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**B.E./B. Tech. (FT) DEGREE EMD SEMESTER EXAMINATIONS APRIL-MAY 2013
GEOINFORMATICS ENGINEERING BRANCH
GI 9024 AIRBORNE LASER TERRAIN MAPPING
REGULATIONS 2008 SEMESTER VI**

Max. Marks 100

Max. Time 3 Hrs.

Note: Answer ALL Questions.

Assume Suitable data if required

Illustrate with sketches wherever necessary

PART A (10 x 2 = 20 Marks)

1. With a neat sketch explain the working principle of Range Measurement in Pulse type Airborne Laser Scanner.
2. What is Differential Absorption LiDAR and where it is used?
3. Why is Binary format preferred over ASCII format for Laser Scanner data?
4. With a neat sketch explain Along track spacing, Across track spacing, Point Density and Swath Width.
5. With a neat sketch explain which geometric features of terrain are used for Strip Adjustment?
6. With a neat sketch differentiate Digital Surface Model(DSM) and Digital Elevation Model(DEM)
7. What is texture mapping?
8. How is the depth of penetration of bathymetric laser scanner determined?
9. List any two applications of Orthoimages derived from Laser Scanning
10. Describe the advantage of Airborne Laser Scanning over Photogrammetry in terms of Canopy penetration.

PART B (5 x 16 = 80 Marks)

11. a. The Project study area has following characteristics: 1. Extent: 1500 Sq. Km., 2. LandUse/Land Cover: Urban-20%, Agriculture-20%, Marshy Inaccessible Land -20% and Coastal Beach – 40%, 3. Height Accuracy – 20 Cm
If you were to generate DEM of the above area, by choosing one among the following techniques such as Levelling, GPS ground Surveying, Photogrammetry and Airborne Laser Scanning, explain the reasons based on which a technique is selected and the reasons based on which other techniques are rejected (10)
b. Why Airborne Laser Scanning is preferred over Photogrammetry in mapping snow covered mountains and Deserts (6)
12. a. i. With neat sketches explain the production of Laser (6)
ii. Explain frequency doubling technique and why is it used (3)
iii. With neat sketches explain the typical waveform of Radar Altimeter to determine Sea Surface Height (4)
iv. Why radar altimeters cannot be used for generating DEM of land surface (3)
(OR)
12. b. i. Discuss in detail the payload characteristics of GLAS and how are they used for mapping and monitoring snow cover in Polar Regions (8)
ii. Discuss in detail the specification of Lunar Laser Ranging Instrument used in Chandrayan (4)
iii. Explain in detail the characteristics of CALIOP payload in CALIPSO to map the Aerosol Concentration in the Atmosphere (4)

- a. i. With a neat sketch, illustrate the various components of Integrated Inertial Navigation Software to combine Inertial and Navigation data for determining optimal Flight Trajectory (12)
ii. How is the high confidence flight trajectory determined using Navigation data alone (4)
(OR)
- 13.b. i. With a neat sketch discuss in detail the various scanning mechanisms and explain which scanning mechanism would you prefer to achieve uniform point density (8)
ii. Given the following: Average flying height of 1200 m, Laser scan angle 40 degrees, Pulse rate of 100 KHz, scan rate of 50 Hz, longest dimension of study area is 20 Km, smallest dimension of rectangular study area 10 Km, flying speed over ground 60 m/sec, strip overlap of 15 %. Calculate the Swath Width, No. of Points per scan line, No. of strips, Area Covered and Point Density (8)
14. a. i. With neat sketches explain in detail various coordinate transformations required to compute the ground coordinates of Laser Foot Print (12)
ii. How is the reflectivity of terrain feature affect range measurement and What is meant by Range Correction Factor (4)
(OR)
14. b. With reference to a case study, explain the steps involved in generating bare-earth Digital Elevation Model from 3D Point Cloud
15. a.i. If you were to extract roads in an urban area consisting of Bitumen and Concrete Road, explain the steps involved in extracting the same from Airborne Laser Scanner data (12)
ii. Discuss in detail the various application domains of Airborne Laser Scanning (4)
(OR)
- 15.b. i. With neat sketches explain in detail the various level of details used in 3D City Models (4)
ii. Discuss in detail the role and significance of various modules in MAPCUBE software in generation of 3D City Models (12)