

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) SECOND YEAR FIRST SEMESTER
EXAM 2025
SURVEYING III**

Time: 3 Hours

Full Marks: 100
[50 Marks for each part]

Part I**Use Separate Answer scripts for each Part****Answer brief & to the point. Assume standard value for any parameter, if required****Group A: Answer Both questions**

1. Briefly Explain any five of the following – 15
 - a. Orientation of Stereoscopic pair
 - b. Identification of photo vertical point
 - c. Fiducial marks on aerial photograph
 - d. Terrestrial Photogrammetry
 - e. EDM
 - f. One major merit and demerit of EDM
 - g. Two major errors associated with EDM
2. What is a Total Station? State the basic inputs which need to be known before taking observation by a total station for determining coordinates of an unknown point. With relevant sketches, explain how the coordinates of a target station can be obtained using total station? 1+5+5

Group B: Answer any Two questions

3. An area 25Km long and 20Km wide is to be covered in an aerial survey scheme having R.F. as 1:15,000 with a 150mm focal length camera and 200mm × 200mm photographic plate fixed to an aircraft flying at ground velocity of 720 Kmph. The forward and lateral overlaps are 60% and 20% respectively. Without considering the effect of Crab and Drift, Determine Flying Height, Number of flight lines, Total No of Photographs to be taken and the shutter interval. 12
4. A Total Station Survey to find the coordinates of target point B was conducted from instrument station point A. The coordinates of ground point 'A' are – Easting 1056.322m, Northing 1147.542m and elevation 9.696m. The height of the centre of the instrument and centre of target from ground stations are 1.345m and 1.55m respectively. The observed vertical and horizontal angles with respect to the zenith line and north are 82°57'40" and 22°38'50" respectively. Determine the coordinates of the ground point 'B' 12
5. Determine the velocity of infra-red with wave length 0.9 mm in air when the pressure, temperature and vapour pressure of air are 1017 pascal, 25°C and 1013 pascal respectively. The following formula may be used, if required 12

$$n_g = 1 + \frac{287.604 + \frac{4.8864}{\lambda_c^2} + \frac{0.0680}{\lambda_c^4}}{10^6};$$

$$n_a = 1 + \frac{2.2767 \times 10^{-3}(n_g - 1)p}{t} + \frac{1.2704 \times 10^{-7}e}{t}$$

[Turn over

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) SECOND YEAR FIRST
SEMESTER – 2025**

Subject: SURVEYING – III Time: 3 hours Full Marks: 100 (50 in each part)

Part II

Instructions: Answer any five questions.

1. What is the basic source of electromagnetic radiation? At what speed does electromagnetic radiation propagates? What is Wein's Displacement Law? Describe electromagnetic radiation in view of quantum mechanics. How is energy of quantum related to its wavelength? (2+2+2+2+2)
2. How does earth's atmosphere impacts electromagnetic radiation? What is index of refraction? With aid of Snell's Law describe refraction. What is the wavelength range of visible spectrum? What is the significance of the infrared region of electromagnetic spectrum in view of remote sensing? (2+2+3+1+2).
3. With aid of diagrammatic illustration define the following: (5*2)
 - ✓ Ground-track.
 - ✓ Apogee.
 - ✓ Swath.
 - ✓ Nadir point.
 - ✓ Orbit.
4. What are the "four different types of image resolutions" mentioned in remote sensing? Compare between those "four different types of resolutions". An image with spatial resolution 30 m and an image with spatial resolution 1 m – Which is better for analysis and why? Differentiate between a 8 bit and a 4 bit image.(2+4+2+2)
5. Compare between active and passive sensors. What do you mean by multispectral imaging sensor system? What are the different types of multispectral imaging scanning systems? Compare in between types of multispectral imaging scanning systems. (3+3+2+2)
6. Indicate the wavelength range of microwave region of electromagnetic spectrum. What are the different types of microwave remote sensing. Differentiate in between types of microwave remote sensing. To which scanning system does thermal remote sensing belongs? In which scanning mode does thermal remote sensors scan the terrain? (2+2+2+2+2).

7. What do you mean by atmospheric windows? Name the major atmospheric windows. State the wavelength ranges of major atmospheric windows. What is the visible portion of electromagnetic spectrum? (2+3+3+2)
8. How to distinguish between trees and soil types with reference to their spectral response? Define GIS. What are the two major GIS models? Diagrammatically illustrate the process of GIS. What do you mean by remote sensors? (2+2+2+2+2)
9. Why does geometric distortions occur in satellite images? Why is image enhancement an important technical tool for digital image processing? What are the different types of image enhancement processes? Compare between linear stretch and histogram equalized stretch. What are the two major types of image classifications? (2+2+2+2+2)
10. What is the first Indian Remote Sensing satellite? What is a satellite orbit? What type of a satellite is INSAT-3A? What are the sensors of INSAT-3A? What do you mean by Normalized Difference Vegetation Index or NDVI? (2+2+2+2+2)