



HINDUSTAN

INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)
CHENNAI

DEPARTMENT OF CIVIL ENGINEERING

HONOURS AND MINORS OFFERED UNDER B.TECH. CIVIL ENGINEERING

MINORS: GEOGRAPHICAL INFORMATION SYSTEM

SNo	Name of the Course	Total Learning Hours	Credit
1	Fundamentals of GIS(CEM4276)	45	3
2	GIS Data Acquisition, Automation, and Applications (CEM4361)	45	3
3	Remote Sensing and GIS (CEM4376)	45	3
Total credits			9

CURRICULUM

B. TECH MINORS IN GEOGRAPHICAL INFORMATION SYSTEM									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
IV	Minors	CEM4276	Fundamentals of GIS	3	0	0	3	0	3
V	Minors	CEM4361	GIS Data Acquisition, Automation and Applications	3	0	0	3	0	3
VI	Minors	CEM4376	Remote Sensing and GIS	3	0	0	3	0	3
TOTAL				9	0	0	9	0	9

L-Lecture T-Tutorial P-Practical C-Credit S-Self-study TCH-Total contact hours

MINORS

COURSE TITLE	Course I - FUNDAMENTALS OF GIS			CREDITS	4
COURSE CODE	CEM4276	COURSE CATEGORY	MINORS	L-T-P-S	3-0-0-0
Version	1.0	Approval Details	33 ACM, 15.12.2021	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%
Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should be conducted per course.					
Course Description	Explore the world of spatial analysis and cartography with geographic information systems (GIS). In-depth with common data types (such as raster and vector data), structures, quality and storage				
Course Objective	<p>The course should enable the students to</p> <ol style="list-style-type: none"> 1. Develop the skills needed to use GIS software in a professional setting. 2. Learn how GIS grew from paper maps to the globally integrated electronic software packages of today. Explore data using ArcMap. 3. Learn the foundational concepts of GIS, how to analyse data, and draw the first map 4. Learn about data models and formats and raster concepts 5. understand vector data and editing 				

Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Perform a project assessment using information from previous projects and lessons 2. Symbolize data and create an eye-catching final product. Learn to store, organize and analyze spatial data, using cartography techniques to communicate results in maps, and collaborate with peers in GIS and GIS-dependent fields 3. Create a professional-quality GIS portfolio piece using a combination of data identification and collection, analytical map development, and spatial analysis techniques. 4. Design data Structures and Personal Geo data bases and Raster data 5. Create a vector data model by using vector attribute tables, writing query strings, defining queries, and adding and calculating fields
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Prerequisites: Nil

CO, PO AND PSO MAPPING

CO	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO2	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO3	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO4	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO5	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS (9)

<p>Introduction (GIS)</p> <p>Course Mechanics - Module 1 Overview - Why GIS is Awesome - What is GIS? - A First Look at Using Desktop GIS - GIS Terminology to Know - Tour of ArcMap - Data Representation in GIS - Desktop GIS Software Packages - Getting Help with GIS - Relevant Skills for the GIS Analyst - ArcGIS Desktop Licensing and Authorization - ArcGIS Desktop Installation Instructions - How Assignments Work in this Course - Module 1 Summary - Glossary of Terms - Resources and Help for GIS - ArcGIS Installation for Desktop - Troubleshooting ArcGIS Installation Problems - Assignment 1: Introduction to ArcMap (Part 1) - Extra Practice: Getting to Know ArcGIS - Lesson 1 Quiz - Lesson 2 Quiz</p>	<p>CO-1 BTL-2</p>
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MODULE2: ArcGIS BASICS & MAKING MAPS (13)

<p>ArcGIS Basics</p> <p>Module 2 Overview - Using ArcMap to Explore Data - Viewing and Changing Layer Properties - Using Feature Classes and Attribute Tables - Select By Attribute and Calculate Geometry - Select by Location - An Introduction to Projections - Analyzing Data with Geoprocessing Tools - Setting Environment Variables - Assessing Spatial Relationships with the Spatial Join Tool - Assignment 2 Overview - Module 2 Summary -Assignment 2: Introduction to ArcMap (Part 2)- Extra Practice: Maps, Geoprocessing, and Projections -Lesson 3 Quiz - Lesson 4 Quiz.</p> <p>Making Maps with Common Datasets</p> <p>Module 3 Overview -Finding Common Datasets - Using Layout View to Make Maps - Core Map Elements - Symbology: Changing How Your Data Looks - Symbology Examples - Setting Up Symbology in ArcGIS - Labeling Map Features - Making Map Books Assignment 3 Overview - Module 3 Summary-Assignment 3: Laying Out and Exporting Maps - Extra Practice: Maps, Maps, Maps! - Lesson 5 Quiz - Lesson 6 Quiz.</p>	<p>CO-2</p> <p>BTL-3</p>
<p>MODULE 3: RETRIEVING AND SHARING DATA (9)</p>	
<p>Retrieving and Sharing Data</p> <p>Module 4 Overview - Using Metadata to Document Data Products - Sharing Data: Making and Using Map Packages - Sharing Maps: Uploading Packages to ArcGIS Online - Sharing Data: Creating Layer Files and Layer Packages - Choosing a Data Format 8m Joins and Relates - Troubleshooting ArcGIS - Module 4 Summary - Assignment 4 (Peer Review) Overview - Course Summary - Extra Practice: Make your own data - Electoral Politics Assignment Instructions - Lesson 7 Quiz - Lesson 8 Quiz - Coursera and UC Davis Honor Code Acknowledgement - Electoral Politics Results Quiz.</p>	<p>CO-3</p> <p>BTL-3</p>
<p>MODULE 4 : DATA MODELS AND FORMATS (7)</p>	
<p>Course Overview - Course Mechanics - Module 1 Overview - Vector Data Concepts - Vector Data in Action - Raster Data Concepts - Raster's in Action - Scale and Implications - Managing Data in the Catalog Window - Data Design: Attribute Types - Using Vector Attribute Tables - Data Design: Joins and Relates - Data Design: Separating Data, Part 1 - Data Design: Separating Data, Part 2 - Module 1 Summary - Getting Started in this Course - Getting a license - Tutorial Assignment 1: Data Structures and Personal Geo data bases - Extra Practice for Lessons 1 and 2 - Lesson 1 Quiz: Raster's and Vectors - Lesson 2 Quiz: Data Design</p>	<p>CO-4</p> <p>BTL-3</p>
<p>MODULE 5: CREATING AND WORKING WITH VECTOR DATA (7)</p>	
<p>Module 2 Overview - Working with Geoprocessing Tools - Intersect Tool - Writing Query Strings - Writing Query Strings: Boolean Operators - Adding and Calculating Fields - Interactive Selection - Using and Configuring Selections in ArcGIS - Editing Existing Data - Data Design: Creating New Feature Classes - Basic Digitizing - Workflow: Preparing Data - Workflow: Making Point Data from Coordinates - Module 2 Summary - Tutorial Assignment 2: Editing Data - Extra Practice for Lessons 3 and 4 - Lesson 3 Quiz: Processing and Geoprocessing - Lesson 4 Quiz: Creating and Editing Data .</p>	<p>CO-5</p> <p>BTL-4</p>

TEXT BOOKS	
1.	Wise, Stephen. (2014). <i>GIS fundamentals</i> , CRC Press.
2.	Paul Bolstad. (2016). <i>GIS Fundamentals_ A First Text on Geographic Information Systems</i> , XanEdu.
3.	Hu, Fei_ Huang, Qunying_ Jiang, Yongyao_ Li, Zhenlong_ Liu, Kai_ Sun, Min_ Xia, Jizhe_ Yang, Chaowei Phil_ Yu, Manzhu. (2017). <i>Introduction to GIS programming and fundamentals with Python and ArcGIS</i> .
4.	Michele Campagna. (2005). <i>GIS for Sustainable Development</i> , CRC Press.
REFERENCE BOOKS	
1.	Alias Abdul-Rahman, MorakotPilouk. (2007). <i>Spatial data modeling for 3D GIS</i> , Springer.
2.	Shashi Shekhar, Shashi Shekhar, Hui Xiong. (2007). <i>Encyclopedia of GIS</i> , Springer.
3.	Lena Sanders . (2007). <i>GIS- Models in spatial analysis</i> , Geographical Information Systems Series ISTE
4.	Alias Abdul-Rahman, MorakotPilouk. (2007). <i>Spatial data modeling for 3D GIS</i> , Springer.
5.	U.M. Shamsi. (2005). <i>GIS applications for water, wastewater, and stormwater systems</i> , Taylor & Francis.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management
MOOC	
1.	https://www.coursera.org/learn/gis
2.	https://www.coursera.org/learn/gis-data

COURSE TITLE	COURSE II - GIS DATA ACQUISITION, AUTOMATION AND APPLICATION			CREDITS	3
COURSE CODE	CEM4361	COURSE CATEGORY	MINORS	L-T-P-S	3-0-0-1
Version	1.0	Approval Details	33 ACM, 06.02.2021	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignment/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%
Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should be conducted per course.					
Course Description	Geographic Information System (GIS) Imagery Analysis Spatial Analysis satellite imagery Gis Applications. Focuses on the basic building blocks of GIS data, so that you know what types of GIS files exist, and the implications of choosing one type over another. How to take non-GIS data, such as a list of addresses, and convert it into "mappable" data using geocoding.				
Course Objective	<p>The course should enable the students to</p> <ol style="list-style-type: none"> 1. Learn all about remotely sensed and satellite imagery, and be introduced to the electromagnetic spectrum 2. Develop a large processing workflow in Model Builder. Use products derived from digital elevation models 3. Practice with tools to support image analysis using Raster Calculation and Spatial Analyst 4. Learn remote sensing and satellite imagery, starting out with an introduction to remotely sensed data and the electromagnetic spectrum 5. Learn how to use some basic tools to support image analysis using Raster Calculator and Spatial Analyst. 				

Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Find and download satellite imagery online and use it for two common types of analysis: NDVI and trained classification. 2. Build own models, and undertake building a large processing workflow together in Model Builder that uses parameters, preconditions, variables, and a set of tools 3. Collect and Manage Data for Workflows. 4. Evaluate a data set preparing data by merging and clipping files as needed 5. Create project, find own data and create own quantitative map- Create choropleth maps in ArcMap-Data classification for mapping. 														
	Prerequisites: Nil														
CO, PO AND PSO MAPPING															
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO2	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO3	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO4	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO5	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related															
MODULE 1: COURSE OVERVIEW, IMAGERY, AND RASTER CALCULATOR														(7)	
<p>Course Overview, Imagery, and Raster Calculator</p> <p>Course Overview- Course Mechanics -Remote Sensing Basics -Characteristics of Remotely Sensed Data -Modes of Acquisition -Acquisition Platforms -Acquiring Imagery and Terrain Data -Working with Imagery in ArcMap -Normalized Difference Vegetation Index (NDVI) Classifying Imagery and Derived Products</p>														CO-1 BTL-2	
MODULE 2: MODEL BUILDER AND DIGITAL ELEVATION MODELS (11)															
<p>Model Builder and Other</p> <p>Overview -What is Model Builder -Creating Toolboxes and Tools with Model Builder -Setting Up a Larger Model -Using Interface Tools as Geoprocessing Tools in Model Builder- Feature Layers and Selections in Models Branching, Preconditions, and Viewing Progress Interactively - Polishing Models for Reuse -Advanced Models and Exporting Models to Python -Geocoding and Reverse Geocoding -Time Enabled Data</p> <p>Digital Elevation Models and Common Algorithms</p>														CO-2 BTL-3	

Overview -Contours –Hill shade –Viewshed- Cut Fill -Vector-Based Suitability Analysis -Fuzzy Suitability Analysis -Watershed Processing -Processing DEMs into Streamlines	
MODULE 3: SPATIAL ANALYST	(8)
<p>Spatial Analyst and where to go from here</p> <p>Overview -Region Group -Focal Statistics and the Swiss Hill shade -Reclassify- Point Density - Online and Connected Applications -Collecting and Managing Data for Your Workflows- Additional Desktop GIS Topics Programming GIS Software, Server-Side GIS, and Cartography - Other GIS Tools & Plugins, and Joining Communities -Course Summary</p>	<p>CO-3</p> <p>BTL-3</p>
MODULE 4: GIS FILE, GEOCODING & MAP DESIGN PRINCIPLES	(9)
<p>GIS File Types, Data Models, and Topology</p> <p>Introduction to topology -Topology and data formats –Shapefile: simple, with no topology - Coverage: Complex, but has topology -Comparison of shape file, coverage, and geo database - Building basic topology – Georelational and object-relational vector data models</p> <p>Finding data and preparing it for your project</p> <p>Evaluating data using metadata - Data dictionary -The importance of metadata - Viewing and editing metadata in ArcMap - Downloading and using GIS data.</p> <p>Geocoding addresses and postal codes</p> <p>What is geocoding- Geocoding in ArcGIS Online -Geocoding postal codes -Geocoding postal codes in ArcMap -Postal codes and census data -Canadian census units -Ecological fallacy - Geocoding Street addresses -Geocoding Street addresses in ArcMap</p> <p>Map Design Principles</p> <p>Developing a critical eye - The map design process -Controls on map design, part 1 -Controls on map design, part 2 - Controls on map design, part 3 -Design principles -Visual hierarchy Figure-ground relationship- Contrast -Legibility -Visual Balance-Map elements -Creating a map layout in ArcMap. Basic map design in ArcMap 13mExporting a map as an image in ArcMap 1mTypography 8mCreating and customizing labels in ArcMap 9m</p>	<p>CO-4</p> <p>BTL-4</p>
MODULE 5: MAPPING QUANTITATIVE&PROJECT	(11)
<p>Mapping Quantitative Data</p> <p>Colour models: HSV -Colour models: CMYK -Choropleth maps -Creating choropleth maps in ArcMap-Data classification for mapping -Data classification methods for mapping -Mean vs. median –Zero values on your map -Joining tables -Working with tables in ArcMap -Field calculations in tables.</p> <p>Quantitative Map Types</p> <p>Dot maps -Creating dot density maps in ArcMap -Proportional symbol maps -Graduated symbol maps -Creating proportional and graduated symbol maps in ArcMap -Contour maps -</p>	<p>CO-5</p> <p>BTL-3</p>

Flow maps -Multivariate maps.	
Project: Getting Data and Making Your Own Map	
TEXT BOOKS	
1.	Wise, Stephen. (2014). GIS fundamentals-CRC Press.
2.	Paul Bolstad. (2016). <i>GIS Fundamentals_ A First Text on Geographic Information System</i> , XanEdu.
3.	Hu, Fei Huang, Qunying Jiang, Yongyao Li, Zhenlong Liu, Kai Sun, Min Xia, Jizhe Yang, Chaowei Phil_Yu, Manzhu. (2017). <i>Introduction to GIS programming and fundamentals with Python and ArcGIS</i> .
4.	Michele Campagna. (2005). <i>GIS for Sustainable Development</i> , CRC Press.
REFERENCE BOOKS	
1.	Alias Abdul-Rahman, MorakotPilouk. (2007). <i>Spatial data modeling for 3D GIS</i> , Springer
2.	Shashi Shekhar, Hui Xiong. (2007). <i>Encyclopedia of GIS</i> , Springer.
3.	Lena Sanders. (2007). <i>Models in spatial analysis</i> , Geographical Information Systems Series ISTE-GIS
4.	Alias Abdul-Rahman, MorakotPilouk. (2007). <i>Spatial data modeling for 3D GIS</i> , Springer.
5.	U.M. Shamsi. (2005). <i>GIS applications for water, wastewater, and stormwater systems</i> , Taylor & Francis.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management
MOOC- COURSERA	
1.	https://www.coursera.org/learn/gis-applications
2.	https://www.coursera.org/learn/gis-data-acquisition-map-design

COURSE TITLE	Course III -REMOTE SENSING AND GIS			CREDITS	2
COURSE CODE	CEM4376	COURSE CATEGORY	MINORS	L-T-P-S	4-0-0-0
Version	1.0	Approval Details	33 ACM, 15.12.2021	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%
Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should be conducted per course.					
Course Description	This course will introduce the students to the state-of-the-art concepts and practices of remote sensing and GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advanced methods will be covered. This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Upon completion, the participants should be able to use remote sensing (Satellite images and Field data) and GIS in their future research work.				
Course Objective	The course should enable the students to <ul style="list-style-type: none"> 1. Understand the application of remote sensing and GIS in solving the research problems 2. Learn Digital Image Processing 3. Understand the concepts of Imaging spectroscopy 4. Learn common data storage mechanisms within GIS 5. Learn geo data bases and shape files. 				
Course Outcome	Upon completion of this course, the students will be able to <ul style="list-style-type: none"> 1. Identify the error corrections in satellite images 2. Process images using complex algorithms to manipulate data. 3. Detect and identify minerals, terrestrial vegetation, man-made materials and backgrounds using hyper spectral remote sensing 6. Use digital elevation models and creating slope and distance analysis products. 4. Bring maps and data to the Internet and create web maps quickly with ArcGIS Online. 				
Prerequisites: Nil					

CO, PO AND PSO MAPPING															
CO	P O 1	P O 2	P O 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
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CO3	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO4	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
CO5	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related															
MODULE 1: REMOTE SENSING & SATELLITE IMAGE CORRECTIONS (8)															
Overview and Introduction -Basics of Remote Sensing-Error corrections in satellite image. I, Error,Error Identification and Correction - III														CO-1 BTL-2	
MODULE2: DIGITAL IMAGE PROCESSING, THERMAL AND MICROWAVE (11)															
Digital Image Processing-I, II, III, IV - Image Classification-I, Photogrammetric - Thermal Remote Sensing - Microwave Remote Sensing														CO-2 BTL-3	
MODULE 3: IMAGING SPECTROSCOPY & APPLICATION (11)															
Hyperspectral Remote Sensing – I, II, III, IV, V- GIS-I - GIS-I -Applications of Remote Sensing GIS-I&GIS-I														CO-3 BTL-3	
MODULE 4:STORAGE FORMATS (8)															
Storage Formats and Working with Rasters														CO-4 BTL-4	
Module 3 Overview – Geo data base Features and Design - File Geo data bases - Personal Geo data bases – Shape files - Workflow: Percent Overlap - Supplemental: Intro to SQLite Databases - Overview of Spatial Analyst – Geo referencing Rasters - Raster Calculator - Workflow: Zonal Statistics as Table - Workflow: Managing Data with Zonal Statistics and Join Field - Module 3 Summary - Tutorial Assignment 3: A Suitability Analysis: Spatial Analyst, Raster Data, and DEMs - Extra Practice for Lessons 5 and 6 -Lesson 5 Quiz: Data Storage - Lesson 6 Quiz: Creating Raster Data.															
MODULE 5:DATA QUALITY AND CREATING WEB MAPS (7)															
Overview - Assessing Data Quality and Uncertainty - Data Quality, Part 2: Measurement and Representation - Topology - Loading Layers in ArcGIS Online - Applying Symbology in ArcGIS Online - Map Annotations and Scaling in ArcGIS Online - Saving and Sharing Maps with ArcGIS Online - Module 4 Summary =- Course Summary - Short Tutorial: Exporting Shapefiles and Uploading them to Web Maps - Extra Practice for Lessons 7 and 8 - Lesson 7 Quiz: Uncertainty														CO-5 BTL-4	

and Quality - Lesson 8 Quiz: ArcGIS Online - Moving Valmeyer Final Quiz.	
TEXT BOOKS	
1.	Lillesand, T.M. and Kiefer, R.W. (1987). <i>Remote sensing and Image Interpretation</i> , John Wiley.
2.	Jensen, J. R. (2012). <i>Introductory digital image processing a remote sensing perspective</i> , Prentice Hall series in geographic information science.
3.	Schowenger dt, R. A. (2007). <i>Remote Sensing: Models and Methods for Image Processing</i> , Academic Press.
4.	Campbell, J.B. (1996). <i>Introduction to Remote Sensing</i> , Taylor & Francis, London.
5.	Joseph, G. (2003). <i>Fundamentals of Remote Sensing</i> , University press.
6.	Cracknell, P. and Hayes, L. (2007). <i>Introduction to remote sensing</i> , Routledge
REFERENCE BOOKS	
1.	Gupta, R. P. (2005). <i>Remote Sensing Geology</i> , Springer.
2.	Van-dr-Meer, F., De Jong, S. (2006). <i>Imaging spectrometry: Basic principles and prospective applications</i> , The Netherlands: Springer Publishers
3.	Rencz, A.N. (2008). <i>Remote Sensing for the Earth Sciences</i> , Manual of Remote Sensing, ASPRS.
4.	De-Jong, Steven, M., Van der Meer, F.D. (2004). <i>Remote Sensing Image Analysis: Including the Spatial Domain: Including the Spatial Domain</i> , Springer.
5.	Claudia, K., Stefan, D. (2014). <i>Quantitative Remote Sensing in Thermal Infrared</i> , Springer.
6.	Jensen, J.R. (2003). <i>Remote Sensing of the Environment an Earth Resource Perspective</i> , Pearson Education, Delhi.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20management
SWAYAM/NPTEL	
1.	https://onlinecourses.nptel.ac.in/noc21_ce61/preview