

ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY
M. TECH. REMOTE SENSING AND GIS
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND I SEMESTER SYLLABUS

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE- GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA4159	Statistical Methods for Engineers	FC	4	0	0	4	4
2.	RS4101	Remote Sensing	PCC	3	0	0	3	3
3.	RS4102	Geographical Information System	PCC	3	0	0	3	3
4.	RS4103	Advanced Surveying	PCC	3	0	2	5	4
5.	RM4151	Research Methodology and IPR	RMC	2	0	0	2	2
6.		Professional Elective I	PEC	3	0	0	3	3
7.		Audit Course I*	AC	2	0	0	2	0
PRACTICALS								
8.	RS4111	Geographical Information System Laboratory	PCC	0	0	4	4	2
9.	RS4112	Remote Sensing Laboratory	PCC	0	0	4	4	2
TOTAL				20	0	10	30	23

* Audit Course is optional

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE- GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	RS4201	Photogrammetry	PCC	3	0	0	3	3
2.	RS4202	Satellite Image Processing	PCC	3	0	0	3	3
3.		Professional Elective II	PEC	3	0	0	3	3
4.		Professional Elective III	PEC	3	0	0	3	3
5.	RS4203	Programming for Spatial Data Processing	PCC	2	0	2	4	3
6.		Audit Course II*	AC	2	0	0	2	0
PRACTICALS								
7.	RS4211	Satellite Image Processing Laboratory	PCC	0	0	4	4	2
8.	RS4212	Photogrammetry Laboratory	PCC	0	0	4	4	2
TOTAL				16	0	10	26	19

* Audit Course is optional

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	RS4301	Matlab Programming	PCC	2	0	2	4	3
2.		Professional Elective IV	PEC	3	0	0	3	3
3.		Professional Elective V	PEC	3	0	0	3	3
4.		Open Elective	OEC	3	0	0	3	3
PRACTICALS								
5.	RS4311	Project Work I	EEC	0	0	12	12	6
6.	RS4312	Practical Training (4 Weeks)	EEC	0	0	0	0	2
TOTAL				11	0	14	25	20

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	RS4411	Project Work II	EEC	0	0	24	24	12
TOTAL				0	0	24	24	12

TOTAL CREDITS: 74

FOUNDATION COURSES (FC)

S. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	MA4159	Statistical Methods for Engineers	4	0	0	4	1

PROFESSIONAL CORE COURSES (PCC)

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	RS4101	Remote Sensing	3	0	0	3	1
2.	RS4102	Geographical Information System	3	0	0	3	1
3.	RS4103	Advanced Surveying	3	0	2	4	1
4.	RS4111	Geographical Information System Laboratory	0	0	4	2	1
5.	RS4112	Remote Sensing Laboratory	0	0	4	2	1
6.	RS4201	Photogrammetry	3	0	0	3	2
7.	RS4202	Satellite Image Processing	3	0	0	3	2
8.	RS4203	Programming for Spatial Data Processing	2	0	2	3	2
9.	RS4211	Satellite Image Processing Laboratory	0	0	4	2	2
10.	RS4212	Photogrammetry Laboratory	0	0	4	2	2
11.	RS4301	Matlab Programming	2	0	2	3	2
TOTAL CREDITS						30	

RESEARCH METHODOLOGY AND IPR COURSES (RMC)

S. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	RM4151	Research Methodology and IPR	2	0	0	2	1
TOTAL CREDITS						2	

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	RS4311	Project Work I	0	0	12	6	3
2.	RS4312	Practical Training (4 Weeks)	0	0	0	2	3
3.	RS4411	Project Work II	0	0	24	12	4
TOTAL CREDITS						20	

LIST OF PROFESSIONAL ELECTIVE COURSES [PEC]

SEMESTER I, ELECTIVE I

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	RS4001	Geodesy	3	0	0	3	3
2.	RS4002	Soft Computing Techniques	3	0	0	3	3
3.	RS4003	Internet of Things	3	0	0	3	3

SEMESTER II, ELECTIVE II

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	RS4004	GIS Applications	3	0	0	3	3
2.	RS4005	Thermal and Hyper Spectral Remote Sensing	3	0	0	3	3
3.	RS4006	Disaster Management and Geomatics Applications	3	0	0	3	3
4.	RS4007	Geomatics for Hydrology and Water Resources	3	0	0	3	3

SEMESTER II, ELECTIVE III

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	RS4008	Microwave Remote Sensing	3	0	0	3	3
2.	RS4009	Python and R Programming	3	0	0	3	3
3.	RS4010	Geomatics for Urban Planning and Management	3	0	0	3	3
4.	RS4011	Laser Scanning for Terrain Mapping	3	0	0	3	3

SEMESTER III, ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	RS4012	Geomatics for Ocean and Coastal Zone Management	3	0	0	3	3
2.	RS4013	Planetary Remote Sensing	3	0	0	3	3
3.	RS4014	Spatial Data Modelling	3	0	0	3	3
4.	RS4015	Web Technology Programming for GIS	3	0	0	3	3

SEMSTER III, ELECTIVE V

S. NO.	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	RS4016	Satellite Meteorology	3	0	0	3	3
2.	RS4017	Geomatics for Environmental Monitoring and Modeling	3	0	0	3	3
3.	RS4018	Geomatics for Agriculture and Forestry	3	0	0	3	3
4.	RS4019	Geomatics for Transportation Planning and Management	3	0	0	3	3

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

S. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	AX4091	English for Research Paper Writing	2	0	0	0	1/2
2.	AX4092	Disaster Management	2	0	0	0	
3.	AX4093	Constitution of India	2	0	0	0	
4.	AX4094	நற்றமிழ் இலக்கியம்	2	0	0	0	

SUMMARY

S. No	Name of the Programme: M. TECH. REMOTE SENSING AND GIS					
	SUBJECT AREA	CREDITS PER SEMESTER				CREDITS TOTAL
		I	II	III	IV	
1.	FC	04	00	00	00	04
2.	PCC	14	13	03	00	30
3.	PEC	03	06	06	00	15
4.	RMC	02	00	00	00	02
5.	OEC	00	00	03	00	03
6.	EEC	00	00	08	12	20
7.	Non Credit/Audit Course	✓	✓	00	00	
8.	TOTAL CREDIT	23	19	20	12	74

OBJECTIVES :

- This course is designed to provide the solid foundation on topics in various statistical methods which form the basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling. It is framed to address the issues and the principles of estimation theory, testing of hypothesis, correlation and regression, design of experiments and multivariate analysis.

UNIT I ESTIMATION THEORY**12**

Estimators : Unbiasedness, Consistency, Efficiency and sufficiency – Maximum likelihood estimation – Method of moments.

UNIT II TESTING OF HYPOTHESIS**12**

Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.

UNIT III CORRELATION AND REGRESSION**12**

Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co-efficient.

UNIT IV DESIGN OF EXPERIMENTS**12**

Analysis of variance – One way and two way classifications – Completely randomized design – Randomized block design – Latin square design - 2^2 Factorial design.

UNIT V MULTIVARIATE ANALYSIS**12**

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components : Population principal components – Principal components from standardized variables.

TOTAL: 60 PERIODS**OUTCOMES :**

After completing this course, students should demonstrate competency in the following topics:

- Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem.
- Use statistical tests in testing hypotheses on data.
- Concept of linear regression, correlation, and its applications.
- List the guidelines for designing experiments and recognize the key historical figures in Design of Experiments.
- Perform exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

The students should have the ability to use the appropriate and relevant, fundamental and applied mathematical and statistical knowledge, methodologies and modern computational tools.

REFERENCES :

- Gupta.S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand and Sons, 2020.
- Jay L. Devore, "Probability and statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2014.
- Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", 9th Edition, Pearson Education, Asia, 2016.
- Johnson, R.A. and Wichern, D. W. "Applied Multivariate Statistical Analysis", 6th Edition, Pearson Education, Asia, 2012.
- Rice, J.A. "Mathematical Statistics and Data Analysis", 3rd Edition, Cengage Learning, 2015.

OBJECTIVES:

- To familiarize about the basic principles of remote sensing
- To acquire knowledge about the motion of remote sensing satellites in the space
- To expose the various types of sensors used for remote sensing
- To gain knowledge about the generation of satellite data products
- To extract useful information from satellite images

UNIT I	PHYSICS OF REMOTE SENSING	9
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Remote Sensing - Definition - Components - Electro Magnetic Spectrum – Basic wave theory – Particle theory – Stefan Boltzman law - Wiens-Displacement Law - Radiometric quantities - Effects of Atmosphere- Scattering – Different types –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of vegetation, soil and water –atmospheric influence on spectral response patterns- multi concept in Remote sensing -

UNIT II	PLATFORMS	9
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Orbit elements – Types of orbits – Motions of planets and satellites – Launch of space vehicle – Orbit perturbations and maneuvers – escape velocity - Types and characteristics of different remote sensing platforms – sun synchronous and geo synchronous satellites.

UNIT III SENSORS 9

Classification of remote sensors – selection of sensor parameters - resolution concept - Spectral, Radiometric and temporal resolution – Quality of images – imaging mode – photographic camera – opto-mechanical scanners – pushbroom and whiskbroom cameras – Panchromatic, multi spectral, thermal, hyperspectral scanners and microwave sensors – geometric characteristics of scanner imagery – Operational Earth resource satellites - Landsat, SPOT, IRS, WorldView, hyperion and hysis, ERS, ENVISAT, Sentinel.

UNIT IV DATA RECEPTION AND DATA PRODUCTS 9

Ground segment organization – Data product generation – sources of errors in received data – referencing scheme – data product output medium – Digital products – Super structure, Fast, GeoTIFF, Hierarchical and HDF formats – Indian and International Satellite Data Products – ordering of data

UNIT V DATA ANALYSIS 9

Data products and their characteristics – Elements of visual interpretation – interpretation keys – Digital image processing – Preprocessing – Image rectification – Image enhancement techniques – Image classification – Supervised and unsupervised classification algorithms for multispectral and hyperspectral images – Accuracy assessment.- hybrid classification techniques – Knowledge based classification, Neural Network Classification, Fuzzy Classification.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to
 - CO1** understand the concepts and laws related to remote sensing
 - CO2** acquire knowledge about various remote sensing platforms
 - CO3** understand the characteristics of different types of remote sensors
 - CO4** gain knowledge about reception, product generation, storage and ordering of satellite data
 - CO5** understand the concept of different image processing techniques and interpretation of satellite data

REFERENCES:

1. Lillesand T.M., and Kiefer, R.W. Remote Sensing and Image interpretation, VI edition of John Wiley & Sons-2015.
2. John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, 2015.
3. John A. Richards, Springer – Verlag, Remote Sensing Digital Image Analysis 5th edition, 2013.
4. Paul Curran P.J. Principles of Remote Sensing, ELBS; 1985.
5. George Joseph, Fundamentals of Remote Sensing, Third Edition, Universities Press (India) Pvt Ltd, Hyderabad, 2018

RS4102

GEOGRAPHICAL INFORMATION SYSTEM

L T P C
3 0 0 3

OBJECTIVES:

- Expose the students with concepts of cartography as major components of input and output related to cartography.
- To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
- To expose the concept of quality and design of cartographic outputs in open GIS environment.

UNIT I CARTOGRAPHY

9

Definition of Map – Mapping Organisation in India- Classification based on Function, Scale, Characteristics – Ellipsoid and Geoid – Co-ordinate Systems - Rectangular and Geographic Coordinates – UTM and UPS - Projection – Function - Types of Map Projections – Transformations – Function - Affine transformation - Choice of Map Projection – Evolution of cartography- Geo-Spatial, Spatial and Non-spatial data – Definition of GIS – Evolution GIS – Components of GIS – Digital Cartography concepts. - 3D GIS.

UNIT II GIS DATA MODELS AND DATA INPUT

9

Point, Line Polygon / Area, elevation and surface – Tessellations - Attributes and Levels of Measurement - Data Sources – Ground and Remote Sensing survey – Collateral data collection – Input: Map scanning and digitization, Registration and Georeferencing – Concepts of RDBMS - Raster Data Model – Grid – Data Encoding - Data Compression – Vector Data Model – Topological properties – Arc Node Data Structure – Raster Vs. Vector Comparison – File Formats for Raster and Vector – Data conversion between Raster and vector.

UNIT III RASTER AND VECTOR DATA ANALYSIS

9

Raster Data analysis: Local, Neighborhood and Regional Operations – Map Algebra – Vector Data Analysis: Topological Analysis, point-in-polygon, Line-in-polygon, Polygon-in-Polygon – Proximity Analysis: buffering, Thiessen Polygon – Non-topological analysis: Attribute data Analysis- concepts of SQL– ODBC

UNIT IV NETWORK ANALYSIS AND SURFACE ANALYSIS

9

Network – Creating Network Data - Origin, Destination, Stops, Barriers – Closest Facility Analysis, Service Area Analysis, OD Cost matrix analysis, Shortest Path Analysis – Address Geocoding – Surface Analysis – DEM, DTM - Point data to Surface interpolation – DEM Representation – Applications

UNIT V DATA OUTPUT AND WEB BASED GIS**9**

Map Compilation – Cartographic functionalities for Map Design – Symbolization – Conventional signs and symbols – Spatial Data Quality – Lineage, Positional Accuracy, Attribute Accuracy, Completeness, Logical Consistency - Meta Data – Web based GIS Merits - Architecture – Map Server – Spatial Data Infrastructure – Spatial Data Standards – OGC Standards - Free and Open Source – Proprietary - GIS Software .

TOTAL: 45 PERIODS**OUTCOMES:**

- On completion of the course, the student is expected to be able to
 - CO1** Understand the Characteristics and Components of Maps and GIS
 - CO2** Perform input of Spatial and Non-spatial data into GIS
 - CO3** Analyse Spatial Relationship between Elements using GIS tools
 - CO4** Evaluate Network and Surface Data for Decision Making
 - CO5** Present the Spatial Information and Access the Quality against Standards

REFERENCES:

- Kang-tsung Chang, Introduction to Geographic Information Systems: 9th Edition, 9781259929649, McGraw-Hill Education, 2018
- Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems, Pearson, 2016.
- Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographical Information Systems, Pearson Education, 4th Edition, 2012.
- Michael N. DeMers, Fundamentals of geographic information systems, Wiley, 2009.
- Borden D Dent, Jeff Torguson, Thomas W. Hodler, Cartography: Thematic Map Design 6th Edition, ISBN-13: 978-0072943825 McGraw-Hill Education – Europe, 2008

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RS4103**ADVANCED SURVEYING****L T P C
3 0 2 4****OBJECTIVES:**

- To understand the working of Total Station and GPS equipment and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS**9+6**

Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Global Navigation System, Regional Navigation System and SBAS - Basic concepts of GNSS, Glonass, IRNSS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler's Law - Perturbing forces - Geodetic satellite - Doppler effect- Different Coordinate and Time System.

UNIT II ELECTRO OPTICAL AND MICRO WAVE TOTAL STATION**9+6**

Computation of group Refractive Index for light, near infrared and microwaves - First velocity correction and Second velocity correction - Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments.. Care and maintenance of Total Station instruments – Applications of COGO functions -Traversing and Trilateration – Topographic mapping - Recent trends.

UNIT III GPS SATELLITE SYSTEM AND DATA PROCESSING 9+6

GPS - Segments - Space, Control and User segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - GPS receivers- GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – Data processing – software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic, pure Kinematic and Real time kinematic methods – Case studies.

UNIT IV LASER SCANNING 9+6

Airborne Topographic Laser Scanner – Ranging Principle – Pulse Laser and Continuous Wave Laser – First Return and Last Return – Ellipsoidal and Geoidal Height - Airborne Laser Scanner (ALS) – Components of ALS - GPS, IMU, LASER Scanner, Imaging Device - Terrestrial Laser Scanners (TLS) – Working Principle – Static, Dynamic and Vehicle Mounted TLS - Space Borne LiDAR Missions – Space Borne Radar Altimeter for mapping Sea Surface Topography.

UNIT V INTRODUCTION TO GEODESY 9+6

Definitions – History, Classifications, Applications, Problem and purpose of Geodesy -. Reference Surfaces and their relationship. Engineering, Lunar, Planetary and interferometric Synthetic aperture radar Geodesy – Local and International Spheroid - Geometry of ellipsoid - fundamental mathematical relationship of Geodetic, Geocentric and Reduced latitudes and their relationship- Ellipsoidal Co-ordinates in terms of Reduced, Geodetic and Geocentric latitude.

TOTAL : 75 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to
 - CO1** Gives basic idea about Total station and GPS
 - CO2** Acquire knowledge about electromagnetic waves and its usage in Total station.
 - CO3** Getting idea about working principle of electro optical and Microwave Total station
 - CO4** Understand the working of GPS
 - CO5** Understand the Geometry of the earth, Gravity and its relationship with nature

REFERENCES :

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996.
2. Satheesh Gopi, rasathishkumar, N.madhu, — Advanced Surveying , Total Station GPS and Remote Sensing — Pearson education , 2017, Second Edition.
3. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983.
4. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 3rd Edition,2016.
5. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 4th Edition,2015.
6. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 2003, Revised Edition.
7. Petr Vanicek and Edward J. Krakiwsky, Geodesy: The concepts, North-Holland Publications Co., Amsterdam,2015.
8. George Vosselman and Hans-Gerd Maas, Airborne and Terrestrial Laser Scanning, Whittles Publishing, 2010.

UNIT I RESEARCH DESIGN**6**

Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.

UNIT II DATA COLLECTION AND SOURCES**6**

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.

UNIT III DATA ANALYSIS AND REPORTING**6**

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS**6**

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENTS**6**

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filing, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL :30 PERIODS**REFERENCES**

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

PROGRESS THROUGH KNOWLEDGE

OBJECTIVES:

- To give practical exposure to the students to data input, data storage, data analyses and data output capabilities of a standard GIS software(proprietary and open softwares)
- It also adds skills in mapping techniques and map outputs.

1. Rectification and Spatial Referencing of Digital Map
2. Onscreen Digitization and Database Creation
3. Projection and Reprojection of spatial data
4. Data Conversion – Vector to Raster, Raster to Vector
5. Populating Attribute data base and querying on attribute data
6. Generation of DEM: from contours, spot heights, GRID and TIN, Isometric mapping
7. Vector Analysis – Buffering, Overlay and Network analysis

8. Raster Analysis – Measurement - Arithmetic overlaying, Logical overlaying, Class interval selection, choropleth maps
9. Map Output - Bar charts, Pie charts and symbols
10. Map compilation
11. Modelling spatial variability
12. Weighted theissen polygon and proximity analysis
13. Customisation and scripting
14. Mini Project :on the above relevant topics

TOTAL: 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

- CO1 Create GIS database through Digitization and Georeferencing
- CO2 Generate DEM from various elevation sources
- CO3 Perform Spatial Analysis of Vector Data using GIS tools
- CO4 Present Geospatial Information in form of Maps, Charts and Symbols
- CO5 Customize tools and interfaces through scripting

REFERENCES:

1. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems, Pearson, 2016.
2. Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographical Information Systems, Pearson Education, 4th Edition, 2012.
3. Borden D Dent, Jeff Torguson, Thomas W. Hodler, Cartography: Thematic Map Design 6th Edition, ISBN-13: 978-0072943825 McGraw-Hill Education – Europe, 2008
4. Kang-tsung Chang, Introduction to Geographic Information Systems: 9th Edition, 9781259929649, McGraw-Hill Education, 2018
5. Michael N. DeMers, Fundamentals of geographic information systems, Wiley, 2009.
6. Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Science and Systems, John Wiley & Sons Inc, 2015, ISBN 978111867695.
7. Tor Bernhardsen, Geographic Information Systems an Introduction, Willey, 3rd Edition, 2002.

RS4112

REMOTE SENSING LABORATORY

L T P C
0 0 4 2

OBJECTIVE:

- This course will facilitate the students to have hands on experience on different steps of Visual digital satellite image.

REMOTE SENSING EXERCISES

1. Spectral reflectance observation of the following using handheld spectro radiometer.
 - i) Vegetation. ii) Soil iii) Water iv) Built-up
2. Map reading Survey of India topo sheets.
3. Base Map preparation from SOI
4. Visual image interpretation keys for different land cover types on different satellite data
5. Land use/land cover map
6. Soil map.
7. Geology and geomorphology maps.
8. Slope maps and Watershed delineation.

TOTAL : 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to
- CO1** Understand spectral reflectance of vegetation, soil, water and built-up using spectro radiometer.
 - CO2** Understand the satellite image formats and base map preparation.
 - CO3** Ready to prepare the base map from Survey of India Toposheets.
 - CO4** Understanding the image elements for landuse/ Landcover maps.
 - CO5** Understand the geology and geomorphology maps through RS data and practical ability to delineate feature boundaries.

REFERENCES:

1. Lillesand T.M., and Kiefer, R.W. Remote Sensing and Image interpretation, VI edition of John Wiley & Sons-2015.
2. John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, 2015.
3. John A. Richards, Springer – Verlag, Remote Sensing Digital Image Analysis 5th edition, 2013.
4. Paul Curran P.J. Principles of Remote Sensing, ELBS; 1985.
5. Charles Elachi and Jakob J. van Zyl, Introduction To The Physics and Techniques of Remote Sensing, Wiley Series in Remote Sensing and Image Processing, 2nd edition, 2006.
6. George Joseph, Fundamentals of Remote Sensing, Third Edition, Universities Press (India) Pvt Ltd, Hyderabad, 2018
7. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011

RS4001

GEODESY

L T P C
3 0 0 3

OBJECTIVE:

- To understand the concept of geodetic surveying and solve the geodetic problems.

UNIT I FUNDAMENTALS

9

Definitions, classifications, applications and problems of geodesy. Historical development and organization of geodesy. Reference surfaces and their relationship, Engineering, lunar and planetary geodesy, Geodetic control (Horizontal and vertical)-Standards, methods and computations.

UNIT II GEOMETRIC GEODESY

9

Basics-Geodetic, Geocentric, Reduced Spheroidal latitudes and their relationship. coordinates in terms of reduced, geodetic and geocentric latitude. Radius of curvature in the meridian & prime vertical and their relationship. Mean Radius of curvature at any azimuth. Length of the meridian arcs and arcs of parallel and area of trapezium on the spheroid. Curves on the spheroid, properties of geodesic and Everest spheroid. Natural or Astronomical coordinate system, Geodetic or Geographical coordinate system, Rectangular or Cartesian coordinate system and relationship between them. Curvilinear coordinate system. Deflection of vertical, spherical excess. Astro-geodetic method of determining the reference spheroid.

UNIT III PHYSICAL GEODESY

9

Gravity field of earth, Concept of equipotential, geopotential and spheropotential surface Normal gravity, The significance of gravity measurements, Measurement of absolute and Relative gravity, Reduction of gravity measurements, Isostasy. Gravity networks, Gravity anomaly and Gravity disturbance. Fundamental equation of physical Geodesy. Determination of Geoid and Deflection of vertical. Orthometric height, Normal height, Dynamic height and their corrections. spheroidal height and Geoidal height.

UNIT IV GEODETIC ASTRONOMY**9**

Basics-Horizon, hour angle, Right Ascension, Ecliptic co-ordinate systems and relationship with Cartesian co-ordinate system, Transformation between them. Special star positions, Major constellation. Rising and setting of stars with respect to declination, hour angle and azimuth. Culmination, Prime vertical Crossing and Elongation. Variation in celestial co-ordinates. Sidereal time, Universal time, Zone time and Atomic time. Determination of Astronomical azimuth, latitude and longitude. Star catalogues, Ephemerides and Almanacs.

UNIT V GEODETIC COMPUTATION**9**

Rectangular and Polar co-ordinates. First and Second geodetic problem. Similarity and Helmert's transformation. Point determination by Intersection, Resection and Arc Section.

TOTAL : 45 PERIODS**OUTCOMES:**

- On completion of the course, the student is expected to be able to
- CO1 Understand the fundamentals of Geometry of the earth, Gravity and its relationship with nature
 - CO2 Understand the procedure for establishing horizontal and vertical Geodetic control and its adjustment procedure.
 - CO3 Determination of Azimuth, Latitude, Longitude and Time by Geodetic astronomical observations.
 - CO4 Provide the various aspects of Geometric and Physical Geodesy.
 - CO5 Inculcate the different height systems used to solve the field problem.

REFERENCES:

- George I. Hosmer, Geodesy, Kessinger publishing 2007.
- Howard goreJ., Elements of Geodesy, Kessinger publishing 2007.
- Wolf gang torg, Geodesy, Walter De Gruyter Inc. Berlin, 4th Edition, 2014.
- Geometrical Geodesy Maarten Hooijberg, Springer verlag 2005.
- Physical Geodesy Bernhard Hofmann-wellenhot & Helmut moritz, springer verlag, 2nd Corrected Edition, 2006.
- Petr Vanicek and Edward J.Kakiwsky, Geodesy, the concepts north Holland publications co, Amsterdam, 1991.
- Heribert Kahmen and wolf gang faig, surveying, watter De Gruyter, Berlin, Reprint, 2012.
- Schwarze, V.S.Geodesy, The challenge of the 3rd millennium, spinger verlag, 1st Edition, 2002.

PROGRESS THROUGH KNOWLEDGE

RS4002**SOFT COMPUTING TECHNIQUES****L T P C****3 0 0 3****OBJECTIVE :**

- The objective of the course is to make the students to understand the concepts of Artificial Neural Network, Fuzzy logic and Genetic algorithms and also their application in Geomatic.

UNIT I ARTIFICIAL NEURAL NETWORKS**9**

Introduction - soft computing vs. hard computing - soft computing techniques – applications - ANN : definition - Structure and Function of a single neuron: Biological neuron, artificial neuron, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebbian learning rule/Delta rule, ADALINE, MADALINE - Introduction of MLP – Deep Learning concepts - Geomatic Applications.

UNIT II FUZZY SYSTEMS**9**

Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp and fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction and features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making and Geomatic Applications

UNIT III NEURO-FUZZY MODELLING**9**

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT IV GENETIC ALGORITHM**9**

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional method.

UNIT V APPLICATIONS IN GEOMATICS**9**

AI Search algorithm-Predicate calculus –Knowledge acquisition and representation - rules of interface - Semantic networks-frames-objects-Hybrid models – Geomatic applications

TOTAL: 45 PERIODS**OUTCOMES:**

- On completion of the course, the student is expected to be able to
 - CO1** Understanding the necessity of soft computing techniques and fundamentals of Artificial Neural Networks
 - CO2** Imparts the concepts of uncertainty and its impacts on artificial intelligence
 - CO3** Helps to realize the merits of hybrid computing techniques
 - CO4** Introduces the concepts of heuristic search methods and optimization of solutions
 - CO5** Gain knowledge on utility of soft computing on multidisciplinary problems

REFERENCES:

1. Introduction to Artificial Neural Systems by Jacek.M Zurada, Jaico Publishing House, 2004.
2. Freeman J.A. and Skapura B.M., "Neural Networks, Algorithms Applications and Programming Techniques", Pearson ,2002.
3. Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Pearson, 2015.
4. Timothy J.Ross: Fuzzy Logic with Engineering Applications. McGraw Hill,NewYork, 4th Edition,2016.
5. Laurene Fauseett: Fundamentals of Neural Networks. Prentice Hall India, New Delhi,Pearson, 2004.
6. George J.Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall Inc., New Jersey,1995
7. Nih.J. Ndssen Artificial Intelligence, Harcourt Asia Ltd.,Singapore,1998

OBJECTIVES:

- To understand Smart Objects and IoT Architectures
- To learn about various IoT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications

UNIT I FUNDAMENTALS OF IoT**9**

Evolution of Internet of Things - Enabling Technologies - IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models - Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT - Functional blocks of an IoT ecosystem - Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II IoT PROTOCOLS**9**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11 ah and LoRaWAN - Network Layer: IP versions, Constrained Nodes and Constrained Networks - Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks - Application Transport Methods: Supervisory Control and Data Acquisition - Application Layer Protocols: CoAP and MQTT

UNIT III DESIGN AND DEVELOPMENT**9**

Design Methodology - Embedded computing logic - Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming.

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES**9**

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest - Role of Machine Learning - No SQL Databases - Hadoop Ecosystem - Apache Kafka, Apache Spark - Edge Streaming Analytics and Network Analytics - Xively Cloud for IoT, Python Web Application Framework - Django - AWS for IoT - System Management with NETCONF-YANG

UNIT V CASE STUDIES/INDUSTRIAL APPLICATIONS**9**

Cisco IoT system - IBM Watson IoT platform - Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry - GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

TOTAL: 45 PERIODS**OUTCOMES:**

Upon completion of the course, the student should be able to:

- Explain the concept of IoT.
- Analyze various protocols for IoT.
- Design a PoE of an IoT system using Raspberry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario

- CO1 To introduce the fundamentals, evolution, architecture and sensors of IOT.
CO2 To provide the protocols of IOT.
CO3 To provide the Design and Development of IOT system using the Embedded computing Logic.
CO4 To give the Data Analytics and supporting services for IOT system.
CO5 To present the case studies and Implementation of IOT system.

REFERENCES:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete. Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Arshdeep Bahga, Vijay Madisetti, —Internet of Things – A hands-on approach||, Universities Press, 2015
3. Olivier Hersent, David Boswarthick, Omar Elloumi, —The Internet of Things – Key applications and Protocols||, Wiley, 2012 (for Unit 2)
4. Jan Ho" ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things||, Springer, 2011.
6. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance your projects, 2nd Edition, O'Reilly_Media, 2011.
<https://www.arduino.cc/>
<https://www.ibm.com/smarterplanet/us/en/?ca=v> smarter planet



AUDIT COURSES

AX4091

ENGLISH FOR RESEARCH PAPER WRITING

L T P C
2 0 0 0

OBJECTIVES

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING

6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS

6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III TITLE WRITING SKILLS

6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV RESULT WRITING SKILLS

6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V VERIFICATION SKILLS

6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission

TOTAL: 30 PERIODS

OUTCOMES

CO1 – Understand that how to improve your writing skills and level of readability

CO2 – Learn about what to write in each section

CO3 – Understand the skills needed when writing a Title

CO4 – Understand the skills needed when writing the Conclusion

CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

OBJECTIVES

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION**6**

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS**6**

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA**6**

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT**6**

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT**6**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

TOTAL : 30 PERIODS**OUTCOMES**

- CO1: Ability to summarize basics of disaster
- CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- CO5: Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES

1. Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.
2. Nishitha Rai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "NewRoyal book Company, 2007.
3. Sahni, Pardeep Et. Al. , " Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi, 2001.

OBJECTIVES

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV ORGANS OF GOVERNANCE

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V LOCAL ADMINISTRATION

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI ELECTION COMMISSION

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

UNIT I	சங்க இலக்கியம்	6
	1. தமிழின் துவக்க நூல் தொல்காப்பியம் - எழுத்து, சொல், பொருள் 2. அகநானூறு (82) - இயற்கை இன்னிசை அரங்கம் 3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி 4. புறநானூறு (95,195) - போரை நிறுத்திய ஒளவையார்	
UNIT II	அறநெறித் தமிழ்	6
	1. அறநெறி வகுத்த திருவள்ளுவர் - அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புறவு அறிதல், ஈகை, புகழ் 2. பிற அறநூல்கள் - இலக்கிய மருந்து - ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்)	
UNIT III	இரட்டைக் காப்பியங்கள்	6
	1. கண்ணகியின் புரட்சி - சிலப்பதிகார வழக்குரை காதை சமூகசேவை இலக்கியம் மணிமேகலை - சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை	
UNIT IV	அருள்நெறித் தமிழ்	6
	1. சிறுபாணாற்றுப்படை - பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குத் போர்வை கொடுத்தது, அதியமான் ஒளவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள் 2. நற்றிணை - அன்னைக்குரிய புன்னை சிறப்பு 3. திருமந்திரம் (617, 618) - இயமம் நியமம் விதிகள் 4. தர்மச்சாலையை நிறுவிய வள்ளலார் 5. புறநானூறு - சிறுவனே வள்ளலானான் 6. அகநானூறு (4) - வண்டு நற்றிணை (11) - நண்டு கலித்தொகை (11) - யானை, புறா ஐந்திணை 50 (27) - மான்	
	ஆகியவை பற்றிய செய்திகள்	

1. உரைநடைத் தமிழ்,
 - தமிழின் முதல் புதினம்,
 - தமிழின் முதல் சிறுகதை,
 - கட்டுரை இலக்கியம்,
 - பயண இலக்கியம்,
 - நாடகம்,
2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,
3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,
4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,
5. அறிவியல் தமிழ்,
6. இணையத்தில் தமிழ்,
7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

TOTAL: 30 PERIODS

தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University) - www.tamilvu.org
2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia) - <https://ta.wikipedia.org>
3. தர்மபுர ஆதின வெளியீடு
4. வாழ்வியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்
5. தமிழ்கலைக் களஞ்சியம் - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

PROGRESS THROUGH KNOWLEDGE