C Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U4402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Professional Elective

Electronics and Communication Engineering

21ECV402 REMOTE SENSING AND INFORMATION SYSTEMS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. Ozone in the atmosphere primarily absorbs which part of the electromagnetic spectrum? CO2- U

   (a) Infrared (b) Ultraviolet (c) Visible (d) Microwave

2. Instrumental parameters are mainly concerned with _____ CO1-U

   (a) Satellite orbit (b) Sensor design and performance

   (c) Earth's curvature (d) Ground station availability

3. Double-bounce scattering usually occurs in _____ CO1-U

   (a) Flat open fields (b) Smooth water bodies

   (c) Urban areas with vertical structures (d) Dense forests

4. Manual digitization involves _____ CO1-U

   (a) Automatic data input using sensor

   (b) Manual tracing of map features on a digitizing tablet

   (c) Importing online datasets

   (d) Voice recognition systems

5. Flood risk zoning helps in _____ CO1-U

   (a) Creating dams without environmental clearance

   (b) Identifying areas likely to be submerged during floods

   (c) Removing vegetation from rivers

   (d) Estimating earthquake probabilities

PART – B (5 x 3= 15 Marks)

6.	Define Electromagnetic Remote Sensing and its scope.	CO1-U	
7.	How NOAA satellites are used in meteorological observations?	CO1-U	
8.	The penetration depth of radar in soil is approximately inversely proportional to the frequency of the wave. Given that X-band (10 GHz) penetrates about 1 cm, estimate the penetration depth of L-band (1.2 GHz). Which band is more suitable for soil moisture detection?	CO2-App	
9.	Define raster data model in GIS.	CO1-U	
10.	A satellite image taken during a flood shows 1,200 water pixels, each with dimensions 30 m × 30 m. Using a GIS overlay with a population map, it is found that 15% of this area overlaps with residential zones. Calculate the total flooded area (in km²) and the residential area affected (in km²).	CO3-App	

PART – C (5 x 16= 80 Marks)

11.	(a)	Write a detailed note on ozone absorption and its significance in remote sensing. Include graphical representation if necessary	CO1-U	(16)
		Or		
	(b)	Describe how electromagnetic energy interacts with earth surface materials.	CO1-U	(16)
12.	(a)	Describe the working and applications of the Landsat series of earth resource satellites. Highlight their significance in environmental monitoring.	CO1-U	(16)
		Or		
	(b)	Illustrate the functions and data outputs of meteorological satellites such as NOAA and GOES. What makes them essential for weather prediction?	CO1-U	(16)
13.	(a)	How does surface roughness affect radar backscatter under varying wavelengths, polarizations, and incidence angles? Illustrate your answer with suitable diagrams, and real-world applications such as soil moisture estimation, terrain classification, or vegetation mapping.	CO5- Ana	(16)
		Or		

	(b)	Compare the characteristics of different radar wavebands (X, C, L, and P bands) used in Earth observation. Analyze how their penetration ability and interaction with land features influence their suitability for specific applications such as vegetation monitoring, soil moisture estimation, and infrastructure mapping. Support your answer with a comparative table and examples from satellite missions.	CO5- Ana	(16)
14.	(a)	Describe the process of manual digitization and scanning in GIS data input. What are the sources of error?	CO1-U	(16)
		Or		
	(b)	How GIS can be used in urban planning. Highlight at least three application areas with outputs.	CO1-U	(16)
15.	(a)	Explain how remote sensing helps in monitoring forest health and precision agriculture.	CO5-Ana	(16)
		Or		
	(b)	Explain resource management in remote sensing.	CO5-Ana	(16)