PG/IS/RSG-103/11

M.Sc. 1st Semester Examination, 2011

REMOTE SENSING AND GIS

PAPER – RSG-103(Gr.-A + B)

(Theory)

Full Marks : 40

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

GROUP – A

(*Basics and Physics of Remote Sensing, Platform and Sensor*)

[*Marks* : 20]

Answer any **two** questions

1. (*a*) With the help of a neat sketch/diagram explain semimajor and semiminor axis.

(*b*) What is eccentricity of an orbiting satellite ?

(*c*) Write Kepler's laws to describe an artificial satellite orbiting the earth.

(*d*) Derive period of an artificial satellite orbiting the earth from Newton's laws of motion (Gravitation) and the satellite's centrifugal force in orbit. 1 + 1 + 3 + 5

2. (*a*) What is resolution of a sensor ?

(*b*) Briefly describe all sensor resolution.

(*c*) Why is clear non-turbulent water blue/green in the visible part of the spectrum and black in the near infrared. 2 + 5 + 3

3. (*a*) Briefly describe the principles of whiskbroom and pushbroom scanners. What are the advantages and disadvantages of each of these systems ?

(*b*) Draw a neat sketch of spectral reflectance curve for vegetation, water and soil ranging from visible to IR wavelengths. Briefly describe the salient features of these curves. 5 + 5

4. (*a*) What is the thermal infrared radiation ?

   (*b*) Which part of the wavelength of the electro-magnetic spectrum is used in thermal remote sensing ?

   (*c*) Define kinetic and radiant temperature.

   (*d*) Write short notes on thermal inertia and apparent thermal inertia. 1 + 1 + 4 + 4

GROUP – B

[*Marks* : 20]

Answer any **two** questions

1. What are the basic components of a typical radar system and their function in creation of a SLR Image ? How Slant Range (SR) is measured ? Write down the advantages and disadvantages of microwave remote sensing ? 6 + 1 + 3

2. Write down the parameters which control the ground resolution cell size of a SLR system and how they affect the Range and Azimuth resolution. Explain the fundamental difference between a synthetic aperture radar (SAR) and real aperture radar (RAR) ? What do you mean by point of zero doppler ? 6 + 3 + 1

3. Answer any *four* : $2\frac{1}{2} \times 4$

   (*i*) 'Diurnal effect' upon the interpretation of thermal imagery.

   (*ii*) Kirchhoff radiation Law.

   (*iii*) LiDAR system

   (*iv*) Band selection of Hyperspectral data.

   (*v*) Radar Image speckles.

4. Is it possible to predict presence of minerals in soil and rocks that from hyperspectral signatures ? How does the spectral signature of Dolomite differ from that of Kaolinite between 5 μm to 30 μm. What are absorption bands ? What are three main components of LiDAR system technology ? 3 + 3 + 1 + 3