

2016

M.Sc. 4th Seme. Examination

**APPLIED MATHEMATICS WITH OCEANOLOGY AND  
COMPUTER PROGRAMMING**

**PAPER—MTM-405 (Unit-II : OM)**

*(Practical)*

Full Marks : 25

Time : 1 Hour

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their  
own words as far as practicable.*

*Illustrate the answers wherever necessary.*

**Special Paper : (Dynamical Meteorology-II)**

Answer any one question from each group.

**Group-A**

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1. Find the dew point temperature by measuring dry bulb and wet bulb temperature near the science building taking a set of 5 data.
2. Calculate the vapor pressure near the science building taking a set of 5 data.

*(Turn Over)*

3. Calculate the saturation vapor pressure near the science building taking a set of 5 data.
4. Find the mixing ratio of the air near the science building measuring of wet and dry bulb temperatures taking a set of 5 data.
5. Find the relative humidity near the science building taking a set of 5 data.
6. Calculate the wind speed and wind direction near the science building taking a set of 5 data.

**Group-B**

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7. In the chart below you find meteorological data that was taken at several different cities in India. Use this data to create the station models for each city listed in the table.

City	Temp (°F)	Dew point	Wind		Air Pressure (mb)	Sky	Present Weather
			Direction	Speed (Knot)			
Arambag	75	68	W	50	1011	25%	Light Rain
Ghatal	55	54	SE	10	1008	overcast	snow
Chandrakona	65	62	SW	65	995	75%	drizzle
Kamarpukur	72	72	NW	30	1009	100%	thunderstorm

8. In the chart below you find meteorological data that was taken at several different cities in India. Use this data to create the station models for each city listed in the table.

City	Temp (°F)	Dew point	Wind		Air Pressure	Sky	Present Weather
			Direction	Speed			
Kharagpur	70	68	SW	25	998	75%	Fog
Egra	48	45	S	10	980	25%	snow
Contai	70	69	SW	15	1005	55%	clear
Haldia	75	72	W	30	999	overcast	thunderstorm

9. In the chart below you find meteorological data that was taken at several different cities in India. Use this data to create the station models for each city listed in the table.

City	Temp (°F)	Dew point	Wind		Air Pressure	Sky	Present Weather
			Direction	Speed			
Calcutta	69	60	NE	40	1007	50%	none
Burdwan	55	51	S	30	1005	overcast	snow
Durgapur	72	68	SW	20	1010	25%	drizzle
Malda	72	70	W	10	1011	100%	thunderstorm

**Group-C (Using Thermo diagram)**

4

10. An air parcel ascends from the position where pressure is 1000 mb and temperature is 25°C, to the level where pressure is 600 mb in an isothermal atmosphere. Determine its geo-potential height.
11. For an air parcel whose temperature, pressure and dew point are 20° C, 90 kPa and -2.5° C respectively. How this air parcel can be represented on a thermo diagram. Hence determine its relative humidity.

12. How much liquid water has been condensed out at the height 40 kPa if adiabatic ascent is occurred for an air parcel initially has temperature =  $30^{\circ}\text{C}$ , mixing ratio = 4 gm/kg and pressure=10 kPa ?
13. Suppose an air parcel initially temperature = $25^{\circ}\text{C}$ , mixing ratio= 5 gm/kg and pressure=80 kPa ascends adiabatically at P=40 kPa and here it is supposed that 1 gm/kg of liquid water falls out leaving the remaining liquid water as cloud droplets that stay with the parcel. If this parcel descends, then what is its new LCL and thermo state back at 80 kPa ?
14. Determine the new state of the air parcel having initial temperature =  $30^{\circ}\text{C}$ , mixing ratio = 5 gm/kg and pressure = 100 kPa after being lifted dry adiabatically to the pressure level 60 kPa.
15. For the air parcel whose pressure is 70 kPa, temperature being  $20^{\circ}\text{C}$  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 ?
16. Air initially at 90 kPa has temperature  $35^{\circ}\text{C}$  and dew point temperature of  $20^{\circ}\text{C}$ . It rises to a height where the pressure is 50 kPa. Precipitation reduces the total water by 5 g/kg and the parcel radiatively cools by  $10^{\circ}\text{C}$  while at cloud top. Finally the parcel descends back to 100 kPa. What is the final relative humidity ?

Field Work	5
Note Book + Viva	5