FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND SCIENCE EDUCATION
DEPARTMENT OF GEOGRAPHY

SECOND SEMESTER EXAMINATION 2010/2011 SESSION

COURSE CODE; (MET 522) 3 Units

Course Title: Advanced Topics in Atmospheric Dynamics

Instructions: Answer any **FOUR** Questions, the use of relevant equations, illustrations and diagrams will be rewarded.

Time allowed: 2hrs 30 minutes.

1. Explain in detail how the atmosphere responds to the various forcings of atmospheric dynamics to maintain a balance.
2. Discuss the thermodynamic concept of temperature and pressure of air as a fluid with emphasis on the conservation laws governing the fluid in a rotating frame of reference.
3. The analytical solution to momentum, mass, energy and state equations are very difficult due to boundary conditions, turbulence and non-linearity. Treatise on various remedies available to solve these problems in order to define the real state of the atmosphere.
4. Write short notes on any FIVE of the following:
   (a) Stability of the hydrostatic balance;
   (b) Potential instability;
   (c) Conditional instability of the second kind (CISK);
   (d) Equivalent potential temperature;
   (e) Convective available potential energy;
   (f) Thermodynamic diagrams and
   (g) Precipitation processes.
5. Envisioning the atmosphere as being powered by a heat engine, explain the relevance of the fuel that drives the engine.
6. Discuss the various problems associated with the prediction of weather in the tropics and suggest possible solutions.