# 2016

## M.Sc. 1st Semester Examination

## REMOTE SENSING & GIS

**PAPER—RSG-101**

*Full Marks* : 40

*Time* : 2 Hours

*The figures in the margin indicate full marks.*

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

*Illustrate the answers wherever necessary.*

### Group-A

*(Fundamental and Physics of Remote Sensing)*

[ Marks : 20 ]

Answer any *two* questions.

**1.** (a) What do you understand by remote sensing ?

(b) What are the major advantages of remote sensing for earth resource study ?

(c) Can scanner system operate in the visible range of the electromagnetic spectrum ? 2+4+4

2. (a) Derive the relation amongst the wavelength, frequency and the energy content of a photon.

   (b) What is the wavelength of electromagnetic radiation which has a frequency of $5 \times 10^8$ Hz ?

   (c) What type of electromagnetic radiation has this wavelength ? Give C (Speed of Light) = $3 \times 10^8$ m/s.

   5+3+2

3. (a) Explain the characteristics of electromagnetic radiation.

   (b) What is "spectral reflectance curve" ? Sketch the spectral reflectance curve of vegetation, waterbody and bare earth. 5+5

4. Write short notes on any *two* : 2×5

   (a) Standard False Colour image.

   (b) Implication of "Stefan-Boltzman" law in remote sensing.

   (c) Black body radiation.

   (d) Radiant and Kinetic temperature.

## Group-B

*(Platform and Sensors)*

[ Marks : 20 ]

Answer any *two* questions.

**1.** (i) State Kepler's laws of planetary motion.

(ii) Suppose the Space Shuttle is in orbit about the earth at 400 km above its surface. Determine the orbital speed and the orbital period of the Space Shuttle.
[$G = 6.673 \times 10^{-11}$ $Nm^2/kg^2$, $M_{earth} = 5.98 \times 10^{24}$ kg, $R_{earth} = 6.37 \times 10^6$ m] 5+5

**2.** (i) Compare Sun-synchronous, Geo-synchronous and Geo-stationary orbit characteristics (with sketches).

(ii) Explain orbit cycle and revisit capability of cartosat-1 (with proper illustration).

(iii) Describe Whisk-broom and Push-broom scanners mentioning number of bands and detectors used in LANDSAT-TM and IRS LISS-III. 3+3+4

**3.** (i) What factors are responsible for microwave backscattered signals upon interaction with ground ?

(ii) Describe different technologies used in Lidar System.

(iii) Compare satellite ground track of inclined geo-synchronous orbit and geosynchronous elliptical orbit on equator.

(iv) "Objects moving in uniform circular motion will have a constant speed but does not have a constant velocity" — explain the statement. 3+3+2+2

**4.** Write short notes on :

(i) Escape velocity ;

(ii) Path Row and Scene of a satellite image ;

(iii) Ascending and descending nodes ;

(iv) Application areas of active and passive Microwave Remote Sensing ;

(v) LIDAR data clouds. 2+2+2+2+2

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