

8. Meteorology I Paper(Met. 311), 2066

Time : 3 hrs.

Full Marks : 100

Attempt TWELVE questions including Q.No. 1 and Q. No. 2 which are compulsory.

1. Differentiate between weather and climate. What are the factors affecting climate of Kathmandu Valley ? Explain qualitatively the relationship between increasing number of vehicles and air temperature. [2+4+4]
2. Describe the composition and structure of the earth's atmosphere with a schematic diagram. Explain the importance of the presence of carbon dioxide in the atmosphere. [6+4]
3. Define and explain briefly the dew point temperature, surface temperature, wetbulb temperature and virtual temperature. [2+2+2+2]
4. What do you understand by temperature lapse rate ? Describe a typical diurnal variation of earth's surface air temperature. [3+5]
5. Explain, briefly the relationship between atmospheric air density and atmospheric pressure. What are the factors affecting atmospheric pressure of the earth ? [4+4]
6. Describe forms and types of precipitation. Explain briefly the formation of precipitation. [5+3]
7. What are the factors affecting evaporation. Explain a simple method of estimating evaporation. [4+4]
8. Describe hydrological cycle of a catchment with a neat schematic diagram. [8]

9. Write the name of instrument used for the measurement of wind speed and direction. What are their units? Describe the relationship between wind speed and evaporation? [2+2+4]
10. Write short notes on any TWO of the following:
 - a. Water vapour pressure
 - b. Adiabatic process
 - c. Temperature gradient
 - d. Gradient wind [4+4]
11. Differentiate between Solar radiation and Terrestrial radiation. Describe briefly heat exchange processes at the earth's surface. [3+5]
12. Discuss the possible factors affecting the temperature of the earth's atmosphere. [8]
13. What do you understand by climatic parameters? Explain climate of Kathmandu Valley in the past, present and future. (i.e. expected climate) [3+5]
14. Explain the typical features of high-latitude and low-latitude climates. [4+4]
15. What is greenhouse effect? Give two examples of the evidence of the climate change. [3+5]
16. Write short notes on any TWO of the following:
 - a. Koppen's classification
 - b. Thornwaite's 1931 classification
 - c. Climate change
 - d. Tropical monsoon climate [4+4]

Meteorology I Paper (Met. 311), 2067

Bachelor Level /Science & Tech/ I Year

Full Marks: 100

Time: 3 hrs.

Attempt TWELVE questions, including Q.No. 1 and 2, which compulsory.

1. What do you understand by earth's atmosphere? Describe the composition and structure of the atmosphere with a schematic diagram. [2+8]
2. What is climatology? Distinguish between Koppen's and Thorwaite's classification of the world climate. Which one do you think the better and why? [1+6+3]
3. Explain the basic principles of temperature measurement. Describe a typical diurnal variation of earth's surface air temperature. [31+5]
4. Define and explain briefly the wet bulb temperature, virtual temperature, dew point temperature and potential temperature. [2+2+2+2]
5. Define geostrophic wind. Write down the Buys Ballot's law and explain its application in meteorology. [2+4+2]
6. Define precipitation. Describe forms and types of precipitation. [1+7]
7. What is evaporation? What are the factors affecting evaporation. Explain a simple method of estimating, evaporation. [1+3+4]
8. With a neat schematic diagram; describe hydrological cycle on the earth. [8]
9. Write the name of instrument used for the measurement of wind speed and

direction. What is wind power? How can we utilize wind power to generate electricity?

[1+2+5]

10. Write short notes on any TWO of the following:
- Kelvin scale of temperature
 - Barographs
 - Principles of wet bulb thermometers
 - Surface wind speed and friction layer
- [4+4]
11. What are the factors affecting solar radiation? Discuss briefly the depletion of solar radiation by earth's atmosphere.
- [4+4]
12. Discuss the possible factors affecting the temperature of the earth's surface.
- [8]
13. What do you understand by climate change? What would be the climate of Nepal if the concentration of CO₂ in the air were doubled?
- [2+6]
14. What is air pollution? What are the sources of air pollution in Kathmandu Valley? Explain briefly the connection of air pollution to climate change.
- [2+3+3]
15. Explain the climate of Nepal.
- [8]
16. Write short notes on any TWO of the following:
- Tropical rainforest climate.
 - Savanna climate
 - Tropical monsoon climate
 - Sahara type climate
- [4+4]

OLD COURSE (MET.311 & 312)

Attempt SIXTEEN questions, including Q.No. 1 and 2, which are compulsory.

- Explain about the condensation nuclei in the formation and development of cloud droplets. Discuss the stability of the atmosphere on the basis of "Parcel method."
- What do you understand by monsoon? What is break in monsoon? Describe in detail the summer monsoon in Nepal.
- Define solar constant. Differentiate between Solar radiation and Terrestrial radiation.
- Discuss the adiabatic process of the atmosphere.
- What is thermodynamic diagram? How can we use this diagram for weather forecasting?
- What is climatology? Distinguish between Koppen's and Thorwaite's classification of the world climate.
- What is thunderstorm? Explain briefly about the life cycle of a thunderstorm.
- What is greenhouse effect? Describe the positive role of Carbon dioxide in the earth's atmosphere.
- Differentiate between frontogenesis and frontolysis. With neat diagrams explain various types of fronts.
- Write short notes on Fog and Cloud.
- Define adiabatic process. Establish the relation $Q/T = (1000/P)^{R/cp}$.

12. Find the geometric height corresponding to an elevation of 5000 geopotential meter (given $g = 980 \text{ cm/sec}^2$) [5]
13. Differentiate between wet bulb temperature and dry bulb temperature. When do the temperatures become equal? [2.5+2.5]
14. Discuss the role of western disturbances on winter rainfall distributions over Nepal. [5]
15. Explain, briefly the principle climates found in Nepal. [5]
16. What is entrainment? Deduce the lapse rate in an entraining cumulus cloud. [1+4]
17. Calculate the specific volume of a sample of light gas at pressure of 1015 mb at a temperature of 298°K .
(Specific heat constant = $2.8705 \times 10^{10} \text{ erg gm}^{-1}\text{k}^{-1}$) [5]
18. Discuss the role of Tibetan Plateau on monsoon circulation of South Asia. [5]
19. Write short notes on any TWO of the following:
 - a. Palo
 - b. Rainbow
 - c. Coronas [2.5+2.5]
20. Define a tropical cyclone. Discuss the life cycle of tropical cyclone. [1+4]

Meteorology I Paper (Met. 311), 2068

Bachelor Level / Science & Tech / I Year

Full Marks: 100

Time: 3 hrs.

Attempt TWELVE questions, including Q. No. 1 and 2, which are compulsory.

1. Describe the composition and structure of the earth's atmosphere with a schematic diagram. Explain the importance of the presence of carbon dioxide in the atmosphere. [6+4]
2. What is climatology? Distinguish between Koppen's and Thornwaite's classification of the world climate. Which one do you think the better and why? [1+6+3]
3. Explain the basic principles of temperature measurement. Describe a typical diurnal variation of earth's surface air temperature. [3+5]
4. Define and explain briefly the wetbulb temperature, virtual temperature, dew point temperature and potential temperature. [2+2+2+2]
5. Define geostrophic wind. Write down the Buys Ballot's law and explain its application in meteorology. [2+4+2]
6. Define precipitation. Describe forms and types of precipitation. Explain briefly the formation of precipitation. [1+4+3]
7. What is evaporation? What are the factors affecting evaporation? Explain a simple method of estimating evaporation. [1+3+4]
8. With a neat schematic diagram, describe hydrological cycle on the earth. [8]
9. Write the name of instrument used for the measurement of wind speed and direction. What is wind power? How can we utilize wind power to generate electricity? [1+2+5]
10. Write short notes on any TWO of the following:

- a. Kelvin scale of temperature
 - b. Barographs
 - c. Principles of wet bulb thermometers
 - d. Surface wind speed and friction layer [4+4]
11. What are the factors affecting solar radiation? Discuss briefly the depletion of solar radiation by earth's atmosphere. [4+4]
 12. Discuss the possible factors affecting the temperature of the earth's surface. [8]
 13. What do you understand by climate change? What would be the climate of Nepal if the concentration of CO₂ in the air were doubled? [2+6]
 14. What is air pollution? What are the sources of air pollution in Kathmandu Valley? Explain briefly the connection of air pollution to climate change. [2+3+3]
 15. Explain the climate of Nepal. [8]
 16. Write short notes on any TWO of the following:
 - a. Koppen's classification
 - b. Thornwaite's 1931 classification
 - c. Climate change
 - d. Tropical monsoon climate [4+4]

Meteorology I Paper (Met. 311), 2069

Bachelor Level/Science & Tech./I Year

Full Marks : 100

(For: Regular Examinee only)

Time : 3hrs.

Attempt TWELVE questions, including Q.No. 1 and 2, which are compulsory.

1. What do you understand by earth's atmosphere? Describe the composition and structure of the atmosphere with a schematic diagram. [2+8]
2. Differentiate between weather and climate. What are the factors affecting climate of Kathmandu Valley? Explain qualitatively the relationship between increasing number of vehicles and air temperature. [2+4+4]
3. Define and explain briefly the dew point temperature, surface temperature wet bulb temperature point temperature, surface virtual temperature. [2+2+2+2]
4. What do you understand by temperature lapse rate? Describe a typical diurnal variation of earth's surface air temperature. [3+5]
5. Explain briefly the relationship between atmospheric air density and atmospheric pressure. What are the factors affecting atmospheric pressure of the earth? [4+4]
6. Describe forms and types of precipitation. Explain briefly the formation of precipitation. [5+3]
7. What are the factors affecting evaporation. Explain a simple method of estimating evaporation. [4+4]
8. Describe hydrological cycle of a catchment with a neat schematic diagrams. [8]
9. Write the name of instrument used for the measurement of wind speed and direction? What are their units? Describe the relationship between wind speed and evaporation. [2+2+4]

10. Write short notes on any TWO of the following:
 - (a) Water vapour pressure
 - (b) Adiabatic process
 - (c) Temperature gradient
 - (d) Gradient wind
11. Differentiate between Solar radiation and Terrestrial radiation. Describe briefly heat exchange processes at the earth's surface. 8
12. Discuss the possible factors affecting the temperature of the earth's atmosphere. [8]
13. What do you understand by climatic parameters? Explain climate of 1 Kathmandu Valley in the past, present and future (i.e. expected climate). [3+5]
14. Explain the typical features of high-latitude and low-latitude climates. [4+4]
15. What is greenhouse effect? Give two examples of the evidence of the climate change. [3+5]
16. Write short notes on any TWO of the following:
 - (a) Tropical rainforest climate
 - (b) Savanna climate
 - (c) Tropical monsoon climate
 - (d) Sahara type climate

Meteorology I Paper (Met. 101-Physical Meteorology) 2070 (New course)

Four Year Bachelor Level/Science & Tech./I Year

Full Marks: 100

Meteorology

Time: 3 hrs.

Use Separate Answer Sheet for each subject

Full Marks: 50

Attempt TWO questions from Group "A" and FOUR from Group "B" and FOUR from Group "C".

GROUP "A"

(2×10=20)

1. Derive and explain the Clausius-Clapeyron equation.
2. Explain the basic principal of temperature measurement Describe a typical diurnal variation of air temperature near the earth's surface.
3. What are the factors affecting atmospheric pressure of the earth. Explain the relationship between air density and atmospheric pressure.

GROUP "B"

(4×5=20)

4. What are the factors affecting incoming solar radiation? Discuss briefly the depletion of solar radiation by earth's atmosphere.
5. Define and explain the Kelvin scale of temperature and the barograph.
6. Explain physical principal of temperature measurement of the earth's surface by a weather satellite.
7. Explain briefly the relationship between atmospheric density and atmospheric pressure.
8. Discuss the possible factors affecting temperature of the atmosphere.

GROUP "C"

(4×2.5=10)

- Give reasons for temperature inversion.
- What is T-phi gram diagram?
- Explain ICAO standard atmosphere.
- Write briefly about Radiosonde.
- What is an Aneroid barometer?

MET 102 -(Climatology)

Full Marks: 50

Attempt TWO questions from Group "A" and FOUR from Group "B" and FOUR from Group "C".

GROUP "A"

(2×10=20)

- Define an air mass. Describe about types of air masses and their modification.
- Describe formation of precipitation by Ice Crystal Theory and collision coalescence theory.
- Differentiate between solar radiation and terrestrial radiation. Draw a schematic diagram and describe the heat budget of earth's atmosphere.

GROUP "B"

(4×5=20)

- What is precipitation? Describe types of precipitation.
- Describe the role of western disturbance in Nepal.
- What are the factors affecting the distributions of insolation?
- Explain briefly about Tundra and Taiga climates.
- What is climatology? How do you study climate of a particular region?

GROUP "C"

(4×2.5=10)

- Describe insolation.
- Write a short note on atmospheric composition.
- Write short note on solar and terrestrial radiation.
- Write characteristics of Rain and Drizzle.
- Write a short note on Sahara type climate.

Meteorology I Paper (Met. 101-Physical Meteorology), 2071Bachelor Level (4 Yrs.)/1st Year/Science & Tech.

Full Marks: 100

Time: 3 hrs.

Use Separate Answer Sheet for each subject.

Full Marks: 50

Attempt TWO questions from Group "A" and FOUR from Group "B" and FOUR from Group "C".

GROUP "A"

(2×10=20)

- Describe the composition and structure of the atmosphere with a neat diagram. Explain the importance of presence of CO₂ in the atmosphere.
- Differentiate between Solar radiation and Terrestrial radiation. What are the factors affecting incoming solar radiation? Discuss vertical depletion of solar radiation by earth's atmosphere.
- Derive and explain Charles' law and Boyle's law.

GROUP "B"**(4×5=20)**

4. Draw an illustrative curve and explain the relationship between atmospheric density and atmospheric pressure.
5. What is isothermal atmosphere? Discuss the possible factors affecting temperature of the atmosphere.
6. What do you understand by a weather station? What is the difference between conventional weather station and automatic weather station?
7. What is a thermodynamic diagram? Explain its application in atmospheric analysis.
8. Explain briefly the factors affecting atmospheric pressure of the earth.

GROUP "C"**(4×2.5=10)**

9. What is emagram diagram?
10. Write short notes on LCL and CCL.
11. Write about atmospheric window.
12. What are dry and moist adiabatic lapse rate?
13. Write briefly about absolute humidity and relative humidity.

[MET 102 - (Climatology)]

Full Marks: 50

Attempt TWO questions from Group "A" and FOUR from Group "B" and FOUR from Group "C".

GROUP "A"**(2×10=20)**

1. Define weather and climate. Distinguish between Koppen's and Thronthwaite's classification of the worlds climate.
2. What is climate change? Why climate is changing? Explain possible consequences of climate change.
3. With a neat schematic diagram, explain possible factors affecting the distribution of solar insolation?

GROUP "B"**(4×5=20)**

4. Describe the depletion of solar radiation by earth's atmosphere.
5. Describe collision coalescence theory.
6. Write a definition of albedo. Describe briefly the reasons of variation of earth's surface albedo.
7. Describe heat budget of earth's atmosphere with a schematic diagram.
8. What is monsoon? Describe briefly characteristics features of summer monsoon in Nepal.

GROUP "C"**(4×2.5=10)**

9. What is an air mass?
10. Write in brief about the Albedo.
11. Explain briefly about climate change due to anthropogenic effect.
12. What is an air mass modification?
13. Write in brief about onset of summer monsoon in Nepal.

Meteorology I Paper (Met. 101-Physical Meteorology), 2072

Bachelor Level (4 Yrs. Prog.) I Year/Science & Tech.

Full Marks: 100

Time: 3 hrs.

Use Separate Answer Sheet for each subject.

Full Marks: 50

Attempt TWO questions from Group "A" and FOUR from Group "B" and FOUR from Group "C"

Group "A"

[2×10=20]

1. Derive and explain the Clausius- Clapeyron equation.
2. Write an essay about the composition of the earth's atmosphere.
3. What do you understand by thermodynamic diagram? Explain the Emagram in detail.

Group "B"

[4×5= 20]

4. What are the factors affecting incoming solar radiation? Discuss briefly the depletion of solar radiation by earth's atmosphere.
5. Define and explain briefly the virtual temperature and potential temperature.
6. Explain physical principle of temperature measurement of the earth's surface by a weather satellite.
7. Explain physical principle of temperature measurement of the earth's surface by a weather satellite.
8. Describe briefly dry and moist adiabatic lapse rate.

Group "C"

[4×2.5=10]

9. What is an Aneroid barometers?
10. What is T-phi gram diagram?
11. Explain ICAO standard atmosphere.
12. Write briefly about Radiosonde.
13. Why atmospheric pressure varies with altitude?

MET 102 – (Climatology)

Full Marks: 50

Group "A"

[2×10 = 20]

1. Define an air mass. Describe characteristics of air masses and their modification.
2. Describe formation of precipitation by Ice crystal Theory and collision coalescence theory.
3. Define surface albedo. Describe heat budget of earth's atmosphere with a schematic diagram.

Group "B"

[4×5 = 20]

4. What is climatology? How do study climate of particular region?
5. Describe the role of western disturbance in Nepal.
6. What are the factors affecting the distributions of insolation?
7. Explain briefly about Tundra and Taiga climates.
8. What is precipitation. Describe types of precipitation.

Group "C"

[4×2.5 = 10]

9. Describe solar insolation.

10. Write short note on solar and terrestrial radiation.
11. Write a short note on Sahara type climate.
12. Write characteristics of Rain and Drizzle.
13. Write a short note on atmospheric composition.

9. General Microbiology (MB. 311), 2066

Time : 3 hour

Full Marks : 100

Group "A"

Long answer questions:

5×10=50

Attempt ALL the questions.

1. Distinguish between classification and nomenclature. Classify bacteria based on temperature requirement for growth. [2+8]
2. Define sterilization. Explain the procedure of moist heat sterilization in bacteriology laboratory. [2+8]
3. Explain the steps of TCA cycle with diagram showing ATP generation. [10]
4. Distinguish between DNA, RNA, Plasmid, genome and genetic code. Explain conjugation process with diagram and example. [4+6]
5. Write down the scheme for classification of medically important viruses, with example for each group. [10]

Group "B"

Short answer questions:

7×5=35

Attempt ALL the questions.

6. Sketch the structure of Entamoeba histolytica.
7. Explain in brief the techniques of isolation and enumeration of Yeast and Mold.
8. Explain in brief the concept of host parasite relationship.
9. Describe Germ theory of disease in brief.
10. Explain the important roles of biomolecules in microorganisms.
11. Explain in brief the principle and procedure of MPN method.
12. Explain the steps of bacterial growth and factors affecting growth.

Group "C"

Very short answer questions:

5×3=15

13. Attempt any FIVE questions.
 - (a) Spontaneous Generation Theory
 - (b) Whittaker's Five Kingdom Concept
 - (c) Gram Staining
 - (d) Catabolism and anabolism
 - (e) Scope of Microbial Biotechnology
 - (f) Plasmodium Falciparum.