dvorak's classification

4. Derive the relation for maximum unambiguous velocity.

5. Explain the Max_Z and CAPPI_Z products from DWR and write their significance.

6. Describe the different orbits of satellites. Discuss their merits and demerits.

7. Describe the principles of remote sensing. Briefly discuss the types of remote sensors used in satellite observations.

Q.4.   Answer the following.

1. Describe the INSAT-3D Meteorological Data Processing System (IMDPS) with block diagram and function of each sub system.

2. Explain ground receiving and processing system of NOAA/METOP/MODIS at IMD.

3. Explain the difference between Microwave and Infra- red (IR) sounding.

4. What is atmospheric sounding? How many types of retrieval approaches can be used?

5. What is atmospheric sounding? How many types of retrieval approaches can be used? Explain one of them.

6. Write a short note on IAPP retrievals.

7. Write down the main characteristics and uses of Visible, Infrared and water vapour imagery.

8. Write in details about the basic principles used for the interpretation of satellite images.

9. Write in details about the different cyclonis structures as per the Dvorak's classification.

10. Write the major features of INSAT-3D satellite and its products and explain one of them.

11. Write the names of various process carried out for Data Products Generation Chain of INSAT- 3D, explain the servo correction.

SECTION : Radar Meteorology (14 Marks)

Q1.   Fill in the Blank.

1. 79 dBm is equal to ………. kilowatts.

2. A Hook shaped echo on a radar display indicates presence of a _____ (Tornado/Hailstorm).

3. Attenuation of radar signal increases with wavelength. _____ True/False

4. Bright bands are usually detectable in _____ precipitation and in wide spread precipitation situations.

5. Distance/range of the target/echo is calculated by the time taken for to & fro journey (True/False)

6. Doppler Frequency shift is directly proportional to the velocity of target.(True/False)

7. In sub-refraction, the radar beam height is _____than the radar indicates.

8. In super-refraction, the radar beam height is _____(lower/higher/equals) than the radar indicates.

9. The diameter of the antenna used with S band radar with 1 deg beam width is ………..

10. The equation for Doppler Dilemma is _____.

11. The height of radar beam with respect to ground at far away distance from radar site is at greater height mainly due to _____(curvature of earth/bending of beam/expansion of beam diameter) .

12. The main rain product of DWR is _____.

13. The maximum power transmitted from S- Band DWR is about ……

14. The maximum unambiguous velocity of an S-band DWR with PRF 1000 Hz is _____.

15. The rainfall intensity (R) is estimated from radar reflectivity factor Z by the equation _____ .

16. The SI unit of Radar reflectivity factor (Z) is ………

17. The standard and polarimetric base moments measured by a dual polarized doppler weather radar are _____ .

18. The unit of reflectivity factor shown in DWR images is _____.

19. The unit of reflectivity is _____.

20. The upper air wind product of DWR IS _____.

21. The velocity towards the radar is displayed in …… colour.

Q2.   Answer the following.

1. Bring out the differences between convective and strati form echoes seen on

2. Define gain and beam width of an antenna and give the relation between them.

3. Derive Radar range equation for an extended target.

4. Derive relations for "Unambiguous range" and "Unambiguous velocity" and establish Doppler Dilemma.

5. Derive the Radar equation.

6. Derive the relation for maximum unambiguous velocity.

7. Describe the various types of non-precipitation echoes seen on Weather radar displays.

8.   Doppler Weather Radar.

9. Explain the advantages of Multi Parametric Radar (Dual Polarized Doppler Weather Radar) over a conventional radar.

10. Explain the Max_Z and CAPPI_Z products from DWR and write their significance.

11. Klystron is preferred over Magnetron in DWR. Why?

12. Name the important parameters of a cyclonic storm that can be measured/observed on

13. Two types of pulses are used in DWR. What are their widths?

14. What are the advantages of Present day Doppler Weather Radars over older conventional weather radars.

15. What are the different polarizations possible in the propagation of Electro Magnetic waves?

16. What are the meteorological parameters that can be measured by a Disdrometer?

17. What are the various non-precipitating type of echoes seen on radar screens?

18. What is range ambiguity? How it can be removed?

19. What is the application of SRI product in forecast?

20. What is the difference between PPI and MAX products derived from DWR?

21. Which polarization is used in Single Polarimetric Radar.

22. Why clouds of height less than 10 km cannot be seen by DWR beyond 600 km?

23. Write four important limitations of a Doppler Weather Radar.

24. Expand the following and mention their uses:

    (a) LIDAR   (b) SODAR   (c) RASS   (d) MST RADAR