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Roll No. of candidate

2023

B.Tech. 8th Semester End-Term Examination

REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM

(Open Elective – III)

New Regulation (w.e.f 2017-18) & New Syllabus (w.e.f. 2018-19)

Full Marks – 70

Time – Three hours

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

1. Choose the correct answer $(10 \times 1 = 10)$

   (i) A perfectly black body
   - (a) Is a diffuse emitter
   - (b) Absorbs all the radiations of every wave length
   - (c) Emits power of every wave length
   - (d) All the above

   (ii) Which one of the following relationships between the wave length (λ), and frequency and the speed (C) of the electromagnetic wave is correct?
   - (a) $C = v + \lambda$
   - (b) $C = \lambda / v$
   - (c) $C = v\lambda$
   - (d) $C = 1/(v\lambda)$

   (iii) Leaf reflectance depends primarily on
   - (a) The pigments
   - (b) Internal cell structure
   - (c) Equivalent water content
   - (d) All of these

   (iv) A digital image is a numeric representation of a two-dimensional
   - (a) Vector
   - (b) Matrix
   - (c) Text
   - (d) Alpha-numeric characters

   (v) Pixels in a typical remote sensing image represent the ——————— of a part of the Earth.
   - (a) Darkness
   - (b) Obscurity
   - (c) Brightness / emissivity
   - (d) None of the above

[Turn over

(vi) Pick up the correct statement from the following:

(a) The sun's energy is either reflected (in visible wavelengths), or absorbed and then reemitted (thermal infrared wavelengths)

(b) Remote sensing systems which measure energy that is naturally available are called passive sensors

(c) Spatial resolution of the imaging system becomes poorer with increase of platform height.

(d) Area coverage of the imaging system increases with the increase of the platform altitude.

(e) All of these

(vii) The optical property of a water body depends on

(a) Absorption by the dissolved material

(b) Absorption by the suspended particulate matter

(c) Scattering by the suspended particulate matter

(d) All of these

(viii) Which among the following is true?

(a) Raster data represents discrete data

(b) Vector data require large storage space

(c) Raster data has a simple data structure

(d) Vector data represents continuous data

(ix) Off-nadir viewing allows a sensor

(a) to obtain imagery with a half-meter or finer resolution

(b) to sense beyond the usual 8-bit range of values

(c) to image locations not directly under the sensor

(d) to image more than 100 bands simultaneously.

(x) Which of the following satellites carries the finest spatial resolution sensor?

(a) World View-2   (b) IKONOS

(c) GeoEye–1   (d) Quickbird

2. Answer any four from the following:

(a) Derive the equation for determining the orbital period of a satellite. Calculate the orbital period for satellite which is orbiting the earth at an altitude of 900 km from the earth's surface. Consider the earth's radius = 6.38×10^6 m, universal gravitation constant= 6.67×10^{-11} Nm^2/kg^2, and mass of the earth = 5.98×10^{24} kg. Calculate the altitude of the orbit of a geostationary satellite.   5+5+5=15

(b) What is the defining characteristic of a perfect specular reflector or a perfect diffuse reflector? Define the term spectral reflectance or Albedo. Draw spectral reflectance curves for dry bare soil, vegetation and water and explain how spectral reflectance curve is useful in identifying an object on earth surface.   3+2+5+5=15

(c) What is image enhancement? Mention different types of image enhancement. Describe the different methods of contrast manipulation.
                                                          (2+3+10=15)

(d) Analyze the importance of image classification in civil engineering projects. With the help of unsupervised classification, how a particular class of object is identified? Enumerate the advantages and disadvantages of unsupervised classification over supervised classification.   5+5+5=15

(e) Define GIS? Mention the key components of GIS. What are raster data and vector data? Write the basic differences between raster and vector data.
                                                          2+3+5+5=15

(f) Explain the applications of remote sensing and GIS in hydrological science or in route location for railway and road.   15

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