# INDIA METEOROLOGICAL DEPARTMENT

# QUESTION BANK

# OF

# INTEGRATED MET. TRAINING COURSE (IMTC)

# FINAL EXAMINATION

## BASED ON 1-11 BATCHES (2013-2021)

## PAPER-IV: SYNOPTIC MET, OBSERVATIONAL SYSTEMS AND OVERVIEW

## PART A,B AND C

**INDIA METEOROLOGICAL DEPARTMENT**
**INTEGRATED MET. TRAINING COURSE (IMTC)**
**QUESTION BANK FOR FINAL EXAMINATION**
**BASED ON QUESTION FROM BATCH 1 TO 11**

**PAPER –IV : SYNOPTIC METEOROLOGY, OBSERVATIONAL SYSTEMS AND OVERVIEW**

## PART A : SYNOPTIC METEOROLOGY

**Q 1. Fill in the blanks.**

1. _____ indices are associated with forecasting of thunderstorm.
2. _____ trough develops off the west coast of India.
3. _____ is an example of mesoscale systems.
4. _____ of two isobaric layers is called thickness.
5. A Geostrophic Wind flows _____ to the isobars.
6. A Geostrophic Wind flows parallel to the _____.
7. A microburst is a much-localized column of _____ air, producing damaging _____ and straight-line winds at the surface that are similar to, but distinguishable from, tornadoes.
8. A ridge is denoted on a chart with _____ colour.
9. A Squall line is an arrangement of many _____Clouds forming a line with breadth : length ratio of at least 1:10
10. Active monsoon over a subdivision means the amount of rainfall is _____ times of Normal.
11. Advance of _____ monsoon may be associated and shift of STWJ to _____ Himalayas.
12. Ahead of an Easterly wave _____ is observed.
13. Along a Ridge line_____ changes abruptly and pressure _____ on both sides.
14. Annual frequency of occurrence of tropical cyclones over North Indian Ocean is _____
15. Arabian Sea is _____(warmer/colder) than Bay of Bengal.
16. Balance between Pressure gradient force to the centrifugal force and Coriolis force is called _____ wind.
17. Before approach of a WD _____ ly component of wind is observed over a station.

18. Category of forecast issued for a season is called _____.
19. CLIPER technique is used in the forecasting of _____of synoptic systems.
20. COL is a region between _____ high pressure and two _____areas.
21. Cold air advection over a station leads to _____of geostrophic wind with height
22. Combination of climatology and persistence technique of forecasting is called _____.
23. Days and nights are equal throughout the year at _____.
24. During SWM, STWJ shifts to the _____ of the Himalays.
25. During break monsoon, good amount of rainfall is observed in the _____.
26. During SWM, STWJ shifts to the _____ of the Himalayas.
27. For declaring a squall, the wind speed should reach at least_____ knots.
28. Full form of MTC is _____ .
29. Heat low during South West Monsoon (SWM) season extends in the _____levels.
30. Heavy rainfall is mostly confined to the _____ sector of a westward moving monsoon depression.
31. Huge clouds are noticed in _____ region of a cyclonic storm (CS).
32. In the rear of an Easterly wave_____ is observed.
33. INSAT derived OLR value during onset of Southwest monsoon should be below_____.
34. Isotherms are drawn on _____ charts.
35. Kal Baisakhi is a _____ activity of Bengal and it is a _____ scale system.
36. Lines of equal heights are known as _____.
37. Low pressure areas are example of_____ Synoptic scale systems.
38. Low value of _____ helps in the growth of cyclonic storms.
39. Maximum rainfall occurs in _____ sector of a monsoon depression moving in W'ly/ NW'ly direction.
40. Maximum sustained wind for a cyclonic storm is _____ Knots.
41. Maximum sustained wind for Cyclonic storm is _____kmph
42. Medium range forecasting is useful for _____ days.
43. Microburst is a localized column of _____ air producing _____ damage.

44. Microburst produces ____ damage whereas tornadoes generally have _____ damage.
45. Mid Tropospheric Cyclones are found over northern parts of Arabian Sea during the _____monsoon months.
46. Monsoon season is during _____ months.
47. _____monsoon season is during JJAS months.
48. Monsoon trough tilts _____ with height.
49. Monsoon trough tilts _____ wards with height.
50. Mumbai is _____ side of the Western Ghat Mountain Ranges.
51. Position of Mascarine high is _____ of equator.
52. Rear of an E'ly wave_____ is observed.
53. Representative month of Indian summer monsoon/SWM is _____ .
54. Short range forecast is issued for a period of _____ days.
55. Streamlines changing to fork shape is related to _____ phenomena.
56. Streams lines form a _____ shape in a deformation field.
57. Streams lines form a hyperbolic shape in a _____ field.
58. Tamilnadu receives its maximum rainfall during _____ season.
59. The 3-cells in 3-cell model for general circulation are _____cell, _____ cell & _____ cell.
60. The appearance of the _____marks the beginning of the mature stage of a thunderstorm cloud.
61. The frequency of _____is highest during the winter season.
62. The frequency of occurrence of dust storm is maximum in _____ month.
63. The frequency of WDs is highest during the _____ season.
64. The maximum sustained wind is the highest _____ minutes average surface wind occurring within the circulation of the system.
65. The monsoon trough tilts _____ with height.
66. The sinking branch of the _____ cell coincides with the subsidence that is observed in the zone between 20º and 35º latitude
67. The temporal scale of short range forecasting is _____ days.
68. The Tornado Vortex may contain several _____ within it.
69. The two jet streams over the Indian region during (SWM) are _____ and _____.

70. The vertical layer of a Tropical Cyclone, in which there is a predominant flow towards the _____from outside, is known as inflow layer.
71. The winds around the low-pressure area blow in _____ direction in the northern hemisphere.
72. Thermal wind blows keeping _____ temperature to its right in Northern hemisphere.
73. Thunderstorms are example of _____ scale systems.
74. Lines of equal pressure values are known as _____ lines.
75. Tornado is a _____ column of air extending from Cb cloud to Earth.
76. Trade winds observed due to turning of winds by _____ force.
77. Tropical cyclones are called _____over Atlantic Ocean
78. Two jet streams over the Indian region during SWM are_____ and _____.
79. Vertical time section provides the idea about the _____ of systems.
80. Warm _____ is the heat engine of Cyclonic Storms (C.S.)
81. Western disturbances are _____ scale system.
82. Wind direction on the _____ are southeasterly /easterly to the north of the monsoon trough.
83. Wind speed during onset of Southwest monsoon should be between_____.
84. Withdrawal of south-west monsoon from _____ parts of the country is not attempted before 1st September

**Q.2] State with brief reason whether following statements are true or false**

1. A lopar over head bay is helpful for activity of severe Norwesters.
2. Approach of Easterly Waves may be noticed from vertical time section.
3. Bathymetry plays an important role in the estimation of storm surge.
4. C.S. form in low vertical shear region.
5. C.S. form in low vertical wind shear region.
6. Calm winds are observed the Eye region of a C.S.
7. Cold wave is observed in the rear of a western disturbance.
8. CS commonly forms over South Atlantic and SE Pacific ocean.
9. Cyclonic storms (C.S) usually have some favorable tilt with height.
10. Cyclonic Storms are very frequent during Southwest monsoon.

11. Cyclonic storms form in low vertical wind shear region.
12. Difference between Dry bulb and Wet Bulb temperatures is called diurnal range of temperature
13. During break monsoon condition over central India P24P24 is plotted in red.
14. Easterly waves travel along lower latitudes.
15. Fall in minimum temperatures is observed before the approach of a WD.
16. Fog is observed after passage of WD over a station during winter season.
17. Fog is observed after passage of WD over a station.
18. Fog is observed in the rear of a western disturbance.
19. Frequent severe dust storm over NW India may leads to weakening of ensuing Southwest monsoon.
20. Heat low of south west monsoon is a shallow low.
21. In order to capture the systems with westerly wind fields the vertical time section is plotted from east to west.
22. Low Level Jet (LLJ) is observed in the around 200 hPa height during SW Monsoon.
23. Low pressure systems are more marked in 12 GMT chart (about 1730 hrs IST)
24. Lower level Convergence & upper level Divergence leads to formation of bad weather.
25. Maximum rainfall is received in NW sector of a Monsoon depression.
26. Monsoon depression develops into cyclonic storms frequently.
27. Monsoon trough shifts towards foot hills of Himalayas during active monsoon.
28. Monsoon trough tilts northward with height.
29. Most of the monsoon depressions do not develop into Tropical cyclones.
30. Presence of Hiparover head bay is helpful for Norwesters activity.
31. Rotation of the earth on its axis caused season.
32. Storm surge is the most devastating phenomena associated with Tropical Cyclone.
33. Streamlines should not start or terminate anywhere in between the chart.
34. Strong or Active monsoon is observed when the monsoon trough is slightly north of its normal position.
35. Strong pressure gradient is observed in COL region.
36. Sub tropical westerly jet stream shifts to lower latitudes in SWM season.
37. Surface heating is the only condition required for convective activity.

38. The duration of the SW monsoon over the country does not varies.
39. The Eye is the region of most destructive weather in a Tropical Cyclone.
40. The heat low plays an important role in Indian summer monsoon.
41. The Tibetan High is generally seen from the month of May.
42. Tropical cyclone is cold core system.
43. Tropical Easterly Jet (TEJ) is observed in the lower troposphere during SW Monsoon.
44. Validity of Medium Range Forecasting is 11 to 30 days
45. Vertical time section may be plotted either from east to west or from west to east.
46. Vertical time section provides the idea about the movement of systems.
47. Vertical Wind Shear is favourable for strong thunderstorms.
48. Vertical Wind Shear is favourable for Tropical Cyclone formation.
49. WD gets fresh moisture supply from the cyclonic circulation over the Bay of Bengal.
50. Windward side of a mountain receives less precipitation than the leeward side.

**Q 3. Answer the following in brief**

1. Characteristics of Sub tropical westerly jet stream
2. Define STWJ and discuss its characteristics.
3. Define the criteria for cold wave based on departure of temperature from normal.
4. Define the criteria for cold wave over plain stations, based on departure of temperature from normal.
5. Define the criteria for heat wave based on departure of temperature from normal.
6. Describe in brief chief features of any SW monsoon semi-permanent features.
7. Describe Mid Tropospheric Circulations (MTC's) during SWM.
8. Describe the chief features of any three SW monsoon semi permanent features..
9. Describe the chief features of Monsoon Depression (MD)
10. Describe the chief features of Monsoon Depression (MD)
11. Describe the chief features of NE Monsoon.
12. Describe the horizontal structure of a C.S.

13. Describe the synoptic conditions needed for NE-India convective activities
14. Describe the synoptic conditions needed for NW and NE India convective activities.
15. Describe the synoptic conditions needed for NW India convective activities.
16. Describe vertical structure of a C.S.
17. Different scales of weather systems.
18. Discuss Genesis criteria for tropical cyclone.
19. Discuss in brief the life cycle of a tropical cyclone.
20. Discuss pre-monsoon thunderstorm activity over NW and NE India.
21. Discuss synoptic conditions leading to FWS to WS rainfall from a W.D. during winter.
22. Discuss the chief features of any semi-permanent systems of SWM.
23. Discuss the chief features of any 4 semi permanent systems of SWM.
24. Discuss the favorable environmental conditions for the formations of a Cyclonic storm (CS).
25. Discuss the pre-monsoon thunderstorm activity over NE and NW India and also give the synoptic conditions necessary for them.
26. Enlist different methods/techniques of weather forecasting.
27. Explain with figures the areas of convergence and divergence in a trough of Westerly and Easterly wind field.
28. Explain with figures the areas of convergence in a trough of Easterly wind field
29. Explain with figures the areas of convergence in a trough of Westerly
30. Explain with figures the areas of divergence in a trough of Easterly wind field.
31. Explain with figures the areas of divergence in a trough of Westerly
32. Favorable synoptic condition for formation of TC.
33. How do you identify western disturbances on synoptic charts?
34. IMD’s sub division-wise criterion for the activity of SWM.
35. Important factors for forming cyclonic storms.
36. Intensification of western disturbances and associated weather.
37. Movement of Western disturbances and their associated rainfall.
38. On set criterion of NE monsoon and chief features.
39. On set criterion of SWM.
40. Onset criteria of South West Monsoon (SWM) over Kerala
41. Outline the life cycle of a mature thunderstorm

42. Rainfall associated with Monsoon depression
43. Scales of atmospheric motions.
44. Thermal wind and its importance.
45. Types of Jet Streams.
46. Types of Jet Streams; briefly describe the characteristics of any one of them.
47. Use of synoptic charts and types of forecasting.
48. What are major differences between Active Monsoon and Break Monsoon?
49. What is the difference between monsoon depression and depression forming in premonsoon season and post-monsoon season?
50. Write a note on adverse weather associated with tropical cyclones.
51. Write down criteria for onset of Northeast monsoon.
52. Write down the criteria for onset of monsoon over Kerala.
53. Write down the four conditions favorable for Radiation fog.
54. Write down the stages of a Tropical Cyclone.
55. Write down three essential conditions for development of thunderstorms.
56. Write three points about origination of WD and its movement across Indian region.
57. Write three points which should be kept in mind for isobaric analysis on a surface chart.
58. Write two differences between Veering and Backing of geostrophic wind with height.

**Q.4] Write short notes of the following.**

1) Characteristics of Sub tropical westerly jet stream..
2) Chief features of Sub tropical westerly jet stream
3) Criteria for onset of NE monsoon over Tamil Nadu.
4) Describe any four synoptic systems associated with the Southwest Monsoon.
5) Describe any three the Semi-Permanent Systems of Southwest Monsoon.
6) Describe WD and its three cases about moisture supply.
7) Different scales of weather systems.
8) Discuss in brief the life cycle of a tropical cyclone.
9) IMD’s sub division-wise criterion for the activity of SWM.
10) Important factors for forming cyclonic storms.
11) On set criterion of NE monsoon and chief features.

12) Onset criteria of South West Monsoon (SWM) over Kerala.
13) Pre monsoon thunderstorm activity over NW and NE India.
14) Rainfall associated with Monsoon depression
15) Scales of atmospheric motions.
16) Use of synoptic charts and types of forecasting.
17) Write a short note on Sea Breeze and Land Breeze.
18) Write a short note on Sea Breeze.

## PART B : OBSERVATIONAL SYSTEMS

**Q 1. Fill in the blanks.**

1. _____ height is used for finding Drift (D) by tail method.
2. _____ is the first significant level.
3. _____ height is used for finding distance (D) by tail method in P.B. computation.
4. _____ is a permanent selected land mark like a tower at a distance of 500 meters or more, whose azimuth angle is predetermined.
5. _____ & _____ are vertical development clouds.
6. _____ is calculated from Dry bulb temperature and Wet bulb temperature.
7. _____is an autographic instrument used to get an automatic& continuous record of wind speed and wind direction.
8. 1 Knot = ----------Kmph
9. 50 is added to YY in a P.B. message to indicate wind speed reported is in -------.
10. A “gust” wind refers to fluctuations in speed and “Squall” refers to sudden _____ of wind speed and which may last for _____minute or more.
11. A Class – 1 observatory will have both _____ instruments.
12. Altostratus and Altocumulus are _____ clouds.
13. Assman psychrometer is used to find ---------- and ----------.
14. Average pressure at sea level is _____ .
15. Cloud direction are measured in _____ points of compass.
16. Datum point is a fixed point / object usually at a distance of --------.
17. Datum point is an object whose _____ is already known.

18. Datum point is selected permanent land mark, of which the _____is predetermined.
19. Dew point temperature is calculated from _____ and _____ temperature.
20. During night P.B. Observation ---------- is attached to the balloon.
21. For a Rain measure for 200 $cm^2$ collector, ----------ml of water is equivalent to 10 mm of Rain.
22. For Open Pan Evaporimeter , if water added from measuring cylinder is 15 cm to reach the level of fixed point gauge, then it is equivalent to _____mm of evaporation.
23. For Open Pan evaporimeter, if water added from measuring cylinder is 20 cm to reach the level of fixed point gauge, then it is equivalent to ----------mm of evaporation.
24. Height of the gun metal rim of a Non Recording Raingauge should be_____cm above ground level as per W. M. O. recommendations.
25. Under the standard conditions, the average atmospheric pressure at sea level is _____
26. In kew pattern barometer pressure is read in ---------- .
27. In kew pattern barometer _____ is read in millibar/ hPa .
28. In minimum thermometer ---------- is used as sensing liquid.
29. Leveling of theodolite is necessary for getting correct _____ angle.
30. Maximum thermometer in the Stevenson Screen kept - inclined/ tilted/horizontal. .
31. Maximum thermometer is set at----------UTC.
32. Maximum wind level should be situated above ____ hPa level.
33. Mercury barometers are calibrated at a temperature of ----------.
34. Nephascope is used for measuring the _____ of the cloud.
35. P.B. observations are required to find out _____ at different levels of atmosphere.
36. Precipitation is the amount of _____between the observations.
37. Relative Humidity is calculated from Dry bulb temperature and _____. temperature.
38. Significant levels are ---------- reported in P.B. message when they are observed below 1 K.M. a.s.l.

39. Squall refers to sudden --------- of wind speed and which lasts for------- minute or more.
40. Sun shine recorder is used to measure the hours of the durations of _____.
41. Surface level is the first significant level.
42. The density of moist air is ---------- than that of the dry air.
43. The azimuth angle is denoted by _____ .
44. The balloon is tracked initially through the _____ telescope for a few minutes.
45. The balloon is tracked initially through the _____telescope for a few minutes.
46. The dry bulb thermometer measures temperature of ----------.
47. The end of the index from the bulb gives the lowest temperature attained by the instrument.
48. The line joining projection of moving balloon horizontally is called _____.
49. The line joining projection of moving balloon horizontally is known as _____of the balloon.
50. The pressure of the air that is measured with the Mercury barometer .
51. The roof of Stevenson screen is _____.
52. The wall of Stevenson screen is _____
53. Visibility is judged by the observer according to visibility _____.
54. Visibility landmark are used to observer the _____ .
55. Weather averaged over a long period is called ----------.
56. Wind direction is measured in ---------- point of compass.
57. Wind direction is determined with reference to _____ points of compass.

**Q 2. True / False with reasoning**

1. 0 R24 R24 R24 R24 Seasonal total rainfall and reported at 03 Z observation.
2. 4PPPP group represents station level pressure.
3. A tail with flags is attached the balloon during day time P.B. ascent.
4. Before drawing the trajectory a suitable scale should be chosen.
5. Cloud direction are measured in 08 points of compass
6. Constant rate of ascent is assumed for day PB ascent
7. Cumulonimbus clouds have a flat top.

8. Cumulus clouds are conspicuously absent over a cool water surface.
9. Cumulus clouds are conspicuously observed at Polar Regions.
10. Datum point determination is necessary.
11. Height of gun metal rim of ORG should be 60 cm agl as per W.M.O. recommendations..
12. Height of gun metal rim of ORG should be 60 cm agl as per W.M.O. recommendations..
13. High clouds may be reported when sky is overcast with low cloud.
14. Identification letter for surface and ship code are BBXX & AAXX respectively.
15. In a Rain Measure for 100 $cm^2$ collector, 200 ml of water is equivalent to 10 mm of rain
16. In Minimum thermometer, alcohol is used as sensing liquid
17. In P.B. message 50 is added in date (YY).
18. In P.B. message 55 is added in date (YY).
19. In P.B. message 60 is added in date (YY).
20. Leveling & orientation is done before taking P.B. observation.
21. Leveling of theodolites is not necessary.
22. Maximum thermometer is kept slightly in a tilted position.
23. Pilot balloon ascent is not taken when it is raining.
24. Surface wind direction is determined by windvane with reference to 8 points of compass.
25. The direction of door opening of Stevenson screen is north in the Northern hemisphere.
26. The end of the index nearest from the bulb gives the lowest temperature attained by the Minimum Thermometer.
27. The optical theodolite used in P.B. observation is also known as bent axis telescope.
28. The roof of Stevenson screen is double layered.
29. The water bottle of wet bulb thermometer should be placed just below the thermometer.
30. There should be at least one datum point in each direction quadrants of the P.B. observatory.
31. There should be at least one datum point in each direction quadrants of the P.B. observatory.

32. There should be only one datum point in any direction quadrant of the P.B. observatory.
33. Though the double theodolite method is most accurate, it is not used in general to find out the height of the balloon during P.B. ascent.

**Q 3. Do as directed/** Write short note

Advantages and disadvantages of aneroid barometer.

1. Bimetallic Thermograph
2. Datum point
3. Describe in brief of Datum point
4. Explain why mercury is used in the thermometer.
5. Maximum wind level
6. Mercury is used in thermometer.
7. Natural Siphon Recording Rain gauge (10 mm) Rainfall
8. Normal Height card
9. Optical theodolite.
10. Order of observation.
11. Principle of cup counteranemometer and its maintenance.
12. Setting of Maximum and Minimum Thermometers.
13. Significant wind level
14. Sunshine recorder
15. Type of clouds and their heights.
16. What are different type of clouds and their heights.
17. Whirling Psychrometer
18. Wind Instrument its maintenance and exposure conditions
19. Working principle of aneroid barometer.
20. Working principle, advantages and disadvantages of aneroid barometer.
21. Write in brief about Maximum wind levels.
22. Write in brief about principle of cup counter anemometer
23. Write in brief about Setting of maximum thermometer.
24. Write in brief about setting of minimum thermometer
25. Write in brief about the Normal Height card
26. Write in brief Site selection for the P.B. observatory.

## PART C : OVERVIEW

**Q 1. Fill in the blanks.**

1. _____ of the earth is not taken into consideration in the Hadley Cell general circulation model.
2. Albedo of the earth atmosphere system is about_____ %.
3. At high latitudes climate is ----------.
4. Coriolis force is the effect of Earth's _____
5. Day and nights are caused due to _____ of the earth.
6. Day and nights are of equal length, 12 hours each at all latitudes on_____ day
7. Days and nights are equal throughout the year at ----------.
8. Deflection in the prevailing wind direction and ocean current is the effect of earths____.
9. During January,_____region is the coldest region over the earth.
10. Equinox occurs on ---------- and ----------.
11. For the earth, value of solar constant is_____ .
12. High pressure area forms in the region of _____ temperatures.
13. Intensity of the solar radiation intercepted at a place depends on _____.
14. Land surface gets heated or cooled _____ than the water surface.
15. Low pressure area forms in the region of_____temperatures.
16. On summer solstice day in the northern hemisphere, the noon sun is over head at _____.
17. Perihelion, when the Earth is nearest to the Sun occurs the date_____.
18. Perihelion, when the earth is nearest to the sun occurs on the date _____ and nights are equal throughout the year at _____
19. Pressure belts and cells shifts generally _____ in July and _____ in January, with the apparent movement of the sun.
20. Sea breeze is experienced in the ----------.
21. Shortest day in the northern hemisphere occurs on the date ----------.
22. Sun emits energy in _____ wave.
23. Sun emits energy in _____ more.

24. The plane passing through the earth's orbit of revolution and the sun is called as _____ plane.
25. The _____ facing slope in mid-latitude of northern hemisphere receives more intense solar radiation than the _____ facing slope.
26. The axis of earth's rotation is inclined about _____ degrees from the plane of ecliptic.
27. The circle which divides the earth in to two parts, illuminated and dark, is called as _____.
28. The circle separating dark half of the earth from the lighted half is called as the _____.
29. The day when the noon sun is overhead at the equator is known as _____ day.
30. The day when the noon sun is overhead at the equator is known as_____day.
31. The earth radiates its energy in the form of_____radiation.
32. The maximum emission of the solar radiation occurs in the _____ spectrum.
33. The plane passing through the earth's orbit of revolution and the Sun is called as _____.
34. The value of solar constant is _____.

**Q 2. State with brief reason whether following statements are true or false**

1. Maximum temperature occurs at local noon
2. Agra shows extreme climatic conditions than Mangalore.
3. Altitude and latitude are not the climate control
4. Average position of ITCZ coincides with geographical equator.
5. Average position of ITCZ is few degrees north of the equator.
6. Classification of clouds by their height and genera.
7. Daily range of temperature is less over the coastal stations as compared to the inland plane stations.
8. Delhi shows extreme climate than puri.

9. During January as well as July the isotherms are almost parallel to the latitudes over the large oceans of southern hemisphere
10. During January, lowest temperature is observed over Siberia instead of North Pole.
11. During January, lowest temperature is observed over Siberia instead of North Pole.
12. During January, the lowest temperature in the northern hemisphere is observed over the Siberian region and not over the North Pole.
13. In the northern hemisphere, south facing mountains slope in mid latitude, gets heated up less than the north facing slope.
14. In the summer hemisphere, days are of longer duration than the nights.
15. Leeward side of a mountain receives more rainfall than the windward side.
16. Maximum temperature occurs at local noon.
17. Nagpur shows extreme climate condition than Bangalore
18. Parallelism and inclination of the earth's axis of rotation are the main causes of the seasons over the earth
19. Places situated in the interior of the subcontinent and that in coastal area experience same type of climate.
20. Rotation of earth on its own axis causes season.
21. South facing slopes in northern hemisphere are warmer than north facing slopes
22. The daily range of temperature is greater over the oceanic area compared to the continents.
23. Though the sun is at high altitude over the equator the year, maximum total annual radiation reaching the earth's surface is found at about $20^{o}$N/S and not at the equator.
24. Varying distance between the sun and the earth is the main cause of seasons.
25. Windward side of a mountain receives less amount of precipitation than the Leeward side.
26. Write a note on met parameters observed and recoded during surface observation. Which instruments are used for their measurement?
27. Write a note on standard synoptic hours of observation and order if observation.

**Q 3. Answer the following in brief**

1. General circulation model.
2. cell model for general circulation
3. Climate
4. Climatic Zones (Koppen Climatic classification)
5. Equinoxes
6. Equinoxes and solstices
7. Factors affecting the temperature distribution over the earth..
8. General circulation model.
9. Hadley's General circulation model.
10. Solstices
11. Three cell model for general circulation.
12. Weather
13. Weather and Climate