

**Major Exam – Semester II (2014-2015)
General Meteorology (ASL830)**

**Max Marks: 40
Time: 2 hour**

Answer all the questions.

1. a) Derive the dynamical equations in a rotating coordinate system as its application to the Newton's second law. Apply the same results to events on a spherical earth. 6
- b) What is the magnitude of the total Coriolis force acting on a bullet of mass m , fired with speed c from latitude ϕ , whose path lies in a plane containing the earth's axis,
- (i) at angles ϕ from the zenith? $f = 2\Omega \omega \sin \phi$
- (ii) at angles $90^\circ - \phi$ from the zenith? $v = 2\omega c$

2. a) Discuss the Gradient Flow. Give full derivation of its equation with solution and discussion of different cases. Compare it with geostrophic values. 4+2

- b) The equation of geostrophic flow on a surface of constant temperature may be written as $fu = -(\partial\psi/\partial y)_\tau$; $fv = (\partial\psi/\partial x)_\tau$. Derive an expression for ψ . 4

3. Explain the following in detail:

- a) Terrestrial radiation. 2+2+4
- b) Radiative equilibrium in the stratosphere.
- c) Discuss the Elsasser diagram for downward flux arriving at the surface; Net flux at selected level.

4. a) Show that the equation for an adiabatic process may be written as 2
- $$p\alpha^\gamma = \text{Const. or } \alpha T^{(C_v/R)} = \text{Const.}$$

b) Explain the following:

- i) Equivalent temperature $T_e = T_{exp}$
- ii) Wet bulb potential temperature. 2+2+2
- iii) Dew point temperature.

- a) Height computation for upper air soundings with derivation. 4.

$\frac{pV}{T} = \text{const.}$

pV^γ

DBT,
WBT
DPT
WBT

C_p