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?

(ii) at angles $90^0 - \phi$ from the zenith? 4

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 $\mathbf{fu} = -(\partial\psi/\partial y)_\tau$; $fv = (\partial\psi/\partial x)_\tau$. Derive an expression for ψ. 4

3. Explain the following in detail:

a) Terrestrial radiation.

b) Radiative equilibrium in the stratosphere.

c) Discuss the Elsassar diagram for downward flux arriving at the surface; Net flux at selected level. 2+2+4

4. (a) Show that the equation for an adiabatic process may be written as

$p\alpha^\gamma = \text{Const.}$ or $\alpha T^{(Cv/R)} = \text{Const.}$

b) Explain the following:

i) Equivalent temperature

ii) Wet bulb potential temperature.

iii) Dew point temperature. 2+2+2

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