

M.Sc. 4th Semester Examination, 2024

APPLIED MATHEMATICS

(Lab : Meteorology (Skill Development Course))

(Practical)

PAPER – MTM-497 (B) (New)

Full Marks : 25

Time : 2 hours

Answer any one question from each Group

The figures in the right hand margin indicate marks

GROUP – A

Answer any one questions : 8 × 1

- 1. Find the relative humidity near the science building taking a set of 5 data.**
- 2. Calculate the saturation vapor pressure near the science building taking a set of 5 data.**

3. Calculate the vapor pressure near the science building taking a set of 5 data.
4. Find the dew point temperature by measuring dry bulb and wet bulb temperature near the science building taking a set of 5 data.
5. Calculate the wind speed and wind direction near the science building taking a set of 5 data.
6. Find the potential temperature of the air near the science building measuring wet and dry bulb temperatures taking a set of 5 data.
7. Find the specific humidity of the air near the science building measuring wet and dry bulb temperatures taking a set of 5 data.
8. Find the virtual temperature of the air near the science building measuring wet and dry bulb temperatures taking a set of 5 data.

GROUP – B

Answer any **one** questions :

4 × 1

9. Plot the air parcel having temperature 20°C , pressure 80 kPa at due point temperature -2.5°C on the tephigram. Find the saturation mixing ratio and the actual mixing ratio of the air parcel.
10. Find the due point temperature and relative humidity of the following air parcel : $T=25^{\circ}\text{C}$, $P=85$ kPa, mixing ratio = 5 gm/kg.
11. Initially an air parcel having the temperature 20°C , mixing ratio 4 gm/kg, pressure 800mb, is being lifted dry adiabatically to the pressure level 60 kPa. What is the state of the air parcel initially and finally (Using Tephigram) ?
12. What will be the height and pressure level of an air parcel initially having temperature 20°C , $P = 80$ kPa, $r = 4$ gm/kg ? When it reaches at saturation level ?

13. Initially for an air parcel $T=20^{\circ}\text{C}$, $P=800$ mb, $r=4$ gm/kg. What is the state of air parcel when it reaches a pressure height of 40 kPa ?
14. For the air parcel whose pressure is 80 kPa, temperature being 30°C and mixing ratio being 4 g/kg, find its dew point, saturation mixing ratio and relative humidity from thermodynamic diagram.
15. For the air parcel whose pressure is 90 kPa, temperature being 20°C and mixing ratio being 6 g/kg, using thermodynamic diagram, find its lifting condensation level, state of the air parcel when it reaches a pressure height of 40 kPa and how much liquid water has been condensed out at that height ?
16. Determine the new state of the air parcel having initial temperature $=25^{\circ}\text{C}$, mixing ratio $=5$ gm/kg and pressure $=80$ kPa after being lifted dry adiabatically to the pressure level 60 kPa.

17. For the air parcel whose pressure is 70 kPa, temperature being 20°C and mixing ratio being 4 g/kg, find its lifting condensation level, state of the air parcel when it reaches a pressure height of 40 kPa and how much liquid water has been condensed out at that height ?

GROUP - C

Answer any **one** questions : 3 × 1

18. Plot the following data around a surface station model when the atmosphere has the following status: in present weather there is a thunderstorm, in past weather there was a moderate rain and the pressure tendency in last 3 hours is 0.3 mb, temperature being 25°C and wind blowing from north-west direction with speed 20 knots.
19. Plot the following data around a surface station model when the atmosphere has the following status: in present weather there is a thunderstorm, in past weather there was a light snow and the pressure tendency in last 3 hours is -0.3 mb, temperature being 25°C and wind blowing from south-east direction with speed 20 knots.

20. Plot the following data around a surface station model when the atmosphere have the following: Temp 45°C , dewpoint 29°C , over-cast, wind from SE at 25 knots, weather light rain, pressure 1112.5 mb.
21. Plot the following data around a surface station model when the atmosphere has the following status: in present weather there is a heavy rain, in past weather there was a moderate rain and the pressure tendency in last 3 hours is -0.3 mb, temperature being 25°C and wind blowing from north-west direction with speed 55 knots.
22. Plot the following data around a surface station model when the atmosphere has the following status : in present weather there is a fog, in past weather there was a light snow and the pressure tendency in last 3 hours is $+1.2$ mb, temperature being 25°C and wind blowing from north-east direction with speed 75 knots.

23. Plot the following data around a surface station model when the atmosphere have the following: Temp 35°C , dewpoint 20°C , overcast, wind from SE at 15 knots, weather light rain, pressure 990.5 mb.

Note Book + Viva	5
Field Work	5

