

Model answer
AS-2286
M.Sc. –Rural Technology (Third Semester)
Examination, 2013
RT-902R: Remote Sensing and Spatial Application-I

Total: 60marks

Section A

Q.1. Multiple choice questions (Answer all questions) (10x2 = 20)

1. All
2. Open forest
3. Wave length
4. Both
5. 8.5
6. Both
7. Both
8. All
9. Infra red region
10. IKNOS

Section B

Short answer type questions (Answer any 4 questions) (4 x 5 = 20)

2. Wild life- includes all non-domesticated plants, animals, and other organisms. Wild life management is the judicious use of wild resources towards the attainment of scientific, ecological, economical, ethical, aesthetic and recreational objectives for the benefit of human beings and for the improvement of nature. Food management – Fodder yield from forest is regulated by practises such as planting or sowing of fodder species, ploughing, controlled burning, pasture improvement and grazing control. Water management- This can be managed by water holes, springs, Reservoir, and self-filling devices such as Guzzler Shelter management - refers to quality and quantity of the arrangement of essential need for the existence of an animal. It

describes the continuity of shelter for animal requirement. Protective cover, Hedgerow, Brush piles artificial roost, nesting cover, can do this. Habitat management- Habitat is sum total of environmental condition of a specific place occupied by a wildlife species or a population of such species.

3. Water logging refers to the saturation of soil with water. Soil may be regarded as waterlogged when the water table of the groundwater is too high to conveniently permit an anticipated activity, Causes of water logging –Heavy rainfall, Floods, construction of railway track, seepage from canal assessment of water logging hazards Moreover, only surface expression of waterlogged areas can be captured on the satellite imagery. Hence, for the purposes of water logging risk assessment it is essential to undertake groundwater modelling, using a combination of remotely sensed information, ancillary field information such as water table time series, and a distributed physically based model to generate future scenarios.

4. The digital image is composed of two-dimensional array of pixels each pixel corresponds to the average brightness or radiance. This is measured electronically over the ground area corresponding to each pixel. The digital number are simply positive integers that result from quantizing the original electrical signal from the sensor in to positive integer values using a process called analogue to digital (A to D) signal conversion. The digital image processing refers to the manipulation and interpretation of digital images with the help of a computer. The digital image processing includes image rectification, image enhancement, image classification, modelling etc.

5. Forests provide a range of benefits (both market and non-market) to the society. These non-market benefits (NMBs) or intangible benefits include open access recreation, public amenity and landscape benefits. Urban forests or urban greens are one of such resources, which are responsible for various environmental, recreational and educational benefits to the human society.

6. Forest fire is the regular event year after year. There are different causes of forest fire (Intentional and Un intentional) Fire can be classified in to ground fire, surface fire, crown fire. Forest fire can have a large impact on both economy and ecosystem. Hence, it needs monitoring for restoring the fire damaged forest region. Traditionally forest fire has been detected using fire lookout towers at high points in a forested area. Unreliability of human observation in addition to difficult life condition for fire lookout personnel have led to the development of auto video surveillance system. More advanced forest fire detection system are based on satellite imagery, AVHRR, MODIS (IRS AWiFS) are used for active forest fire detection

7. A survey is made to physically establish a location in the field. Two methods are used to obtain this information. One method, referred to as “conventional survey”, obtains all of necessary information in the field. Conventional surveys may be conducted by traditional means such as by tapping the traditional knowledge, which can be done by interviewing, involving local people, group discussion. It includes direct measurement of vegetation, Census survey, plot method, plot less method, PCQ method, Transect sampling, Bell transect, line intercept.

Section C

Long answer type question (Answer any 2 questions) (2x10=20)

8. Agriculture is the backbone of Indian economy, providing livelihood to about 67% of population and contributing approximately 35% to GDP of the country. Agricultural productivity substantially increased during post independence era; however, it needs to be further enhanced to meeting the food requirements of burgeoning population. The appropriate planning and judicious management of resources are quite important for sustainable agricultural production. Remote sensing and GIS tools are recognized indispensable tools for monitoring and mapping of natural resources including agriculture crops. Different spectral and spatial resolutions of satellite remote sensing made it possible for the modelling the crop responses in varied conditions. The following are the major applications of agriculture in remote sensing:

- Crop inventory
- Crop identification
- Acreage estimation
- Crop forecasting
- Yield modelling
- Crop a biotic stress
- Crop biotic stress
- Soil salinity
- Water logging and flood zone mapping
- Soil erosion mapping

9. Plant diseases and pests can affect a wide range of commercial crops, and result in a significant yield loss. It is reported that at least 10% of global food production is lost due to plant diseases. Disease and pest control could be more efficient if disease and pest patches within fields can be identified timely and treated locally. This requires obtaining the information of disease infected

boundaries in the field as early and accurately as possible. The most common and conventional method is manual field survey. The traditional ground-based survey method requires high labour cost and produces low efficiency. Thus, it is unfeasible for large area.

Remote sensing technology can provide spatial distribution information of diseases and pests over a large area with relatively low cost. The presence of diseases or concentrations, cell structure, nutrient, water uptake, and gas exchange. These changes result in differences in colour and temperature of the canopy, and affect canopy reflectance characteristics, which can be detectable by remote sensing. Therefore, remote sensing provides a harmless, rapid, and cost-effective means of identifying and quantifying crop stress from differences in the spectral characteristics of canopy surfaces affected by biotic and a biotic stress agents. Remote sensing technology provides a possible way to detect the incidence and severity of the disease rapidly.

The interaction of electromagnetic radiation with plants varies with the wavelength of the radiation. The same plant leaves may exhibit significant different reflectance depending on the level of health and or vigour. Healthy and vigorously growing plant leaves will generally have

1. Low reflectance at visible wavelengths owing to strong absorption by photoactive Pigments (chlorophylls, anthocyanins, carotenoids).
2. High reflectance in the near infrared because of multiple scattering at the air-cell Interfaces in the leaf's internal tissue.
3. Low reflectance in wide wavebands in the short-wave infrared because of absorption by Water, proteins, and other carbon constituents.

For example the incidence and severity of yellow rust can be monitored according to the differences of spectral characteristics between healthy and disease plants. Hyper spectral remote sensing is one of the advanced and effective techniques in disease monitoring and mapping.

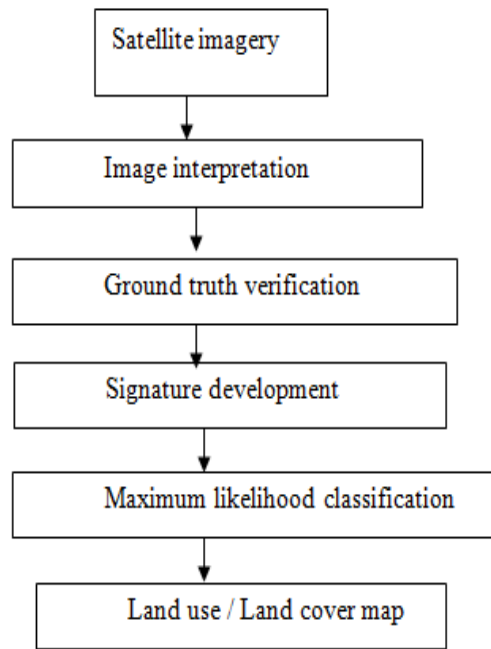
10. The classification of land use differs in different countries. In India land use classification given by National Remote Sensing Agency is widely followed for remote sensing based land use classification. It is a two level classification system and hence depending upon the intensity and the level of classification varies. First level refers the major land use and second level subdivides the major land use.

Classification scheme adopted for land use mapping

S.No.	Level 1	Level II
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1.	Building lands	1.1 Settlement
2.	Agricultural lands	2.1 crop land 2.2 Plantation cropland 2.3 Fallow
3.	Wasteland	3.1. Salt affected land 3.2. Waterlogged land 3.3. Marshy land 3.4. Gullied Ravenous 3.5. Land with or without scrub 3.6. Sandy area 3.7. Barren rocky
4	Forest	4.1 Evergreen semi evergreen forest 4.2 Deciduous forest 4.3 Degraded forest 4.4 Forest blank 4.5 Forest Plantation 4.6 Mangrove 4.7 Shifting cultivation
.5	Water bodies	5.1 River stream 5.2 Reservoir
6	Wetland	6.1 Coastal wetlands 6.2 Inland wetlands
7.	Others	7.1 Snow covered land

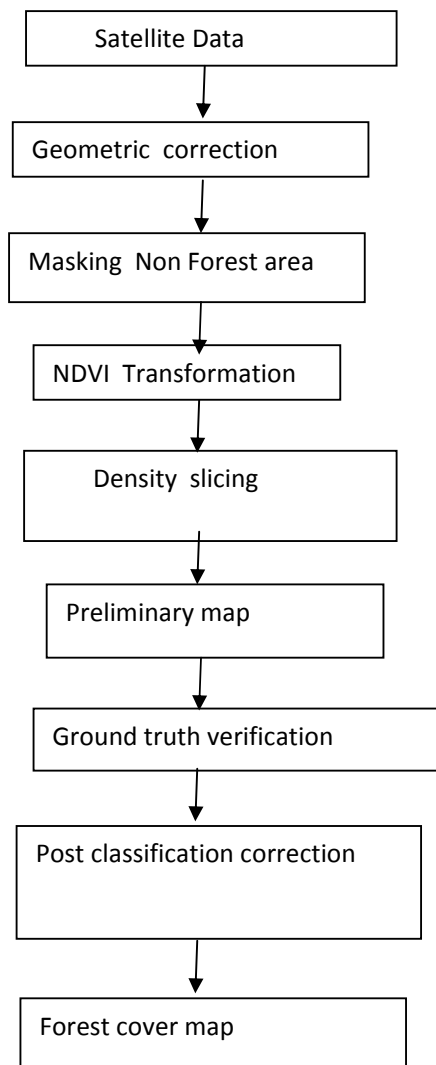
Methodology



11. Forest cover is defined as an area more than 1 ha in extent and having tree canopy density of 10 percent and above This definition is based on the resolution of digital satellite data (pixel size 23.5m x 23.5m), scale of interpretation (1:50,000) and the technique employed for image processing. The minimum area of 1 ha for forest cover has been kept because this is the smallest area that can be delineated on a map at 1:50,000 scale.

In India Forest survey of India monitors and map country forest cover on biennial basis Now FSI assess forest cover using satellite based remote sensing data and publishes state of forest report (SFR) .

Methodology adopted



The forest cover is broadly classified in 4 classes, namely very dense forest, moderately dense forest, open forest and mangrove. The classification of the cover into dense and open forests is based on internationally adopted norms of classification.

Very dense Forest	All Lands with tree cover (Including mangrove cover) of canopy density of 70% and above
Mod Dense forest	All lands with tree cover (Including mangrove cover) of canopy density between 40% and 70% above
Open forest	All lands with tree cover (Including mangrove cover) of canopy density between 10% and 40%
Scurb	All forest lands with poor tree growth mainly of small or stunted trees having canopy density less than 10 percent
Non Forest	Any area not included in the above classes
