*Total number of printed pages: 10* **Programme(PG)/3rd/PCSE312**

**2022**

# ADVANCED DIGITAL IMAGE PROCESSING

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*



**1. Answer the following questions:**

**a) Match the "Satellites (sensor)" with their "Spatial & Spectral resolution":** 1x8=8

| Satellite (sensor) | Spatial & Spectral resolution |
|---|---|
| IKONOS | 0.55 m (PAN), 2.16 m (MS) |
| Quick Bird | 0.46 m (PAN), 1.84 m (MS) |
| GeoEye-1 | 2.5 or 5 m (PAN), 10 m (bands 1-3), 20 m (band 4) |
| Landsat | 30 m (bands 1-220) |
| SPOT 5 | 23.5 m (bands 1-3), 70.5 m (band 4) |
| Meteosat | 1 m (PAN), 4 m (bands 1-4) |
| IRS (LISS-3) | 15 m (PAN), 30 m (bands 1-5, 7), 60 m ( band 6) |
| EO-1 (Hyperion) | 1 km (PAN), 3 km (all other bands) |

**b) True or False:** 1x12=12

**(i)** Sparse annotation has very small proportion of pixels are assigned semantic classes.
**(ii)** Scribble-level annotation is also called as line level annotation.
**(iii)** Image Segmentation is used for object based classification.
**(iv)** Boundary regulated network (BR-Net) is a correction neural network model.
**(v)** Maximum Likelihood and Minimum-Distance (MD) are object based classification methods.
**(vi)** Regions Segmentation is used for pixel based classification.
**(vii)** Radiometric calibration is used to improve the quality of original image.
**(viii)** 'WI' Index is used to extract vegetation.
**(ix)** 'NDVI' Index is used to extract vegetation.
**(x)** Ensemble classification methods are better than each individual method.
**(xi)** Geostationary Satellite is stationary relative to earth.
**(xii)** Geo-synchronous Satellite is corresponding to geostationary orbit.

**2. a)** Describe SVM and its working different scenarios. 8

**b)** Explain the four tuning parameters of SVM classifier. 12

**3. a)** What is accuracy assessment of classification? 2

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|---|---|---|---|
| | **b)** | Explain all the different measures for Accuracy Assessment with the formulations. | 12 |
| | **c)** | What do you mean by Biophysical modelling and its types? | 6 |
| | | | |
| **4.** | **a)** | Write down the steps used for preparing land use land cover classification map using back propagation neural network algorithm in ENVI software. | 10 |
| | **b)** | Describe the hyperspectral remote sensing with hyperspectral image analysis, Derivative analysis and Atmospheric Correction. | 10 |
| | | | |
| **5.** | Write short notes on the following (***any four***): | | 4x5=20 |
| | **a)** | Frequency domain | |
| | **b)** | Image Texture | |
| | **c)** | Hyperspectral sensors | |
| | **d)** | ASD SpectroRadiometer | |
| | **e)** | LULC classification scheme in 4 levels | |
| | | | |
| **6.** | Differentiate between the following (***any four***): | | 4x5=20 |
| | **a)** | Monotonically increasing and Strictly monotonically increasing | |
| | **b)** | Harmonic mean filter and Contraharmonic mean filter | |
| | **c)** | Cartosat-DEM and SRTM-DEM | |
| | **d)** | Multispectral and Hyperspectral | |
| | **e)** | FCM and PCM | |