

ANDHRA UNIVERSITY



Regulations and Syllabus relating to
**BACHELOR OF TECHNOLOGY (B.Tech.)
GEOINFORMATICS ENGINEERING
DEGREE EXAMINATION**
(Under Semester System)
(with effect from 2013-2014)

REGULATIONS

1. The Degree of Bachelor of Technology (4 – year course) / Bachelor of Engineering (4 – year course) will be conferred on a candidate who satisfies the following conditions.

1.1 (i) Candidates shall have passed (a) the two year Intermediate Examination with Mathematics and Physical Sciences as optional subjects under Part-III conducted by the Board of Intermediate Education, Andhra Pradesh.

OR

(b) The Intermediate Examination with vocational courses in Engineering and Technology conducted by Board of Intermediate Education, Andhra Pradesh.

OR

(c) The Diploma Examination in Engineering of State Board of Technical Education and Training, Andhra Pradesh, provided they pass 10th Class examination of Board of Secondary Education, Andhra Pradesh or its equivalent examination.

OR

(d) An examination recognized by the Academic Senate of the Andhra University as equivalent to the aforesaid examinations with a minimum of 12 years of schooling with Mathematics and Physical Sciences.

(ii) Candidates must have qualified themselves at the Entrance examination(s) as prescribed by the University for purpose of admission into B.Tech./B.E. courses.

(iii) Candidates from other countries and other states permitted to study B.Tech./B.E. courses by the Govt. of India may be exempted by the Executive Council from appearing for the entrance examination, provided they satisfy all other conditions.

1.2 (i) The normal duration of the course is four academic years for B.Tech./B.E. Degree. The first academic year shall comprise of semester I & II combined together and each of the subsequent academic years shall be divided into two semesters hereinafter referred to as 2nd year Semester – I, 2nd year Semester – II, 3rd year Semester – I, 3rd year Semester – II and so on in chronological order.

(ii) Candidates shall have pursued a regular course of study, as detailed below, for not less than four years and shall have fulfilled the academic requirements laid down and shall have passed all the prescribed examinations.

2.1 A regular course of study during an academic year/semester means a minimum attendance of 75% of all the subjects of the year / semester, as the case may be, computed by

***First year common to all branches of BE/B.Tech of AU**

totaling the number of periods of lectures, workshops laboratories, drawing, tutorials, project and any other practicals, held in every subject over the year / semester as specified in the schemes of instruction.

However, in special case and for sufficient cause shown, the Vice-Chancellor may, on the recommendation of the Principal and Head of the Department concerned, condone the deficiency in the average attendance to an extent of 9% for reasons such as ill-health, if the application for condonation is submitted at the time of actual illness and is supported by certificate of authorized Medical Officer approved by the Principal.

In the case of students, who participate in activities like N.S.S., N.C.C., Inter-collegiate tournaments conducted by Andhra University, Inter-University tournaments conducted by the Inter-University Board and any such other activities involving the representation of the College/University with the prior approval of the Principal, the candidate may be deemed to have attended the college during the actual period of such activity, solely for the purpose of attendance.

2.2 A candidate who cannot satisfy the attendance requirements as specified in clause 2.1, because of late admission under special circumstances, reasonable and acceptable to the University on the basis of documents, shall attend at least 50% of the total scheduled periods during that academic year and shall have attended at least 90% of the total periods of instructions held from the date of admission.

2.3 A candidate, who fails to satisfy the regulation under clause 2.1 or 2.2, shall not be allowed for the University examinations at the end of the year in case of first year or semester and shall not be allowed for promotion to the next semester of study. He / she shall be required to repeat the entire regular course of study of that academic year in case of first year or semester in case of semester.

2.4 The criteria for promotion from 1 year to II/IV Semester – 1 and to subsequent Semesters is based on the requisite attendance put up by the candidate and satisfactory completion of the course of study during the year / semester.

2.5 (i) If a candidate fails more than three subjects or if he obtains less than 50% aggregate in the first year, he shall not be promoted to third year.

(ii) If a candidate fails in more than three subjects or if he obtains less than 50% aggregate in the Semester – I and Semester – II of the 2nd year putting together, he shall not be promoted to fourth year.

3.1 The schemes of instruction and examination for the first year course shall be on annual pattern. The period of instruction shall ordinarily be from July to April and shall comprise

of a minimum of 180 instruction days. The year-end examinations shall ordinarily be held during the month of May.

3.2 The schemes of instruction and examination for courses other than 1 year shall be on semester pattern. The period of instruction for Semester – I of each year (from 2nd year to final year) shall ordinarily be from July to November and for Semester – II of each year (from 2nd year to final year) shall ordinarily be from December to April. Each semester shall comprise of a minimum of 16 weeks of instruction. The end examinations of Semester – I of each year shall ordinarily be held during the month of November and that of Semester – II of each year shall ordinarily be held during the month of May of the academic year.

3.3 There shall be no supplementary examinations except for Semester – I and Semester – II of the final year. The supplementary examinations shall ordinarily be held during the month of June/July for Semester – I and Aug./Sept. for Semester – II of the final year.

4.1 The examinations for the B.Tech./B.E./B. Arch. Degree shall be conducted as per the prescribed Schemes for the following branches of study:

(i) For the B.Tech. Degree (4 – Year course) 1. Chemical Engineering 2. Chemical Engineering (Elective: Petroleum Engineering) 3. Chemical Engineering (Elective: Biotechnology) 4. Computer Science and Engineering 5. Instrumentation Technology 6. Information Technology 7. Geoinformatics Engineering

(ii) For B.E. Degree (4 – Year Course) 1. Civil Engineering 2. Civil Engineering with Environmental Engg. (Elective) 3. Electrical and Electronics Engineering 4. Electronics and Communication Engineering 5. Electronics and Instrumentation Engineering 6. Mechanical Production and Industrial Engineering 7. Mechanical Engineering 8. Metallurgical Engineering 9. Mechanical Engineering (with Marine Engg. Electives) 10. Naval Architecture.

(iii) for B.Arch. Degree (5 – Years course)
and for any other branch of Engineering / Technology as and when approved by the University from time to time.

4.2 There shall be Regular Examinations at the end of Year / Semester as listed below.

B.Tech./B.E./B. Arch.	1 Year
B.Tech./B.E./B. Arch.	Semester – I of 2 nd year
B.Tech./B.E./B. Arch.	Semester – II of 2 nd year
B.Tech./B.E./B. Arch.	Semester – I of 3 rd year
B.Tech./B.E./B. Arch.	Semester – II of 3 rd year
B.Tech./B.E./B. Arch.	Semester – I of 4 th year
B.Tech./B.E./B. Arch.	Semester – II of 4 th year
B. Arch.	Semester – I of 5 th year
B. Arch.	Semester – II of 5 th year
Supplementary Examinations shall be conducted only for	
B.Tech./B.E.	Semester – I & II of 4 th year
B.Arch.	Semester – I & II of 5 th year

5. Assessment for the award of the Degree shall consist of

(i) Internal evaluation of the work done by the students during the year / semester for 30 marks in each theory subject and for 50 marks or such other marks prescribed in the scheme of examination, in each practical and project.

(ii) Year / semester end examination as detailed in the scheme of examination for 70 marks in each theory subject and for 50 marks or such other marks prescribed in the scheme of examination, in each practical and project.

5.1 The marks for the internal evaluation shall be awarded by the concerned teachers based on class work, quiz, viva-voce, two mid-examinations etc., according to a scheme / schedule to be notified by the Department at the beginning of the year / semester.

5.2 The year / semester and examination in each theory subject, for a maximum of 70 marks, shall be conducted by the University through duly constituted Boards of Examiners.

5.3 The year / semester end examination in practicals / project for 50 marks or such other marks prescribed in the scheme of examination, shall be conducted by the University by two examiners one of them being external to the college.

5.4 Candidates shall be required to produce complete and certified records of the work done by them in each of the practical subjects at the time of year / semester end practical examination, failing which they will not be allowed for such examination.

6.1 A candidate shall be declared to have passed in any subject (theory/practical) if he / she secures in the University examinations, not less than 40% in theory and not less than 50% in practicals, provided that the result otherwise not withheld.

6.2 A candidate shall be deemed to have satisfied the minimum requirement for the award of the Degree; (i) If he / she is declared to have passed all the subjects (theory and practicals) included in the Scheme of Examination of I year and subsequent six semesters for the award of B.Tech./B.E. Degree and subsequent eight semesters for the award of B.Arch. Degree. and

(ii) If he/she secures 50% marks in the overall aggregate of both the University examinations and sessional marks put together of all the subjects of B.Tech./B.E./B.Arch. course.

6.3 Candidates, who fail to satisfy clause 6.2 (ii) may be permitted to attain the overall aggregate upto 50% within 4 years after completing the course of study by appearing at the University examinations only of B.Tech./B.E./B.Arch. subjects of their choice. The so attained overall aggregate shall be limited to 50% only. Any candidate who fails to attain the minimum aggregate of 50% even after such appearances, during a total of eight academic years from the year of admission, shall become ineligible for the award of B.Tech./ B.E./B.Arch. Degree.

6.4 A candidate may be permitted to improve his/her performance by reappearing for the whole of the University examinations, only in all the theory subjects of a year / semester, after completion of the 4-year/5-year course of study, as the case may be, and during the four consecutive examinations only.

Such an improvement can be availed of only once, for each of the annual / semester examinations of the course of study, provided that all the subjects of the year / semester shall have been passed as per the clause 6.1. When considered in its totality, better of the two performances (as a whole but not subject wise) shall be taken into consideration for the purpose of awarding First Class. There shall be no subject wise improvement permitted in any year / semester of study for the above purpose. In any case, no such improvement shall be permitted after completion of eight academic years from the year of admission.

6.5 There shall be no provision for the improvement of sessional marks in any theory or practical subject in any year / semester of study.

7. Whenever there is a change of regulations, scheme and syllabi (such as from Unit pattern to Semester System), a candidate who fails in any subject or who wants to improve his/her performance as per clause 6.4, will be permitted to appear for the University examinations conducted during the subsequent 4 years only, under the previous regulations, scheme and syllabi. There after, such candidates shall be required to appear for such examinations under new regulations and syllabi in the equivalent subjects as decided by the Board of Studies.

8. All the candidates who have satisfied the minimum requirement as specified above, shall be arranged in two classes based on the aggregate marks obtained in the examinations of I year to final year for the award of B.Tech./B.E./B.Arch. Degree.

9. The marks obtained will be converted to grades on a 10 point scale and then to Semester Grade point Average(SGPA) and subsequently Cumulative grade point average is awarded at the end of the course by University.

1st Year (Common with all the B.E./B.Tech. courses)

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl. Marks	Total Marks	Credits
						Hrs	Marks			
ENG 101	English & Language Lab	2	1	-	3	3	70	30	100	2+1
ENG 102	Mathematics – I	3	-	-	3	3	70	30	100	4
ENG 103	Mathematics – II	3	-	-	3	3	70	30	100	4
ENG 104	Physics	3	-	-	3	3	70	30	100	4
ENG 105	Chemistry	3	-	-	3	3	70	30	100	4
ENG 106	Computer Programming and Numerical Methods	3	-	-	3	3	70	30	100	2
ENG 107	Engineering Graphics	3	-	-	3	3	70	30	100	4
ENG 108	Social Science	3	1	-	4	3	70	30	100	4
ENG 109	Physics Lab	-	-	3	3	3	50	50	100	2
ENG 110	Chemistry Lab	-	-	3	3	3	50	50	100	2
ENG 111	Workshop	-	-	3	3	3	50	50	100	2
ENG 112	C – Programming Lab	-	-	3	3	3	50	50	100	2
	Total	23	2	12	37	-	760	440	1200	37

Note: In addition to the above it is also included NSS/Sports as an audit course with compulsory attendance having 2 credits with 2 hours/week in the first year

2nd Year Semester – I

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl. Marks	Total Marks	Credits
						Hrs	Marks			
GI 211	Information Technology and Applications	4	-	0	4	3	70	30	100	4
GI 212	Mathematics – III	4	1	0	5	3	70	30	100	4
GI 213	Fundamentals of Geology	4	1	0	5	3	70	30	100	4
GI 214	Object Oriented Programming-I: C++	4	1	0	5	3	70	30	100	4
GI 215	Geomorphology	4	1	0	5	3	70	30	100	4
GI 216	Surveying	4	0	0	4	3	70	30	100	4
GI 217	Geology and Geomorphology Practical	0	0	6	6	3	50	50	100	2
GI 218	Surveying Practical	0	0	6	6	3	50	50	100	2
Total		24	4	12	40	-	520	280	800	28

Note: In addition to the above it is also included NCC as an audit course with compulsory attendance having 2 credits with 2 hours/week.

2nd Year Semester – II

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl. Marks	Total Marks	Credits
						Hrs	Marks			
GI 221	Fundamentals of Atmospheric Systems	4	1	0	5	3	70	30	100	4
GI 222	Photogrammetry and Photo interpretation	4	1	0	5	3	70	30	100	4
GI 223	Remote Sensing – I	4	1	0	5	3	70	30	100	4
GI 224	Environmental Studies	4	0	0	4	3	70	30	100	2
GI 225	Object Oriented Programming-II: JAVA	4	0	0	4	3	70	30	100	4
GI 226	Probability and Statistics	4	1	0	5	3	70	30	100	4
GI 227	Photogrammetry and Remote Sensing Practical	0	0	6	6	3	50	50	100	2
GI 228	Object Oriented Programming Practical	0	0	6	6	3	50	50	100	2
Total		24	4	12	40	-	520	280	800	26

Note: In addition to the above it is also included Ethics & Morals as an audit course with compulsory attendance having 2 credits with 2 hours/week.

3rd Year Semester - I

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl. Marks	Total Marks	Credits
						Hrs	Marks			
GI 311	Principles of Physical Oceanography	4	1	0	5	3	70	30	100	4
GI 312	Digital Image Processing – I	4	1	0	5	3	70	30	100	4
GI 313	Database Management Systems	4	0	0	4	3	70	30	100	4
GI 314	Operations Research	4	0	0	4	3	70	30	100	4
GI 315	Remote Sensing–II	4	1	0	5	3	70	30	100	4
GI 316	Elective – I	4	1	0	5	3	70	30	100	4
GI 317	Digital Image Processing– I Practical	0	0	6	6	3	50	50	100	2
GI 318	Database Management Systems Practical	0	0	6	6	3	50	50	100	2
GI 319	Soft Skills			3				100	100	1
FE-01 (Geo-Engg)	Free Elective-1 Spatial Information Technology	4	0	0	4	3	70	30	100	4
Total		28	4	15	47	-	590	410	1000	33

Elective-I

GI 316-1 Geoinformatics for Environmental Monitoring

GI 316-2 Geoinformatics for Earth Science Applications

3rd Year Semester – II

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl. Marks	Total Marks	Credits
						Hrs	Marks			
GI 321	Web Programming and Applications	4	1	0	5	3	70	30	100	4
GI 322	Geographic Information Systems-I	4	1	0	5	3	70	30	100	4
GI 323	Elements of Cartography	4	0	0	4	3	70	30	100	4
GI 324	Geodesy and GPS	4	1	0	5	3	70	30	100	4
GI 325	Digital Image Processing – II	4	1	0	5	3	70	30	100	4
GI 326	Elective – II	4	0	0	4	3	70	30	100	4
GI 327	Geographic Information System-I Practical	0	0	6	6	3	50	50	100	2
GI 328	Digital Image Processing–II Practical	0	0	6	6	3	50	50	100	2
GI 329	Industrial Training (Summer vacation)									
Total		24	4	12	40	-	520	280	800	28

Elective-II

GI 326-1 Geoinformatics for Ocean Resources Evaluation

GI 326-2 Mathematical Morphology in Image Processing

4th Year Semester - I

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl Marks	Total Marks	Credits
						Hrs	Marks			
GI 411	Digital Photogrammetry	4	1	0	5	3	70	30	100	4
GI 412	Geological Engineering	4	1	0	5	3	70	30	100	4
GI 413	Computer Graphics	4	0	0	4	3	70	30	100	4
GI 414	Urban Planning and Information Systems	4	1	0	5	3	70	30	100	4
GI 415	Principles of Economics and Management	4	-	0	4	3	70	30	100	4
GI 416	Elective – III	4	1	0	5	3	70	30	100	4
GI 417	Digital Photogrammetry Practical	0	0	6	6	3	50	50	100	2
GI 418	Urban Planning and Information Systems Practical	0	0	6	6	3	50	50	100	2
GI 419	Industrial Training & Seminar (Assessment)	0	0	0	0	0	0	100	100	2
Total		24	4	12	40	-	520	380	900	30

Elective-III GI 416-1 Geoinformatics for Watershed Management
 GI 416-2 Geoinformatics for Soil and Agriculture Surveys

4th Year Semester – II

Code No.	Subject	L	T	Lab	Total	Univ. Exam		Sessl Marks	Total Marks	Credits
						Hrs	Marks			
GI 421	Geographic Information Systems – II	4	2	0	6	3	70	30	100	4
GI 422	Data Mining & Neural Networks	4	2	0	6	3	70	30	100	4
GI 423	Elective-IV	4	2	0	6	3	70	30	100	4
GI 424	Geographical Information Systems – II Practical	-		6	6	3	50	50	100	2
GI 425	Project Work	0	0	9	9	3	50	50	100	8
FE 02 (Geo-Engg)	Free Elective-2 Geoinformatics for Resources Development and Disaster Management	4	0	0	4	3	70	30	100	4
Total		16	6	15	37	-	380	220	600	26

Elective-IV GI 423-1 Geoinformatics for Coastal Zone Management
 GI 423-2 Geoinformatics for Forestry and Ecology

ENG 101 English & Language Lab

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks.			
2	1	-	3	3	70	30	100	2+1

Vocabulary: (i) One word Substitute; (ii) Words Often Confused; (iii) Synonyms and Antonyms (iv) Foreign Phrases; (v) Phrasal verbs derived from the dynamic verbs: GO, PUT, TAKE, LOOK, RUN and TURN; (vi) Idioms and Phrases.

Grammar: (i) Spotting the error in a sentence; (ii) Correction of errors in a given sentence; Correction of errors in given sentence; Correction of errors in given sentence-errors in the use of words – errors in constructing a sentence – errors of Indianisms – use of slang-errors in punctuation; (iii) Concord; (iv) Tense and uses of Tenses; (v) Spelling; (vi) Articles, prepositions and words followed by prepositions.

Reading: Comprehensions: Location the Topic sentence – Main idea – Subordinate idea; Pickout definitions, factual information, Reference and Inferences.

Writing: Precis writing, note making and note taking, letter writing, technical report writing, general essay writing.

Textbook: An anthology of prose selections reflecting the Indian Culture and the Contemporary social problems.

Prescribed Book : Remedial English Grammar by F.T. Wood.

Reference Books : Intermediate Grammar Usage and Composition by Tickoo and Subramanian. An Intermediate English Practice Book by S. Pit Corder English for Engineering students by G.V.L.N. Sarma Examine your English by Margaret M. Maison. Advanced skills of communication and ESP (English for Specific Purpose).

Oral Communication : a) Social interaction; b) Mock interviews; c) Formal, Semi-formal- Informal Situations; d) Household situations; e) Office, f) Post Office/Bank/Railway Station; g) Telephonic – Face to Face Communication.

Group Discussion: (ESP – English for specific purpose) Project proposals – Project Reports – How to prepare for a meeting – How to write minutes of a meeting – How to write a research paper and dissertations.

ENG 102-Mathematics-I

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3		-	3	3	70	30	100	4

I. PARTIAL DIFFERENTIATION AND ITS APPLICATIONS

Functions of two or more variables, partial derivatives, Homogeneous functions-Euler's theorem, total derivative, differentiation of implicit functions, geometrical interpretation-tangent plane and normal to a surface, change of variables, Jacobians, Taylor's theorem for functions of two variables, errors and approximations, total differential, maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers, differentiation under the integral sign-Leibnitz rules.

II. SOLID GEOMETRY

Equation of a plane, equations of straight line, condition for a line to lie in a plane, coplanar lines, shortest distance between two lines, intersection of three planes, equation of sphere, tangent plane to a sphere, cone, cylinder, quadric surfaces.

III. MULTIPLE INTEGRALS AND THEIR APPLICATIONS

Double integrals, change of order of integration, Double integrals in polar coordinates, areas enclosed by plane curves, triple integrals, volumes of solids, change of variables, area of a curved surface, calculation of mass, centre of gravity, centre of pressure, Moment of inertia, product of inertia, principal axes, Beta function, Gamma function, relation between Beta and Gamma functions, Error function or probability integral.

IV. INFINITE SERIES

Definitions, convergence, divergence and oscillation of a series, general properties, series of positive terms, comparison test, Integral test, D-Alembert's Ratio test, Raabe's test, Logarithmic test, Cauchy's root test, Alternating series- Leibnitz's rule, series of positive or negative terms, power series, convergence of Exponential, Logarithmic and Binomial series, Uniform convergence, Weirstrass M- test, Properties of Uniformly convergent series. (All tests without proofs)

V. FOURIER SERIES

Euler's formulae, conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and Even periodic functions-Expansions of Odd and Even periodic functions, Half-range Series, Parseval's Formula, Practical Harmonic Analysis.

TEXT BOOKS:

Scope and treatment as in "Higher Engineering Mathematics", by Dr. B.S.Grewal, 42nd edition, Khanna Publishers.

REFERENCE BOOKS:

1. A text book of Engineering mathematics, by N.P.Bali and Ieyangar, Lakshmi Publications.
2. Advanced Engineering Mathematics by H.K.Dass. S.Chand Company.
3. Higher Engineering mathematics by B. V. Ramana, Tata McGraw Hill Company.

ENG 103 –Mathematics II

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3		-	3	3	70	30	100	4

I. LINEAR ALGEBRA

Rank of a matrix, Eigen values and Eigen vectors of a matrix, Cayley- Hamilton theorem, consistency of linear simultaneous algebraic equations, Matrix inversion, Gaussian Elimination, LU factorization, Jacobi and Gauss- Siedel iterative methods for solving simultaneous equations, Determination of Eigen values using forward iteration (Rayleigh's power Method), Hermitian and Skew-Hermitian matrices, Unitary matrix, Quadratic forms and Canonical forms.

II. ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER AND APPLICATIONS

Formation of differential equations, solution of a differential equation-geometrical meaning, equations of the first order and first degree, Variables separable, homogeneous equations, linear equations, Bernoulli's equation, Exact equations, Equations reducible to exact equations, equations of the first order and higher degree, Clairaut's equation.

Applications: Orthogonal Trajectories; Simple Electric Circuits, Chemical reactions, Newton's law of cooling only.

III. LINEAR DIFFERENTIAL EQUATIONS

Higher order linear differential equations with constant coefficients, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

IV. SERIES SOLUTION OF DIFFERENTIAL EQUATIONS

Series solution of ODE - Frobenius method (when $x=0$ is a regular singularity), Bessel's Equation, Equations reducible to Bessel's equation; Legendre polynomials, Rodrigue's formula, generating function, Recurrence relations, Orthogonality relation for Bessel functions and Legendre polynomials.

V. LAPLACE TRANSFORMS

Transforms of elementary functions, properties of Laplace transforms, existence conditions, Inverse transform, transforms of derivatives, transforms of integrals, multiplication by t , division by t , convolution theorem, applications to Ordinary Differential equations and simultaneous linear equations with constant coefficients, Laplace transforms of Unit step function, Unit Impulse function and Periodic functions.

TEXT BOOKS:

Scope and treatment as in "Higher Engineering Mathematics", by Dr. B.S.Grewal, 42nd edition, Khanna Publishers.

REFERENCE BOOKS:

1. A text book of Engineering mathematics, by N.P.Bali and Ieyangar, Lakshmi Publications.
2. Advanced Engineering Mathematics by H.K.Dass. S.Chand Company.
3. Higher Engineering mathematics by B. V. Ramana, Tata McGraw Hill Company.

ENG 104 – Physics

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3		-	3	3	70	30	100	4

Thermodynamics: Heat and work. First law of thermodynamics and applications. Reversible and Irreversible process. Carnot Cycle and efficiency. Entropy, Entropy and second law, entropy and disorder. Entropy and Probability. Third law of thermodynamics. (Statement only).

Electromagnetism: Concept of electric flux. Gauss law and applications. Electric potential. Potential and field strength, Potential due to point charge and Dipole. Magnetic field, Magnetic force on current, Torque on a current loop, Hall effect, Ampere’s law. B near a long wire, B for solenoid, Biot-Savart’s law, B for A circular loop. Faraday’s law of induction. Lenz’s law. Inductance, Calculation of induction. L-R circuit, induced magnetic fields, Displacement current. Maxwell’s equations.

Optics: Interference Principle of superposition. Young’s experiment. Coherence, Interference in thin films, Wedge shaped film, Newton’s rings. Michelson’s interference and its applications. Diffraction Single slit (qualitative and quantitative treatment): Polarization Polarization by reflection, reflection and double Refraction. Nicol Prism, Quarter and half wave plate. Circular and elliptical Polarization and detection.

Laser and fibre optics: Spontaneous and stimulated emissions. Population inversion. Ruby Laser. Gas Laser, Semi – Conductor Laser, Applications of Lasers, Fibre optics, Optical fibre and total internal reflection. Acceptance angle and cone of a fibre, Fibre optics in communications. Optical path in fibre.

Ultrasonics: Production of Ultrasonics by Magnetostriction and Piezo Electric Effects – Ultrasonics and diffraction pattern. Applications of Ultrasonics.

Modern Physics: De Broglie’s Concept of matter waves. Uncertainty Principle. Schroedinger Wave equation. Application to particle in a box. Elementary concepts of Maxwell – Boltzman, Bose – Einstein’s and Femi – Dirac Statistics (no derivation). Femi – Dirac Distribution function (no derivation). Free Electron Theory of Metals, Band Theory of solids. Kronig-Penny Model, Metals, Insulators and semiconductors. Superconductivity, Meisner Effect, Types of super conductors and applications of super conductors.

Text Books: Engineering Physics by R.K. Gaur and S.D. Gupta Physics by Halliday and Resnick – Part I and II Modern Engineering Physics by A.V. Vasudeva.

ENG 105 - Chemistry

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3		-	3	3	70	30	100	4

Solid State Chemistry: Classification of solids – Thermal and electrical conductivity-stress-strain behavior of solids. Crystals – Types of Crystal – Imperfections. Band theory of solids – conductors, semi-conductors and insulators. Chemistry of semi-conductors and insulators – Super conductivity – Organic semi conductors. Fabrication of integrated circuits. Purification of solids by Zone refining – single crystal growth – Epitaxial growth.

Energy sources and applications: Thermal: Coal – Ranking of coal –Analysis coal – Calorific value and determination – Metallurgical Coke – Engineering applications. Chemical: Electrode Potential – Electrochemical Series – Galvanic Cells – Primary and secondary – Acid and Alkaline Cells – Fuel cells. Nuclear: Fission and fusion – Power reactors – Applications of Nuclear Energy – Disposal of Radioactive wastes. Solar: Photoelectric Cells – Solar cells – Types – Production of solar Energy – Applications.

Elementary treatment of materials used in information technology: Liquid Crystals – Polythiophene – Cellulose Acetate – Silicon Metal – Germanium, Gallium Arsenide – Gallium Phosphide – Arsenic – Boron – Iron Oxide (FeO) – Iron sulphide (FeS) – Zinc Oxide (ZnO) – Cadmium Sulphide (CdS) – Cesium – Lithium – Ferric Chloride (FeCl₃).

Corrosion Engineering: Principle and Theories of Corrosion – Types of corrosion – Effect of environment on corrosion – Corrosion testing – Prevention of corrosion – Cathodic Protection. Protective Coatings – Metallic Coatings – Anodized Coatings. Paints – Special Paints, Varnishes and Lacquers.

High Polymers: Types of Polymerization – Plastics – Thermosetting and Thermoplastic Resins – Compounding of Plastics – Fabrication of Plastics. Preparation and properties of Cellulose Derivatives – Vinyl Resins – Nylon 6,6 – Bakelite – Polycarbonates – Epoxyresins- Fibre reinforced plastics – Optical Fibres – Conducting Polymers – Molecular Computers – Engineering applications of Polymers. High Polymers: Rubbers and Elastomers.

Fuel Technology: Motor fuels – Petroleum – Refining – Knocking and Octane Number of Gasoline – Cetane Number of Diesel Oil, Synthetic Petrol - LPG – Applications. Rocket Fuels – Propellants.

Lubricants: Classification – Properties – Mechanism – Selection of Lubricants of Engineering operations.

Building Materials: Portland Cement: Constituents – Chemistry involved in setting and Hardening of Cement – Cement Concrete – RCC – Decay of Cement – Special cements, Refractories: Classification – Properties and Engineering applications. Ceramics: Classification – Properties and uses.

Pollution and its control: Air Pollution – Chemical Characteristics – Carbon, Sulphur and Nitrogen Compounds – Acid Rain – Green House Effect – Monitoring of air pollution – Control of air pollution with regard to Carbon, Sulphur and Nitrogen Compounds.

Water pollution: Impurities in water – Municipal water treatment – Qualities, W.H.O. Limits for Concentration of Minerals, Salts, Suspended solids, Turbidity – Sulphate Hardness, Carbonate hardness – Limits for industrial and drinking purposes – Removal of Hardness – Tests – Simple methods – Antibacterial treatment – Break point Chlorination – Ozone, Ultra Violet Ray treatment – Sewage treatment – BOD – COD – Treatment of effluents from sugar and paper industries. Desalination of sea water by Reverse Osmosis and Electro Dialysis.

Text Books: Engineering Chemistry by P.C. Jain and M. Jain A text book of Engineering Chemistry by S.S. Dara Engineering Chemistry by B.K. Sarma A text book of Engineering Chemistry by Balasubramanian et. al, Material Science and Engineering by V. Raghavan.

ENG 106 - Computer Programming & Numerical Methods

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3	-	-	3	3	70	30	100	2

Objectives: To make the student familiar with programming in C and enable the student to implement the numerical methods described in this course using C as Programming Language.

Section A Computer Programming in

Basics: Variables – Constants – Expressions – Operators and their precedence and associativity. Basic input and output statements. Control structures. Simple programs in C using all the operators and control structure.

Functions: Concept of a function – Parameters and how they are passed – Automatic Variables – Recursion – Scope and extent of variables. Writing programs using recursive and non-recursive functions.

Arrays and Strings: Single and multidimensional arrays – Character array as a string – Functions on strings. Writing C Programmes using arrays and for string manipulation.

Structures: Declaring and using structures – Operations on structures – Arrays of structures – User defined data types – Pointers to using files.

Files: Introduction – file structure – File handing functions – file types – Files – Error handing – C Programming examples for using files.

Section B

Computer Oriented Numerical Methods 1. Basic concepts: Preliminary Concepts of Algorithms – Flow Charts and their execution traces – A Simplified Model of a Computer. 2. Representation for Characters and Numbers: Representation for integer and real numbers. Effect of finite representation on arithmetic operations for example overflow, underflow, associativity and normalization. Some elementary methods for overcoming these limitations. 3. Numerical Methods: Notation of round-off and truncation errors, numerical methods of finding roots of an algebraic equation of one variable. Successive bisection method, False position method, Newton Raphson method and Secant method. 4. Solutions of simultaneous Algebraic Equations; Gauss elimination method and Gauss Seidal methods. 5. Interpolation: Lagrange’s Interpolation and difference table methods. 6. Numerical Solution of Differential Equation: Euler’s method, Taylor’s series method and Runge-Kutta method.

Books Section A: Programming with C by K.R. Venugopal and Sudeep R Prasad.

Section B: Introduction to Numerical Methods by S.S. Sastry

Elementary Numerical Methods by S.D. Conte.

Reference: C Programming Language by Kerningham & Ritchie.

ENG 107 - Engineering Graphics

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3	-	-	3	3	70	30	100	4

Principles Of Graphics

Two-dimensional geometrical construction – conic sections, involutes and cycloids –

Representation of three dimensional objects – principles of projections – Standard codes of principles.

Orthographic Projections

Projections of points, straight lines and planes – Auxiliary projections – Projections and sectioning of solids – Intersection of surfaces – Development of surfaces.

Pictorial Projections

Isometric projections – Perspectives – Free hand sketching.

Computer Graphics

Hardware-Display technology – Software – Introduction to drafting software.

Text Books

Narayanan K.L. and Kannaiah P., Engineering Graphics, 1992.

Reference

William M. Neumann and Robert F. Sproul, Principles of Computer Graphics, McGraw Hill, 1989.

Warren J. Luzadder and Join M.Duff, Fundamentals of Engineering Drawing, Prentice-Hall of India Private Ltd., Eastern Economy Edition, 1995.

Natarajan K.V., Text book of Engineering Drawing, Private Publication, Madras, 1990.

Mathur M.L. and Vaishwanar R.S., Engineering Drawing and Graphics, Jain Brothers, New Delhi, 1993.

ENG 108 Social Science

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
3	1	-	4	3	70	30	100	4

Society

Individual – society – individual and society – related theories – sociological thinking.

Science and technology and society Role of science and technology on development of various societies – Ancient society – Valued system – Agriculture and industrial development – Technological changes and their influence on social , economic and political systems – Basic differences on rural and urban development strategies.

Engineers and national development

Limitation of technological solutions – Engineering ethics and professionalism need of engineer to consider societal needs – interaction with the society at planning , implementation and management stages – Participatory management – Desirable organizational units.

ENG 109 – Physics Lab

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	3	3	3	50	50	100	2

12 of the following experiments must be completed: 1. Lee’s method – determination of coefficient of thermal conductivity of a bad conductor 2. Melde’s experiment – determination of the frequency of an electrically maintained tuning fork. 3. Newton’s rings – determination of radius of curvature of a convex lens. 4. Diffraction grating-determination of wavelengths in mercury line spectrum-using spectrometer. 5. Determination of Cauchy’s constants using Spectrometer and mercury light. 6. Wedge method-det. of thickness of a paper by forming parallel interference fringes. 7. Michelson’s interferometer-a) det. of ?? using calcite crystal. 9. Optical Bench – a) Young’s double slit b) Lloyd’s mirror c) biprism d) diffraction at an edge e) Thickness of wire 10. Ultrasonic Diffraction – Velocity of ultrasonic waves in liquids. 11. Variation of magnetic field along the axis of current carrying circular coil – Stewart and Gee’s apparatus. 12. Calibration of voltmeter using potentiometer. 13. Carey Foster’s bridge a) laws of resistance b) temperature coefficient of resistance 14. B-H curves – determination of hysteresis loss 15. Calendar and Barnes method – determination of specific heat of water. 16. Hall effect – a) Determination of hall coefficient B) determination of charge density 17. Photoelectric effect – a) characteristics of photoelectric cell b) det. of Planck’s const. 18. Determination of Rydberg constant using hydrogen discharge tube. 19. Determination of e/m of an electron – Thomson’s method 20. Determination of band gap of semi conductor.

ENG 110 - Chemistry Laboratory

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	3	3	3	50	50	100	2

List of Practical Experiments: 1. Estimation of sodium carbonate in soda ash 2. Estimation of electrolytic strength in a Lead acid battery 3. Estimation of iron as ferrous iron in an ore sample 4. Estimation of Oxalic acid by Redox method 5. Estimation of calcium in a sample of Portland cement 6. Estimation of volume strength of hydrogen peroxide 7. Estimation of chromium in potassium dichromate 8. Estimation of copper in a copper ore. 9. Estimation of active chlorine content in a disinfectant bleaching powder. 10. Determination of hardness of an underground water sample. 11. Estimation of zinc in a zinc ore by ferrocyanido method. 12. Determination of alkalinity of water sample.

Demonstration Experiments: 13. Determination of viscosity and viscosity index of a lubricant. 14. Construction of electrochemical power cell. 15. Electro and electroless plating of a metal strip.

ENG 111 – Workshop

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	3	3	3	50	50	100	2

1. Carpentry: Bench work, tools used in carpentry. Jobs for class work – half lap joint, mortise and tenon joint, half – lap dovetail joint, corner dovetail joint, bridle joint.

2. Sheet Metal: Tools used in sheet metal work. Laying developments of sheet metal jobs, soldering. Jobs for class work – square tray, taper side tray, funnel, elbow pipe.

3. Fitting: Tools used in fitting work. Different files, chisels, hammers and bench vice. Jobs for class work – hexagon, rectangular, circular and triangular fits. External and internal threads with dies and taps.

Reference: Elements of Workshop technology, Vol. 1 by S.K. and H.K. Hajra Choudary.

ENG 112 C - Programming Lab

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	3	3	3	50	50	100	2

1. Write a program to read x,y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line? 2. Write a program, which generates 100 random integers in the range of 0 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while and do while) 3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position, Copying one string to another, Reversing a string, adding one string to another. 4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int., long. Float and double. What happens when you add 1 to the largest possible integer number that can be stored? 5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order. 6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix). 7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation. 8. Given two points on the surface of the sphere, Write a program to determine the smallest arc length between them. 9. Implement bisection method to find the square root of a given number to a given accuracy. 10. Implement Newton Raphson method to det. a root of polynomial equation. 11. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange's interpolation. 12. Write a function, which will invert a matrix. 13. Implement Simpson's rule for numerical integration. 14. Implement Gaussian quadrature for numerical integration. 15. Write a program to solve a set of linear algebraic equations.

GI 211 Information Technology and Applications

L	T	PD	Total Pds	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I Computer Fundamentals

Introduction to computers, types of computers, basic components of computer systems- CPU- memory, Input devices-Keyboard, smart cards, Light pen, touch screen, mouse, digitizer. Output devices – Video display devices, flat panel display, printers, audio output (chap 9)

Unit II Data Acquisition: Chapters (2,3,4,5)

Acquisition of Numbers and Textual Data: Input units, internal representation of numeric data, representation of characters, error detecting codes.

Acquisition of image data : Acquisition of textual data, pictures, storage format for pictures, fundamentals of image compression, image acquisition with digital camera.

Acquiring Audio Data : basics of audio signals, acquiring and storing audio signals.

Acquisition of Video: Capturing a moving scene with a video camera, compression of video data, MPEG compression standard.

Unit III Computer Software (chap 10)

Overview of Operating Systems: operating system fundamentals, software – system software, application software (overview of Word, Excel, PowerPoint). Overview of Windows; Linux (Windows-Desktop-Control panel -Start menu; Operations on file (new, save, copy, edit, etc)

Unit IV

Business Information Systems and E-commerce (Chap 16, 17)

Types of information needed by organizations, Management structure and information needs, design of an operational information system, system life cycle, computer system for transaction processing

E-commerce : Introduction, Business to business, business to customer and customer to customer e-commerce, their advantages and disadvantages. E-commerce system architecture, payment schemes, electronic cheque payment, Cash transactions, EDI, Intellectual properties rights and e-commerce.

Unit V

Computer Networks and Internet (Chapter 8, 15)

Overview of computer Networks and Internet: computer networks - LA N, WAN and their applications, intranet, naming computers connected to internet.

Some Internet Applications : Email, Information browsing, WWW, Information retrieval from the web, Other facilities provided by the browser, audio on the internet, pictures, animation, video on the internet. Introduction to applications such as Google maps and Google earth

Text books

1. **Introduction to Information technology** by V. Rajaraman, PHI

Reference Books: Introduction to Computers by Peter Norton

GI 212 Engineering Mathematics-III

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

I. VECTOR CALCULUS

Differentiation of vectors, curves in space, velocity and acceleration, relative velocity and relative acceleration, scalar and vector point functions, vector operator ∇ applied to scalar point functions- gradient, ∇ applied to vector point functions- divergence and curl. Physical interpretation ∇f , $\nabla \cdot \vec{F}$, $\nabla \times \vec{F}$, ∇ applied twice to point functions, ∇ applied to products of two functions; , Irrotational and Solenoidal fields.

Integration of vectors, line integral, circulation, work done, surface integral-flux, Green's theorem in the plane, Stoke's theorem, volume integral, Gauss Divergence theorem.

Introduction of orthogonal curvilinear coordinates, cylindrical and spherical polar coordinates

II. INTRODUCTION OF PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations, solutions of partial differential equations- equations solvable by direct integration, linear equations of first order: Lagrange's Linear equation, non-linear equations of first order, Charpit's method.

Homogeneous linear equations with constant coefficients- rules for finding the complementary function, rules for finding the particular integral (working procedure), non- homogeneous linear equations.

III. APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of variables, One dimensional wave equation-vibrations of a stretched string, one dimensional Heat equation, Two dimensional heat flow in steady state - solution of Laplace's equation in Cartesian and polar coordinates (two dimensional).

IV. INTEGRAL TRANSFORMS

Introduction, definition, Fourier integral, Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier Sine and Cosine transforms, Finite Fourier Sine and Cosine transforms, properties of Fourier transforms, Convolution theorem for Fourier transforms, Parseval's identity for Fourier transforms, Fourier transforms of the derivatives of a function, simple applications to Boundary value problems.

TEXT BOOKS:

Scope and treatment as in "Higher Engineering Mathematics", by Dr. B.S.Grewal, 42nd edition, Khanna Publishers.

REFERENCE BOOKS:

1. A text book of Engineering mathematics, by N.P.Bali and Ieyangar, Lakshmi Publications.
2. Advanced Engineering Mathematics by H.K.Dass. S.Chand Company.
3. Higher Engineering mathematics by B. V. Ramana, Tata McGraw Hill Company.

GI 213 Fundamentals of Geology

L	T	PD	Total Pds	Univ. Exam		Sessional. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I: General Geology

Branches of Geology – Solar system, Origin of the Earth, Age of the Earth, Interior of the Earth, Isostasy, Elements of seismology, Earthquakes, Volcanoes, Elementary knowledge on continental drift and plate tectonics with evidences. Groundwater

Unit – II: Mineralogy

Crystal symmetry, forms, twinning; crystal chemistry; optical mineralogy, classification of minerals, diagnostic physical and optical properties of rock forming minerals.– study of the following rock forming minerals – Olivine family, Quartz family, Feldspar family, Amphibole Family, Pyroxene family, Mica family, Garnet – Processes of ore mineral formation – Coal and petroleum – origin and occurrence in India

Unit – III: Petrology

Igneous rocks classification, forms, Structures and textures – Description of Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt **Sedimentary rocks** - classification, forms, structures and textures- Description of sandstone, limestone, shale, Conglomerate and breccia. **Metamorphic rocks** - classification, forms, structures and textures-Description of Quartzite, Marble, Slate, Phyllite, Gniess and Schist, Khondalite, Charnockite. Igneous and metamorphic provinces of India

Unit – IV: Structural Geology

Strike, Dip, Plunge; Description and classification of folds, faults, Joints and Unconformities; Use of Brunton compass; Clinometer compass

Stratigraphy: Stratigraphic principles; Geological time scale, major stratigraphic divisions of India. -Major geological formation of India: Archaeans group, Cuddapahs system, Vindhyan formations, Gondwana system, Deccan traps, siwaliks . Geology and Mineral Resources of Andhra Pradesh.

Unit – V: Engineering Geology:

Geophysical Investigations (Electrical, Seismic survey) for constructions of dams, reservoirs, buildings, roads, coastal structures, and Tunnels. Importance of geology in construction and development of civil Engineering projects.

Textbooks

Parbin Singh, “Engineering and General Geology”, Katson Publication House, 1987.

K.M. Bangar “Principles of Engineering Geology. Standard publishers Distributors.

Krynine and Judd, “Engineering Geology and Geotechniques”, McGraw Hill Book Company, 1970.

Reference

Legget, “Geology and Engineering”, McGraw Hill Book Company, 1998.

Blyth, “Geology for Engineers”, ELBS, 1985.

GI 214 Object Oriented Programming-I: C++

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Unit – I

Overview of object oriented programming (OOP): OOP paradigm, basic concepts underlying OOP: data abstraction and encapsulation, objects and classes, inheritance, polymorphism

Operator overloading, function overloading, single inheritance, multiple inheritance.

Unit – II

Review of Language constructs of C used in C++ : variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, stacks, queues, structure, unions, functions, pointers; preprocessor directives and examples of these applications in C++

Unit – III

Creation of Classes and Objects, accessing class members, Private Vs Public, Constructor and Destructor, Objects, Member Functions , Method definition, Inline Function Implementation, Constant member functions, Overloading Member Functions ,Need of operator overloading, prefix and postfix, overloading binary operators and examples in C++

Unit – IV

Inheritance and types, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of derived classes, and virtual functions, size of a derived class, order of invocation.

Unit – V

Polymorphism and Virtual Functions ,Importance of virtual function, abstract base classes and pure virtual functions, virtual destructors, File and Streams Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of file.

Textbooks

- 1.Object Oriented Programming in C++ by E. Balaguruswamy, TMH Publishing Co. Ltd., New Delhi
- 2.Mastering C++ by KR Venugopal and Rajkumar, T Ravishankar; Tata McGraw Hill Publishing Co. Ltd., New Delhi

References:

- 1) Object Oriented Programming using C++ by B Chandra, Narosa Publishing House Pvt,Ltd., Daryaganj, New Delhi 110002
- 2)Object Oriented Programming using C++ by R Rajaram , New age International (P) Ltd,Publishers New Delhi

GI 215 Geomorphology

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

Definition and scope of geomorphology; 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

Scope and significance of soil studies; soil and regolith; soil forming factors – geological, climatic, topographical, biological and time factors; Soil components – mineral matter, organic matter, soil-water and soil-air; Soil Properties – colour, texture, structure, acidity and alkalinity; soil profile; Pedogenic regimes – laterisation, gleisation, podzologisation, calcification and salinisation; soil classifications – zonal system, and Seventh approximation system.

Unit V

Applied geomorphology: landform interpretation for groundwater explorations; mineral exploration – surface expressions of ore bodies; weathering residues, placer deposits; applications in engineering projects: route selection – highways, canals, transmission lines; site selections – dam sites, industries; townships

Text Books

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

GI 216 Surveying

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Unit – 1

Principles of Surveying, Classification of Surveying, Introduction to various traditional surveys – Chain Surveying: Instruments, Sources of errors – Compass Surveying: Definitions of Bearings, Theory of Magnetic Compass, Problems and errors in compass survey – Plane Table Surveying: Working Operations, Leveling – Centering – Orientation, Methods of Plane Table Surveying.

Unit – 2

Leveling – Methods of Leveling – Dumpy Level: Differential Leveling, Profile Leveling, Cross sections, Reciprocal Leveling, Precise Leveling – BS, FS, IS, HI, TP, reduction of levels – Theodolite: Measurement of horizontal and vertical angles, Open and Closed traversing, Concepts of Trigonometric leveling.

Unit – 3

Tacheometric Surveying – Principles of Tacheometry, Stadia method - Principle of Stadia method, Distance and Elevation formulae for staff vertical & staff normal, Subtense method - Principle of Subtense method, vertical base observations, horizontal base subtense measurement, methods of reading the staff, Tangential method – constant base tangential measurements, variable base tangential measurements.

Unit – 4

Concepts of Triangulation – Geodetic surveying, classification of triangulation systems, Triangulation figures and systems, Topographic Surveying – methods of representing relief, contours and contour interval, characteristics of contours, procedure in topographic surveying, contour interpolation.

Unit – 5

Advanced Methods of Surveying – Electronic devices: Total Station, Global Positioning System, Differential Global Positioning System, Remote Sensing, Aerial Photogrammetry

Text Books

B.C. Punmia, Surveying (Volume 2) Laxmi Publications

Paul R Wolf and Bon A. Dewitt, Elements of Photogrammetry – With Application in GIS, Mc Graw-Hill

GI 217 Geology and Geomorphology Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
0	0	6	6	3	50	50	100	2

a. Geology exercises

Geological maps and sections
 Identification of some important rock forming minerals
 Description and Identification of typical rocks
 Description structural models-folds, faults and joints

b. Geomorphology exercises

Description of landform models
 Topographic profiles – projected and composite profiles
 Preparation of slope maps
 Stream profiles from topographic maps
 Landform interpretation from topographic maps
 Drainage Morphometry

GI 218 Surveying Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	-	6	3	50	50	100	2

Chain survey
 Prismatic Compass survey
 Dumpy Level Survey
 Plane Table Survey
 Total Station Survey
 GPS Survey
 Integration of field surveys with various software.

GI 221 Fundamentals of Atmospheric Systems

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

The Atmosphere: Nature, origin, composition and vertical structure.

Insolation and Heat Budget: Insolation, solar constant, distribution, atmospheric depletion of solar radiation, heat budget, latitudinal heat budget. Temperature of the atmosphere: Heat and temperature, processes of heat energy transfer, heating and cooling of atmosphere; Controls of temperature; Distribution of temperature: Air temperature and its measurement, measurement of sunshine and insolation; Horizontal distribution, seasonal distribution, vertical distribution, temperature inversion.

Unit II

Air Pressure and winds: Measurement of air pressure, variations of air pressure and weather, pressure gradient; Pressure variations: diurnal and seasonal; basic atmospheric pressure patterns; vertical variation in air pressure; horizontal distribution of pressure; seasonal variations in pressure pattern;

Wind: Factors affecting wind direction and speed, wind observation and measurement ; wind shift.

General circulation of the atmosphere: Thermal circulation on non-rotating earth, thermal circulation on a rotating earth. Surface wind systems. Departure from idealized circulation pattern; Surface wind systems; Latitudinal shifting of wind belts; Longitudinal variations in air flow patterns; Winds in tropical region; Sub tropical winds; Westerlies; polar winds; Jet stream

Unit III

Atmospheric Moisture: Sources of atmospheric moisture, humidity measurements, evaporation, factors affecting evaporation, potential evapotranspiration;

Clouds: Formation and classification.

Precipitation: Causes, forms, processes, and types, observations of precipitation, regional distribution and seasonal variation of precipitation, artificial precipitation.

Monsoons: Economic importance of monsoon, concepts of the origin of monsoon, Asian monsoon; Indian monsoon, burst of monsoon, climatic significance of monsoon.

Unit IV

Weather disturbances:

Air masses: source regions, classification, air mass modification.

Fronts: General characteristics, frontogenesis and frontolysis, classification of fronts

Tropical disturbances: Types of tropical disturbances, origin of tropical cyclones, movement and tracks of hurricanes, hurricane seasons, regional distribution.

Thunderstorms, tornadoes and waterspouts: Thunderstorms-origin and structure, stage of development, Thunderstorm electricity and thunder, precipitation in thunder storm, classification and distribution; tornadoes and waterspouts

Unit V

Weather forecasting and analysis: Historical background, how weather forecasting is done, types of weather forecasts, weather forecasting methods, satellites in weather forecasting.

Applied climatology: climate and natural vegetation, climate and agriculture, climate and animal husbandry, climate and housing, Air pollution and health, climate and human comfort, climate and urban planning

Textbooks:

1. Climatology, Lal, D.S., Sharda Pustak Bhawan, 11, University road, Allahabad, 2003
2. General climatology, Howard J. Critchfield, Prentice-Hall of India private Limited, New Delhi, 1987
3. Physical Geography, Tikka, R.N., Kedar Nath Ram Nath & Co, Meerut, 2006
4. Meteorology Today, C. Donald Ahrens, West Publishing company, New York, Third edition
5. Atmosphere, weather and climate, Siddhartha, K., Kishalaya Publications Pvt. Ltd., 2004.

GI 222 Photogrammetry and Photo interpretation

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

Fundamentals of Photogrammetry and photo interpretation; History of aerial photography; Types of photographs: vertical and oblique photographs.

Aerial cameras: lens, optical axis, focal length, focal plane and fiducial marks; Principal Point; Geometry of vertical photographs

Unit II

Scale on vertical photographs – over flat terrain and variable terrain; average photo scale;

Methods of determining the scale on vertical photographs

Overlap, side lap and flight planning

Stereoscopic viewing of vertical photographs; Depth perception; Stereoscopes and their use;

Vertical exaggeration – factors involved and determination

Unit III

Relief Displacement on vertical photographs

Determination of horizontal ground lengths, directions and angles from photo coordinates

Parallax: Y-parallax and X-Parallax; Parallax measurement – monoscopic method and stereoscopic method – principle of floating mark

Unit IV

Aerial mosaics: comparison with maps

Elements of air photo pattern: rock types, landforms, surface drainage patterns, erosion features, gray tones, vegetative and land use details

Unit V

Applications of aerial photographic techniques in soil surveys; forest surveys, agricultural and land use planning; geological and geomorphological investigations; civil engineering projects

Textbooks

1. 'Elements of Photogrammetry' by P.R.Wolf and B.A. Dewitt, McGraw Hill, 2004
2. 'Remote Sensing and image Interpretation' by Thomas M. Lillesand and R.W. Kiefer, John Wiley & Sons, Inc., 2000
3. 'Aerial Photographic interpretation' by Donald R. Lueder, McGraw-Hill 1959
4. P.J. Curran, Principles of Remote Sensing, ELBS/Longman1985

GI 223 Remote Sensing – I

L	T	PD	Total Pds	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I Introduction:

Remote sensing system, Observe Earth from space

Remote sensing-A historic prospective, Indian remote sensing programme

The earth Observation Evolution –Paradigm shift, Legal and ethical aspect.

Electro Magnetic Radiation (EMR): Velocity of EM radiation, Propagation of EM waves, Attenuation, quantum nature of EM radiation, Thermal emission, EM radiation for Remote sensing

Fundamentals of Radiometry: Measure Geometry-concept of the solid angle, radiometric quantities, Surface characteristic for Radiometric Measurements, Observation geometry in Remote sensing, Radiometric Measurements, scene Reflectance Measurement.

Physical Basis of Signature: Signature in the Reflective OIR region, Thermal Infrared (TIR), Microwave region.

Unit – II EMR Interaction with Atmosphere

Atmospheric characteristics – atmospheric gas composition – pressure and temperature variation with altitude – Rayleigh, Mie scattering and non-selective scattering– atmospheric windows – Atmospheric effects on solar radiation and microwave spectrum –Thermal infrared radiation – Emissivity – Emittance of materials – Kichoff’s Law in spectroscopy – Wien’s Displacement Law, Stefan Boltzmann Law – ocean colour temperature measurement –Introduction to Microwave Remote sensing

EMR Interaction with Earth materials: Spectral signature concepts – Factors affecting spectral reflectance of materials. Instruments used to study the spectral reflectance – spectrophotometer – spectro-radiometer

Unit – III Remote Sensor –An overview

Classification of Remote sensor, selection of sensor parameters, spatial resolution, spectral resolution, radiometric resolution, Temporal resolution

Optical and Infrared sensors: Quality of Image in Optical system, Imaging mode, Photographic camera, Television camera, Opto-mechanical scanners, Opto-mechanical scanners operated from satellites, Push broom cameras, Whisk broom cameras. Microwave sensors

Unit- IV Platforms

Principles of satellite Missions, Locating satellites in space, Types of Orbit, Airborne platforms – balloons, helicopters, aircrafts – Space borne platforms – Sun synchronous and Geosynchronous satellites – Projectile geometry – Land coverage – Repetitivity – On track and Across track stereovision capability. IRS, LANDSAT, SPOT, CANADA, JAPAN, EUROPEAN, satellite series.

Unit-V Image Interpretation

Introduction to image Interpretation.

Basic principles of Image Interpretation

Elements of Image Interpretation

Techniques of image Interpretation and interpretation Keys

Methods of searching and sequence of Interpretation
Methods of analysis and Reference levels

Textbooks

1. Lillisand T.M. and Kiefer R.W. Remote Sensing and Image Interpretation (4th ed), John Willey and Sons, Inc, New York, 2000
2. Fundamentals of Remote sensing- George Joseph, University Press.
3. Floyd F. Sabins, Jr. Remote Sensing – Principles and Interpretation W.H. Freeman and Company, New York, 1986.

References

- Raymond. M. Measures – “Laser Remote chemical Analyses John Wiley and sons, 1988.
- Pandey S.N. Principles and Applications of Photogeology. Wiley Eastern, 1987.
- Druny S.A. Image Interpretation in Geology, Chapman and Hall, London, 1983.
- Arumugam. M. Engineering Physics, Anuradha Publishers, 1998.
- Janza. F.J., Blue, H.M., and Johnston, J.E., “Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A., 1975.

GI 224 Environmental Studies

L	T	PD	Total Pds	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

- Module 1: Introduction – Definition, scope and importance; measuring and defining environmental development indicators
(1 Lecture)
- Module 2: Ecosystems: introduction, types, characteristic features, structure and functions of Ecosystems – Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)
(2 Lectures)
- Module 3: Environment and natural Resource Management:
Land resources – land as a resource; Common property resources; Land degradation; Soil erosion and desertification; effects of modern agriculture; fertilizer-pesticide problems
Forest resources – Use and over-exploitation
Mining and Dams – their effect on forest and tribal people
Energy resources – Energy needs; renewable and non-renewable energy sources; use of alternative energy sources; impact of energy use on environment
(8 Lectures)
- Module 4: Bio-diversity and its conservation
Value of bio-diversity – consumptive and productive use; social, ethical aesthetic and option values
Bio-geographical classification of India – India as mega diversity habitat
Treats to bio-diversity – hotspots; habitat loss; poaching of wildlife; loss of species; seeds, etc.
Conservation of bio-diversity – in situ and ex situ conservation
(3 Lectures)
- Module 5: Environmental Pollution – Local and Global Issues
Causes, effects and control measures of air pollution, indoor air pollution; Water pollution; Soil pollution; Marine pollution; Noise pollution; Solid waste management – composting, vermiculture; Urban and industrial wastes, recycling and re-use
Nature of thermal pollution and nuclear hazards; Global warming; Acid rain; Ozone depletion
(8 Lectures)
- Module 6: Environmental problems in India: Drinking water; Sanitation and public health; Effects of activities on the quality of environment, Urbanisation, Transportation, Industrialisation, Green revolution;
Water scarcity and Groundwater depletion; Controversies on major dams – resettlement and rehabilitation of people – problems and concerns;
Rainwater harvesting; cloud seeding and watershed management
(5 Lectures)

- Module 7: Economy and Environment: The economy and environment interaction, Economics of development, preservation and conservation; Sustainability – theory and practice; Limits of growth; Equitable use of resources for sustainable lifestyles; Environmental impact assessment **(4 Lectures)**
- Module 8: Social issues and the environment: Population growth and environment; Environmental education; Environmental movements; Environment vs. development
Energy resources: Energy needs; renewable and non-renewable energy sources; Use of alternative energy sources; Impact of energy use on environment **(2 Lectures)**
- Module 9: Institutions and governance: Regulation by government; Monitoring and enforcement of environmental regulation;
Environmental Acts: Water (Prevention and control of pollution) act; Air (prevention and control of pollution) act; Environmental protection act; Wildlife protection act; Forest conservation act; Coastal zone regulations
Institutions and policies relating to India
Environmental governance **(5 Lectures)**
- Module 10: International conventions: Stockholm Conference 1972; Earth Summit 1972; World Commission for Environmental Development (WCED) **(2 Lectures)**
- Module 11: Case Studies: Chipko Movement; Narmada Bachao Andolan; Silent Valley Project; Madhura Refinery and Taj Mahal; Industrialisation of Pattancheru; Nuclear Reactor at Nagarjuna Sagar; Tehri dam; Ralegaon Siddhi (Anna Hazare); Kolleru Lake – aquaculture; Fluorosis in Andhra Pradesh **(3 Lectures)**
- Module 12: Fieldwork:
Visit to a local area to document and mapping of environmental assets - river/forest/grass/land/hill/mountain
Study of local environment –common plants, insects, birds
Study of simple ecosystems – pond, river, hillslopes, etc
Visits to industries – water treatment plants, effluent treatment plants **(5 Lectures)**

Textbooks

1. Environmental Studies, A. Kaushik and C.P. Kaushik, New Age International Publishers (P) Ltd
2. Principles of Environmental Science and Engineering, P. Venugopala Rao, Prentice-Hall India (P) Ltd., New Delhi
3. Environmental Sciences, P.D. Sarma
4. Environmental Studies, S. Mukherjee and A. Ghosh, Books and Allied (P) Ltd., Kolkata

GI 225 Object Oriented Programming-II: JAVA

L	T	PD	Total Pds	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit 1

Fundamentals of Object-Oriented Programming: Basic concepts, benefits and applications

JAVA Evolution: Features of java, relation with Internet and WWW

Unit 2

JAVA Language: Basics of Java, Constants, Variables, and Data Types, Operators and Expressions, Decision Making and Branching, Decision Making and Looping, Class fundamentals, Declaring objects, Assigning object reference variables, Introducing methods, Constructors, The this keyword, Garbage collection, The Finalize() method, A stack class, Over loading constructors, Using objects as parameters, Arguments passing, Returning objects, Recursion.

Unit 3

Advanced OOP in Java: Arrays, Strings and Vectors

Inheritance basics, Member access and inheritance, Using super class, Creating a multilevel hierarchy, Method overriding, Dynamic method dispatch, Using abstract classes, Using final with inheritance, The object class.

Unit 4

Packages: Putting Classes Together, Defining a package, Understanding classpath, Importing Packages, Defining an interface, Implementing interfaces, Applying Interfaces, Variable in interfaces.

Multithreaded Programming, Managing Errors and Exceptions

Unit 5

Applet Programming: The applet class, Applet architecture, An applet skeleton: Initialization and termination, Overriding update, Status window, Handling events: The event class, Processing mouse events, Handling keyboard events, HTML applet tag, Passing parameters to applets, Applet context and show document, The audio clip & applets tub interface, Outputting to the console. Swing concepts, JDBC connectivity
Managing Input / Output Files in JAVA

Text Books:

Programming with Java: A Primer, 3E, E BALAGURUSAMY, Tata McGraw Hill

The Complete Reference JAVA, Patrick Naughton and Herbert Schildt, Tata McGraw-Hill Publishing Company Ltd

GI 226 Probability and Statistics

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit-I

Probability and Random Variables

Probability concepts, Random variables, Moments, Moment Generating function,

Binomial, Poisson, Geometric, Negative binomial, Exponential, Gamma, Weibull

distributions, Functions of random variable, Chebychev inequality.

Unit –II

Two Dimensional Random Variables

Marginal and conditional distributions, Covariance, Correlation and Regression, Transformation of random variables, Central limit theorem.

Unit – III

Random Processes

Classification, Stationary and Markov processes, Poisson process, pure birth process, Birth and death process, Markov chains, Markovian queueing models.

Unit – IV

Reliability Engineering

Concepts of reliability, Hazard function, Series and parallel systems, Reliability and Availability of Markovian systems, Maintainability, Preventive maintenance.

Unit – V

Design of Experiments and Quality Control

Completely randomised design, Randomised block design, Latin square design, Process control, Control charts of measurements and attributes, Tolerance limits.

Textbooks

Miller, I.R and Freund, J.D., Probability and Statistics for engineers, Prentice-Hall, 1995

Kapur, J.N and Saxena, H.C, Mathematical statistics, S. Chand & Company Ltd., New Delhi, 1997

Balagurusamy, E, Reliability engineering, Tata-McGraw Hill Publishers, New Delhi, 1984

Bhat, U.N, Elements of applied stochastic processes, Wiley Series in Probability and Mathematical statistics, New York, 1983

GI 227 Photogrammetry and Remote Sensing Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	-	6	3	50	50	100	2

a. Aerial Photographic interpretation

Testing stereo vision; Use of Lens stereoscope and Mirror stereoscope; Use of Parallax Bar for height calculation from aerial photographs; Calculation of scale of the photographs; Marking Principal point and conjugate principal point on the stereopairs
Preparation of aerial mosaics; Interpretation of aerial photographs for identification of landforms of fluvial, Aeolian, glacial, coastal, volcanic and arid processes
Identification of tectonic elements from aerial photographs

b. Remote Sensing Practical

Operating Spectral radiometer in the field to collect radiometric values from various natural and artificial features of land surface; Identification of various land features from the satellite images in association with topo sheets and field visits; Calculations of coverage of satellite images for different latitudes, number of swath paths for various satellites; Study of imagery indexes; Visual study of single band images; Visual study of multi-spectral images; Preparation of base maps from the topographic maps; Preparation of thematic maps from visual interpretation

GI 228 Object Oriented Programming Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Cycle -I

Write a function using variables as arguments to swap the values of a pair of integers
Write a program to read a matrix of size m*n from the keyboard and display the same on the screen.

Define a class to represent a bank account including the following members:- Data members: a) Name of the depositors; b) Account number; c) Type of account; d) Balance amount in the account and Member function - To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display the name and balance.

Create a class **Float** that contains 2 float data members. Overload all the 4 arithmetic operators so that to operate on the objects of float.

Operations related to file handling

Cycle – II

Write programs in JAVA to implement the following concepts-
Streams and File operations ; Packages in JAVA; Exception handling mechanism; Applets and applications; Multi-threading in JAVA; Fundamental applications using swing

GI 311 Principles of Physical Oceanography

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

The World Oceans; Physical Properties of Sea Water and their Distribution: Salinity of Sea Water: Factors Affecting Salinity, Salinity Distribution in Oceans. Temperature in the Oceans: Factors Influencing Sea Water Temperature, Temperature Distribution in Oceans. Pressure; Density: Factors Affecting Density of Ocean Water, Density distribution in the Oceans; Colour of Sea Water: Colour Determination, Factors influencing the Colour of Sea Water. Light Transmission in Sea Water: Extinction Coefficients in the Sea, Variation of Extinction Coefficient; Sound Transmission in Sea Water: Velocity of Sound Waves, Variation of Sound Velocity in the Ocean, Refraction of Sound-Shadow Zone and Sound Channel, Attenuation of Sound in the Ocean.

Unit II

Oceanographic Instruments and methods: Sea Water Temperature Measurement, Salinity Measurement, Current Measurement, Ocean Wave Measurements, Tide Measuring Instruments, Water Transparency Measurement, Radiation Measurement and Platform- Sea and Airborne and Remote Sensing Satellites, Satellite Navigation, DGPS, Eco-sounder.

Unit III

Ocean Waves: Classification of Ocean Waves, Characteristics of Waves, Motion of an Ocean Wave, Wind-Generated Waves, Wave Height Conditions in Different Regions of the Oceans, Deep Water Wave Characteristics in the Arabian Sea and Bay of Bengal of Indian Coasts, Wave Propagation in Shallow Water, Problem Waves.

Ocean Tides: Tide Producing Forces, Tide Characteristics, Tidal Theories, Harmonic Analysis and Prediction of Tides, Tidal Ranges and Tidal Periods, Tidal Bore

Unit IV

Water Masses: Introduction, T-S diagrams, Properties of Water Masses, Types of Water Masses. Ocean Circulation: Introduction, Currents: Some General observations, Factors controlling Ocean Circulation, El Nino, Western Intensification of currents, Currents in Atlantic Ocean, Currents in Pacific Ocean, Currents in Indian Ocean.

Unit V

Sea level changes: Introduction, Evidences for Sea level Changes, Mechanisms of Sea level Changes, Impact of Sea level Change, Impact of Projected Sea level rise.

Marine Resources: Introduction, Maritime zones, Types of Marine Resources, Resources: extent, distribution and utilization, Problems of Marine Resources-Marine Pollution, Conservation of Marine Resources.

Text Books:

1. Descriptive Physical Oceanography, Reddy, M.P.M., Oxford & IBH Publishing Co. 2001
2. Oceanography – A Brief Introduction, Siddhartha, K., Kisalaya Publications, 2004
3. Introductory Oceanography, Harold V.Thurman, Macmillan Publishing Company, 1994
4. Introductory Oceanography, J.Weisberg and H.Parish, McGraw-Hill Kogakusha,1974
5. Descriptive Physical Oceanography, Gorge L. Pickard and William J. Emery, Pergamon Press, Fourth Edition

GI 312 Digital Image Processing – 1

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit -1

Introduction – Introduction to data sources, Characteristics of digital Image data, spatial data sources, Digital data acquisition, Digital Image Data formats, Image processing system considerations.

Unit -2

Initial Statistics Extraction – Univariate and Multivariate Statistics, Histogram – Contrast modification of Image data, Histogram Equalization, Histogram matching, Density slicing

Unit -3

Image Pre-processing – Sources and Corrections of Radiometric distortions, Sources and Corrections of Geometric distortions, Image registration.

Unit -4

Interpretation of Digital Image Data – Approaches to Interpretation, Forms of Imagery for image interpretation, Computer processing for image interpretation, Quantitative analysis.

Unit -5

Image Enhancements – Image Reduction & Magnification, Transects, Geometric Enhancement using Image Domain techniques – Neighborhood Operations, Template Operators, Convolution Operation, Spatial Filtering, Edge Detection, Line Detection, Texture, Spatial Correlation – The Semi variogram, Shape Detection.

Textbooks

John, R.Jensen. Introductory Digital Image Processing – Prentice Hall, New Jersey, 1986

John A. Richards – Xiuping Jia. Remote Sensing Digital Image Analysis – An Introduction – Springer Berlin Heidelberg, New York

GI 313 Database Management Systems

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Chapter 1 - Databases and Database Users

Introduction , Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS.

Chapter 2 - Database System Concepts and Architecture

Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems.

Chapter 3 - Data Modeling Using the Entity-Relationship (ER) Model

Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher Than Two.

Chapter 4 - The Relational Data Model and Relational Database Constraints

Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions, and Dealing with Constraint Violations

Chapter 5 - The Relational Algebra and Relational Calculus

Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus .

Chapter 6 - Relational Database Design by ER and EER-to-Relational Mapping

Relational Database Design Using ER-to-Relational Mapping, Mapping EER Model , Constructs to Relations

Chapter 7 - SQL-99: Schema Definition, Constraints, Queries, and Views

SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries
INSERT, DELETE, and UPDATE Statements in SQL, Specifying Constraints as Assertions and Triggers, Views (Virtual Tables) in SQL, Additional Features of SQL

Chapter 8 - Introduction to SQL Programming Techniques

Database Programming: Issues and Techniques, Embedded SQL, Dynamic SQL, and SQLJ
Database Programming with Function Calls: SQL/CLI and JDBC, Database Stored Procedures and SQL/PSM

Chapter 9 - Functional Dependencies and Normalization for Relational Databases

Informal Design Guidelines for Relation Schemas, Functional Dependencies,
Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms,
Boyce-Codd Normal Form

Chapter 10 - Relational Database Design Algorithms and Further Dependencies

Properties of Relational Decompositions, Algorithms for Relational Database Schema Design,
Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal
Form, Inclusion Dependencies, Other Dependencies and Normal Forms

Chapter 11 Emerging Database Technologies and Applications

Mobile Databases, Multimedia Databases, Geographic Information Systems (GIS), Genome Data
Management

Textbooks

Fundamentals of Database Systems, 5/E (Chap 1-3,5-11 and 30) Ramez Elmasri,
Shamkant B. Navathe, Pearson Ed.

Reference : Database System Concepts, 5/E Avi Silberschatz, Henry f.Korth,
S.Sudarshan, Tata Mc GrawHill

GI 314 Operations Research

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Unit I

Overview of operations research: OR models, OR techniques

Linear Programming: introduction, graphical solution, graphical sensitivity analysis, standard form of linear programming problems, basic feasible solutions, unrestricted variables, simplex algorithms, artificial variables, big M and two phase method, degeneracy, alternative optima, unbounded solutions, infeasible solutions.

Unit II

Dual problems, relation between primal and dual problems, dual simplex method, Integer programming, branch and bound algorithms cutting plan algorithm

Unit III

Transportation model, starting solutions, northwest corner rule, lowest cost method, Vogels approximation method, transportation algorithms, assignment problem, Hungarian method

Unit IV

Network Models, Project scheduling - CPM and PERT - their algorithms

Unit V

Dynamic Programming: recursive nature of dynamic programming, forward and backward recursion

Game theory: two persons zero sum games, mixed strategy games and their algorithms

Text books

- 1) Introductions to operations Research by Hillier/Lieberman, Tata McGraw Hill
- 2) Operations Research by R.Panneerselvan, prentice Hall of India

RS 315 Remote Sensing - II

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit-I Sensors, Data reception, Data processing & Data generation

Sensors and its specifications
 Multispectral Scanner (MSS) used in Landsat series satellites
 Return Beam Vidicon (RBV) used in Landsat series satellites
 Thematic Mapper (TM) used in Landsat series satellites
 High Resolution Visible (HRV) Imager used in SPOT Satellite
 Linear Image Self Scanning (LISS) Camera used in IRS series
 Thermal Scanners
 Satellite Data Receiving and data generation
 Data processing & correction

Unit-II Radiometric and Geometric corrections

Radiometric corrections Random noise correction
 Atmospheric correction, Geometric errors and corrections,
 Distortion evaluated from tracking data, distortion evaluated from ground control Image correction.
 Ground Investigation in support of Remote sensing
 Uses of ground data, calibration correction, Interpretation of properties, Training sets, Accuracy evaluation, test sites.

Unit- III Thermal Imaging

Thermal Imaging: Introduction - IR region of the Electromagnetic spectrum, Atmospheric transmission, Kinetic and radiant temperature, Thermal properties of materials, Emissivity, Radiant temperature, Thermal conductivity, Thermal capacity, thermal inertia, Apparent thermal inertia, Thermal diffusivity
 IR - radiometers, Airborne and Satellite scanner system
 Characteristics of IR images, Scanner distortion, image irregularities, Film density and recorded Temperature ranges
 Effects of weather on images: Clouds, Surface winds, Penetration of smoke plumes;
 Interpretation of thermal imagery; Advantages of Thermal imagery

Unit IV Introduction to Microwave remote sensing

Introduction, Microwaves for Remote sensing, History of Microwave Remote Sensing, The E M R, radar operating principal; Radar equations, Definitions Incidence angle, Look angle , depression angle , Azimuth angle, Spatial Resolutions in Radar , Range Resolution , Azimuth Resolution.

Types of Microwave sensors, Real Aperture Radar (RAR), Synthetic Aperture Radar (SAR), Geometry of Radar Imagery, Microwave Radiometers, Microwave Scatterometer, Microwave Altimeter, Airborne and Space born Platforms and Sensors, SEASAT , SIR-A, SIR-B , JERS , ERS and EOS.

Unit - IV Radar data & Data Interpretation

Spatial Resolutions in Radar: Range resolution, Azimuth Resolution, Radar return and Image signature, System properties (Wavelength, Polarization and Incidence angle)
Terrain properties: Di-electric constant, Surface Roughness, Feature Orientation
Forms of Radar return: Spectral Reflection, Corner Reflection or Diffused scattering

Radar image characteristics, slant range distortion, Relief displacement, Lay-over, Foreshortening, Radar shadow, Parallax and Stereo capability, speckle. Interpretation of SLAR image, SAR Image, Atmospheric applications, Ocean and Land, SAR interferometry

Text Books

1. Lillisand T.M. and Kiefer R.W. Remote Sensing and Image Interpretation (4th ed), John Willey and Sons, Inc, New York, 2000
2. Fundamentals of Remote sensing- George Joseph, University Press.
3. Applied Remote Sensing, C.P. Lo, Longman, Scientific and Technical Publishers
4. Remote Sensing in hydrology, Engman, E.T. Gurney, R.J.
5. Remote Sensing in water management in command areas, Govardhan

GI 316-1 Geoinformatics for Environmental Monitoring (Elective-I)

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit –I Water and the Environment

Remote sensing of fluorescence – water quality – water pollution – potential pollution sources – water runoff, Remote Sensing and Water quality management – snow surface cover – flood prediction. Soils and land forms – insects and disease – soil erosion – salinity – flood damage – soil limitation – soil degradation using Remote Sensing and GIS.

Unit –II Urban Environment

General consideration rural structure – Urban areas – Impact of industrial pollution – chemical effluents, land reclamation – disposal of solid waste – mining pollution

Unit- III Marine Environment

Sensors for environmental monitoring – sensors – visible and outside visible wave length – absorption spectrometers – selection of ground truth sites – sea truth observations – Radar techniques for sensing ocean surface – thermal measurements – application of sensing, mapping oil slicks – Chlorophyll detection – Fisheries resources – Coastal marine studies – determination of temperature and sea state.

Unit –IV Air pollution and Global Climatology

Remote sensing techniques for Air quality monitoring – case studies – weather forecasting and climatology – emissivity characteristics – measurement of atmospheric temperature – composition – constituent distribution and concentration – wind flows and air circulation – Hurricane tracking – meteorological satellite systems.

Unit –V Case studies

River pollution – the case of Ganga River

Air Pollution in Delhi; Mathura Refinery and Taj Mahal; Marine pollution in Visakhapatnam; Urbanization and its impact on Visakhapatnam city environment

References

Baretl, E.C. and Culis I.F. Introduction to Environmental Remote Sensing, second edition, Chapman and Hall, New York, 1993

Lintz, J. and Simonent, D.S. Remote Sensing of environment Addison Wesley, Rading mars, 1976

OR

GI 316-2 Geoinformatics for Earth Science Applications (Elective-I)

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I: Remote sensing applications in lithological studies

Introduction; Scope for Geological applications in multispectral data, Thermal Data, Microwave data Mapping of Broad scale Lithological Units in General, Igneous, sedimentary and metamorphic rock, Identification of Mineral Assemblage, their physical properties mode of origin and mode of occurrence; Lithological mapping using aerial photos and satellite imagery, Digital analysis for lithological discrimination

Unit – II: Remote Sensing applications in structural analysis

Bedding and simple dipping strata, Folds, Faults, rift zones, Lineaments, Unconformity, Structural mapping – structural analysis through aerial- and satellite- data, digital techniques for structural analysis.

Unit- III: Remote sensing application in geomorphology

Nature and type of landforms like denudational, structural, fluvial, marine, Aeolian, glacial and volcanic

Unit – IV: Remote sensing application in geological investigations

Remote sensing in Mineral Exploration, Main types of Mineral Deposits and their surface indications, Stratigraphic & lithological Guides, Geomorphological guides, Structural guides, Guide formed by Rock alteration, Geobotanical gudes. Groundwater, Petroleum,. Hydrogeological mapping, Engineering Geological studies, Land slide studies and disaster management studies using Remote Sensing and GIS techniques – case studies

Unit- V: Engineering and Sub-surface exploration & Disaster Assessment

Engineering geological Investigations: river valley projects, dams and reservoirs, route location (high ways and Rail ways) canal and pipeline alignments; neotectonism, seismic hazard and damage assessment, local ground condition, disaster assessment, volcanic and geothermal Energy applications, volcanic mapping and monitoring, identification of coal fires; environmental geology

Resistivity, aeromagnetic and electromagnetic survey for subsurface explorations

Textbooks

Ravi P.Gupta, Remote sensing Geology-Springer Publisher,A1 Books Co.in.

Joseph Lintz (Jr) and David Simonett Remote Sensing of environment, Addison Wesley Publishing Company London, 1976.

Parbingsingh Geology Katson Publishing House Ludhiana 4th edition 1985.

Manual of Remote Sensing Vol. II, American Society of Photogrammetry falls church virginia – 1985.

Three Dimensional Applications in Geographical Information Systems – by Jonathan Raper, Dept. of Geology, Birkbeck College, University of London – 1989.

GI 317 Digital Image Processing-I Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Study of Digital Data Products – Characteristics of digital Images, Importing different satellite data products, converting hardcopy images to digital format
Radiometric Enhancements – LUT Stretch, Histogram equalization, Histogram matching, Image filtering
Geometric Enhancements – Geometric correction, Mosaic of images, Resolution merge
Functions & Operations on digital imagery

GI 318 Database Management Systems Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Study features of a commercial RDBMS package such as ORACLE, MS Access, MYSQL & Structured Query Languages (SQL) used with the RDBMS. (Select two of RDMSS)
Laboratory exercises should include defining schemes for applications, creation of a database, writing SQL Queries, to retrieve information from the database, use of host Languages, interface with the embedded SQL, use of forms& report writing packages available with the chosen RDBMS product.

Some sample examples, which may be programmed, are given below:

Accounting package for a shop,
Database manager for a magazine agency or a newspaper agency,
Ticket booking for performances,
Preparing greeting cards & birthday cards,
Personal accounts- insurance, loans, mortgage payments, etc,
Doctor's dairy & billing system,
Personal bank account
Class marks management, hostel accounting,
Video tape library,
History of cricket scores,
Cable TV transmission program manager,
Personal library.

GI 319 – Soft Skills

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	1

SYLLABUS IN SOFT SKILLS

1. Basic Skills

- Listening
- Speaking
- Reading
- Writing

2. Non-Verbal

- Grooming (Personal Appearance)
- Using Space
- Body Language
- Paralanguage

3. Basic Etiquette

- Introducing
- Conversation –Small Talk
- Table Manners
- Telephone/ Cell phone manners

4. Goal Setting

- Immediate, Short Term, Long term
- Smart Goals
- Strategies to achieve goals

5. Time-Management

- Types of time
- Identifying time wasters
- Time Management skills

6. Using Telephone

- Making and receiving calls
- Handling wrong numbers and unnecessary calls
- Intonation
- Enunciation

7. Leadership and Team Management

- Qualities of good leader
- Leadership styles
- Decision Making
- Problem Solving
- Negotiation Skills

8. Assertiveness

- Assertiveness and aggressiveness
- Disagreement
- Openness and Expressiveness
- Self Concept
- Positive Thinking

9. Group Discussion

- Purpose (Intellectual ability, Creativity, Approach to a problem, Solving, Tolerance, Qualities of a leader)
- Group Behaviour
- Analysing Performance

10. Job Interview

- Identifying Job Openings.
- Preparing a Resume (Basic, Functional, Specific)
- Covering Letter (Solicited/Unsolicited)
- Interview (Opening, Body – Answer Q, Close – Ask Q)
- Types of questions
- Handling difficult Questions)

REFERENCE BOOKS

1. “Technical Communication” Principles & practice by Meenakshi Raman and sangeeta Sharma, Oxford University Press.
2. “Developing Communication Skills” by Krishna Mohan & Meera Banerji, Macmillan Publishers.
3. “Technical Writing” Process and Product by Sharon J. Gerson & Steven M. Gerson, Pearson Education Publishers
4. “Technical Communication Skills” by Rizvi, Tata McGrawhill Publications.
5. “The Ozford Guide to Writing and Speaking” by John Seely, Oxford University Press.

Free Elective-1: FE 01 (Geo-Engg) Spatial Information Technology

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Unit - I

Scope: Satellite and computer technologies and information explosion; Spatial information: Visualization, measurement and analysis of the earth surface features/phenomena; Maps, aerial photographs, satellite remote sensing, GPS and GIS; Earth Coordinate System; Maps: types of maps; map scale and geographic details; Lettering and symbols on maps; Map projections; Topographic maps: India and adjacent countries series of maps; contours, map interpretation for physical and cultural features

Unit - II

Aerial photographs: types of photographs; Fundamentals of photogrammetry and photo interpretation; Scale on aerial photographs; Geometry of vertical aerial photographs; Stereoscopy; End lap; Side lap; Vertical exaggeration; Parallax and Parallax Measurements; Relief displacement on vertical aerial photographs; orthophotography.

Unit - III

Satellite Remote Sensing: digital images; Electromagnetic spectrum and earth surface interactions; Orbiting satellites, sensors, imaging techniques and data products; Computer processing of digital images: image registration, enhancement and classification techniques; image interpretation and applications; Principles of digital photogrammetry.

Unit - IV

Global Positioning Systems (GPS); Navigation; GPS elements – space segment, user segment and control segment; Accuracy issues; determining orthometric heights. GPS receivers: Multi-channel, sequential and multiplexing receivers; Differential GPS; GPS applications in defense, surveying, mapping, and in everyday life

Unit – V

Geographic Information Systems (GIS): Fundamental concepts of GIS; Spatial data: types of spatial data; sources of spatial data; input techniques; data organization and storage; manipulation and analysis of spatial data in GIS. Applications of GIS;

Textbooks

1. Practical Geography, R.L. Singh, Kalyani Publishers, New Delhi, 1979
2. Elements of Cartography, Robinson et al., Wiley 2004
3. Aerial photographic interpretation, Lueder, D.R., McGraw Hill Book Co., 1959
4. Elements of Photogrammetry, P. R. Wolf and B.A. Dewitt, McGraw-Hill, 2004
5. Remote sensing and Image interpretation, Lillesand, Keifer and Chipman, John Wiley, 2007
6. Higher Surveying, B.G. Punmia, A.K. Jain, and A.K. Jain, Laxmi Publ, 2005
7. Surveying and Leveling (Part 1), T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune, 1988
8. Essentials of GPS, N.K. Agrawal, Spatial Networks Pvt.Ltd., 2004
9. GPS: Theory and Practice, B. Hofmann-Wellenhof, H. Lichtenegger and J.Collins, 5th Revised Edition, Springer, Wien, New York, 2001.
10. Introduction to GIS, K-T Chang, Tata McGraw-Hill 2007

GI 321 Web Programming and Applications

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I

Fundamentals of Web

Hyper Text Markup Language, Web designing through application tools (Microsoft FrontPage/Adobe Dream weaver), Cascading style sheets. Netscape and Internet Explorer extensions

Exercises: Basics of HTML: page layout, headers, paragraphs, links, lists.

Cascading Style Sheets (CSS) & Page Layout with CSS HTML Tables & Frames

HTML User Interface Controls, HTML Forms

Using Frontpage/Dreamweaver for Webpage Design

Unit – II

Scripting Languages

CGI programming, Introduction to Scripting languages, (Java Script/ Vb Script / PHP / Python), Java Script: History, Features of JavaScript, Syntax and Symantics and use in Web pages

Exercises:

Introduction to JavaScript; JavaScript: Arrays, loops, conditional statements and functions; Document Object Model (DOM); Capturing and handling events in JavaScript; Working with Windows and Frames

Unit – III

Web programming & Application Development

TCP/IP Network model, Client Server technology, Web server, Web Application development using web technologies.

Exercises: Setting up Apache/IIS; Installing PHP; Installing MySQL; Installing and using PHPMyAdmin

Unit – IV

Server Side and Client side scripting

Introduction to Database connectivity, Open Database Connectivity Standard(ODBC), Data insertion, retrieval and selection criteria using database connectivity tools (Database and scripting languages),

Exercises:

- A. Introduction to PHP; Working with Data Types and Operators; Building Functions and Control Structures; Manipulating Strings; Working with Files and Directories; Manipulating Arrays
- B. Introduction to SQL; Working with Databases and MySQL; Validating form data (server side); Error Handling and Debugging

Unit – V

Internet GIS: Introduction to Internet/Web GIS; Spatial (Raster and Vector) data dissemination using Web GIS; Distributed GIS development and Services;

Exercises: Configuring and installing map server (Proprietary & Open Source); Creating a WebGIS application: publishing raster and Vector Data; Creation of OGC Services (WMS/WFS); Consuming/Creating OGC Services; Introduction to open layers

Textbooks/References:

1. HTML - A Beginners guide, Second edition, Ian Lloyd, 2009.
2. Discovering the Internet: Complete Concepts and Techniques by Gary B. Shelly , Thomas J. Cashman , H. Albert Napier , Philip J. Judd
3. Learning Web Design: A Beginner's Guide to HTML, Graphics, and Beyond by Jennifer Niederst.
4. PHP and My SQL for Dynamic Web Sites: Visual Quick Pro Guide (2nd Edition) by Larry Ullman
5. Professional PHP5 Programmer to Programmer) by Edward Lecky-Thompson
6. PHP5 and My SQL Bible by Tim Converse and Joyce Park with Clark Morgan
7. Database connectivity, Bernard Van Haecke
8. Internet GIS: Distributed geographic information services, ZR Peng and MH Tsou.
9. Beginning Map server Open Source GIS Development by Bill Kropla (Apress)

GI 322 Geographic Information Systems –I

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I

Introduction to Geographical Information Systems: Introduction maps and spatial information. Computer assisted mapping and map analysis, Map Projections – Usage of Maps Geographic Information Systems. The components of geographical Information System; Future directions and trends in GIS

Data display, Data Storage, Spatial Indexes, Data analysis tool – Computer Assisted Cartography – Advantages, Disadvantages, GIS and Computer Assisted Cartography – History of GIS – Basic Components of GIS – Hardware, Software, Organizational Context – Comparison of GIS and Hardcopy Maps – GIS Software available in Market.

Unit – II

Data Files and Data bases- Data Types – Non-Spatial Data – Nominal, Ordinal, interval, ratio- Spatial Data – Points, Lines and Polygons / Area – File Types – Simple lists, Ordered Sequential Files – Indexed Files – Data Base – Functions, Data base structures – Hierarchical, Network, Relational.

Unit – III

Raster Data structures - Raster Data Model – Creating a raster – Cell by cell entry, digital data, Scanner – Tessellations – Regular, Irregular – Geometry of Regular Tessellations – Shape, Adjacency, Connectivity, Orientation – Resolution of Regular Cell – Data Encoding, Rule of dominance, Rule of importance, Centre of Cell, Space Filling Curves – Run length, Block, Row Order, Prime Row Order, Peano Order, Pi Order – Variable Resolution regular cells – Quadtree data structure – Irregular Tessellations – Theissen polygons, Triangulation, Delaunay triangles.

Unit – IV

Vector Data Structure - Vector Data Model – Arcs, Storing area – Data Base Creation – Digitizer, On Screen Digitizing – Topology – Euler Equation, Topological Consistency, Topological Errors, Error identification, Topological Editing, Line weeding, Node matching, Dangle truncation, Fuzzy tolerance, Digital Line Graph, Arc Node Structure, DIME etc.

Unit – V

Continuous Surface Representation - Digital Elevation Models – Elevation data capture, Interpolation, DEM representation – Altitude matrix, TIN structure – DEM interpretation, Scale, Visualisation, Applications.

Text Books

Burrough P.A., Principles of Geographical Information Systems for Land Resources Assessment, Oxford University Press.

Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.

Paul A Longley, Michael F Goodchild, David J Maguire, David W Rhind, Geographical Information Systems, Volume I and II, John Wiley and Sons, Inc., 1999.

Star J. Estes. J GIS – An Introduction, Prentice Hall, NJ, USA, 1990.

GI 323 Elements of Cartography

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

Maps: basic characteristics of maps; types of maps – classified by scale, function and subject matter. Map scale; representation of scale on maps; determining the scale of a map; Geographical coordinates - latitudes and longitudes; Properties of the graticule

Unit II

Map projections - conformal, equivalent and azimuthal projections; perspective projections, non-perspective projections, conventional projections
Conical projections; Cylindrical Projections; Zenithal projections; Space map projection

Unit III

Sources of Map data: Ground surveys: Principles of surveying; Measurement technology – traditional and automated survey systems; Remote sensing: aerial photography and satellite-based imaging; Census: population enumerations, geocoding – entity focus and aggregation; Spatial sampling: sample size, sampling units, dispersion of sampling units, sample distribution

Unit IV

Cartographic design: Graphic elements of map design; Contrast, Figure-ground, colour and balance

Typography and lettering - type form, type size and type colour; Methods of lettering - cerographic technique, free-hand lettering, stick-up lettering, mechanical lettering; Guidelines for positioning of letters; lettering as a graphic symbol

Unit V

Relief representation on maps: Pictorial methods– hachuring, hill-shading; Quantitative methods – spot heights, Bench Marks, contours

Slope representation: Methods of expression of slopes – degrees, gradient percentage; finding slopes from contours – Wentworth’s method and Smith’s method

Block diagrams

Digital Cartography

Textbooks

‘Elements of Cartography’ by A.H. Robinson, J.L. Morrison, P.C. Muehrcke, A.J. Kimerling and S.T. Guptill, John Wiley & Sons, 2004

‘Elements of Cartography’ by A.H. Robinson and K.D. Sale, John Wiley & Sons

‘Fundamentals of Cartography’ by R.P. Misra and A. Ramesh, McMillan Co., New Delhi

‘Elements of Practical Geography’ by R.L. Singh, Kalyani Publishers, New Delhi

GI 324 Geodesy and GPS

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	2	-	6	3	70	30	100	4

Unit I

Basic principles of Geodesy; History of Geodesy; Spherical Earth; Ellipsoidal Earth; Geoidal Earth; Geodetic Survey Systems; Horizontal Positioning – Determination of Astronomic position, Triangulation, Trilateration; Vertical Positioning.

Unit II

Fundamentals of Reference Systems and Frames: Geodetic and Cartesian coordinate system; principles of coordinate transformation; Datums: Horizontal and vertical datums – national, regional and local datums; Major datums and Indian datum; World Geodetic System (WGS) WGS84; tidal datums

Unit III

Satellite Geodesy: definition; observational systems: Historical systems; Doppler; laser; radar altimetry

Unit IV

Global Positioning System (GPS): Definition; GPS elements – space segment, user segment and control segment; Observation principles; phase measurement techniques; determining orthometric heights; GPS Error Sources and Error Handling Procedures: Atmospheric effects, clock and orbital errors, multipath, anti-spoofing and selective availability, etc; interference and jamming. Accuracy issues, GPS satellite navigation message; GPS time, fundamental and derived frequencies.

Unit V

GPS receivers: Multi-channel, sequential and multiplexing receivers; GPS applications: Defense, civilian, Navigational and Geodetic applications; GPS-GIS integration; GPS applications in surveying, mapping, GIS and land navigation and precision farming; integration with other sensors: GPS in intelligent transportation and fleet management

Textbook

1. Physical Geodesy by Weikko A. Heiskanen and Helmet Moritz, Freeman and Company
2. The gravity field of the Earth, International Geophysics Series- Vol-10 by Michele Caputo, Academic Press, New York
3. Global Positioning System – Theory and Practice – Hofmann W.B, Lichtenegger. H, Collins. J – Springer Verlag Wein, New York
4. GPS: Theory and Practice, B. Hofmann-Wellenhof, H. Lichtenegger and J.Collins, 5th Revised Edition, Springer, Wien, New York, 2001.
5. GPS Satellite Surveying, A. Leick, 2nd edition, John Wiley & Sons, 1995
6. GPS: Theory and applications, B. Parkinson, J. Spilker, Jr. (Eds), Vol. I & II, AIAA, 370 L'Enfant Promenade SW, Washington, DC20024, 1996
7. GPS for Geodesy, A. Kleusberg and P. Teunnisen (Eds), Springer-Verlag, 1996
8. Surveying, F. Moffitt and J. Bossler, 10th edition, Addison Wesley Longman, Inc., 1998, Chapter 10: The Global Positioning System, pp. 349-368 (optional).

GI 325 Digital Image Processing – II

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit -1

Image Transformation – Multi Spectral Transformation of Image Data – Principal Component Transformation, Noise adjusted Principal Component Transformation, Tasseled Cap Transformation, Image Indices – Arithmetic, Ratioing, Vegetation.

Unit -2

Image Transformation - Fourier Transformation of Image Data – Special Functions, Fourier Series, Fourier Transform, Convolution, Sampling Theory, Discrete Fourier Transform, Concept of Spatial Frequency.

Unit -3

Classification – Supervised Classification – Maximum Likelihood, Minimum Distance, Parallelepiped, Other Supervised Classifications, Context Classifications, Non-parametric Classification – Linear Discrimination, Support Vector Classifier, Neural Network Approach, Unsupervised Classification – Delineation of Spectral Classes, Similarity metrics and clustering criteria, Iterative Optimization, Single pass Clustering Technique, Agglomerative Hierarchical Clustering, Clustering by Histogram Peak Selection, Classification Accuracy Assessment.

Unit -4

Interpretation of Hyper-spectral Image Data – Data Characteristics, Challenges to Data Interpretation, Data Calibration Techniques, Interpretation using Spectral Information, Hyperspectral Interpretation by Statistical Methods, Feature Reduction, Regularized Covariance Estimators.

Unit -5

Change Detection – Nature of Change Detection, Change Detection Algorithms – Image Differencing, Image Ratioing, Classification Comparisons, Preprocessing to Improve Change detection.

Textbooks

John, R.Jensen. Introductory Digital Image Processing – Prentice Hall, New Jersey, 1986.

John A. Richards – Xiuping Jia. Remote Sensing Digital Image Analysis – An Introduction – Springer Berlin Heidelberg, New York.

GI 326-1 Geoinformatics for Ocean Resources Evaluation (Elective-II)

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I:

Interaction of EMR with water: Definitions, wave particle duality, Maxwell's equations, Interaction of EMR with water. Fresnel's equation, scattering, absorption. Fundamentals of Ocean Optics and their utility in Remote sensing of Ocean Colour: Definitions of fundamental radiometric qualities, Downwelling Irradiance, Upwelling Irradiance, Scalar Irradiance, Attenuation Coefficient, Scattering coefficient, Subsurface Diffused Reflectance Beam attenuation coefficient.

Unit – II

Retrieval of Oceanic parameters from ocean colour sensor (Techniques, Algorithms and Applications): Atmospheric Correction: Rayleigh Scattering, Mie Scattering, Atmospheric absorption, Atmospheric correction procedure for Ocean colour sensors, Computation of aerosol optical thickness. Applications of RS data for pigment mapping & productivity estimation, Suspended Sediment Concentration, Ocean Colour Mapping.

Unit – III

Principles of TIR/Passive microwave radiometer, Retrieval of Oceanographic parameters (SST, WV, Wind Speed): Physics of thermal radiation, Planck's radiation law, Stefan-Boltzman Law, Wein's law. Physical principles of passive radiometry, Rayleigh-Jeans approximation; Microwave property of sea water; Dielectric constant. Retrieval method of SST, Water vapour and wind speed from the satellite. Principles of SAR, Altimeter, Scatterometer and their applications in Ocean Studies: Principles of Satellite Altimeter, measurements of ocean current, Tidal observation, Ocean topography. Principles of Scatterometer, retrieval of wind speed from scatterometer data. Principles of Synthetic Aperture Radar (SAR) and its applications for oceanographic studies.

Sea-bed Surveys: Echo-sounding, sub-bottom profiling, swath-bathymetry.

Unit – IV

Remote Sensing Applications in Coastal Marine Ecology. Fundamentals of marine ecology: Eco-system structure & organization, Bio-pyramids pelagic, non – pelagic, benthos, beach and sub-tidal ecology, coastal dune ecosystem, plant-animal interaction, coastal wetlands, salt marshes and mangroves. Remote Sensing application in coastal and marine ecology (mangrove, coral reefs, sea grass etc.): Remote sensing applications for the study of mangroves, coral reefs, sea grass. Integration of *in situ* data with remote sensing data for assessment of coastal features. Coastal eco-system mapping and monitoring, Sea Level Change and impact on Coastal/Estuary/Lagoonal Ecosystem: Elements of coastal ecosystem, parameters required to study coastal ecosystem.

Methodology to monitor coastal ecosystem and Role of RS. Sea level change and its impact on Coastal/Estuary/Lagoonal ecosystem.

Unit – V

Marine GIS (MGIS) Ocean State Forecasting: Materials and methods for Ocean State Forecasting.

Ocean Observing System (GPS, Ships, Buoys, Platforms): Principles of GPS, Conventional methods for marine observations, Sensor performance in coastal studies: camera, multispectral scanners, thermal scanner, laser sensor, Microwave radiometer, Radar altimeter, scatterometer.

Textbooks

1. Introduction to Satellite Oceanography, 1985, *G. A. Maul, Martinus Nijhoff Publishers, Dordrecht.*
2. Satellite Oceanography, 1985, *I. S. Robinson, Ellis Horwood, New York.*
3. Marine Optics, 1976, *N. G. Jerlov, Elsevier, Amsterdam.*
4. Remote Sensing Applications in marine Science & Technology, 1982, Edited by *A. P. Cracknell, Dordrecht D. Reidel.*
5. Ocean Environmental Management, 1995, *Ernst Frankel, Printice hall PTR, New Jersey.*
6. SEA management, 1992, *A theoretical Approach, Adal berto Vallega, Elsevier Science Publishers.*

OR

GI 326-2 Mathematical Morphology in Image Processing

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit - I

Overview of mathematical morphology-Basic set theory and logical operations-Euclidean space-continuous and discrete space-Image Representation-Image and grey level images-shapes-quantisation-shape-binary images- translation-rotation-scaling

Unit - II

Mathematical Morphology-Binary Mathematical Morphology-Erosion, Dilation, Opening, Closing Hit or Miss Transformation-Basic morphological algorithms-boundary extraction-region filling-Convex Hull-Thinning-Thickening

Unit - III

Digital Skeletons-Grey Scale Mathematical Morphology-Grey scale Erosion-Grey Scale dilation-Grey Scale Opening and Closing-Application of grey scale morphology-(Non-Linear filtering techniques)-Morphological Smoothing-Morphological gradient-Black and White Top-Hot transformations

Unit - IV

Binary and Grey level image segmentation-Skeletization by Zone of Influence Technique-Watershed segmentation technique- Segmentation of SPOT, RADARSAT, ERS SAR, and IRS data-Morphology based noise removal techniques for Microwave remote sensing data analysis-Granulometries for feature analysis

Unit - V

Exact dilations-Distance-transformations-Exact distance transforms through exact dilations-Vornoi Diagrams (Graph Theory)-Scale space skeletonization-Multi-scale morphological transformations-Shape Morphology for DEM analysis and terrain characterization

Textbooks

J. Serra, Image Analysis and Mathematical Morphology, Academic Press (London), 1982, p. 610

C. R. Giardina and Edward Dougherty, Mathematical Morphology in Image and Signal Processing, Prentice Hall, New Jersey, 1988.

suggested Reading

Gonzalez, Digital Image Processing

R. M. Haralick, and L. G. Shapiro, Computer and Robot Vision, Addison Wesley, Reading, v. 1, 1992, p. 453-507.

Technical Periodicals: IEEE Geosciences and Remote Sensing, IEEE Pattern Analysis & Machine Intelligence, IEEE Image Processing, IEEE Signal Processing

GI 327 Geographic Information Systems -I Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Classification of spatial data, layer and symbol concept using a GIS software, GIS project overview.

Exercise on digitizing entities like point, line and polygon data

Editing and adding labels, cleaning and generating coverage topology

Exercise on scanner and different scanner format and raster to vector conversion

Attribute data addition and query generation

Simple overlay analysis, map and report output

GI 328 Digital Image Processing– II Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Multi Spectral Transformation of Image Data – Principle Component Analysis, Tasseled CAP, Calculation of indices

Fourier Transformation of Image Data – Fourier Transformation, Inverse Fourier Transformation, Discrete Fourier Transformation, Convolution

Classification - Supervised Classification, Unsupervised Classification.

Topographic Analysis – Creation of Slope map, Aspect map, Contour map, Viewshed analysis

Change Detection Analysis.

GI 329 – Industrial Training

(Summer Vacation)

Students will have to visit laboratories of government organizations like NRSA, ISRO, RRSSCs, etc., and reputed private institutes engaged in Geoinformatics-related projects for training and interaction during summer vacation.

GI 411 Digital Photogrammetry

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit -1

Introduction to Analytical Photogrammetry – Image measurements, Control points, Collinearity condition, Coplanarity condition, Space resection by collinearity, Space intersection by collinearity, Analytical Stereo model, Analytical Interior Orientation, Analytical Relative Orientation, Analytical Absolute Orientation, Analytical Self-calibration.

Unit – 2

Principles of Softcopy Photogrammetry – System Hardware, Image measurements, Orientation procedures, Epipolar geometry, Digital image matching, Automatic production of digital elevation model and Orthophotos.

Unit – 3

Ground Control for Aerial Photogrammetry & Aerotriangulation – Traditional field survey methods of establishing horizontal & vertical controls. Ground control surveys by GPS, Pass Points for Aerotriangulation, Sequential construction of Strip model from Independent models, Independent model Aerotriangulation by simultaneous Transformations, Bundled Adjustment, Bundled Adjustment by GPS control, Triangulation with Satellite images, Computational strategies for triangulation.

Unit – 4

DEM Quality assessment- Vertical & Horizontal Accuracy, Post Spacing, Vertical & Horizontal Datum, Projection and Coordinate system, DEM Editing, TIN/DEM Accuracy testing, Quality Control, TIN interpolation
 DEM User Requirements – Accuracy and Cost Considerations – Technology-based cost comparisons, Area-based cost comparisons, and Accuracy-based cost comparisons.

Unit – 5

Photogrammetric Applications in GIS – Hazardous Waste Management, Water Quality Management, Wild Life Management, Environmental Restoration, Land Development, Transportation, Hydrography, Multi purpose Land Information System.

Text Books

Paul R Wolf and Bon A. Dewitt, Elements of Photogrammetry (3ed), Mc Graw Hill
 David F. Maune. Digital Elevation Model Technologies and Applications: The DEM User Manual. The American Society of Photogrammetry and Remote Sensing, Bethesda, Maryland

GI 412 Geological Engineering

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-		3	70	30	100	4

Unit-I

Introduction of palaeontology, Morphology, classification and geological significance of important invertebrates, vertebrates, microfossils and palaeo flora; Coal and petroleum geology; marine geology and ocean resources;

Unit II

Magmatic differentiation; phase diagrams and trace elements as monitors of magma evolutionary processes; mantle melting models and derivation and primary magmas. Metamorphism; controlling factors, metamorphic facies, grade and basic types; metamorphism of pelitic, mafic and impure carbonate rocks; role of fluids in metamorphism; metamorphic P-T-t paths and their tectonic significance; structure and petrology of sedimentary rocks; sedimentary processes and environments, sedimentary facies. Engineering properties of Rocks: compressive strength triaxial tensile strength, shear strength, modulus of elasticity, poissons ratio. Engineering classification of rock masses.

Unit III

Stress, strain and material response; brittle and ductile deformation; primary and secondary structures; geometry and genesis of folds, faults, joints, unconformities; cleavage, schistosity and lineation; methods of projection, tectonites and their significance; shear zone; superposed folding; basement cover relationship.

Unit IV

Ore mineralogy and optical properties of ore minerals; ore forming processes vis-à-vis ore-rock association (Magmatic, hydrothermal, sedimentary and metamorphogenic ores); ores and metamorphism; fluid inclusions in ore prospecting and exploration of economic minerals; sampling, ore reserve estimation, geostatistics, mining methods. ore dressing and mineral economics.

Unit V

Cosmic abundance; meteorites; geochemical evolution of the earth; geochemical cycles, carbon, phosphorous, nitrogen, sulphur, distribution of major, minor and trace elements; elements of geochemical thermodynamics, isotope geochemistry; geochemistry of waters including solution equilibria and water rock interaction.

TextBooks

1. Rutley's Elements of Mineralogy, C.D. Gribble, Frank Rutley, H.H. Read, Unwin Hyman, 1989
2. The Principles of Petrology, G.W. Tyrrell, B.L. Publ., 1994
3. Structural Geology, M.Billings, Prentice Hall, 1984
4. An introduction to crystallography, F.C. Phillips, Wiley, 1972
5. Engineering Geology, P.Singh, S.K. Kataria & Sons
6. Principles and Applications, G. Faure, Prentice, 1998

Reference

1. Igneous and Metamorphic Petrology, F.J. Turner and J. Verhoogen, McGraw Hill
2. Sedimentary rocks, F.J. Pettijohn, CBS Publ.,
3. Ore Microscopy, E.N. Cameron, John Wiley

GI 413 Computer Graphics

L	T	PD	Total Pds	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs.	Marks			
4	-	-	4	3	70	30	100	4

Unit 1

Overview of Graphics Systems

Random-scan and raster scan monitors, Color CRT, Plasma panel displays, LCD Panels, Plotters, Film recorders, Graphics workstations, Display processors, Graphics software, Input/Output Devices, Touch panels, light pens, graphics tables.

Output primitives

Points and lines, DDA, Bresenham's Line algorithm, parallel line algorithm, line function, circle generating algorithm, filled area primitives and pixel addressing.

Unit II

Two-Dimensional Geometric Transformations and viewing

Use of homogeneous coordinate systems, Translation, scaling, rotation, Mirror reflection, Rotation about an arbitrary point, Zooming and panning, Rubber band methods, dragging, Parametric representation of a line segment. Point-line and polygon clipping

Unit-III

Three-Dimensional Concepts and object representations

polygon surfaces, Curved lines and surfaces, Quadric surfaces, Blobby objects, Spline representations, Cubic Spline Interpolation methods, Bezier curves and surfaces.

Unit IV

Three-Dimensional Geometric and Modeling Transformations

translation, Rotation, Scaling, Other Transformations, Composite transformations, Three dimensional transformation functions, modeling and coordinate transformations.

Three-Dimensional Viewing

Viewing coordinates, projections, Clipping, Three dimensional viewing functions. Three dimensional viewing

Visible-Surface Detection Methods

Back face detection, Depth buffer method, Depth sorting method, Area subdivision method, Visibility detection functions.

Unit V

Illumination Models and Surface-Rendering Methods

Halftone Patterns and dithering techniques, Polygon rendering methods, Environment mapping

Color Models and Color Applications

Properties of light, Intuitive color concepts, RGB, YIQ, CMY, HSV color models.

Text book: Computer graphics C version , second edition
Donald Hearn & m.Pauline baker

GI 414 – Urban Planning and Information Systems

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I Introduction

Planning: background and principles; Need for planning; Urbanisation and its impact, Distribution of land use/land cover; Town planning in ancient India and new towns of India; Requirements and possible types of development of towns; Geoinformatics application in Urban Planning

Unit II Formulation of Plans

Objectives and contents; Regional plan; Perspective plan; Master plan; Development plan; Project (scheme) plan; Delineation of planning area; Trend analysis; Land suitability analysis; Land use planning; Zoning and principles of zoning; Building Bye-laws and its principles; Requirement of urban & regional planners; Remote sensing for different levels of development planning

Unit – III Housing

Importance of housing; urban housing demand and production; Slums and squatters; Housing problem in India; National Housing policy; Site analysis - Layout design; Housing projects / Slum housing; Urban renewal projects; Urban infrastructure planning

Unit – IV Transportation planning

Classification of urban roads; Traffic surveys: speed, time, delay surveys; Use of speed, journey time and delay studies; Traffic volume; Origin Destination surveys; Parking surveys; Utility of remote sensing in traffic and transportation studies

Unit – V Urban Information System

Information system: Land; Housing; Transportation; Infrastructure; Trends in mapping using remote sensing, GIS and GPS; Database creation for Infrastructure development Decision support system for urban and regional management

Textbooks

- Rangwala, Town Planning, Charotar Publishing House, Anand, India
- Gallian B. Arthu and Simon Eisner, The Urban Pattern, City Planning and Design. Affiliated Press Pvt. Ltd., New Delhi 1985.
- Margaret Roberts, Ana Introduction to Town Planning Techniques, Hutchinson, London, 1980.

GI 415 Principles of Economics and Management

L	T	P D	Total Periods/week	Univ. Exam	Marks	Sessional Marks	Total Marks
4	-	-	4	3 hrs	70	30	100

1. **Introduction to Managerial Economics** – Wealth, Welfare and Scarce; Definitions of Economics; Micro and Macro Economics; Demand - Law of Demand, Elasticity of Demand, types of elasticity and factors determining price elasticity of Demand; Utility - Law of Diminishing Marginal Utility and limitations.
2. **Conditions of Direct Market Structures** – Perfect Competition, Imperfect Competition, Monopolistic Competition, Monopoly, Oligopoly and Duopoly
3. **Forms of Business Organisations** –Sole proprietorship, Partnership, Joint Stock Company – Private limited and public limited companies, public enterprises and their types
4. **Introduction to Management:** Functions of management - Taylor’s scientific management; Henry Fayol’s principles of management; **Human Resource Management** – basic functions of HR manager; manpower planning, recruitment, selection, training, development, placement, compensation and performance appraisal (in brief)
5. **Production management** – Production planning and control, plant location, break-even analysis, assumptions and applications
6. **Financial management** –types of capital: fixed and working capital and methods of raising finance; depreciation: straight line and diminishing balance methods. **Market management** – functions of marketing and distribution channels
7. **Entrepreneurship** – Entrepreneurial functions, entrepreneurial development: objectives, training, benefits; phases of installing a project

Textbooks

1. K.K. DEWETT, Modern Economic Theory, S.Chand and Co., New Delhi 55
2. S.C. SHARMA and BANGA T.R., Industrial Organisation & Engineering Economics, Khanna Publications, Delhi 6

Reference Books

1. A.R. ARYASRI, Management Science, Tata McGrah-Hill, New Delhi 20
2. A.R. ARYASRI, Managerial Economics and Financial Analysis, Tata McGrah-Hill, New Delhi 20

Elective-III GI 416-1 Geoinformatics for Watershed Management

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit-1 (Watershed Concept)

- a) Issues in watershed management - land degradation, agricultural productivity, reservoirs sedimentation, depletion of bioresources, floods and droughts. Principles and approaches - principles of watershed management, different approaches in watershed management; Problem oriented approach, three dimensional approaches, integrated approach, steps in watershed management.
- b) Watershed characteristics - size, shape physiography, slope, climate, drainage, land use, vegetation, geology, soils, hydrology, hydrogeology, socio-economics. Linear aspects of channel systems - Aerial aspects of drainage basins.

Unit-2 (Land Management)

- a) Survey, layout ; Preparation and Development. Contour demarcation, Bush clearance, updating, store picking and packing, leveling, shaping and consolidation, fencing, ploughing; soil and soil moisture conservation. Soil survey; conservation measures. Contour techniques, ploughing, furrowing, trenching and staking, Gully control. Previous check dams. Brushwood dam, Rock fill dam, Gabion; Impervious check dams.
- b) Land capability classification, land degradation and problem soils. Reclamation of saline soils, alkaline soils, saline soils, acidic soils, sulphide soils; sediment yield modeling and watershed prioritization. The universal soil loss equation, sediment yield index method, statistical regression model, the European soil erosion model; Site selection from conservation measures.

Unit-3 (Water Management)

- a) Surface water - Study of rainfall, estimation of run-off at micro catchments, stream gauging; Rainwater harvesting catchment, harvesting, harvesting structures, Ground water - exploration of canal command areas, potential areas; integrated water resources management, conjunctive use.
- b) Dry land Agriculture - Runoff agriculture, micro catchment forming, irrigation with saline water, reusing water, conserving water, sprinkler irrigation, drip irrigation, pot irrigation, other systems, reducing crop land percolation losses, reducing transpiration losses, selection of water use efficiency crops.

Unit-4 (Integrated Management)

- a) Agriculture - Crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern; sustainable agriculture, Hybrid and improved seeds; Biomass management, crop rotation, legumes, organic fertilization, spider farming, pastures and silvipastures; horticulture; tree culture; form forestry; bund utilization, boundary plantation; social forestry; Energy - Renewable resource water power, solar energy wind power; biomass, fire food synthetic fuels, burning of municipal / garbage, ocean tides and waves.
- b) Appropriate Technology - Farm Equipment; Contour Methods; Check Dams, Water catchment and Harvesting, Kunds, Depression Harvesting, Harvesting below ground level, Harvesting below stream bed level, Ground water harvesting; low cost technology, Water Conservation, Utilization of Wasted Natural Resources, Novelties; Rural Technological

Delivery Systems, Cultivating Wasted Lands, Tree Culture, Farm Forestry, Silvipastures, horticulture, Social forestry, afforestation, wonder ways.

Unit-5 (Monitoring and Evaluation)

- a) People's Part - Awareness, participation, Response; State and integrated approach, Appreciation of the concept, training, transfer of technology, Resource and Development, Agro-industrial infrastructure; Sustainable society, livestock, small animal farming, pisciculture, sericulture, Health and hygiene education, transport, cues.
- b) Monitoring and Evaluation - Purpose of Monitoring and Evaluation, Nature of Monitoring and Evaluation - An interactive dynamic Process, Design of Monitoring programs - Determining information needs, Setting information-need priorities, Determining means of collecting information, Information management in monitoring programs; Monitoring Biophysical Data, Monitoring Socio-economic Data, Monitoring Project Activities and outputs, Design of Evaluation Procedures, Types of Evaluation, Focus of Evaluation, Reporting Evaluation Results, Insuring Use of Monitoring and Evaluation Information, A Final Word of Caution.

Text Books and References

1. Watershed Management, J.V.S. Murthy - Publishers; New Age International (P) Ltd., New Delhi.
2. Space Technology Applications for Sustainable Developments at Watersheds, Technical Report, ISRO-HQ-TR-104-95, ISRO, Bangalore.
3. Watershed Management Project Planning, Monitoring and Evaluation; A Manual for the Asian Region - Asian-US Watershed Project - Forestry for sustainable Development Program. University of Minnesota, College of Natural Resources, St. Paul Minnesota, U.S.A.

OR

Elective-III GI 416-2 Geoinformatics for Soil and Agriculture Surveys

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-		3	70	30	100	4

Unit I. Crop Inventory And Agricultural Water Management

Land Use / Land Cover: Information needs for Crop Inventory and agricultural water management, Digital and Visual techniques of land use mapping, Digital land use change detection; accuracy assessment

Crop Inventory: Importance of Remote Sensing in agriculture, Spectral characteristics of crops (Optical, Thermal & Microwave), Vegetative Indices, Principles of crop discrimination and acreage estimation, Principles and Approaches of Crop Yield Modeling using Remote Sensing, Crop condition, Stress assessment using temporal data. Canopy parameters retrieval (LAI, Biomass, Phenology etc.)

Agricultural Water Management: Remote sensing techniques for irrigated/un-irrigated crop inventory, irrigation water requirement, irrigation scheduling using remote sensing based crop water stress indices, ET estimation using remote sensing techniques, importance and assessment of soil moisture using remote sensing techniques (Optical, Thermal and Microwave), Definition and types of drought, Conventional and remote sensing based methods of agricultural drought assessment, (NADAM Project (National Agricultural Drought Assessment and Monitoring)

Unit II. Soil Survey, Mapping & Land Evaluation (SMLE)

Remote Sensing of soils: Information needs for soil survey, mapping and land evaluation. Spectral characteristics, factors affecting reflectance from soils, optical and microwave remote sensing, hyper spectral remote sensing, Spectral soil indices and its relationship with soil classification

Soil Profile Properties: Definition of soils, pedogenesis, Morphological characteristics of soil profile, genetic horizons and their nomenclature.

Soil Survey & Mapping: Kinds of soil survey, Taxonomic units & mapping units, methodology of soil mapping using remote sensing techniques (aerial & satellite), Pattern analysis, Physiognomic & physiographic analysis, Cost Time & Accuracy assessment, Soil Information Systems.

Unit III. Crop Resource Survey (CR)

Satellite Agro-meteorology: Satellite sensors & specifications for agro-meteorological applications, agro-meteorological parameters retrieval ABHRR applications in agro-meteorology GIS based land surface flux modeling

Advances in Crop resource Survey: Hyperspectral Imaging for Crop growth monitoring Precision agriculture, Canopy reflectance modeling, radiation interaction with plant canopies, various radiant transfer models, sun and sensors geometry effects on reflectance.

Unit IV. Soil Conservation (SC)

Genesis & Mapping of degraded lands and their potential: Formation and agents, site characteristics of degraded lands, GIS application for assessment of potentiality and productivity,

Genesis of shifting cultivation, salt – affected soils, wet lands, ravenous and gullied lands, desertic lands. Mapping using aerospace data. Comparison of empirical and process based models for soil loss estimation

Study of soil maps, USDA Soil Classification System, Interpretation of soil map for land capability, hydrological soil groups and soil suitability analysis (FAO Framework) for soil conservation planning.

Unit V. Soil Survey (SS)

Soil Classification: Soil forming factors, process: podzolization, laterization, salinization, gleization. Genesis of soil of different orders, epipedons, sub-surface diagnostic horizons, soil temperature and moisture regimes

Categories of USDA soil classification system: orders, sub-orders, great groups, sub-groups, family and series. Examples of soil classification

Soil Survey Applications: Arable farming, plantation, forestry, engineering, planning & development, irrigation.

Textbooks

Evapotranspiration and irrigation water requirements, edited by *M. E. Jenson, R. D. Burman and R. G. Allen (1994). ASLE Manual and Reports on Engineering Practice.*

Scaling up in Hydrology using Remote sensing (1996). *John Wiley Publication. Edited by J. B. Stewart, E. T. Engman, R. A. Feddes and Y. Ken.*

Mutreja, K. N. (1986) Applied Hydrology. Tata McGraw-Hill Pub. New Delhi, pp: 314 – 171.

Remote sensing Applications in agriculture by *Eston & Clarke.*

Applications of Remote Sensing to Agrometeorology (Ed. F. Toselli), Kulwer Academic Publishers.

Introduction to Agrometeorology (1994), Second Edition by *H. S. Man Oxford & IBH Publishing Co. Pvt Ltd.*

Bocoo, G.; Palacio, J. and Valenzuela, C. R. 1990. Gully erosions modelling using GIS and geomorphic knowledge, ITC Journal, 1990-3: 253-261.

Csillag, F., Pasztor, L., and Biehl, 1993. Spectral band selection for the characterization of salinity status of soils. Remote sensing of Environment, 43, 231-242.

Dwivedi, R. S. and Sreenivas, K. 1998. Image Transforms as a tool for the study of soil salinity and alkalinity dynamics. Int. J. Remote sensing, 19 (14): 605-619.

Baumgardner, M. F., L. F. Silva, L. L. Biehl, and E. R. Stoner, 1985. Reflectance properties of soils, Adv. Agron., 38, 1-44.

Ben-Dor, E., Irons. And Epema, G. F., 1999. Soil reflectance in remote Sensing of earth Sciences: Manual of Remote Sensing, (Edited by Andrew N. Renez) 3rd edition, Vol. 3, pp. 111-118. (John Wiley & Sons. Inc.).

Burrough, P. A., 1986. Principles of geographical information systems for land resources assessment. Oxford Univ. Press, New York.

GI 417 Digital Photogrammetry Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Creation of Non-oriented Digital Stereo Models
 Creation of Oriented Digital Stereo Models
 Accuracy of Digital Stereo Models
 Measurements of 3 Dimensional information
 Collecting & Editing 3D GIS data
 Aerial Triangulation
 Triangulation with Satellite Imagery
 Orthorectification
 Automatic Digital Terrain Model Extraction

GI 418 Urban Planning and Information Systems Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

Identification of urban objects on aerial photographs/satellite imagery of various scales
 Urban land use/ land cover classification & interpretation on aerial photographs/satellite imagery

- Visual interpretation
- Digital classification

 Urban facility mapping through GPS and analysis
 Urban environmental analysis
 Database creation for urban area analysis – a case study

GI 419 Industrial Training & Seminar

GI 421 Geographic Information Systems –II

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit – I :Spatial Data Manipulation and Transformation

Line intersections – Point-in-line, Point-in-segment, Point-in-polygon, line intersection with polygons, Union and Intersections of Polygons, shape measures of polygons, buffer zones – Data Transformation – Change in Dimensionality, Change in position – Rubber Sheeting, Tin Sheeting – Vector to Raster, Raster to Vector Conversion.

Unit – II: Spatial and Non-spatial Data Analysis – Raster and Vector

Display of raster data – Local operators – recoding, overlaying – Local Neighbourhood operators – Filtering, Slopes and Aspects – Extended Neighbourhood operators – Distance, Buffer zones, Visible area or Viewshed – Zonal operations – Zone identification, Zone area, Zone Perimeter, Distance from Zone boundary – Vector data – Polygon overlay, polygon statistics, Network Analysis – Non-spatial data analysis – Structured Query Language.

Unit – III: Spatial Modeling

Modeling – Definition – Spatial Modeling – External Model, Conceptual Model, Logical Model, Internal Model – GIS applications in Resource Management – AM / FM studies.

Unit – IV: Data Quality and Error Data Propagation in GIS

Data Quality – Accuracy – Spatial Accuracy, Temporal Accuracy, Thematic Accuracy – Resolution – Spatial resolution, thematic Resolution, Temporal resolution – Consistency – Completeness – Data Quality in Spatial Data Transfer Standards – Lineage, Positional, Attribute accuracy, Logical Consistency, Completeness – Error Propagation.

Unit – V: Miscellaneous Topics

Multi Criteria Evaluation in GIS – Data capture using GPS for GIS FM studies – Object Oriented Database Models. Recent trends in GIS.

Text Books

Burrough P.A., Principles of Geographical Information System for Land Resources Assessment, Oxford University Press.

Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.

Paul A Longley, Michael F Goodchild, David J Maguire, David W Rhind, Geographical Information Systems, Volume I and II, John Wiley and Sons, Inc., 1999.

Star J. Estes, J GIS – An Introduction, Prentice Hall, NJ, USA, 1990.

GI 422 Data Mining and Neural Networks

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	2	-	6	3	70	30	100	4

Part A: Data Mining

Unit I

Introduction to Data Mining: importance and motivation of data mining, relational databases, data warehouses and data mining, translational databases, advanced database systems and advanced database application, data mining functionalities, pattern classification of data mining systems, major issues in data mining.

Data mining primitives, definition of data mining tasks, data mining query language, designing of graphical user interface based on data mining query language and architecture of data mining systems

Unit II

Classification and Clustering, classification and prediction concepts and issues regarding classification and prediction, classification by decision tree introduction, Bayesian classification, classification by back propagation, classification based on concepts from Association rule mining, K- nearest neighborhood classifiers, case based reasoning, genetic algorithms, roughest approach, fuzzy set approaches and prediction.

Cluster analysis: introduction to cluster analysis, types of data in cluster analysis, categorization of major clustering methods.

Unit III

Data mining applications: GIS and Data Mining – geospatial data mining for market intelligence; data mining for automated GIS data collection

Part B: Neural Networks

Unit IV

Neural network fundamentals: introduction to Hopfield networks, learning in neural networks, applications of neural networks, recurrent networks, distributed representations, multilayer networks and back propagation algorithm.

Unit V

Neural networks applications: neural network-based land transformation models; ANN and GIS in natural resource applications

Textbooks:

1. Introduction to Data Mining by A. Addisan Weeley Publication
2. Neural Networks and Fuzzy systems by B. Kosko, Prentice_hall India

References

Geospatial Data Mining for Market Intelligence by Paul Duke (<http://www.tdan.com/view-articles/4921>)

Data mining for automated GIS data collection by K-H Anders, Photogrammetric Week 01, 2001 pp 263-272 (<http://www.ifp.uni-stuttgart.de/publications/phowo01/Anders.pdf>)

Using GIS artificial Neural networks and remote sensing to model urban change in the Minneapolis-St Paul and Detroit Metropolitan areas, by B.C. Pijanowski and B.A. Shellito
(<http://web.ics.purdue.edu/~bpijanow/ASPRS%202001%20pijan.pdf>)

Integration of GIS and Artificial Neural Networks for Natural Resources Applications by Gregory L. Easson, and David J. Barr
(<http://gis.esri.com/library/userconf/proc96/TO150/PAP126/P126.HTM>)

Elective-IV GI 423-1 Geoinformatics for Coastal Zone Management

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I

Coastal and littoral zones – definitions and scope of study

Shore zone processes – waves, tides and currents

Coastal landforms;

River deltas: types of deltas and their morphological variations

Human activities and their impact on the delta-fringe coast

Unit II

Coastal wetlands – Mangrove swamps, marshes, lagoons, tidal channels/creeks and their significance in coastal stability and economic importance

Continental margins – forms and processes; territorial waters and Exclusive Economic Zone

Sea level changes – factors involved; effects of sea level oscillations on coastal zones

Sea-level rise and coastal vulnerability; Role of geoinformatics in assessment of coastal vulnerability to sea-level rise

Unit III

Coastal Hazards:

Storm surges and Tsunamis: Origin, propagation and run-up;

Role of coastal topography, bathymetry and vegetation;

Coastal hazard preparedness – coastal protection, education and awareness of coastal communities; Role of geoinformatics in assessment of coastal vulnerability to tsunamis

Unit IV

Human activity and coastal environment – deforestation, agriculture/aquaculture, pollution and coastal structures, and their effect on coastal zones

Coastal vegetation; shelter belts; coastal aquifers; freshwater-seawater interface

Morphology of Indian coasts

Unit V

Coastal zone management – concepts, models and information systems

Coastal Regulations Zones (CRZ) and Coastal Management Zones (CMZ): Indian context

Application of remote sensing in coastal zone studies

Role of Geographic Information Systems in coastal zone studies

Text books

1. Geomorphology by A.L. Bloom, Waveland Pr.Inc. 2004
2. Deltas, Coleman, J.M., Continuing education Publication Co.Inc. 1976
3. Coastal Sedimentary Environments, Davis, A.R. (Jr.), Springer-Verlag, 1985.
4. Beaches and Coasts, King, C.A.M., Edward Arnold, 1972

5. Introduction to Marine Geology and Geomorphology, King, C.A.M., Edward Arnold, 1974
6. Applications in Coastal Zone Research Management, Martin, K.St. (ed), U.N. Institute for Training and Research, 1993.
7. Integrated Ocean and Coastal Management, Sain, B.C., and Knecht, R.W., UNESCO Publication, 1998.
8. Subtle Issues in Coastal Management, Sudarshan et al., (ed), IIRS, Dehra Dun, 2000.
9. Tsunamis – Case Studies and Recent Developments, Satake, K. (ed), Springer, 2005

References:

1. The role of Physical Processes in Mangrove Environments by Y. Mazda, E.Wolanski and P.V. Ridd, Terrapub, Tokyo, 2007

Elective-IV GI 423-2 Geoinformatics for Forestry and Ecology

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
4	1	-	5	3	70	30	100	4

Unit I. Forest Classifications

Natural vegetation of India and its classification: Concept of natural vegetation, forest / vegetation types of India and its classification.

Spectral properties of vegetation & other features: Spectral response from vegetation under different spectral regions, effects of phenological changes on spectral behaviour, spectral signatures etc.

Aerial photo interpretation for forestry and ecological information extraction: Qualitative characteristics for interpretation of forest types, specifications for aerial remote sensing data, forest mapping using aerial photographs.

Quantitative measurements from aerial photos: Measurements of crown diameter, crown counts and tree/stand height, volume/biomass and area estimation, data requirements, methods of data collection, processing, and complication techniques.

Unit – II Forest Mapping

Visual interpretation of Satellite imagery and Change Detection: Image elements for extraction of vegetation related information from space borne images, monitoring forest change and damage by visual interpretation.

Digital image processing for forest vegetation, mapping and change detection: Enhancements, spectral indices, data compressions techniques, Classification approach, Change detection techniques, Accuracy estimation criteria & methods.

Unit – III Microwave remote sensing and its applications in forestry

Concepts involved in interpretation of micro wave remote sensing data for forest and land use information extraction, merging multi spectral and microwave data, utility for volume/density classification.

Forest Canopy Density mapping: Mapping Canopy density of forest/vegetation types.

Forest disease detection & monitoring: Application of remote sensing data for disease detection & monitoring.

Unit IV. Forest Management (FM)

Forest fire assessment and risk zonation: Concepts and introduction about fire behaviour; Fire mapping possibilities using RS data; Identification of fire prone areas using RS and GIS based spatial modeling.

Forest resources information system: Concept of forest resources information system, compilation, integration and interpretation of information for forest management

Biodiversity conservation planning: Concept of biodiversity characterization at landscape level.

Unit V Forest ecology

Ecological principles and concepts: Ecological principles and concepts, Ecological approaches for evaluation of various ecosystems.

Structural analysis of vegetation: Spectral vegetation indices and enhancing; vegetation response in remote sensing data, Vegetation classification and mapping using RS data for ecological studies – terrestrial, wetland and Estuarine vegetation, Phytosociological analysis.

Functional analysis of vegetation and biomass estimation: Biological productivity components and their relationship with remote sensing data; Bio-productivity cycle; Terrestrial ecology; Biomass estimation.

Landscape ecology: Concepts of landscape ecology, parameters involved in landscape study, landscape analysis approaches etc.

Environmental impact assessment: Environmental policy and strategy; Environmental management system; Impact assessment; Vegetation monitoring and modeling landscape dynamics, Decision Support System.

REFERENCE

- Manual of Remote Sensing by American Society of Photogrammetry (latest edition)
Principles of Remote Sensing by *P. J. Curran (1985)*.
Revised Forest Types of India by *H. G. Champion & S. K. Seth (1968)*.
Vegetation Mapping by *A. W. Kuchlar & I. S. Zonneveld*.
Aerial Photographs in Land Use and Forest Surveys by *M. S. Timar & A. R. Maslekar (1974)*.
Special Properties of Plants. Appl. Opt. 4, pp 11-20 by *D. M. Gates, H. J. Keegan, J. C. Shelter and V. R. Weidner (1965)*.
Procedure of Change Detection. Int. J. Remote Sensing, 2, 277-291 by *P. J. Howarth & C. M. Wicks (1981)*
Land Evaluation for Forestry by food and agricultural Organization (FAO) (1984).
Use of Aerial Photographs in working Plans. Indian Forester, 102(2), 98 – 108 by *M. S. Tomar (1979)*.
Land Use and Forest Type Classification Proposed for Aerial Photo Interpretation by *M. S. Tomar (1976)*.
Remote Sensing and its Scope in Indian Forestry. Indian Forester, 100(3), 192 – 210.
Remote Sensing for Forest Surveys and Management by *S. P. S. Kushwaha* In: Proc. ISTE, Varanasi (1987).
Wildlife management by *R. H. Giles (1978)*.
Ecology and Field Biology by *R. L. Smith (1974)*.
Fundamentals of Ecology by *E. P. Odum (1976)*.
A Handbook of Ecology by *R. S. Ambasht & N. K. Ambasht (1993)*.
Landscape Ecology by *T. T. R. Forman and M. Godron (1986)*.
Remote sensing of Green Biomass. Photogramm. Engg. & Remote Sensing 48(2), 243 – 25 (1982).

GI 424 Geographic Information Systems - II Practical

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	6	6	3	50	50	100	2

1. Design a project based on cadastral/line drawing / map of a town/region for GIS project; identification of project problem.
2. Data input (spatial and attribute) editing and creating topology
3. Performing Geographic Analysis for the designed project
4. Presenting the results (map/report) of the analysis
Viva presentation

GI 425 Project Work

L	T	PD	Total Pds	Univ. Exam		Sessnl. Marks	Total Marks	Credits
				Hrs.	Marks			
-	-	9	9	3	150	50	200	8

Each student has to take up a project work on a chosen field of interest within the scope of the degree in consultation with the teacher-guide allotted to him/her and submit a dissertation at the end of the stipulated time period, and face a viva-voce before a committee appointed for the purpose

Free Elective-2 FE 02 (Geo-Engg)
Geoinformatics for Resources Development and Disaster Management

L	T	PD	Total PDs	Univ. Exam		Sessional Marks	Total Marks	Credits
				Hrs	Marks			
4	--	--	4	3	70	30	100	4

Unit I

Natural Resources Development: Introduction and Scope: role of geoinformatics technologies – aerial photographs; satellite remote sensing; GPS; and GIS in resource evaluation

Water resources – surface water and groundwater resources: mapping and monitoring of watersheds, tanks and reservoirs; hydrogeomorphic mapping and identification of groundwater potential zones

Ocean resources: estimation of sea-surface temperature; primary productivity and potential fishing zones

Unit II

Soil and agricultural resources: Spectral behavior of soils; Mapping of soils using multispectral images; Evaluation of soil erosion prone zones through GIS; Remote sensing in Land use / land cover mapping; Crop area estimations; monitoring of crop vigour; Yield estimations.

Forest resources: mapping of forest types; estimations of timber volume; monitoring of forest health – forest pests, forest fires, Trends in deforestation and afforestation.

Unit III

Remote sensing techniques for identification of rocks and minerals; mapping of geological structures; surface manifestation of minerals and their identification; spectral properties of minerals; role of thermal and hyperspectral remote sensing in mineral exploration. Case studies

Unit IV

Geoinformatics in Disaster Management: introduction and scope

Coastal Hazards: Storm surges and Tsunamis: Origin, propagation and run-up;

Role of coastal topography, bathymetry and vegetation;

Coastal hazard preparedness –Role of geoinformatics in coastal hazard mapping, risk and vulnerability assessment and evacuation analysis; coastal protection, education and awareness of coastal communities

Unit V

Geoinformatics applications in disaster mapping and mitigation; Risk zone mapping: earthquakes – identification of geological structures like faults; volcanic activity – thermal imaging for monitoring temperature changes; Geoinformatics analysis of potential zones for landslides; avalanches; and floods. Mapping of disaster affected areas for rescue and mitigation; damage assessment; GIS-based decision support systems for disaster management

Books and References:

Remote sensing for earth resources 2nd Edition, (ed) D.P. Rao, AEG Publ., Hyderabad, 1999

Geomatics solutions for Disaster Management, Li, Zlatanova and Fabbri (ed), Springer, 2007

Role of remote sensing in disaster Management, Nirupama and S.P Simonovic, ICLR Research Paper Series 21, 2002 (available at http://www.iclr.org/pdf/Niru_report%20Simonovic.pdf)

Remote Sensing imagery for natural resources monitoring: a guide for first time users, D.S. Wlike and J.T. Finn, Columbia University Press

Successful response starts with a map: Improving Geospatial Support for Disaster Management by Committee on Planning for Catastrophe: A Blueprint for Improving Geospatial Data, Tools, and Infrastructure, National Research Council, National Academies Press, 2006, ISBN: 0309103401

Applications of Remote Sensing in Agriculture, M.D. Steven and J.A.Clark, Butterworths, 1990

Tsunamis- to survive from tsunami, Susumu Murata et al., 2009 World Scientific Books

Reference

Sea-Level Rise and Coastal vulnerability – an assessment of Andhra Pradesh coast, India through remote sensing and GIS, Nageswara Rao, K. et al., (2008) *Journal of Coastal Conservation*, Vol. 12: pp. 195-207

Imperatives for Tsunami Education, Nageswara Rao, K. (2007) *Current Science*, Vol. 93 (1) pp. 8-9