Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
June, 2018

Level : B.E.
Year : IV
Course : GEOM 402
Semester : I

Exam Roll No.:
Time: 30 mins.
F. M. : 10

Registration No.:
Date JUN 11 2018

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Multiple Choice Question (Tick the most appropriate answer).

1. The amount of electromagnetic radiation an object emits depends on
   a. temperature
   b. area of object
   c. distance from source
   d. wavelength

2. A vertical polarised light
   a. electric vector is parallel to plane of incidence
   b. electric vector is perpendicular to the plane of incidence
   c. electric and magnetic vector are perpendicular to each other
   d. none of above

3. Which of the following statements is true with respect to electromagnetic radiation waves?
   a. the Earth 'vibrates' at a very low frequency
   b. the Earth 'vibrates' at a very high frequency
   c. high-pitched sounds have long wavelengths and low frequencies
   d. low-pitched sounds have short wavelengths and high frequencies

4. The total emitted power for a surface, calculated over the whole electormagnetic spectrum as a function of temperature is given by
   a. Planck's law
   b. Weins law
   c. stefan-boltzmann's law
   d. Kirchhoff's law

5. A spectral location of sensor bands is constrained by
   a. atmospheric absorption bands
   b. intended application of the sensor
   c. reflectance features of objects
   d. all of above

6. A path emitted component vary significantly when
   a. Smaller angles from nadir
   b. Heterogeneous objects
   c. Large angles from nadir
   d. Homogenous objects

7. What contrast enhancement method is suitable for areas with homogenous features?
   a. Histogram equalization
   b. Linear
   c. Piecewise linear
   d. Histogram Matching

8. For Modified empirical line method of atmospheric correction, dark object is represented as
   a. Asphalt surface
   b. FOTRAN simulation
   c. MODTRAN simulation
   d. Clean water

9. In the Lambertian world, for the same plant, greenness measured from different angles are
   a. constant
   b. unpredictable
   c. varies with angle
   d. All of above

10. Select the most correct answer from the following statement
   a. A sensor with narrow spectral band has higher radiometric resolution
   b. Modulated ratios reduces effect of atmosphere in images
   c. Contrast enhancement increases quantitative property of image
   d. The revisit time is not equal to the repeat cycle

11. Which of the following is true in image enhancement
   a. The effect of applying an average filter is that the resulting image looks sharper
   b. Stretching is best when the sensor uses lowest range of DN values
   c. High pass filter smoothens appearance of images
   d. Filters are used to reduce noise in images

12. If the IFOV for all pixels of a scanner stays constant, which of the following statements is true?
   a. the ground area represented by pixels at the nadir will be at a smaller scale then those pixels which are off nadir
   b. the spectral resolution will vary from the image centre to the swath edge
   c. the spatial resolution will vary from the image centre to the swath edge
   d. the ground area represented by pixels off nadir will be at a larger scale then those pixels which are at nadir

13. Principal component analysis results in
   a. Smaller set of correlated variables
   b. Smaller set of uncorrelated variables
   c. Set of undefined variables
   d. All of above

14. An image with random dark pixels is results of
   a. Detector saturation
   b. Intermittent electronic problems
   c. Data transmission loss
   d. All of above

15. A different gain and offset setting in detector of a sensor results in
   a. Stripping noise
   b. Bad scan line noise
   c. Random noise
   d. Saturation noise

16. A classification approach that results in unclassified class is
   a. Minimum distance
   b. Random forest
   c. Maximum likelihood
   d. Parallelepiped

17. A process known as dilation in morphological filtering can be achieved by operating
    a. Minimum filter
    b. Median filter
    c. Maximum filter
    d. minimum followed by maximum filter

18. Which of the following factor is most important in image segmentation
    a. Scale of segmentation
    b. Contextual information
    c. weight of colour and shape
    d. Thematic information

19. Which of the following statement is true
    a. object based approach provides reliability of statistics from image
    b. pixel based approach provides reliability of statistics from image
    c. in pixel based approach pixel value always belong to one class
    d. all of above

20. Which of the following is incorrect when describing the geometry of side-looking radar (SLR)?
    a. SLR geometry can result in several image effects such as foreshortening, layover, and shadow
    b. SLR geometry makes radar quite useful for terrain analysis
    c. SLR geometry makes radar imagery an excellent choice for applications such as forestry and land-use mapping.
    d. SLR geometry effects actually enhance the visual appearance of relief and terrain structure

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SECTION "B"
[8Q × 5 = 40 marks]

Attempt *ANY EIGHT* questions.

1. Derive equation describing total at-sensor radiance for solar reflective region of electromagnetic spectrum with contribution from different components. [5]

2. Explain the role of contrast stretches in the image processing. Specifically address why an analyst would pick a particular type of stretch and some of the dangers in selecting an inappropriate stretch for a given data. [5]

3. You have been asked by the NLUP (National Landuse Project) Director why perform land change analysis using remotely-sensed imagery? What are some of the issues / complications / concerns when using classified satellite images for land cover / land use change analysis? Discuss. [5]

4. Define spatial resolution. Discuss the factors affecting spatial resolution and feature representation by a sensor. [1+4]

5. How resolution defines the minimum mapping unit (MMU)? Describe steps in object based classification approach. [2+3]

6. Discuss the importance of correction and calibration of remote sensing images. Discuss noise types and its reduction approaches. [2+3]

7. What is surface roughness in RADAR imaging system? Discuss on radar image distortions. [2+3]

8. How does spatial and spectral transformation help in image classification and analysis? Explain. [5]

9. Write short notes –attempt *ANY TWO*. [2.5+2.5]
   a. Multi-sensor formation flying
   b. Relative radiometric correction
   c. Range resolution
   d. Sampling and quantization