

<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2019**

**Course: Hyperspectral Remote Sensing**  
**Program: B. Tech. GIE**  
**Course Code: PEGI – 3004**

**Semester: VI**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions:**

**SECTION A**

**Answer all Questions**

S. No.	Question	Marks	CO
Q 1	List major characteristics of “EO-1 Hyperion” hyperspectral satellite sensor	4	CO1
Q2	Write brief note with illustration on vegetation red edge reflectance parameters	4	CO2
Q3	Advantages of Maximum Noise Fraction (MNF) and Independent Component Analysis (ICA) methods over Principal Components Analysis (PCA)	4	CO3
Q4	Draw the schematic diagram showing principle of whiskbroom scanning use in hyperspectral remote sensing data acquisition	4	CO2
Q5	List two red edge vegetation structural parameters and two chlorophyll content assessing hyperspectral vegetation indices.	2 + 2	CO3

**SECTION B**

Q6	Write short notes with diagram and empirical relationships the concepts of SVM and ANN methods of digital classification of hyperspectral RS data.	10	CO3
Q7	Explain with illustration and empirical relationship – BRDF in reflectance spectroscopy. Write short note on atmospheric correction of hyperspectral remote sensing data using radiative transfer model “ATREM”.	5 + 5	CO1
Q8	Discuss identification of various types of mineral assemblages from ASTER Ratio Indices.	10	CO4
Q9	Write notes on various analysis approaches adopted for the use of hyperspectral RS data in assessment of environmental hazards and disasters	10	CO4
<b>OR</b>			
	Discuss the various methods used for estimation of soil organic carbon and soil organic matter content using hyperspectral RS data	10	CO4

**SECTION-C**

Q10	Discuss in details various methods used for extracting the red edge vegetation spectral parameters from hyperspectral RS data	20	CO3
Q11	Write in details analysis approaches of hyperspectral remote sensing data for estimation of various types of vegetation biochemical parameters.	20	CO4
<b>OR</b>			
	Give an detail accounts of concept of spectral unmixing analysis of hyperspectral RS data; various types of mixing of materials in nature; and MESMA and MTMF spectral unmixing analysis techniques	5 + 5 +10	CO4

<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2019**

**Course: Hyperspectral Remote Sensing**  
**Program: B. Tech. GIE**  
**Course Code: PEGI - 3004**

**Semester: VI**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions:**

**SECTION A**

**Answer all Questions**

S. No.	Questions	Marks	CO
Q 1	Write full forms of the hyperspectral aerial/satellite sensors – CASI; MERIS; HYDICE & CASI	4	CO1
Q2	Write the empirical formula of hyperspectral indices – NDSI; Clay mineral ratio; Ferrous mineral ratio and Iron oxide ratio	4	CO3
Q3	With schematic diagram explain the approaches of spectral ratio indices computation	4	CO3
Q4	Draw the schematic diagram showing principle of push broom scanning technique use in hyperspectral remote sensing data acquisition.	4	CO2
Q5	List two vegetation anthocyanin pigment content and two lignin & cellulose content assessing hyperspectral vegetation indices.	2 + 2	CO3

**SECTION B**

Q6	Write short notes with diagram and empirical relationships the concept of PCA and Wavelet decomposition methods of feature selection using hyperspectral RS data.	5 + 5	CO3
Q7	Explain in detail with illustrations and empirical relationships the radiation interaction principles of reflectance spectroscopy in two mediums (atmosphere and geosphere); three mediums ( atmosphere, geosphere and hydrosphere)	10	CO1
Q8	Write note on spectral characteristics of soils and methods of soil salinity assessment using hyperspectral RS data	5 + 5	CO4
Q9	Discuss analysis approaches used in assessment of environmental hazards and disasters using hyperspectral R.S.	10	CO4
<b>OR</b>			
	Discuss use of hyperspectral remote sensing data in snow and glacier studies.	10	CO4

**SECTION-C**

Q10	Discuss in details – various types of mixing of materials in nature; concept of spectral unmixing analysis of hyperspectral remote sensing data, and MESMA and MTMF spectral unmixing analysis techniques.	5+5+ 10	CO3
Q11	Give an detail account of various methods used for extracting the red edge vegetation spectral parameters from hyperspectral RS data	20	CO4
<b>OR</b>			
	Write in detail approaches of use of spectral absorption features techniques for mineral mapping utilizing hyperspectral remote sensing data.	20	CO4