DRONE SURVEYING
(Job Oriented Elective – I)

Course Code: 20CE11Q2

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Course Outcomes:
At the end of the course, the student will be able to:
CO1: Explain the fundamentals of Drone surveying (L2)
CO2: Describe the Methods of Surveying with Drone (L2)
CO3: Explain the concepts of Image processing and Photogrammetry (L2)
CO4: Explain Modeling with Drones (L2)
CO5: Discuss the Drone applications (L2)

UNIT-I (10 Lectures)

INTRODUCTION ON DRONES:

Introduction to Drones, History of Drone/UAS/UAVs, payload, battery life, Specs for good results, Regulations of DGCA and Drone license, Pre and Post Flight planning- Flight execution and photography, data collection- Image Format, GSD, Scale and Resolution.

Learning outcomes:
At the end of the unit, the student will be able to
1. explain the components in Drone (L2)
2. discuss about flying regulations (L2)
3. explain the flight plan (L2)

UNIT-II (10 Lectures)

SURVEYING WITH DRONE:
Consideration for hardware selections, comparison on surveying drone and its accuracy, Techniques of controlling errors, Consideration of GCP in vertical and horizontal accuracies, Planning and estimation of drone surveying jobs, Autonomous flight vs. manual and hybrid flight profiles.

Learning outcomes:
At the end of the unit, the student will be able to
1. explain drone hardware (L2)
2. describe about drone applications and accuracy (L2)
3. explain the planning process in Drone Surveying (L2)

UNIT-III (10 Lectures)
IMAGE PROCESSING AND PHOTOGRAMMETRY:
Aerial Triangulation, post processing softwares, Analyzing Data, Contouring, DEM, DSM, Cut, Fill, and Volumetric Measurement Calculation and orthophoto generation.

Learning outcomes:
At the end of the unit, the student will be able to
1. discuss the software workflow (L2)
2. explain the terrain data extraction (L2)
3. describe the process of orthophoto generation (L2)

UNIT-IV   **(10 Lectures)**

MAPPING AND MODELING:

Introduction to mapping and modeling concepts, Understanding RTK, PPK and GCP's, Overview of popular data processing software platforms and functions.

Learning outcomes:
At the end of the unit, the student will be able to
1. explain the concepts of mapping (L2)
2. describe the concepts of RTK and GCP (L2)
3. explain drone data processing (L2)

UNIT-V   **(10 Lectures)**

APPLICATIONS:

Application of drone for Surveying & Mapping-Construction, Irrigation and Agricultural, Engineering Land Survey and Transportation.

Learning outcomes:
At the end of the unit, the student will be able to
1. discuss the applications of drones in construction (L2)
2. explain the role of drones in irrigation and agriculture (L2)
3. explain drone role in land survey (L2)

Text Books:

1. Lillesand and Kiefer, "Remote Sensing and Image Interpretation", 5th Edition, published by John Wiley and Sons, 2008.
2. One Nation Under Drones: Legality, Morality, and Utility of Unmanned Combat Systems by John E. Jackson.
3. A.M. Chandra, S.K. Ghosh, "Remote Sensing and Geographical Information System", Narosa Publishing house, 1st Edition, 2007.

References:

1. David P Paine, "Aerial Photography and Image Interpretation", 2nd Edition, published by Wiley, Higher Education, 2006.
2. Drones and Support for the Use of Force by James Igoe Walsh.