**RS Imagery – Total Marks (45)**

**Q1)**For broadleaf and needleleaf vegetation – what is the approximate wavelength range that is reflected most, and what section of the EMS does this range belong to? **(1)**

* 0.8 1.0 micron

**Q2)**True/False: Soil and vegetation reflect roughly the same proportion of blue light. **(1)**

* True

**Q3)**Give a wavelength (in microns; μm) at which **snow and ice, dry soil,**and **vegetation**are indistinguishable by their reflectance. In other words, at which wavelength is the proportion of radiation reflected the same (+/- 10%) for these features? **(2)**

* Between 1.1 and 1.7

**Q4)** Broadleaf and needle leaf vegetation reflect the same amount at 0.7 µm. What causes this? Is there something contained in the foliage of both types of vegetation which causes identical spectral signatures? How does this pattern in spectral reflectance affect how we see live vegetation **(5)**

-mention palisave parenchyma in mesophyll is the dominant control of reflectance here

-Chlorophyll a and b absorb most light at 0.7 micron which means most vegetation types have similar reflectance

-Absorption of red-light and blue by chlorophyll means see green b/c only portion not absorbed

- Full pts for mentioning that chlorophyll is the first pigment to die, which means other pigments (carotenoids and xanthophylls) start to dominate giving the distinctive fall colors

**Q5)**Figure 2 contains 4 additional spectra, belonging to unknown surface features. Hypothesize about what each one of these spectra might be and provide your reasoning. Use the known features (broadleaf vegetation, wet soil, etc.) and what you have learned from class/readings to inform your choices. This is a difficult task, and educated guesses are all that is asked for. Do a bit of research, put some thought into it, and explain the reasoning for your guesses. These spectra do **NOT** represent the features which are already labeled. You must think of new features which could be observed with remote sensing.   **(12)**

**Q6)**Each pixel of Landsat’s thermal infrared band (band 6) covers  pixels of the other bands. If it helps, draw a picture of the two pixel resolutions. **(1)**

* 4

**Q7)**  Band 6 is recorded with a coarser resolution because thermal radiation has a very**long** wavelength. Therefore, there is**less** energy available to sense**. (2)**

* + Long
  + Less

**Q8)** In a standard false colour composite healthy vegetation appear BLANK. Vegetation is more reflective in the BLANK part of the spectrum than in the green part of the spectrum, so BLANK appears brightest **(3)**

* Red
* NIR
* Band 4

**Q9).** Experiment with many different false colour composites.  Which 3 bands would you combine if you wanted to analyze **vegetation?**Do some light research on spectral properties and the applications of different Landsat bands and write a sentence or two justifying each of your choices. Then, append a screenshot of your chosen composite to your response. **(3)**

*Variable responses allowed, band combinations should highlight the utility of the high NIR reflectance.* Full points should describe what differences in color allow the user to see (i.e. healthy vegetation will reflect brighter because the leaf structure remains)

**Q10).** Experiment with many different false colour composites.  Which 3 bands would you combine if you wanted to analyze **water quality?**Do some light research on spectral properties and the applications of different Landsat bands and write a sentence or two justifying each of your choices. Then, append a screenshot of your chosen composite to your response. **(3)**

*Variable responses allowed, band combinations should mention the utility of Blue band for bathymetry and/or SWIR for showing water clarity*

**Q11).** Experiment with many different false colour composites.  Which 3 bands would you combine if you wanted to analyze **agriculture?**Do some light research on spectral properties and the applications of different Landsat bands and write a sentence or two justifying each of your choices. Then, append a screenshot of your chosen composite to your response. **(3)**

*Variable responses allowed. Band combinations should discuss the use of SWIR bands and NIR for identifying locations with active vegetation and dryness of the landscape*

**Q12).** Experiment with many different false colour composites.  Which 3 bands would you combine if you wanted to analyze **urban areas?**Do some light research on spectral properties and the applications of different Landsat bands and write a sentence or two justifying each of your choices. Then, append a screenshot of your chosen composite to your response. **(3)**

*Variable responses allowed – all should mention that urban areas are overall brighter in most reflectance and the utility of SWIR for differentiating between concrete and barren soil .*

**Q13) Spectral curves of Landsat pixels contain mixture of land cover types, so not pure spectra (3)**

**Q14: Screenshot of spectral plot and points (3)**