

U.G. 5th Semester Examination - 2020

PHYSICS

[HONOURS]

Discipline Specific Elective (DSE)

Course Code : PHY(H)-P-DSE-02/PR

[PRACTICAL]

(Atmospheric Physics)

Full Marks : 20

Time : 2 Hours

The figures in the right-hand margin indicate marks.

1. Answer any **two** questions: 10×2=20

A) Define the following Atmospheric waves –

i) Kelvin Waves

ii) Rossby Waves

Briefly discuss the Perturbation methods of representing atmospheric waves with proper illustrations. What is Numerical Weather Prediction? 1+1+6+2

B) Draw an Environmental Lapse Rate on the provided Skew T Diagram and comment on the atmospheric stability conditions. Identify the Melting Layer Height from the data sheet provided. 8+2

[Turn over]

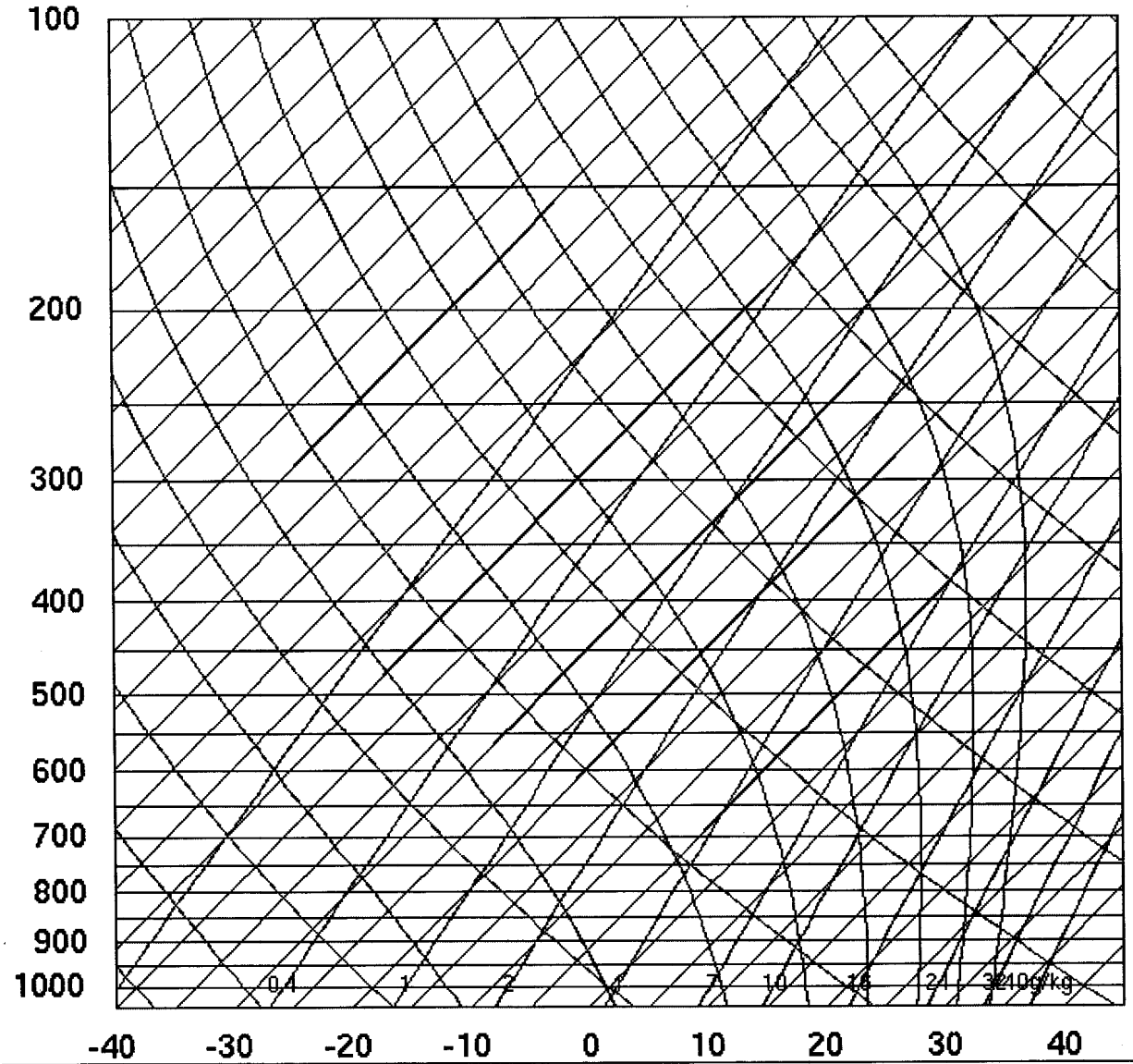
C) Describe the working principle of a LIDAR. What are the applications of LIDAR in atmospheric system studies? Give examples of some space borne LIDAR databases. 4+4+2

D) What is time series analysis? What is the relationship with periodicity? How can time series analysis be utilized to represent the temperature fluctuations from prehistoric data? 4+2+4

E) State the equation to determine the rain rate from RADAR reflectivity. Consider the attached RADAR Reflectivity profile and estimate highest and lowest rain rates assuming thunderstorm conditions. What is the difference between X band and S band RADAR? 3+5+2

B)

42809 VECC Calcutta



Station information and sounding indices

Station identifier: VECC
 Station number: 42809
 Observation time: 200519/0000
 Station latitude: 22.65
 Station longitude: 88.45
 Station elevation: 6.0
 Showalter index: 2.89
 Lifted index: -5.51
 LIFT computed using virtual temperature: -6.19
 SWEAT index: 187.20
 K index: 12.70
 Cross totals index: 15.10
 Vertical totals index: 26.10
 Totals totals index: 41.20
 Convective Available Potential Energy: 2610.88
 CAPE using virtual temperature: 2901.75
 Convective Inhibition: -81.94
 CINS using virtual temperature: -23.56
 Equilibrium Level: 121.28
 Equilibrium Level using virtual temperature: 121.07
 Level of Free Convection: 795.95
 LFCT using virtual temperature: 852.82
 Bulk Richardson Number: 1948.57

 Bulk Richardson Number using CAPV: 2165.65
 Temp [K] of the Lifted Condensation Level: 297.36
 Pres [hPa] of the Lifted Condensation Level: 932.35
 Equivalent potential temp [K] of the LCL: 365.90
 Mean mixed layer potential temperature: 303.39
 Mean mixed layer mixing ratio: 20.97
 1000 hPa to 500 hPa thickness: 5814.00
 Precipitable water [mm] for entire sounding: 48.72

E)

