PG/IS/RSG-103/12

M.Sc. 1st Semester Examination, 2012

REMOTE SENSING AND GIS

PAPER—RSG-103 (Gr.-A + B)

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*) What do you understand by remote sensing ?

(*b*) Explain various interactions of incident electro-magnetic energy with the atmosphere.

(*c*) Derive the relation amongst the wavelength, frequencies and the energy content of a photon. 3 + 3 + 4

2. (*a*) What is spectral reflectance curve and what are its utilities in remote sensing ?

(*b*) Discuss on the spectral reflectance characteristics of water, vegetation and bare ground.

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

3. (*a*) Briefly describe the resolutions of a remote sensing sensor/data acquisition system.

(*b*) What is meant by resolution and precision in RS spatial data ? 8 + 2

4. (*a*) Evaluate the equation of orbital time period of a satellite which is moving on a circular orbit.

(*b*) Write the difference between sun-synchronous and geosynchronous orbit.

(*c*) Calculate the speed of satellite which is moving in a circular orbit with radius 4,2,164 km. 4 + 3 + 3

GROUP – B

[*Marks* : 20]

Answer any *two* questions

1. Describe how the geometrical and electrical properties of the target influence the radar return. Explain with neat diagram how pulse length of the RADAR signal controls the range resolution of a SLAR Image ? A SLAR system sends pulser for a period of 0·2 μsec. Find out the range resolution of the system at a depression angle of 45°. 4 + 4 + 2

2. Write down the fundamental differences in the nature of relief displacement of aerial photograph and RADAR Image ? Describe 'Fore-shortening' 'Layover' and 'shadows' of a RADAR Image. What is the advantage of polarized RADAR energy ? 2 + 6 + 2

3. What is the relation between 'Angular beam width' of a RADAR signal with the 'Antenna length' and 'beam width' of the transmitted pulse ? How a narrower beam width can be achieved by synthesizing a virtual antenna length ? What do you mean by 'multiple look' on 'non-coherent integration' for speckle supression ? 3 + 5 + 2

4. (*a*) What are basic differences between Hyperspectral and Multispectral imaging ? Explain Radiance and Reflectance. Write a note on Transmittance of atmosphere at wavelengths 1·4-1·5 μm and 1·8-2·0 μm.

(*b*) What is the concept of a Perfect Blackbody (BB) ? What do you mean by the Wien Displacement Law ? (2 + 2 + 1) + (2 + 3)