UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination May 24, 2021

Course: Hyperspectral Remote Sensing **Semester: VIII**
Program: B. Tech. GIE **Time 03 hrs.**
Course Code: PEGI 3004P **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q 1	**True or false (Each question carry one mark):** a. Siderite shows additional absorption band 1.3 micro m. (T/F) b. Increase in snow grain size increases spectral reflectance in visible bands (T/F) c. Carnotite gives yellow colour due to electronic transition effect. (T/F) d. SIPI is sensitive to variation of ratio of plant carotenoids to chlorophyll a. (T/F) e. Hydrocarbon produces prominent absorption band at 1740 nm. (T/F)	**5**	**CO4**
Q2	**True or false (Each question carry one mark):** a. Atmospheric transmittance depends only on optical thickness (T/F) b. Bi-conical method of directional reflectance measurement uses large solid angle measurement. (T/F) c. NAPC is a statistical method of hyperspectral data transformation. (T/F) d. Hyperspectral bands redundancy is effectively handle by information entropy. (T/F) e. Hidden factors variability of signals of hyperspectral data can be reveal by ICA (T/F)	**5**	**CO1**
Q3	**Fill in the blank (Each question carry one mark):** a. A coefficient describing the conversion of light to organic matter by plant is called ---------- b. ---------- is an example of RT based canopy reflectance model. c. Subtle spectral differences of end members cannot be handle by ----------method. d. The distance between the probability distributions produced by spectral signature of two pixels is computed by ----------analysis method e. The scatter plot of reflectance of iron oxide at 500 nm and reflectance of clay at 2200 nm shows ---------- relationship.	**5**	**CO2**
Q4	**True or false (Each question carry one mark):** a. The spectral reflectance at 446.9 nm is linearly related with water chlorophyll content. (T/F) b. Hydroxyl ion in rocks / minerals shows overtone absorption at 1.44 micro m. (T/F) c. Soil unbound water gives spectral absorption at 1.4 micro m. (T/F) d. NDMI uses reflectances of 790 and 795 nm bands.(T/F) e. SCLS method of analysis is applied to MESMA technique. (T/F)	**5**	**CO3**

Q5	**Fill in the blank (Each question carry one mark):** a. ---------- atmospheric model corrects methane absorption in hyperspectral RS data. b. ---------- transformation data, generally is not statistically independent. c. Angular distance measure does not take ---------- of the classes. d. ---------- method of digital analysis of hyperspectral data maximize covariance between dependent variables and factors in the training data set. e. The ratio of % spectral transmittance at 931nm to % spectral transmittance is used to compute ----------.	**5**	**CO2**
Q6	**True or false (Each question carry one mark):** a. Fisher's LDA is a feature extraction method using hyperspectral RS data (T/F) b. Radiometric response function of a satellite sensor is corrected for both spectral response and geometric response. (T/F) c. AOTF technology is used in hyperspectral image scanning (T/F) d. The harmonic vibration is a function of masses of the molecule (T/F) e. The first BRDF measuring satellite hyperspectral imaging sensor is PROBA (T/F)	**5**	**CO1**
	SECTION B		
	Instructions: Write short notes / Describe briefly		
Q 7	Explain the approach of data transformation of hyperspectral RS data using ground truth thematic classes training information and distinctions of this approach with PCA. Write short notes on feature selection method using hyperspectral RS data which uses frequency components of the data.	**3+ 3 + 4**	**CO1**
Q 8	Describe briefly hyperspectral machine learning based digital classification technique, which uses limited numbers of training data. Write brief notes on an analysis method, which is use for calibration and atmospheric correction of hyperspectral RS data.	**5 + 5**	**CO2**
Q 9	Discuss briefly the visible radiation interaction mechanisms with minerals and rocks. How hyperspectral spectral absorption parameters are use in identification minerals? (Explain with examples)	**5 + 5**	**CO3**
Q 10	Write short on concept of material mixing in the context of remote sensing. What are advantages and disadvantages of simple linear mixing, MESMA, MTMF & CEM. Explain the applications of hyperspectral RS in various areas of snow and glacial studies.	**3 + 3 + 4**	**CO3**
Q 11	Write short notes with empirical relationships on hyperspectral indices use specifically for quantification vegetation photosynthesis. Explain how hyperspectral RS can be use in precision agriculture and forest fire studies.	**5+ 5**	**CO4**
	SECTION-C		
Q12	Discuss in details with empirical relationships and illustrations, the various approaches of quantification of shift in wavelength position in 670nm and 780nm in vegetation spectrum derived from hyperspectral remote sensing data. OR Describe the factors affect spectral characteristics of soils. Write in details with empirical relationships, illustrations and flow charts various methods of assessment soil salinity and organic carbon content using hyperspectral RS data.	**20** **5 + 15**	**CO4**