

SMT-S 408

**M-403: Climate Modelling**

2007-2008

**Unit-I:**

General circulation and climate modelling: Introduction to climate modelling.

Energy balance models - their structure; Zero dimensional energy balance models; one dimensional energy balance models.

Radiative convective models : The structure of Global Radiative convective models : Radiation computation - Short wave radiation, long wave radiation, heat balance at the ground, Convective adjustment ; Sensitivity experiments with Radiative convective models.

Two dimensional models - zonally averaged climate models - spatial and temporal structure ; statistical and dynamical climate models; representation of convection, cloud cover, precipitation, radiation and surface characteristics in 2-D SDMs.

**Unit-II:**

Three dimensional atmospheric general circulation models - the structure of General circulation climate models.

Numerical information - Grid point general circulation models; Phillips experiment.

Spectral general circulation models - Spectral method; Triangular and Rhomboidal truncation; Spectral Transform method.

**Unit-III:**

Physics in general circulation climate models - Radiative Transfer, Boundary layer; Surface parameterization; convection; Large scale rainfall.

Regional climate models: Formulation; boundary conditions, specific applications.

Ocean modelling: Basic equations, wind driven barotropic models, simple thermohaline models, baroclinic models, mixed layer models.

**Text Books:**

1. Introduction to three dimensional general circulation models. W.M. Washington and Parkinson.
2. A Climate Modelling Primer. A. H. Sellers and K. McGuffie
3. Numerical prediction and dynamic meteorology. G.J. Haltiner and R.T. Williams. John Wiley.