

KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Marks scored:

Level : B.E.

Course : GEOM 402

Year : IV

Semester: I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 31 MAY 2019

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose the most appropriate answer from the given options and **encircle** the letter of your choice.

1. The amount of reflected electromagnetic radiation doesn't depend on:
 - a. Physical properties of the Earth material
 - b. Chemical properties of the Earth material
 - c. wavelength of electromagnetic energy
 - d. scattering in atmosphere
2. The spacing between pixels on the ground is called:
 - a. Ground-projected Sample Interval (GSI)
 - b. Spatial resolution
 - c. Ground-projected Instantaneous Field of View (GIFOV)
 - d. Field of View (FOV)
3. Earth observation satellite is an example of:
 - a. Terrestrial remote sensing
 - b. Ground based remote sensing
 - c. Airborne remote sensing
 - d. Space borne remote sensing
4. Sun is an example of:
 - a. Passive sensor
 - b. Active sensor
 - c. Source of Electromagnetic energy
 - d. Combination of passive and active sensor
5. Which of the following statement is true?
 - a. As wavelength increases to the shortwave radiation, less radiation is available from the Sun.
 - b. As wavelength increases to the long wavelength radiation, less radiation is available from the Sun.
 - c. As wavelength increases to the shortwave radiation, more radiation is available from the Sun.
 - d. As wavelength increases to the long wavelength radiation, more radiation is available from the Sun.
6. The magnitude of scattered light is approximated by pure Rayleigh scattering with the dependence on wavelength.
 - a. Fourth power
 - b. Inverse fourth power
 - c. Square
 - d. Inverse square
7. An optical system is never 'perfect' in the sense of forming a point image of a point source. This is associated with of the sensor.
 - a. Optics PSF
 - b. Image motion PSF
 - c. Detector PSF
 - d. Electronics PSF
8. The unusual anomalies in the image data can be determined by using:
 - a. Histogram
 - b. Individual pixel brightness value
 - c. Univariate descriptive statistics
 - d. Multivariate statistics

9. Synthetic Aperture Radar (SAR) image makes use of Portion of Electromagnetic spectrum.
 - a. Ultraviolet
 - b. Optical
 - c. Infrared
 - d. Microwave
10. Noise reduction in the image can be done by using:
 - a. High pass filter
 - b. Low pass filter
 - c. Edge detection filter
 - d. Gradient filter
11. Sum of the weight is zero for:
 - a. High pass filter
 - b. Low pass filter
 - c. High boost filter
 - d. Band pass filter
12. The contrast enhancement done by linearly stretching minimum and maximum value without considering the histogram is called:
 - a. Linear Stretch
 - b. Histogram Equalization
 - c. Piecewise linear stretch
 - d. Saturation stretch
13. Principal component analysis (PCA) technique is used in remote sensing
 - a. To map the image into number of classes
 - b. To enhance the appearance of the image
 - c. To reduce the dimensionality of the image
 - d. To reduce noise in the image
14. After downloading an image from a particular source, you came to know that there is some line of zero. What kind of error is this?
 - a. Periodic line dropout
 - b. Line stripping
 - c. Salt and pepper effect
 - d. Spikes
15. If an image is taken with solar zenith angle of 30 degree. One representative DN value of that image is 40, then corrected DN value after sun angle correction is:
 - a. 80
 - b. 20
 - c. 46
 - d. 35
16. The error in the image scene due to terrain relief falls under:
 - a. Mistakes
 - b. Systematic error
 - c. Random error
 - d. Compensating error
17. Which of the following image format is suitable if one is mainly interested in accessing pixels of several band at one time?
 - a. Band Sequential (BSQ)
 - b. Band Interleaved by Sample (BIS)
 - c. Band Interleaved by Line (BIL)
 - d. Band Interleaved by Pixel (BIP)
18. If supervised classification is done by using Landsat image whose spatial unit of analysis is image pixel, the minimum mapping unit (MMU) is usually
 - a. 30 hectares
 - b. 0.09 hectares
 - c. 0.30 hectares
 - d. 9 hectares
19. _____ is an algorithm for un-supervised classification?
 - a. Minimum distance
 - b. Parallelepiped
 - c. Maximum Likelihood
 - d. K-mean classifier
20. Which of the following statement is not true in case of orthorectification?
 - a. Orthorectification does correction of image for topographic distortion
 - b. Orthorectification converts the image in an orthographic projection
 - c. Orthorectification is done before preparation of topographic map from the image
 - d. Digital Elevation Model (DEM) doesn't require for orthorectification

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Semester: I
F. M. : 40

SECTION "B"
[8Q. × 5 = 40 marks]

Attempt ANY EIGHT questions.

1. Why remote sensing is demanding field in the present context than traditional methods of surveying? In which principle remote sensing system is guided by? [2+3]
2. Justify the following statements. [2 × 2.5 = 5]
 - a) Sky appears blue during the day.
 - b) The sun radiates the electromagnetic energy in its highest amount in visible wavelength range.
3. Briefly explain the radiation components involved in acquiring image using thermal infrared portion of remote sensing system. [5]
4. Prepare covariance and correlation coefficient matrix using the following table. [5]

Pixel	Band1	Band2	Band3
(1,1)	130	57	180
(1,2)	165	35	215
(2,1)	100	25	135
(2,2)	135	50	200

5. a) How can you correct an image to remove atmospheric error using empirical line method? [2]
- b) Atmospheric correction with the assumption of Lambertian surface, we measured surfaces using a spectroradiometer when Landsat ETM+ passing through the site. Here are the surface reflectance values and their corresponding DN values.

Surface	Surface spectral reflectance	At-sensor DN
Clean water	0	25
Snow	0.95	245
Soil		120

Specification for ETM+ band1:

Pixel size: 30m

Radiometric resolution: 8 bit

Gain: 4DN/(W/m²srµm)

Band Width: 630-690nm

Orbit: Polar orbit

Offset: -2 DN

- i. Using empirical line approach, what is the surface reflectance of soil?
 - ii. Using concept of DOS, estimate the spectral path radiance you can convert at-sensor spectral radiance L_{λ} to DN using the gain and offset information. [1.5+1.5]
6. What is the role of image enhancement in digital image? List different techniques used for contrast enhancement. Describe any one of them. [1+2+2]

7. List different algorithms used for supervised classification. Explain any one of them. Which of them is most effective and why? [1+2+1+1]

8. The given table represents confusion matrix of 4 different Land Use/ Land Cover. [5 × 1 = 5]

Land Use/Land Cover	Urban	Crop	Water	Forest	Barren
Urban	150	21	7	17	30
Crop	2	730	24	115	21
Water	3	18	83	8	3
Forest	23	81	4	350	13
Barren	39	8	3	11	115

Calculate:

- i. User accuracy of Water
- ii. Producer accuracy of Forest
- iii. User Accuracy of Urban
- iv. Producer Accuracy of Crop
- v. Kappa coefficient

9. Write short notes on (ANY TWO): [2 × 2.5 = 5]

- a) Principal Component Analysis (PCA)
- b) Spectral Reflectance Curve
- c) Histogram Equalization
- d) Geocoding