ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

For

CIVIL ENGINEERING

M.TECH. REMOTE SENSING

JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

ACADEMIC REGULATIONS R13 FOR M. Tech (REGULAR) DEGREE COURSE

Applicable for the students of M. Tech (Regular) Course from the Academic Year 2013-14 onwards

The M. Tech Degree of Jawaharlal Nehru Technological University Kakinada shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.0 AWARD OF M. Tech DEGREE

2.1 A student shall be declared eligible for the award of the M. Tech Degree, if he pursues a course of study in not less than two and not more than four academic years.

2.2 The student shall register for all 80 credits and secure all the 80 credits.

2.3 The minimum instruction days in each semester are 90.

3.0 A. COURSES OF STUDY

The following specializations are offered at present for the M. Tech course of study.

1. M.Tech- Structural Engineering
2. M.Tech- Transportation Engineering
3. M.Tech- Infrastructure Engineering & Management
4. ME- Soil Mechanics and Foundation Engineering
5. M.Tech- Environmental Engineering
6. M.Tech-Geo-Informatics
7. M.Tech-Spatial Information Technology

8.   M.Tech- Civil Engineering
9.   M.Tech -Geo-Technical Engineering
10. M.Tech- Remote Sensing
11. M.Tech- Power Electronics
12. M.Tech- Power & Industrial Drives
13. M.Tech- Power Electronics & Electrical Drives
14. M.Tech- Power System Control & Automation
15. M.Tech- Power Electronics & Drives
16. M.Tech- Power Systems
17. M.Tech- Power Systems Engineering
18. M.Tech- High Voltage Engineering
19. M.Tech- Power Electronics and Power Systems
20. M.Tech- Power System and Control
21. M.Tech- Power Electronics & Systems
22. M.Tech- Electrical Machines and Drives
23. M.Tech- Advanced Power Systems
24. M.Tech- Power Systems with Emphasis on High Voltage Engineering
25. M.Tech- Control Engineering
26. M.Tech- Control Systems
27. M.Tech- Electrical Power Engineering
28. M.Tech- Power Engineering & Energy System
29. M.Tech- Thermal Engineering
30. M.Tech- CAD/CAM
31. M.Tech- Machine Design
32. M.Tech- Computer Aided Design and Manufacture
33. M.Tech- Advanced Manufacturing Systems
34. M.Tech-Computer Aided Analysis & Design
35. M.Tech- Mechanical Engineering Design
36. M.Tech- Systems and Signal Processing
37. M.Tech- Digital Electronics and Communication Systems
38. M.Tech- Electronics & Communications Engineering
39. M.Tech- Communication Systems
40. M.Tech- Communication Engineering & Signal Processing
41. M.Tech- Microwave and Communication Engineering
42. M.Tech- Telematics

43. M.Tech- Digital Systems & Computer Electronics
44. M.Tech- Embedded System
45. M.Tech- VLSI
46. M.Tech- VLSI Design
47. M.Tech- VLSI System Design
48. M.Tech- Embedded System & VLSI Design
49. M.Tech- VLSI & Embedded System
50. M.Tech- VLSI Design & Embedded Systems
51. M.Tech- Image Processing
52. M.Tech- Digital Image Processing
53. M.Tech- Computers & Communication
54. M.Tech- Computers & Communication Engineering
55. M.Tech- Instrumentation & Control Systems
56. M.Tech – VLSI & Micro Electronics
57. M.Tech – Digital Electronics & Communication Engineering
58. M.Tech- Embedded System & VLSI
59. M.Tech- Computer Science & Engineering
60. M.Tech- Computer Science
61. M.Tech- Computer Science & Technology
62. M.Tech- Computer Networks
63. M.Tech- Computer Networks & Information Security
64. M.Tech- Information Technology
65. M.Tech- Software Engineering
66. M.Tech- Neural Networks
67. M.Tech- Chemical Engineering
68. M.Tech- Biotechnology
69. M.Tech- Nano Technology
70. M.Tech- Food Processing
71. M.Tech- Avionics

and any other course as approved by AICTE/ University from time to time.

3.0 B.   Departments offering M. Tech Programmes with specializations are noted below:

Civil Engg.	1.	M.Tech- Structural Engineering
	2.	M.Tech- Transportation Engineering
	3.	M.Tech- Infrastructure Engineering & Management
	4.	ME- Soil Mechanics and Foundation Engineering
	5.	M.Tech- Environmental Engineering
	6.	M.Tech-Geo-Informatics
	7.	M.Tech-Spatial Information Technology
	8.	M.Tech- Civil Engineering
	9.	M.Tech -Geo-Technical Engineering
	10.	M.Tech- Remote Sensing
EEE	1.	M.Tech- Power Electronics
	2.	M.Tech- Power & Industrial Drives
	3.	M.Tech- Power Electronics & Electrical Drives
	4.	M.Tech- Power System Control & Automation
	5.	M.Tech- Power Electronics & Drives
	6.	M.Tech- Power Systems
	7.	M.Tech- Power Systems Engineering
	8.	M.Tech- High Voltage Engineering
	9.	M.Tech- Power Electronics and Power Systems
	10.	M.Tech- Power System and Control
	11.	M.Tech- Power Electronics & Systems
	12.	M.Tech- Electrical Machines and Drives
	13.	M.Tech- Advanced Power Systems
	14.	M.Tech- Power Systems with Emphasis on High Voltage Engineering
	15.	M.Tech- Control Engineering
	16.	M.Tech- Control Systems
	17.	M.Tech- Electrical Power Engineering
	18.	M.Tech- Power Engineering & Energy System
ME	1.	M.Tech- Thermal Engineering
	2.	M.Tech- CAD/CAM
	3.	M.Tech- Machine Design
	4.	M.Tech- Computer Aided Design and Manufacture
	5.	M.Tech- Advanced Manufacturing Systems
	6.	M.Tech-Computer Aided Analysis & Design
	7.	M.Tech- Mechanical Engineering Design

ECE		
	1.	M.Tech- Systems and Signal Processing
	2.	M.Tech- Digital Electronics and Communication Systems
	3.	M.Tech- Electronics & Communications Engineering
	4.	M.Tech- Communication Systems
	5.	M.Tech- Communication Engineering & Signal Processing
	6.	M.Tech- Microwave and Communication Engineering
	7.	M.Tech- Telematics
	8.	M.Tech- Digital Systems & Computer Electronics
	9.	M.Tech- Embedded System
	10.	M.Tech- VLSI
	11.	M.Tech- VLSI Design
	12.	M.Tech- VLSI System Design
	13.	M.Tech- Embedded System & VLSI Design
	14.	M.Tech- VLSI & Embedded System
	15.	M.Tech- VLSI Design & Embedded Systems
	16.	M.Tech- Image Processing
	17.	M.Tech- Digital Image Processing
	18.	M.Tech- Computers & Communication
	19.	M.Tech- Computers & Communication Engineering
	20.	M.Tech- Instrumentation & Control Systems
	21.	M.Tech – VLSI & Micro Electronics
	22.	M.Tech – Digital Electronics & Communication Engineering
	23.	M.Tech- Embedded System & VLSI
CSE	1.	M.Tech- Computer Science & Engineering
	2.	M.Tech- Computer Science
	3.	M.Tech- Computer Science & Technology
	4.	M.Tech- Computer Networks
	5.	M.Tech- Computer Networks & Information Security
	6.	M.Tech- Information Technology
	7.	M.Tech- Software Engineering
	8.	M.Tech- Neural Networks
Others	1.	M.Tech- Chemical Engineering
	2.	M.Tech- Biotechnology
	3.	M.Tech- Nano Technology
	4.	M.Tech- Food Processing
	5.	M.Tech- Avionics

4.0 ATTENDANCE

4.1   A student shall be eligible to write University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

4.2   Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

4.3   Shortage of Attendance below 65% in aggregate shall not be condoned.

4.4   Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.

4.5   A prescribed fee shall be payable towards condonation of shortage of attendance.

4.6   A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

5.1   For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the **average** of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for a total duration of 120 minutes with 4 questions (without choice) each question for 10 marks. End semester examination is conducted for 60 marks for 5 questions to be answered out of 8 questions.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End Semester Examinations and 40 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be two seminar presentations during III semester and IV semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the End semester Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled. For re-registration the candidates have to apply to the University through the college by paying the requisite fees and get approval from the University before the start of the semester in which re-registration is required.

5.6 In case the candidate secures less than the required attendance in any re registered subject (s), he shall not be permitted to write the End Examination in that subject. He shall again re-register the subject when next offered.

5.7 Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher or teacher of the respective college and the second examiner shall be appointed by the university from the panel of examiners submitted by the respective college.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

6.1 A Project Review Committee (PRC) shall be constituted with Head of the Department and two other senior faculty members.

6.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

6.3 After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

6.4 If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Project Review Committee (PRC). However, the Project Review Committee (PRC) shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5 A candidate shall submit his status report in two stages at least with a gap of 3 months between them.

6.6 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after

successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. The candidate has to pass all the theory and practical subjects before submission of the Thesis.

6.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

6.8 The thesis shall be adjudicated by one examiner selected by the University. For this, the Principal of the College shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned and head of the department.

6.9 If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the University.

6.10 If the report of the examiner is favourable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:

    A.   Excellent

    B.   Good

    C.   Satisfactory

    D.   Unsatisfactory

The Head of the Department shall coordinate and make arrangements for the conduct of Viva-Voce examination.

6.11 If the report of the Viva-Voce is unsatisfactory, the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the University.

7.0 AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured
First Class with Distinction	70% and above (Without any Supplementary Appearance)
First Class	Below 70% but not less than 60% 70% and above (With any Supplementary Appearance)
Second Class	Below 60% but not less than 50%

The marks in internal evaluation and end examination shall be shown separately in the memorandum of marks.

8.0 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

9 .0   TRANSITORY REGULATIONS (for R09)

9.1   Discontinued or detained candidates are eligible for re-admission into same or equivalent subjects at a time as and when offered.

9.2   The candidate who fails in any subject will be given two chances to pass the same subject; otherwise, he has to identify an equivalent subject as per R13 academic regulations.

10. GENERAL

10.1   Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

10.2   The academic regulation should be read as a whole for the purpose of any interpretation.

10.3   In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

10.4   The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN
EXAMINATIONS

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project

	(theory or practical) in which the candidate is appearing.	work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and

	the examination.	shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/ Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining

		examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1.   Punishments to the candidates as per the above guidelines.

2.   Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)

   (i)   A show cause notice shall be issued to the college.

   (ii)   Impose a suitable fine on the college.

   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇨ Ragging within or outside any educational institution is prohibited.

⇨ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years	+	Rs.10,000/-
Causing death or abetting suicide	10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

ABSOLUTELY
NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.

2. Ragging entails heavy fines and/or imprisonment.

3. Ragging invokes suspension and dismissal from the College.

4. Outsiders are prohibited from entering the College and Hostel without permission.

5. Girl students must be in their hostel rooms by 7.00 p.m.

6. All the students must carry their Identity Card and show them when demanded

7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE, JNTUKA RAGGING FREE UNIVERSITY

Course Structure and Syllabus (R13)
M.Tech. (Remote Sensing)

I Year – I SEMESTER

S.No	Name of the Subject	L	P	C
1	Principles of Photogrammetry	4	—	3
2	Principles of Remote Sensing	4	—	3
3	Principles of Geographical Information Systems	4	—	3
4	Earth Systems	4	—	3
5	Object Oriented programming through JAVA	4	—	3
6	**Elective – I**	4	—	3
	a) Data Base Management Systems			
	b) Principles of Geo-data base			
	c) Web Technologies			
7	Map Analysis & Photogrammetry Lab & Satellite Image Interpretation Lab	—	4	2
	Total			**20**

II SEMESTER

1	Digital Image Processing	4	—	3
2	Advanced Remote Sensing	4	—	3
3	Internet GIS	4	—	3
4	R.S. & GIS Applications In Earth Sciences	4	—	3
5	Geodesy & GNSS	4	—	3
6	**Elective – II**	4	—	3
	a)Remote Sensing & GIS for Disaster Management			
	b) Data Warehousing &Data Mining			
	c) Advanced surveying and cartography			
	d) Advanced Photogrammetry			
	e) Geo-statistical Methods			
7	Digital Image Processing Lab & GIS & GPS Lab	—	4	2
	Total			**20**

III SEMESTER

1	Seminar	—	—	2
2	Dissertation / Thesis	—	—	18
	Total			**20**

IV SEMESTER

1	Seminar	—	—	2
2	Dissertation / Thesis	—	—	18
	Total			**20**

SYLLABUS
(Common for M.TECH. SIT, RS)

I – I		L	P	Credits
		4	-	3
PRINCIPLES OF PHOTOGRAMMETRY				

UNIT-I

Introduction – Definition of Photogrammetry - types of photographs, **Vertical Photographs –** Geometry of vertical photographs, Scale of a vertical photograph over flat terrain, over variable terrain - average photo scale, methods of determining scale of vertical photographs, Flying height of a vertical photograph Stereoscopic viewing of Vertical photographs – depth perception; overlap, side lap; flight planning; vertical exaggeration - factors involved and determination.

UNIT-II

Relief displacement on vertical photographs

Stereoscopic Parallax –Photographic "Flight-Line" Axes for Parallax Measurement – Monoscopic methods Parallax measurement – Principle of the Floating Mark – Stereoscopic methods of Parallax Measurement – Parallax equation – Elevations by parallax Differences – Approximate Equation for elevations from Parallax Differences – Measurement of Parallax Differences- Parallax Correction Graph – Computing Flying Height and Air Base – Mapping with Stereoscope and Parallax Bar – ; Y-parallax Error Evaluation. . Determination of Horizonal ground length, directions and angles from photo coordinates.

UNIT -III

Elements of air photo pattern – rock types, landforms, surface drainage patterns, Erosion features, photographic gray tones, vegetatative details, cultural details, boundary characteristics, micro details of the terrain.

UNIT-IV

Elementary Methods of Planimetric Mapping With Vertical Photographs: Planimetric Mapping by Direct Tracing – Planimetric Mapping with Reflection and Projection Instruments – Georeferencing

of Digital Imagery – Planimetric Mapping Using a Tablet Digitizer – Heads-up Digitizing.

UNIT V

Photo Elements and Mosaics – Advantages and disadvantages of photomaps and mosaics - uses of photomaps and mosaics, types of mosaics, Materials for preparing mosaics, Mosaic construction. – Orthophoto mosaics- Reproduction.

TEXT BOOK:

1. Elements of Photogrammetry by PAUL R. WOLF

2. Lillisand T.M and R.W.Kiefer (1994) 4th edition. Remote sensing and image interpretation, John Wiley & Sons, New York.

3. Sabins F.F Jr Latest Remote Sensing: Principles and Interpretation, W.H.Freeman & Co., New York.

REFERENCE:

1. Manual of Photogrammetry – American Society of Photogrammetry By ALBERT.D

2. Principles and Applications of Photo Geology By SHIV PANDEY

4. Photogrammetry- Vol I by Krauss, J., - Springler – Verlag Publications

5. Photogrammetry 3rd Edition by Moffitt, Francis H. & Mikhail, Edward M., - Harper and Row Publishers.HH

6. Photogrammetry 3rd Edition by Moffitt, Francis H. & Mikhail, Edward M., - Harper and Row Publishers.HH

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	Credits
	4	-	3
PRINCIPLES OF REMOTE SENSING			

UNIT I

Introduction of Remote Sensing, Electro Magnetic Spectrum - Energy interaction with 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.

UNIT II

Platforms: Types of Platforms, types of sensors, Resolutions, satellite orbits, scanning mechanism, Satellite data types, ground truth data collection Instruments used for ground truth data collections.

UNIT III

Satellites and Data Products - Satellite programs of the world – geostationary, sun synchronous, meteorological, ocean monitoring and telecommunication satellites, LANDSAT, SPOT, IRS, Quick Bird, IKONOS, Cartosat Oceansat, NOAA and Other recent satellites.

UNIT-IV

Thermal Remote Sensing: Radiant flux – heat transfer – thermal infrared radiation – thermal properties of materials – emissivity of materials – thermal inertia of Earth surface features. Thermal IR detection and imaging – characteristics of TIR images. Factors controlling IR Survey – applications.

UNIT V

Microwave remote sensing: Definitions-aircraft radar system – SLAR – components, imaging system, wavelengths – range and azimuth resolution – real aperture and synthetic aperture systems, geometry of radar Images - mosaics. Image characteristics: Polarization, look direction and look angle – radar image interpretation, Air borne, Space-borne, different platforms and Sensors, Seasat, SIRA, SIRV,ERS, JERS, Radarsat, Risat, ASTER, SRTM. **Hyperspectral Remote Sensing** -

Spectroscopy, Image cube, AVIRIS, Spectral matching, Data Libraries, Application of Hyperspsectral data, MODIS.

Text Books:

1. George Joseph,(2005) Fundamentals of Remote sensing 2nd edition , University press, Pvt, Ltd, Hyderabad

2. Shir N.PANDEY Principles of Remote Sensing , Newage International Publishers..

3. CURRAN P.J(1985) Principles of Remote Sensing,Longman,Essek.

4. Lillisand T.M and R.W.Kiefer (1994) 4th edition. Remote sensing and image interpretation, John Wiley & Sons, New York.

5. Sabins F.F Jr Latest Remote Sensing: Principles and Interpretation, W.H.Freeman & Co., New York.

6. Hayesm L., [1991] Introduction to Remote Sensing, Taylor and Fransis Publication, London.

7. James .B. Campbell , Randolph H. Wynne, Introduction to Remote Sensing- The Guilford press, 2011.

REFERENCES:

1. Remote sensing by JAMES B.CAMPBEL published by Taylor & fancies Ltd.

2. JOHN R.JENSEN " Remote sensing for Environment"pearson edition Pvt Ltd, New Delhi

3. Alexey Bunkin and Konstantin Voliak, Laser Remote Sensing of the Ocean, John Wiley and Sons. 2001, Canada.

4. Gibso, P., and Clare H.Power, [2000] Introductory Remote Sensing Principles and concepts, Routledge, 1st edition, London.

5. Henderson, F. M., and Anthony J. Lewis, 1998, Manual of Remote Sensing, Volume 2, Principles and Application of Imaging Radar, 3rd Edition, John Wiley and Sonc Inc, Canada, USA.

6. Ulaby, F.T., Moore, R.K. AND Fung, A.K., "Microwave Remote Sensing Active and Passive", Vol. 1,2 and 3, Addison – Wesley Publication Company, 2001.

7. Floyd. M. Handerson and Anthony, J. Lewis, "Principles and Application of Imaging Radar,

8. Manual of Remote Sensing", 3rd edition Vol.2 ASPRS, Jhumurley and Sons, 1998.

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	Credits
	4	-	3
PRINCIPLES OF GEOGRAPHICAL INFORMATION SYSTESTEMS			

UNIT I

INTRODUCTION TO GIS SPATIAL ANALYSIS

Spatial Elements, Spatial Measurement Level, Spatial Location and Reference, Spatial Patterns, Geographic Data Collection, Populations and Sampling Schemes, Inferences from Samples, Map Scale, Map Characteristics, Map Projections, Grid Systems for Mapping, The Cartographic Process, Map Symbolism, Map Abstraction and Cartographic Databases, Thematic maps and associated common problems.

UNIT II

CARTOGRAPHIC AND GIS DATA STRUCTURES

Computer Database Structures for Managing Data, Hierarchical Data Structures, Network Systems, Relational Database Management Systems.

UNIT III

GIS Data Models & Input Devices:

Graphic Representation of Entitles and Attributes, GIS Data Models for Multiple Coverage's, Raster Models, Storing of Raster Data, Vector Models, Input Devices, Raster, Vector, Reference Frameworks and Transformation, Map Preparation and the Digitizing Process, Methods of Vector Input, Method of Raster Input, Remote sensing, Raster Data Input, External Databases.

UNIT IV

DATA STORAGE AND EDITING

Storage of GIS Databases, Editing the GIS Database, Detecting and Editing Errors of Different Types, Entity Errors: Vector, Attribute Errors: Raster and Vector, Dealing with Projection Change, Edge Matching, Conflation and Rubber Sheeting, Templating.

UNIT V

GIS Design and Implementation

GIS Design, Internal and External GIS Design, Software Engineering Approach, System Design Principles, System Development Waterfall Mode, Structured Designed Model, Technical Design, Cost/Benefit Issues, Data and Applications Requirements Models, Formal GIS Design Methodology, The Spiral Model, Rapid Prototyping, Database Design Study Area, Scale, Resolution, and Level of Detail, Classification, Coordinate System and Projection.

TEXT BOOK:

1. Michael N Demers , FUNDAMENTAL OF GIS , 4th edition Published by John Wiley & Sons Inc

2. Burrough P.A.**,** Principles of GIS , Rachael Mc Donnell.

3. Rolf A.de Principles of GIS , ITC Education series :1,3rd Edition.

REFERENCES:

1. Jeffrey Star and John Estates Geographic Information System- An Introductory , Pretence Hall Inc.

2. Marble, D.F and Calkins, Basic Readings In Geographic Information System ,H.W – Spad Systems Ltd.

3. A.M. Chandra and S.K. Ghosh 2000.Remote Sensing and GIS . Narosa Publishing House, New Delhi.

4. Lo.C.P., Yeung. K.W.Albert (2002) Concepts and Techniques of Geographic Information Systems, Prentice - Hall of India Pvt ltd. New Delhi.

Common for M.Tech. (Remote Sensing and Geoinformatics)

I – I	L	P	Credits
	4	-	3
EARTH SYSTEMS			

UNIT – I

Scope: earth surface forms and processes – geomorphology; atmospheric components and systems; Oceans dynamics and circulation patterns

Fundamental concepts in geomorphology; Endogenetic processes: volcanism and tectonism; Exogenetic processes: weathering, Mass-wasting and erosion; geomorphic agents.

UNIT – II

Fluvial processes and landforms: valleys and valley forming processes - associated features; Alluvium – active and relict alluvium; Floodplain morphology; Types of streams - Genetic classification of streams; Alluvial fans and deltas

Shore Zone processes and landforms: shore line, shore zone and coast; Wind waves, tides, littoral currents, storm surges and tsunamis; Erosional and depositional landforms.

UNIT III

Glacial processes and landforms: ice and glaciers; types of glaciers; glacial motion; Regimen of glaciers – nourishment and wastage of glaciers; active, passive and dead glaciers; erosional and depositional landforms.

Eolian processes and landforms; dominance of wind processes in arid and semi-arid regions; erosional and depositional landforms

UNIT – IV

Atmosphere: Composition and Vertical Structure; Insolation and Heat Budget; Atmoshere Pressure and winds: variations of air pressure and weather – diurnal and seasonal; Wind: Factors affecting wind direction and speed, wind observation and measurement ; wind shift, General circulation of the atmosphere; Atomspheric humidity, clouds

and precipitation and monsoons; Air masses, fronts, weather disturbances – storms, tornadoes and their impact on life and property.

UNIT – V

The World Oceans; Physical properties of sea water – salinity, density, temperature, pressure, colour; Ocean dynamics: Waves – wind waves, tsunamis; Tides – diurnal semi-diurnal; Currents – longshore currents; Ocean currents – cold and warm currents and ocean circulation patterns Sea level changes – episodic, seasonal and long-terms changes and their impacts; Predicted sea-level rise: causes and consequences

TEXTBOOKS:

1. Geomorphology by A.L. Bloom, Waveland Pr.Inc. 2004

2. Principles of Geomorphology by W.D. Thornbury, Wiley Eastern, 1984

3. Landscape Systems by T.L. McKnight, Pretice-Hall International, 1987

4. Fundamentals of Geomorphology by R. Huggett, Routledge, 2007

5. Climatology, Lal, D.S., Sharda Pustak Bhawan, 11, University road, Allahabad, 2003

6. General climatology, Howard J. Critchfield, Prentice-Hall of India private Limited,New Delhi, 1987

7. Physical Geography, Tikka, R.N., Kedar Nath Ram Nath &Co, Meerut, 2006

8. Descriptive Physical Oceanography, Reddy, M.P.M., Oxford & IBH Publishing Co. 2001

9. Oceanography – A Brief Introduction, Siddhartha, K., Kisalaya Publications, 2004

10. Beaches and Coasts, C.A.M. King, Edward Arnold, 1961

11. Earth's Cryosphere and Sea level Change, Bengtsson et al., Springer, 2011

REFERENCE:

Sea-level rise and coastal vulnerability - an assessment of Andhra Pradesh Coast through remote sensing and GIS, Nageswara Rao et al., 2008, Journal of Coastal Conservation, Vol. 12 (4), pp. 195-207

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	Credits
	4	-	3
OBJECT ORIENTED PROGRAMMING THROUGH JAVA			

UNIT-I

Introduction

Introduction to OOPS: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented Programming - Objects and Classes – Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication – Benefits of OOP – Application of OOPs.

Introduction to Java: Importance of Java to internet, byte code, Java buzzwords, data types, variables, declaring variables, dynamic initialization, scope and life time of variables, type conversion and casting, compiling and running of simple Java program.

UNIT-II

Arrays, Control Structures , Classes and Objects

Arrays, Operators, control statements, Concepts of classes and objects, class fundamentals Declaring objects, assigning object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and constructors, parameter passing - call by value, recursion, exploring the String class.

UNIT-III

Inheritance,Packages and Interfaces

Inheritance Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object

class.Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-IV

Exception Handling and Multithreading

Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes, Concepts of Multithreading, differences between process and thread, thread life cycle,creating multiple threads using Thread class, Runnable interface, Synchronization, thread priorities, inter thread communication.

I/O Streams: File –Streams, Advantages, The stream classes, Byte streams, Character streams.

UNIT-V

Event Handling and AWT Controls

Applets - Concepts of Applets, differences between applets and applications,life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Abstract window tool kit - Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

AWT components : Concepts of components, container, panel, window, frame, canvas, Font class, Color class and Graphics.Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers.

TEXT BOOKS

1. The Complete Reference Java J2SE 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.

2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	Credits
	4	-	3
ELECTIVE - I **DATABASE MANAGEMENT SYSTEMS**			

UNIT I :

Introduction

Database System Applications- Database System versus File System-Components of DBMS- View of Data- Data Models: Object Based Logical Model, Record Base Logical Model (Relational Model, Network Model, and Hierarchical Model), Database System Architecture – History of Database Systems. Entity-Relationship Model: Basic Concepts – Constraints – Keys –Design Issues – Entity Relationship Diagram – Weak Entity Sets – Extended E-R Features –Design of an E-R Database Schema – Reduction of E-R Schema to Tables.

UNIT II :

Relational Model

Structure of Relational Databases – Relational Algebra – Tuple Relational - Calculus – Domain Relational Calculus. SQL: Background – Basic Structure – Set - Operations – Aggregate Functions – Null Values – Nested Subqueries – Views – Complex Queries –Modification of the database – Joined Relations – Data-Definition Language. Other Relational Languages: Query-by-Example.

UNIT III:

Relational-Databases

Domain Constraints – Referential Integrity – Assertions – Triggers – Security and Authorization. **Relational-Database Design**: Normalization -first normal form , second normal form, third normal form, Boyce-Codd normal form, fourth normal form.

Spatial Database Extensions: Introduction to Spatial Extensions - PostGIS, Oracle Spatial, SQL spatial, MySQL spatial

UNIT IV :

DATABASE STORAGE

Storage & File Structure: Overview of Physical Storage Media- Magnetic Disks- Storage

Access- File Organization- Organization of records in Files- Data- Dictionary.

Indexing & Hashing: Basic Concepts- Ordered Indices- B+ -Tree Index Files- B-Tree Index Files- Static Hashing- Dynamic Hashing.

UNIT V :

CONCURRENCY CONTROL & RECOVERY SYSTEM

Multiple Users and Concurrent Executions- Serializability. Lock- Based Protocols- Two-phase Locking Protocol- Multiple Granularity Protocol- TimestampBased Protocols. Recovery System: Failure Classification- Storage Structure- Recovery and Atomicity- Log- Based Recovery- Shadow paging.

TEXT BOOK:

1. Silberschatz, Korth, Sudarshan, *Database System Concepts*, 4th Edition – McGraw-Hill Higher Education, International Edition 2005.

2. **Database Management Systems** by Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.

REFERENCES:

1. Database Management Systems by P.Radha Krishna HI-TECH Publications 2005.

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	Credits
	4	-	3
ELECTIVE - I PRINCIPLES OF GEODATA BASE			

UNIT-I

Introduction to DBMS – Brief history – types of DBMS – data models – ER model: concepts – design. GIS data model: Conceptualizing the real world in GIS.

UNIT-II

Relational Data Base Management Systems: Concepts – Constrains – Relational Data base Design – Relational Models Extended with ADT. SQL – simple – complex –spatial join.

UNIT-III

Representation of Spatial Objects: Geographic space modeling – Representation Modes – Representing the Geometry of a Collection of objects – Spatial data formats and Exchange formats – Spatial Abstract data Types. – Object Oriented GIS.

UNIT-IV

Geodata Base: Arc Geodatabase – topology – defining the relationship class – geometric networks – Geocoding services – Building geodatabases with CASE tools.

UNIT-V

Emerging Trends: Data Mining: concepts – application of data mining, Data Warehousing: Characteristics of Data Ware house – applications, Intelligence Decision making: Artificial Intelligence, Decision support system, Expert system – components – design–applications.

REFERENCES:

1. Korth and Silberschatz (2002) Database System Concepts - McGraw - Hill Book Company

2. Rigaux, P., Scholl, M., Voisard, A. (2002). Spatial Applications - with Application to GIS,Morgan,Kaufmann.

3. Ramiz Elmarsi & Shenkant B – Navatha (2002) "Fundamentals of Database System" 3rd Edition, Pearson Education: New Delhi.

4. Buliding Geodata Base (2002) GIS by ESRI publication, USA

5. Thomas Ott, Frank Swiaczny (2000) Time-Integrative Geographic Information systems, Springer

Common for M.Tech SIT, RS and Geoinformatics

I – I	L	P	**Credits**
	4	**-**	**3**
ELECTIVE - I **WEB TECHNOLOGY**			

UNIT-I

INTRODUCTION ; History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects.

UNIT-II

DYNAMIC HTML : Introduction – Object refers, Collectors all and Children. Dynamic style, Dynamic position, frames, navigator, Event Model – On check – On load – Onenor – Mouse rel – Form process – Event Bubblers – Filters – Transport with the Filter – Creating Images – Adding shadows – Creating Gradients – Creating Motion with Blur – Data Binding – Simple Data Binding – Moving with a record set – Sorting table data – Binding of an Image and table.

UNIT-III

MULTIMEDIA : Audio and video speech synthesis and recognition - Electronic Commerce – E-Business Model – E- Marketing – Online Payments and Security – Web Servers – HTTP request types – System Architecture – Client Side Scripting and Server side Scripting – Accessing Web servers – IIS – Apache web server.

UNIT-IV

DATABASE- ASP – XML : Database, Relational Database model – Overview, SQL – ASP – Working of ASP – Objects – File System Objects – Session tracking and cookies – ADO – Access a Database from ASP – Server side Active-X Components – Web Resources – XML – Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

UNIT-V

SERVLETS AND JSP : Introduction – Servlet Overview Architecture – Handling HTTP Request – Get and post request – redirecting request – multi-tier applications – JSP – Overview – Objects – scripting – Standard Actions – Directives.

TEXT BOOK

1. Deitel & Deitel, Goldberg, "Internet and world wide web – How to Program", Pearson Education Asia, 2001.

REFERENCES

1. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India – QUE, 1999.

2. Aferganatel, "Web Programming: Desktop Management", PHI, 2004.

3. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.

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I – I	**L**	**P**	**Credits**
	-	**3**	**2**
MAP ANALYSIS & PHOTOGRAMMETRY LAB & SATELLITE IMAGE INTERPRETATION LAB			

A. MAP ANALYSIS & PHOTOGRAMMETRY LAB

Map Analysis

1. Maps – types of maps; maps scales; topographic maps – numbering system of topographic maps of India and adjacent countries series.

2. Contours; Topographic profiles – simple, superimposed and projected profiles.

3. River Profiles.

4. Drainage morphometry.

5. Identification of surface features from topographic maps

Photogrammetry

1. Familiarization with pocket, mirror and prism stereoscopes.

2. Marginal Information of aerial photograph

3. Orientation of stereo model and marking principle points and conjugate Principal points, fiducial axes and flight line.

4. Computing photo scale using known objects.

5. Computing photo scale using a map of known scale.

6. Computing photo scale using focal length and altitude.

7. Height measurement

   (i) Monoscopic measurement

   (ii) Stereoscopic measurement

8. Slope measurement

B. SATELLITE IMAGE INTERPRETATION LAB

1. Study of SOI Topographical Maps and Satellite Image

2. Preparation of Base Maps and interpretation

3. Preparation of Slope Maps and interpretation

4. Preparation of Drainage Maps & Watershed Maps and interpretation

5. Preparation of Land Use/Land Cover Maps and interpretation

6. Referencing system of various resource satellite images

7. Marginal information of satellites images

8. Constructing spectral reflectance curves.

9. Interpretation of Thermal images

Common to M.Tech. RS and Geoinformatics

I – II		L	P	Credits
		4	-	3
DIGITAL IMAGE PROCESSING				

UNIT-I

Introduction - Image processing display systems. Initial statistical extraction - univariate and multivariate statistics, histogram and its significance in remote sensing data. Preprocessing - Introduction, missing scan lies, desk tripping methods, geometric correction and registration, atmospheric corrections, illumination and view angle effects and orthorectification, resampling, radiometric correction - Noise models.

UNIT-II

Sensor and Data model: Sensor model – Resolutions - Pixel characters - Image formation – The histogram and its significance- ENTROPY and its significance - Univariate & multivariable Image statistics - Spatial Statistics

UNIT-III

Image Enhancements: Spatial enhancement - Spectral signatures - Image characteristics, ratioing, feature space scatterogram - Point, local and regional operation - Fourier transform; scale-space transform, wavelet transform, multi-image fusion

UNIT-IV

Information Extraction: Classification - Feature extraction, training – Supervised, Unsupervised and Hybrid training, Non-parametric and sub-pixel classification, Hyper-spectral Image analysis,Sources of Classification Error, Error Characteristics, Interpretation of the Error Matrix. Measurement of Map Accuracy,Nature of Change Detection, Change Detection algorithms.

UNIT-V

Image Analyses and Understanding: Pattern recognition, boundary detection and representation, textural and contextual Analysis, decision concepts - Fuzzy sets, evidential reasoning. Expert system, Artificial Neural Network - Integration of data.

Text Books:

1. John R.Jenson, "Introductory Digital Image Processing", Prentice Hall Series, 1996.

2. John A.Richards, Springer-Verlag, "Remote Sensing Digital Image Analysis" 1999.

3. Rafael C.Gonzalez, "Digital Image Processing (2nd Edition)", Prentice Hall, 2002.

References

1. David L. Verbyla "Satellite Remote sensing of Natural Resource Management", Lewis publishers, Florida

2. Anil K. Jain "Fundamentals of Digital Image Processing" Prentice Hall Publications, USA.

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Common for M.Tech. SIT and RS

I – II	L	P	Credits
	4	-	3
ADVANCED REMOTE SENSING			

UNIT-I

FUNDAMENTALS AND RADIOMETRY: Introduction, plane waves, antenna systems, radiometry, microwave interaction with atmosphere constituents, Earth's surface and vegetation, Physical mechanisms and empirical models for scattering and emission Radiometric systems, Sensors, Data product and applications.

UNIT-II

RADAR REMOTE SENSING: Radar interaction with Earth surface and vegetation, Surface scattering theory. Radar equation, Fading concept, Measurement and discrimination, Physical mechanisms and empirical models for scattering, Geometry of RADAR images, Radar return and image signature. Resolution concept.

UNIT-III

REAL AND SYNTHETIC APERTURE RADARS : Airborne, Space-borne , different platforms and sensors, Data products and selection procedure, SEASAT, SIRA, SIRB, ERS , JERS, RADARSAT missions and emission Radiometric systems, Sensors, Data product and applications.

UNIT-IV

Interpretation of Microwave Data: Physical Mechanism and empirical models for scattering and emission, volume scattering and emission, volume scattering. Geological interpretation of RADAR, Applications in Forestry , land use, and other disciplines.

UNIT-V

Application of radar remote sensing: Application in Agriculture, Forestry, Geology, Hydrology, ice studies, land use, mapping and ocean related studies.

REFERENCES:

1. Ulaby, F.T., Moore, R.K. AND Fung, A.K., "Microwave Remote Sensing Active and Passive", Vol. 1,2 and 3, Addison – Wesley Publication Company, 2001.

2. Floyd. M. Handerson and Anthony, J. Lewis, "Principles and Application of Imaging Radar, Manual of Remote Sensing", 3rd edition Vol.2 ASPRS, Jhumurley and Sons, 1998.

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Common For M.tech. Sit, Rs And Geoinformatics

I – II	L	P	Credits
	4	-	3
INTERNET GIS			

UNIT I:

> **Introduction to distributed internet GIS:** Introduction, Distributed GIS – Basic components, Applications of distributed GIS.

UNIT II

> **Introduction to Networking:** Network environments protocols, TCP/IP, LAN, WAN, Data exchange b/w 2 terminals

UNIT III

> **Client/server computing :**Client, server, glue, client-server system partition, 2-tier, 3-tier & n-tier architectures, advantages & disadvantages of client-server architecture, DCOM and .NET, DCOM Architecture and Interface, Advantages & disadvantages of DCOM, CORBA, CORBA Architecture and Interface, advantages & disadvantages CORBA.

UNIT IV

> **Web mapping:** Static map publishing, clickable maps, architecture of static web publishing, web mapping architecture Client-HTML viewer, HTTP server with CGI, Map server & other server, side applications

UNIT V

> **Geographic Markup Language**: Principle-characteristics-commercial web mapping programs-Internet GIS Applications, crimes, Transportation, Tourism, Urban land management.

TEXT BOOK

1.   Internet GIS – "Distributed Geographic Information Services For Internet And Wireless Networks" , Zhong-ren peng , Ming- Hsiang Tsou

I – II	L	P	Credits
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REMOTE SENSING AND GIS APPLICATIONS IN EARTH SCIENCES			

UNIT-I

LITHOLOGY AND STRUCTURE: Introduction Rocks and Minerals image characters of igneous sedimentary and metamorphic rocks. Lithological mapping using aerial and satellite data – Structural Geology introduction Mapping structural features such as folds Lineaments / faults fractures image characters of folds faults lineaments etc. – Digital techniques for lithological and structural analysis – case studies.

UNIT-II

SPECTRA OF ROCKS AND MINERALS: Spectral properties of geologic features in different regions of Electromagnetic Spectrum Elemental composition and nature of the spectra of rocks and minerals Optimal spectral windows – Geologic Remote Sensing and its significance in Geologic mapping – case studies.

UNIT-III

GEOMORPHOLOGICAL APPLICATIONS: Introduction – Geomorphic processes and Geomorphic Landforms Geomorphic mapping using aerial photographs and satellite data – Landform analysis in Ground water studies coastal zone management and Civil Engineering projects – case studies.

UNIT-IV

REMOTE SENSING AND GIS APPLICATIONS: Thematic presentation of Lithologic structural and Geomorphic details ground truth data. Integration of all relevant data using Remote Sensing and GIS in ground water studies.

UNIT-V

CASE STUDIES ON RS & GIS APPLICATIONS : Coastal zone management Disaster Management Studies like Landslides Droughts

and Floods Engineering Geology Mineral exploration and Petroleum exploration.

REFERENCES

1. Sabins, F., 'Remote Sensing principles and interpretation' W.H. Freeman and Company, 1987.

2. Parbin Singh, 'Engineering and General Geology', Ketson Publication House, 1987.

3. Drury, S.A., Image interpretation in Geology , Chapman and Hall, 1993.

4. Michael N. Demers, "Fundamentals of GIS", John Wiley and Sons, 1999

5. Resources Management and Environmental Monitoring - Manual of Remote Sensing", 3rd Edition, Vol.4, American Society of Photogrammetry and Remote Sensing/John Wiley and Sons, 2004.

6. Pete Bettinger and Michael G Wing. "Geographic Information Systems: Applications in Forestry and Natural Resources Management", McGraw-Hill Higher Education, 2003.

7. Roy, P.S.,'Geoinformatics for Tropical Ecosystems', Asian Association of Remote Sensing, 2003.

8. Singh, R.P. and Vinod Tare. 'Spatial Technologies for Natural Hazards Management'. Proceedings of ISRS National Symposium, November 21–22 IIT, Kanpur. ISRS Publications, , 2000.

Common for M,.Tech.,(Remote Sensing and Geoinformatics)

I – II	L	P	Credits
	4	-	3
GEODESY &GNSS			

Unit I

Basics: Definition – Fundamental goals of Geodesy – Basic concepts – Historical perspective – Development applications in Satellite Geodesy – Geoid and Ellipsoid - satellite orbital motion – Keplerian motion – Kepler's Law – Perturbing forces – Geodetic satellite. Coordinate systems in Geodesy.

Unit II

Satellite System: GPS - Different segments – Space, control and user segments – Satellite configuration – GPS signal structure – Orbit determination and Orbit representation, Anti spoofing and Selective availability – Task of control segment – GPS receivers – Main receiver components .

Unit III

Surveying with GPS: Introduction, Planning a GPS Survey, Surveying Procedure. GPS observable – Code and carrier phase observation – Linear combination and derived observable.

Unit IV

GPS Data Processing:: Point Positioning, Different Positioning & Relative Positioning, Data Processing, Ambiguity Resolution, Adjustment Filtering & Smoothing, Network Adjustment, Dilution of Precision & Accuracy Measures.

Unit V:

Applications of Satellite Geodesy: Geodetic control surveys, Cadastral surveying, Photogrammetry & Remote Sensing, Engineering application and Monitoring – GIS, GLONASS satellite configuration comparison – Satellite Laser Ranging & Applications – Concepts of satellite altimetry, Introduction to GALILEO, GAGAN.

References:

1.   Hofmann W.B, Lichtenegger. H, Collins. J Global Positioning System
      – Theory and Practice — Springer Verlag Wein, New York

2.   Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd
      Edition, 2004.

3.   Guocheng Xu GPS Theory, Algorithms and Applications, Springer –
      Verlag, Berlin, 2003.

4.   Seeber G. Satellite Geodesy, Walter De Gruyter, Berlin, 1998.

Common for M.Tech. (Spatial Information Technology, Remote Sensing and Geo-informatics)

I – II	L	P	Credits
	4	-	3
ELECTIVE II **REMOTE SENSING AND GIS FOR DISASTER MANAGEMENT**			

Unit I

Geological Disasters: Meaning and types of disasters – earthquakes – volcanoes – landslides – selection of variables – creation of layers – space-time analysis – GIS for management plans – case studies.

Unit II

Hydrological Disasters: Cyclone: cyclone related parameters and effects on land and sea – damage assessment. Flooding: topography, land use and flooding – space-time integration GIS based parameters and layers – flood prone area analysis and management – risk assessment – case studies for cyclones and floods.

Unit III

Climatological Disasters :

Drought: Types of droughts – factors influencing droughts – variable identification – vegetation index – land use /ground water level changes – delimiting drought prone areas – processes of desertification – over utilization of water and land resources layer creation – GIS based management strategies – case studies.

Unit IV

Anthropogenic Disasters Marine Disasters: Atmospheric Disasters: Ozone layer depletion – green house / global warming – acid rain – snow melt – sea level rise – related problems layer creation – oil spill and chemical pollution – coastal erosion and deposition – variable identification – over lays – analysis / management strategies – coral / mangrove depletion- case studies.

Unit V

> **Biodiversity Disasters**: Ecological degradation – nuclear disaster and biodiversity loss – parameters (mapping of forest types, protected areas and natural forests) – population extinction – conserving bio-diversity (species and subspecies) role of GIS in mapping and modeling of biodiversity

References:

1. Korte ,The GIS book: 5/e, , G. B., Onward Press, Australia,2001.

2. Barett, E.C., Anton Micallef (Editors) Remote Sensing for Hazard Monitoring and Disaster Assessment, Taylor and Francis, London,1991.

3. M.Anji Reddy, Remote Sensing and Geographical Information Systems.,2/e, , BSP, 2001.

4. Demers, Michael N.,John Willey Fundamentals of Geographic Information Systems, ,New York,2000.

5. John A. Matthews, Bill McGuire, Ian Mason, Natural hazards and environmental change 2002.

6. Andrew Skeil Environmental Modeling with GIS and Remote sensing, John Willey , New York,2002.

7. John. G. Lyon GIS for Water Resource and water Shed Management, Taylor and Francis,2003.

Common for M.Tech. (Spatial Information Technology, Remote Sensing and Geo-informatics)

I – II	L	P	Credits
	4	-	3
ELECTIVE II **DATA WAREHOSUING AND MINING**			

UNIT-I

Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, MajorIssues in Data Mining. **Data Preprocessing:** Needs reprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction,Data Discretization and Concept Hierarchy Generation.

UNIT-II

Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining.

Data mining primitives, Languages, and System Architectures- Data Mining Primitives, Data Mining Query languages, Designing Graphical user interface based on a Data mining query language,Architectures of Data Mining Systems.

UNIT-III

Concepts Description: Characterization and Comparison- Data Generalization and Summarization – Based characterization,Analytical characterization, Mining Class comparisons: Discriminating between different Classes, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules in Large Databases - Association Rule Mining, Mining Single – Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, from Association Mining to Correlation.

UNIT –IV

Classification and Prediction – Issues regarding Classification and prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, ACategorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis

UNIT—V

Mining Complex Types of Data - Multidimensional Analysis and Descriptive Mining of Complex, Data objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the WWW.

TEXT BOOKS:

1.   JIAWEIHAN & MICHELINE KAMBER , "Data Mining: Concepts and Techniques", Harcourt India, Elsevier India, Second Edition.

2.   Pang-NingTan. MichaelSteinback,VipinKumar, "Introduction to Data Mining", Pearson Education, 2008.

3.   Data Mining Techniques – ARUN K PUJARI, University Press

4.   Building the Data Warehouse – W.H.Inmon, Wiley Dreamtech India Pvt. Ltd.

REFERENCES:

1)   Margaret H Dunham,S.Sridhar,"Data mining: Introductory and Advanced Topics", Pearson Education,2008.

2)   Humphires,hawkins,Dy, "Data Warehousing: Architecture and Implementation", Pearson Education,2009.

3)   Anahory, Murray, "Data Warehousing in the Real World", PearsonEçiucation, 2008.

4)   Kargupta, Joshi, etc., "Data Mining: Next Generation Challenges and Future Directions" Prentice Hall of India Pvt Ltd, 2007.

Common for M.Tech. (Spatial Information Technology, Remote Sensing and Geo-informatics)

I – II	L	P	Credits
	4	-	3
ELECTIVE II **ADVANCED SURVEYING AND CARTOGRAPHY**			

UNIT I

Advanced Surveying: Electronic Distance Measurement (EDM) – principle, instrument characteristics, accessories, operation, EDM without reflecting prisms; Total Station – types, instrument description, field techniques, motorized total stations; field procedures for total stations in topographic surveys.

UNIT II

Topographical Surveying: Definition, uses of topographical maps, relief, methods of representing relief, contour and contour interval, characteristics of a contour, procedure in topographic surveying, Methods of locating contours, Interpolation of contours, DAM Surveys.

UNIT III

Managing data bases: Data organisation – Data compression – Data measurement – Basic statistical processing –Geographic information system – The measuring of GIS to cartography.

UNIT IV

Data processing

Computer system for the processing of graphic data – Hardware – Software – SICAD – Digitising of cartographic presentation – Structuring and storage of data – Cartographic data processing – Output of cartographic presentation – Examples and applications.

UNIT V

Modelling in digital cartography : Fundamentals of modelling, graph theory, topology – Digital planimetric modelling – Digital relief modelling – Quality of digital landscape models – Topographic model

generalisation, Map revision– Web Cartography – Dynamic and Static Web Maps.

TEXT BOOKS:

1. Text Book of Plane Surveying By David Clark Part I and Part II

2. Text Book of Surveying By Punmia Part I and Part II

3. Menno, Jan Kraak and Ferjan Ormeling, "Cartography – Visualization of Geo spatial

4. Data", 2nd Edition, Pearson Education, 2004.

5. Arthur. H. Robinson etal "Elements of Cartography", 7th Edition, John Wiley and sons,2004.

REFERENCES:

1. R.W. Anson and F.J. Ormeling, "Basic Cartography for Students and Technicians"

2. Vol. I, II and III, 2nd Edition, Elsevier Applied Science Publishers, 2002.

3. Menno, Jan Kraak and Allan Brown, "Web Cartography Developments and Prospects,

I – II	L	P	Credits
	4	-	3
ELECTIVE II **ADVANCED PHOTOGRAMMETRY**			

UNIT I

History and development, principles, classification; Aerial Cameras - Basic optics photographic process and Imaging System. oblique, title and terrestrial Photogrammetry.

UNIT II

The concepts, tools, viewing and measuring systems of sterocope. The image Geometry and object coordinates, scale, displacement. Characteristics, scale, measurement, tilt effects, rectification, overlap, stereopair.

UNIT III

Concepts of Interior, relative and absolute orientation. The image correlation, linearisation, scaling & leveling, analytical procedures, 3D Information and mapping.

UNIT IV

Basics of Planimetric mapping, radial line triangulation. Aerial mosaics, types of control points. The concepts of overlap, floating mark parallax equation, height information.

UNIT V

Elements of Aerotriangulation and analytical method, strip deformation, strip and block adjustment: Automated system, image correlation, matching and orientation, mapping and Information extraction. The project information; project planning, photo control, planning, cost estimate

REFERENCE BOOKS

1. Wolf Paul. P., "Elements of Photogrammetry", McGraw Hill International Book Company, 2nd editiion, 1983

2. Francies H. Moffit and Mikail, Edward M., "Photogrammetry", Harper and Row Publi - shers, 3rd edition, 1980

3. Karl Krans, "Photogrammetry, Vol I & Vol II", Ferd DGmmler verlag, 4th edition 1997 American Society of Photogrammetry, 4th edition, 1980

Common for M.Tech. (Spatial Information Technology, Remote Sensing and Geo-informatics)

I – II	L	P	Credits
	4	-	3
ELECTIVE II **GEO-STATISTICAL METHODS**			

UNIT I

Binomial, Poisson and Normal distributions - Definitions, Simple problems only (Derivations not included)

UNIT II

Principle of Least Squares, Fitting of straight line and parabola - Correlation - Karl Pearson's coefficient of correlation and Spearmann's rank correlation - Linear regression.

UNIT III

Sampling Distributions - Tests based on Normal, t, Chi-Square and F-Distributions

UNIT IV

One way and Two way classification of ANOVA - Completely Randomised Design - Randomised Block Design - Latin square Design.

UNIT V

Single and multiple server markovian queueing models - M/M/1 and M/M/c queueing models and Applications (Derivations not included).

REFERENCE BOOKS

1.   Gupta, S.C., and Kapoor, V.K., Fundamentals of mathematical statistics, Sultan Chand and sons, Reprint 20032. Gupta, S.C., and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand and sons, 20033. Veerarajan.T., Probability Statistics and Random processes, TMH, First reprint, 2004

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I – II	L	P	Credits
	4	-	3
DIGITAL IMAGE PROCESSING LABORATORY &			
GIS & GPS LABORATORY			

A. DIGITAL IMAGE PROCESSING LABORATORY

1. Reading and Displaying satellite data from BIL, BSQ and BIP format

2. Generation of False Color Composite (FCC)

3. Extracting area of Interest

4. Generating Histogram of various bands

5. Geo referencing the base image

6. Geometric correction of satellite image

7. Enhancement using Band ratio and NDVI

8. Enhancement using different Filtering techniques

9. Principal Component Analysis (PCA)

10. Fourier Analysis

11. Unsupervised Classification

12. Supervised Classification

13. Classification using Neural Network and Fuzzy Logic

14. Change detection study

15. Accuracy Assessment

B. GIS & GPS LABORATORY

1. Campus survey by GPS

2. Software and hardware needs of GPS

3. Collecting ground control points (GCPs)

4.   Digitization- Point, Line, Polygon and Surface Data

5.   Building topology-measuring distance and area

6.   Adding attribute data- querying on attribute data

7.   On screen digitization-Data Conversion-Vector to Raster, Raster to Vector

8.   Generation of DEM: from contours, spot heights, Arc Hydro

9.   Vector Analysis-Buffering, Overlay and Network analysis

10. Raster Analysis-Measurement-Arithmetic overlaying, Logical overlaying