UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(23/July/Adp./62)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised Syllabi and Courses of Studies in the subject of **Remote Sensing and GIS** for Master Degree Programme of **Semester Ist, IInd, IIIrd and IVth** under the **Choice Based Credit System (as given in the annexure)** for the examinations to be held in the years as per the details given below:

Subject	Semester	for the examinations to be held in the year	% of Change
Remote Sensing and GIS			
	Semester-I	Dec. 2023, 2024 and 2025	**20%**
	Semester-II	May 2024, 2025 and 2026	
	Semester-III	Dec. 2024, 2025 and 2026	
	Semester-IV	May 2025, 2026 and 2027	

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in.

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/23/6368-6378
Dated: 12-7-2023.

Copy for information and necessary action to:

1. Dean Faculty of Science
2. HOD/Convener, Board of Studies **Remote Sensing And GIS**
3. All members of the Board of Studies
4. C.A. to the Controller of Examinations
5. Director, Computer Centre, University of Jammu
6. Deputy Registrar/Asst. Registrar (Conf. /Exams. PG)
7. Incharge University Website for necessary action please

Sumita Sharma 12/7/23
Deputy Registrar (Academic)

12/7/23 12/7/23

SYLLABUS

MASTER OF SCIENCE IN REMOTE SENSING & GIS

UNIVERSITY OF JAMMU JAMMU

2023-2025

EXAMINATION PROCEDURE
OF
M.Sc. REMOTE SENSING AND GIS

i. The duration of course for the Master's degree in Remote Sensing and GIS shall be divided into four semesters covering two academic sessions. The first academic session will comprise of first and second semesters and the second academic session comprise of third and fourth semesters. Each semester normally comprises of 45 working days.

ii. The minimum attendance required by a candidate will be as per university rules.

iii. Each of Ist, IInd and IIIrd Semester shall consist of four theory courses and two laboratory courses. Fourth semester shall have two theory courses, one laboratory courses and the Project Work. Further, first and third semesters shall have Remote Sensing Field Work (GNSS Survey) and Remote Sensing Field Work (Ground Truth) respectively.

iv. Each theory university examination shall be of THREE hours' duration whereas each laboratory University examination shall be of THREE to FOUR hours. Each theory and laboratory course shall consist of 100 marks. For theory papers 60 marks shall be for major examination and 40 marks for minor examination, while for practicals 50% marks shall be for External Examination and 50% marks for Internal Examination. Besides this, the Remote Sensing field work of respective First and Third semesters shall consist of 30 marks included in the practicals. The evaluation of Remote Sensing Field Work shall be done internally and the marks awarded included in the practicals shall be sent to the University by the Head. The Project Work of IVth semester shall be of 200 marks out of which 150 marks shall be for project report and 50 marks for the viva-voce. The evaluation of the Project report will be done by the External and Internal (Supervisor) examiners including the viva-voce before a committee consisting of Head and external as well as internal examiners. The marks of the Project Work shall be sent to the University by the Head. The student shall have to pass separately each of the theory courses, laboratory courses, fieldwork, project work and the internal assessments (theory and laboratory).

A candidate for a pass at each semester Examination shall required to obtain:

a. At least 36% marks or requisite Grade (as per CBCS norms) in the aggregate of the paper prescribed for the examination.
b. At least 36% marks in the practical's or requisite Grade (as per CBCS norms)

v. Minor & Major Examination: -

a. Theory

Two minor tests of 20 marks for each theory course shall be held on the dates and time specified in the Academic calendar and/or by the Head. The one major test of 60 marks for each theory course shall be held on the dates and time specified in the Academic calendar and/or by the Head.

b. Laboratory

Internal assessment of 25 marks in each laboratory course work will be done on the basis of regularity and proper maintenance of records, test and viva-voce.

Remote Sensing Field Work: -

Remote sensing Field work/training is an integral part of this Course. As such, the students of M.Sc. Ist and IIIrd Semester are required to undergo field work separately in each academic session to acquire comprehensive and detailed field training in various aspects, such as GNSS survey, field checking, ground truth studies. At the end of the above field work, each student will be required to submit the field report covering all aspects for evaluation, normally within two weeks after the completion of the field work. The evaluation based on field work report, and viva - voce shall be done by the Teacher In-Charge of the Field Work and Head.

Any student failing to undergo /complete his /her Field Work & Training due to major set back such as severe or prolonged illness/ death of the nearest kith and kin shall be allowed, with the permission of Vice - Chancellor, a second chance. The student shall have to carry out, at his /her own cost, the field work in any of the area /aspect in and around Jammu provinces, as assigned by the Head and submit his /her field report for evaluation and appear at viva - voce examination along with his / her batch of students of the same year.

The attendance required during the field training is 100%. However, the attendance up to 10% may be condoned by the Vice Chancellor on the recommendation of the Teacher In-Charge duly forwarded by the Head. Such condonation shall be granted only in genuine case of severe illness of a student rendering him/her unfit to carry out the fieldwork.

Project Work: -

The subject/topic of the Project Work, related to the problems of Remote Sensing and GIS will be allotted to each student in the beginning of the M.Sc. IVth Semester. The students, in consultation with their respective supervisors, may give their choice of preference of problem /topic / area. However, the decision of the Head shall be final. Each student will be required to work independently on the problem assigned including literature consultation, data collection, fieldwork and/or training, laboratory investigations, report writing etc., under the guidance of his/her supervisor. The students will have to submit to the department three typed (bound) copies of his/her work, in the form of Project Report. After the evaluation, a copy of which will be returned to the concerned supervisor and the student separately.

Theory paper Setting

Minor Test-I: This will be conducted from the 25% of the syllabus and will consist of 10 multiple choice type question and four descriptive choice question (10 marks each) Time allowed: 1.30 hours

Minor Test-II: This will be conducted from the next 25% of the syllabus and will consist of 10 multiple choice type question and four descriptive choice question (10 marks each) Time allowed: 1.30 hours

Major Test:

This will be conducted from the rest of the 50% of the syllabus (80% weightage to given for the 50% syllabus not covered in Minor-I & Minor-II and 20% weightage to be given for the syllabus already covered in Minor-I & Minor-II, as per the following distribution of questions

Section A: 10 multiple choice type question (Total 15 marks) to be set from the syllabus covered in Minor-I & Minor-II (06 marks) and from the remaining syllabus (09 marks)

Section B: 5 short answer questions (Total 15 marks) to be set from the syllabus covered in Minor-I & Minor-II (06 marks) and from the remaining syllabus (09 marks)

Section C: Two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the syllabus not covered in Minor-I & Minor-II

Restructuring of M.Sc. Remote Sensing and GIS course

Course No.	Title of the course	Change in Syllabus %age	Credits	Major Exam	Minor Exam	Total Credits
	SEMESTER – I					
PSRSGTC101	Information Technology	20%	4	60	40	
PSRSGTC102	Fundamentals of Remote Sensing and Image Interpretation	0%	4	60	40	
PSRSGTC103	Aerial photography, Aerial and Digital Photogrammetry	20%	4	60	40	
PSRSGTC104	Cartography and Global Navigation Satellite System	20%	4	60	40	
PSRSGPC105	Information Technology, RS and Image Interpretation	0%	4	50	50	
PSRSGPC106	Photogrammetry, Cartography and GNSS	0%	4	50	50	
	Field work: GNSS Survey, Remote Sensing data with Field Verification					24
	SEMESTER – II					
PSRSGTC201	Applied Statistics	0%	4	60	40	
PSRSGTC202	Digital Image Processing	0%	4	60	40	
PSRSGTC203	Geographical Information System	0%	4	60	40	
PSRSGTC204	Thermal, Microwave and LiDAR Remote Sensing	20%	4	60	40	
PSRSGPC205	Statistics and Digital Image Processing	0%	4	50	50	
PSRSGPC206	Geographical Information System and Microwave Remote Sensing	0%	4	50	50	24
	SEMESTER – III					
PSRSGTC301	Remote Sensing and GIS in Geosciences	0%	4	60	40	
PSRSGTC302	Remote Sensing and GIS in Water Resources	20%	4	60	40	
PSRSGTC303	Remote Sensing and GIS in Agriculture Soil and Land Evaluation Studies	0%	4	60	40	
PSRSGTC304	Remote Sensing and GIS in Forestry	0%	4	60	40	
PSRSGPC305	Remote Sensing and GIS in Geosciences and Water Resources	0%	4	50	50	
PSRSGPC306	Remote Sensing and GIS in Agriculture Soil and Land Evaluation Studies and Forestry	0%	4	50	50	
	SWAYAM/ MOOC**		4	100		28
	Field Work: Field Work for Ground Truth Verification					
	SEMESTER – IV					
PSRSGTC401	Remote Sensing and GIS in Urban Studies	0%	4	60	40	
PSRSGTC402	Remote Sensing and GIS in Environmental Sciences	0%	4	60	40	
PSRSGTE403	Cryospheric Systems and Climate Change Science	New course 100%	4	60	40	
PSRSGTE404	Disaster, Risk Reduction and Hazard Assessment		4	60	40	
PSRSGTO405***	Fundamentals of Geographical Information System/ SWAYAM /MOOC	0%	4	60	40	
PSRSGPC406	Remote Sensing and GIS in Urban Studies and Environmental Sciences	0%	4	50	50	
PSRSGDC407	Project Work: Project Report-150		8	200		
	Viva voce- 50					32
	Open Elective Course OR SWAYAM/ MOOC**		4	100		

Note: *SWAYAM/MOOC Course offered to the students of the Department in Sem-III

**Open Elective Course OR SWAYAM/ MOOC Course offered to the students of the Department in Sem-IV

*** Students of outside department adopted Open Course or SWAYAM/MOOC in Sem-IV.

- Students of the Department adopted only one elective course in Sem-IV from Course No. PSRSGTE403 & Course No. PSRSGTE404.

Evaluation Scheme

The students shall be continuously evaluated during the conduct of each course on the basis of their performance as follows:

Examination (theory)	Syllabus to be covered in the examination	Time allotted for the examination	Total Marks
Minor Test I (after 30 days)	Up to 25 %	1½ hour (4 credits)	20
Minor Test II (after 60 days)	Up to 50 %	1½ hour (4 credits)	20
Major Test (after 90 days)	Up to 100 %	3 hour (4 credits)	60

Guidelines for setting of question papers

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour
Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1)
Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1)

Minor test II (Up to 50% syllabus) Time: 1½ hour
80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1)
Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2)
Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)

Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours
Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks)
Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks)
Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO PSRSGTC101 **TITLE: Information Technology**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit-1

1.1 Introduction: Hardware, software and data, Von-Neumann architecture

1.2 Software: System, Application, Open source, DBMS

1.3 Coding: ASCII, UNICODE

1.4 Problem Solving Tools: Algorithm, Flowchart Designing

Unit-2

2.1 Communication systems, wired and wireless communication, communication types

2.2 Major types of networks-LAN, WAN, MAN etc., Topologies

2.3 WWW, web server, web browser, HTML: Text Formatting Tags, Adding Lists, Table, Paragraphs, Links, Lists

2.4 TCP/IP Protocol Suite, IP Address

Unit-3

3.1 Introduction to C: keywords, data types, variables, constants, expressions

3.2 Operators: Mathematical, Unary, Binary, Relational and Logical operators, Operator precedence and associativity

3.3 Conditional Control statements: if statement, if else statement, nested if statement, if else if ladder and Ternary operator, Switch case statement

3.4 Looping control Statements: While loop, Do while Loop, For loop, Nested loops

Unit-4

4.1 Functions: Definition, Types of Function, Scope, Call by Value

4.2 Pointers: Declaration, Definition, Indirection, Arithmetic, Call by Reference

4.3 Single dimensional arrays: Definition, Declaration, Accessing, Passing to function

4.4 Double dimensional arrays: Definition, Declaration, Accessing, Passing to function

Unit-5

5.1 Strings: Declaration, Initialization, Accessing, Passing to function, declaring and accessing array of strings

5.2 Standard and library functions: string length, string copy, finding substring, concatenating strings etc.

5.3 Structures & Unions: Declaring, Initializing and Accessing structures, passing structures to functions

5.4 Files: File opening modes, Opening and closing a data file, Reading, Writing

Books Recommended

Introduction to Information Technology by EFRAIM TURBAN, R. KELLY RAINER and RICHARD E. POTTER Published by John Wiley & Sons.

Computer Networks by Andrew S. Tanenbaum

Gottrfriield, B.S.: Programming with C, Tata McGraw Hill Publishing Co. Ltd.

Programming in C by Jamwal Shubhnandan, Pearson Publications

E. Balaguruswamy: Programming in ANSIC, Tata McGraw Hill Publishing Co. Ltd.

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO *PSRSGTC101 **TITLE: Information Technology**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC102 **TITLE: Fundamentals of Remote Sensing and Image Interpretation**

Maximum Marks: 100
Major Examination: 60
Minor Examination: 40

Credit: 4 **Time allowed: 3 hours**

Unit – 1

1.1 Remote sensing - history & development, definition, concept and principles
1.2 Energy resources, radiation principles, EM Radiation and EM Spectrum
1.3 Black body radiation, laws of radiation
1.4 Interaction of EMR with atmosphere and earth's surface

Unit – 2

2.1 Platforms - aerial and space borne characteristics
2.2 Satellites and their characteristics - Geo-stationary and Sun-synchronous
2.3 Earth Resources Satellites- LANDSAT, SPOT, IRS, IKONOS etc.
2.4 Meteorological satellites -INSAT, NOAA, GOES etc.

Unit – 3

3.1 Basic concept and principles of active and passive sensors
3.2 Sensors - types and their characteristics, across track (whiskbroom) and along track (pushbroom) scanning
3.3 Optical Imaging sensors - MSS, TM, LISS, WiFS, PAN etc.
3.4 Concept of resolution - spatial, spectral, temporal, radiometric

Unit – 4

4.1 Basic principles, types, steps and elements of image interpretation
4.2 Techniques of visual interpretation and interpretation keys
4.3 Multidate, multispectral and multiresoultion concepts
4.4 Instruments for visual interpretation

Unit – 5

5.1 Remote sensing data products - open data and commercial EO data
5.2 Ground truth collection - spectral signatures
5.3 Commonly used ground truth equipments - use of spectro-radiometers
5.4 Display forms - computer printouts, thematic maps, dot density maps

Books Recommended

Campbell, J.B.2002: Introduction to Remote Sensing. Taylor Publications
Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall.
Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Sabbins, F.F., 1985: Remote Sensing Principles and interpretation. W.H. Freeman and company

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC102 **TITLE: Fundamentals of Remote Sensing and Image Interpretation**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC103 TITLE: Aerial Photography, Aerial and Digital Photogrammetry
Maximum Marks: 100 Credit: 4 Time allowed: 3 hours
Major Examination: 60
Minor Examination: 40

Unit – 1
1.1 Introduction to aerial photography – basic information, specifications for Aerial photograph
1.2 Types and geometry of aerial photographs,
1.3 Planning and execution of photographic flights
1.4 Concept of duration flights in aerial photographs

Unit –2
2.1 Aerial cameras and lens: types and their characteristics
2.2 Aerial film negative and its processing- completion of photographic task
2.3 Basic color photography, choice of film types, comparison of Color, IR and panchromatic films
2.4 Procurement cost and security of aerial photograph

Unit – 3
3.1 Aerial mosaic, measurements from aerial photographs, scale of aerial photograph and methods of scale determination
3.2 Concept of image displacement, relief displacement and its determination
3.3 Concept of stereoscopic vision and stereoscopes, vertical exaggeration in stereo viewing
3.4 Measurement of height from aerial photograph, concept of parallax and its formula, parallax difference and its measurements

Unit – 4
4.1 Concept of photogrammetry, stereo phogrammetry, orthophotos and digital orthophotography
4.2 Concept of orientation, model deformation and rectification
4.3 Photographic and stereoscopic plotting instruments
4.4 Elements of photointerpretation, symbols and colour schemes used in photointerpretation

Unit 5
5.1 Concept of coordinate transformation, triangulation, bundle core formation
5.2 Concept of collinearlity, coplanarity concept of omega, phi and kappa
5.3 Concept of DEM, DTM and DSM and modelling by using DEM
5.4 Terrain analysis and its potential applications

Books Recommended
Rampal K.K. 1999: Hand book of Aerial Photography and Interpretation. Concept Publication
Paul R Wolf 2014; Elements of Photogrammetry
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Miller, V.C., 1961: Photogeology. McGraw Hill.
Moffitt, F.H. and Mikhail, E.M., 1980. Photogrammetry, Harper and Row,
Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.
Pandey, S.N.,1987: Principles and Applications of Photogeology. Wiley Eastern.

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC103 TITLE: Aerial Photography, Aerial and Digital Photogrammetry

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC104 TITLE: Cartography and Global Navigation Satellite System

Maximum Marks: 100 Credit: 4 Time allowed: 3 hours

Major Examination: 60

Minor Examination: 40

Unit – 1

1.1 Introduction to cartography: Definition, nature and scope of cartography

1.2 Cartography as a science of communication, Basis of map readings.

1.3 Scale: Definition, Significance of scale, methods of representing scale

1.4 Types of scale and their importance.

Unit – 2

2.1 Classification and significance of maps

2.2 Map reference and coordinate system

2.3 Cartographic symbols: Point, line, Area symbols, their definitions and significance

2.4 Cartographic methods: Quantitative and Non-quantitative areal distribution maps with the help of following methods: Isopleth, Choropleth, Dot, Chorocromatic and Choroschematic methods; their merits and demerits

Unit – 3

3.1 Map Projection- Concept, classification and choice of map projection

3.2 Study of Topographical maps: Survey of India National series maps, layout and numbering of topographical maps

3.3 Representation of natural and cultural features, relief representations

3.4 Digital cartography: Conventional mapping vs Digital mapping, Elements of digital cartography; relation between digital cartography, Remote Sensing and GIS.

Unit – 4

4.1 Introduction to Global Navigation Satellite System (GNSS) - fundamental concepts

4.2 GNSS system elements and signals

4.3 Classification of GNSS receivers

4.4 GNSS measurements and accuracy of GNSS

Unit –5

5.1 GNSS field survey design

5.2 GNSS data processing and data correction

5.3 Augmented and regional navigation system

5.4 Emerging trends in GNSS

Books Recommended

Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications

Mishra R.P and Ramesh A. 1989: Fundamentals of Cartography. Concept Publishing Company

Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication

Rampal K.K. 1993: Mapping and compilation. Concept publication

Robinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography. John Wiley

Taylor, D.R.F. 1985: Education and Training in Contemporary Cartography, John Willey

The Syllabi M.Sc. Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2023, Dec. 2024 and Dec. 2025

COURSE NO. PSRSGTC104 TITLE: Cartography and Global Navigation Satellite System

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

COURSE NO. PSRSGPC105 **TITLE: PRACTICALS RELATING TO COURSE No. **PSRSGTC101 and PSRSGTC102**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- i) MS OFFICE
  ii) MS EXCEL
  iii) MS ACCESS
- Internet and HTML
  Elementary C-Programming
- Working knowledge of Image analysis softwares
- Study of satellite image, metadata information and marking reference system
- Analysis of spectral reflectance curves
- Visual interpretation of satellite images
- Interpretation of different resolution IRS satellite images – LISS III, LISS IV, PAN, AWIFS etc.
- Interpretation of cultural & natural details from IRS satellite image

COURSE NO PSRSGPC106 **TITLE: PRACTICALS RELATING TO COURSE No. PSRSGTC103 and PSRSGTC104**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- Stereo test and orientation of aerial photograph
- Determination of photo scale
- Use of parallax bar, determination of heights
- Preparation of photo line index
- Identification of features on vertical aerial photographs
- Visual interpretation of aerial photographs
- Study of SOI topographic sheets
- Calculation of map numbering and imaging reference system
- Base map preparation
- Handling of GNSS, data collection and integration of GNSS data

REMOTE SENSING FIELD WORK (GNSS SURVEY)

- Familiarization with GNSS receiver and to know the set up unit
- Initialisation of the system in the field
- To get aquainted with the various functions of the GNSS
- Using GNSS with map & compass
- Area calculation by GNSS
- Navigation by way points
- Navigation by track points
- Transfer of way points
- Map preparation and map upgradation

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC201 **TITLE: Applied Statistics**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit -1

1.1 Statistical data: types and sources, discrete and continuous series, scales of measurement, measures of location and dispersion

1.2 Skewness, moments and kurtosis

1.3 Matrix algebra: types and properties of matrices, addition, subtraction, multiplication, inverse of a matrix

1.4 Time series - definition, components (trend, seasonal, irregular and cyclical), forecasting based on moving average, single exponential smoothing, trend fitting (linear and exponential growth)

Unit- 2

2.1 Correlation: introduction, types, properties, product moment and rank Correlation

2.2 Simple linear regression with examples (using SPSS/Excel software)

2.3 Multiple and partial correlation: concept, computation for three variables only

2.4 Introduction to sampling, sampling techniques, sample size determination

Unit-3

3.1 Random variable-discrete and continuous, concept of classical probability and probability distribution, simple applications

3.2 Mathematical expectation and related elementary results

3.3 Standard discrete distributions- binomial and poisson with applications

3.4 Normal distribution with applications of standard normal curve, exponential distribution with examples

Unit -4

4.1 Concept of sampling distribution and standard error, sampling distribution of mean

4.2 Concept of Hypothesis - The Elements of a Test of Hypothesis - Basic Concepts - Null and Alternative Hypotheses - Type I and Type II Errors - Test statistic, point and interval estimation, hypothesis, two types of error, level of significance and concept of confidence level

4.3 Small and large sample test - concerning proportions, means, variances (such as Z, t and F test)

4.4 Chi square test for goodness of fit and test of independence

Unit -5

5.1 Concept of analysis of variance (ANOVA), ANOVA with one way and two-way classification

5.2 Introduction to design of experiment, CRD and RBD

5.3 Introduction to multivariate techniques like multiple regression and multiple correlation, MANOVA, PCA, discriminant analysis and factor analysis concepts only

5.4 Case studies on multivariate analysis through SPSS/Excel software

Books Recommended

1. Paul L. Meyer: Introductory Probability and Statistical Applications, Adsion Wesley.
2. Kapoor and Gupta: Fundamentals of Mathematical Statistics, S Chand and Sons.
3. Kapoor and Gupta: Fundamentals of Applied Statistics, S Chand and Sons.
4. Shanti Narayan: Textbook of Matrices, S. Chand and Co.
5. R.A. Johnson: Applied Multivariate Statistical Analysis, Pearson.

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: *PSRSGTC201 **TITLE: Applied Statistics**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour
Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1)
Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1)

Minor test II (Up to 50% syllabus) Time: 1½ hour
80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1)
Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2)
Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)

Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours
Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks)
Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks)
Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC202 **TITLE: Digital Image Processing**
Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**
Major Examination: 60
Minor Examination: 40

Unit – 1
1.1 Introduction to digital image processing- concept of digital image, steps in DIP
1.2 Image processing systems -hardware and software considerations
1.3 Digitization of photographic image and image visualization
1.4 Digital image data formats, image data storage and retrieval

Unit – 2
2.1 Basic statistical concept in DIP
2.2 Fundamental of image rectification, definition, principle and procedure
2.3 Radiometric & geometric correction of remotely sensed data
2.4 Image calibration methods (DN to radiance, radiance to reflectance)

Unit – 3
3.1 Image enhancement techniques - an overview
3.2 Contrast enhancement - linear and non-linear, histogram equalization and density slicing
3.3 Spatial filtering and edge enhancement
3.4 Multi image manipulation -addition, subtraction, ratioing and spectral indices

Unit 4
4.1 Enhancement by using colours - advantages, types of colour enhancements
4.2 Image transformation -Intensity Hue Saturation (HIS) and PCA
4.3 Image fusion techniques
4.4 Change detection techniques

Unit – 5
5.1 Image classification types - supervised and unsupervised, advantage and limitations
5.2 Advanced classification techniques
5.3 Classification accuracy assessment
5.4 Overview of classification techniques for high spatial resolution and hyperspectral data

Books Recommended
Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
Gibson, P.J. 2000: Digital Image Processing. Routledge Publication
Gupta, R.P., 1990: Remote Sensing Geology. Springer Verlag.
Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication
Pratt.W.K. 2004: Digital Image Processing. John Wiley
Sabbins, F.F., 1985: Remote Sensing Principles and Interpretation. W.H. Freeman and Company

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC202 **TITLE: Digital Image Processing**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC203 **TITLE: Geographical Information System**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit - 1

1.1 Introduction to GIS - definition, concept and history of developments in the field of information systems

1.2 Computer fundamentals for GIS

1.3 Hardware and software requirements for GIS

1.4 Coordinate system and projections in GIS

Unit - 2

2.1 Data structure and formats

2.2 Spatial data models - raster and vector, data inputting & GIS

2.3 Spatial data quality and uncertainty

2.4 Data base design - editing and topology creation in GIS, linkage between spatial and non-spatial data

Unit - 3

3.1 Spatial data analysis - significance and type, attribute query, spatial query

3.2 Vector based spatial data analysis- topological analysis

3.3 Raster based spatial data analysis- local, neighborhood, regional and global operations

3.4 Buffer analysis, network analysis

Unit - 4

4.1 Data quality and sources of errors

4.2 Integration of RS and GIS data

4.3 Digital elevation model and derivation of parameters

4.4 GIS data integration and modeling

Unit - 5

5.1 Open sources software and cloud computing

5.2 Overview of spatial data infrastructure and decision support systems (DSS)

5.3 Overview of image processing & GIS Packages

5.4 Recent trends in GIS- AM/FM, Virtual 3D GIS, Mobile GIS, OLAP, Internet GIS, Open GIS, GIS customization and GIS for citizen science

Books Recommended

Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications

Chang.T.K. 2002: Geographic Information Systems. Tata McGrawHill

Heywood.I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems. Pearson Education

Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.

Skidmore A.2002: Environmental Modeling with GIS and Remote Sensing. Taylor and Francis

Tar Bernhardsen. Geographical Information Systems. John Wiley.

Wise S.2002: GIS Basics. Taylor Publications

ESRI Map book: GIS the Language of Geography by ESRI-USA ESRI-2004

Satellite Geodesy: Gunter Seeba

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC203 **TITLE: Geographical Information System**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour
Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1)
Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1)

Minor test II (Up to 50% syllabus) Time: 1½ hour
80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1)
Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2)
Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)

Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours
Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks)
Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks)
Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC204 **TITLE: Thermal, Microwave and Lidar Remote Sensing**
Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**
Major Examination: 60
Minor Examination: 40

Unit 1

1.1 Thermal radiation principles and sources,
1.2 Thermal Radiant energy- basic considerations and thermal properties
1.3 Board band thermal IR Sensing
1.4 Concept of temperature estimation from thermal bands

Unit 2

2.1 Thermal IR multispectral sensing, ground and space based thermal sensors and their applications
2.2 Characteristics of thermal IR images and factors affecting thermal images
2.3 Interaction of thermal radiation with terrain elements
2.4 Thermal scanning, aerial and spaced based thermal scanner and their applications

Unit 3

3.1 Introduction to microwave remote sensing: active and passive microwave remote sensing, classifications of active sensors and passive sensor
3.2 Microwave data sets and their specifications and advances
3.3 History and concept of radar and air borne and space radar Concept of Synthetic Aperture Radar (SAR), Side looking airborne radar (SLAR), equation and components
3.4 Radar equation, synthetic Aperture Radar (SAR) – and its imaging modes

Unit – 4

4.1. Active microwave system components surface materials- brightness temperature, dielectric constant, complex dielectric properties, surface roughness polarization
4.1 Geometry of Radar, concept of relief displacement shadow and foreshortening and layover
4.2 Concept of Interferometry DInSAR and PSInSAR and its applications
4.3 Concept of polarimetry and its applications

Unit – 5

5.1 Microwave remote sensing applications, and response of radar to vegetation water, soil moisture,
5.2 Physics of laser, laser interaction with objects, Platform of laser scanning (ground, air, space)
5.3 LiDAR – components of LiDAR system, type of LiDAR (topographic, bathymetric, etc.) and Potential applications of LiDAR data
5.4 Concept of Radar Altimetry and its potential applications

Books Recommended

Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Sabbins, F.F., 1985: Remote Sensing Principles and Interpretation. W.H.Freeman and company

The Syllabi M.Sc. Remote Sensing and GIS Second Semester for the Examination to be held in the year of May 2024, May 2025 and May 2026

COURSE NO: PSRSGTC204 **TITLE: Thermal, Microwave and Lidar Remote Sensing**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
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COURSE NO. PSRSGPC205 **TITLE: PRACTICALS RELATING TO COURSE No. **PSRSGTC201 and PSRSGTC202**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- Frequency distribution, moments of distribution
- Matrix algebra: types and properties of matrices, addition, subtraction, multiplication, inverse
- Correlation: concepts and methods
- Regression: Bi-variate, linear
- Exponential and power
- Multivariate, principle component analysis
- Normal, binomial, poison
- Introduction to Boolean and fuzzy logic
- Pattern analysis, measures of arrangement & dispersion autocorrelation, semivariogram analysis

Following tasks to be done using ERDAS image processing software:

- Free download Images such as Landsat (ETM+, OLI/TIRS), MODIS, NOAA, SRTM, GTOPO, ASTER
- To load digital data and to convert image data
- Display of B&W and FCC using ERDAS
- File management- raster layer and layer information
- Image enhancements - spectral, radiometric and spatial
- Look up table and histogram manipulation
- Low pass filters, high pass filters, band rationing, principal component analysis
- Geometric correction and mosaicing of image
- Vector functions - Spatial & attribute query
- Data import and export
- Geometric & Radiometric correction
- Unsupervised classification
- Supervised classification
- Use of model maker for band rationing
- Map composition

COURSE NO. PSRSGPC206 **TITLE: PRACTICALS RELATING TO COURSE No. PSRSGTC203 and PSRSGTC204**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- Familiarization with ARC GIS software
- Geo-referencing in ARC GIS
- Digitization and layer creation
- Data input, data editing and topology creation
- Editing the layers (use of snap tolerance, remove overlap, gaps, union & intersect etc.)
- Non spatial data entry
- Linking spatial and non- spatial data (Join & Relate)
- Create new table, add field to table, add record to table, calculate area and perimeter
- Buffer analysis and query analysis (selection by location and selection by attributes)
- Overlay analysis
- Network analysis –finding the shortest route between two places, finding the optimum path etc.
- Output map generation
- Calculation of at satellite radiance and surface radiance from thermal imagery
- Computation of brightness temperature from thermal imagery
- Calculation of thermal emissivity
- Calculation of land surface temperature
- Backscattering image generation
- Processing of radar image: speckle removal through different filters
- Radar Image Interpretation

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC301 **TITLE: Remote Sensing and GIS in Geosciences**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit – 1

1.1 Remote sensing in geology - an overview

1.2 Basic concept of geomorphology, earth surface process and resultant landforms

1.3 Spectral characteristics of rocks and minerals

1.4 Drainage patterns - types and its significance in geological studies

Unit -2

2.1 Interpretation of landforms due to folding and faulting, geomorphic indices of active tectonics

2.2 Interpretation of fluvial landforms

2.3 Interpretation of glacial, coastal, eolian and volcanic landforms

2.4 Interpretation of karst landforms

Unit - 3

3.1 Lithological interpretation of igneous, sedimentary and metamorphic rocks

3.2 Interpretation of structural and denudational landforms - cuesta, hogback, butte, mesa etc.

3.3 Interpretation of landforms related to igneous, sedimentary and metamorphic rocks

3.4 Digital Elevation Model, terrain evaluation and geomorphological mapping

Unit – 4

4.1 Identification and mapping of geological structures: folds, faults, unconformities and lineaments

4.2 Structural and tectonic landforms mapping and analysis

4.3 Neo-tectonics and active tectonic

4.4 Seismicity and geodynamics in NW Himalaya

Unit – 5

5.1 Remote sensing in mineral exploration - an overview and application of remote sensing in mineral exploration - Indian examples

5.2 Remote sensing in oil exploration - features helpful in detection of target areas for oil exploration

5.3 Engineering geological investigation, alignment studies - roads, tunnels, canals etc. site selection studies - dams, bridges, highways, airstrips etc

5.4 Geological hazards mapping and disaster management

Books Recommended

Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin

Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.

Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall

Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.

Pandey, S.N.,1987: Principles and Applications of Photogeology. Wiley Eastern.

Ray, R.G., 1969: Aerial Photographs in Geologic Interpretations. USGS Prof, Paper 373.

Sabbins, F.F., 1985: Remote Sensing Principles and Interpretation. W.H. Freeman and Company

Skidmore A.2002: Environmental Modeling with GIS and Remote Sensing. Taylor and Francis

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC301 **TITLE: Remote Sensing and GIS in Geosciences**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hours Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC302 **TITLE: Remote Sensing and GIS in Water Resources**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit 1

1.1 Basic concept of water resources: hydrological cycle and water balance

1.2 Issues in water resources development, management and utilization

1.3 Spectral characteristics of water and snow and relevance of RS techniques for hydrological investigations

1.4 Surface water, Snow cover and glacier interpretation, mapping and monitoring using Remote Sensing

Unit – 2

2.1 Remote sensing in ground water exploration and factors affecting ground water occurrence

2.2 Fundamentals of groundwater hydrology - Porosity, permeability, transmissibility, specific yield, specific retention and hydraulic conductivity and types of aquifers

2.3 Drainage mapping and morphometric analysis

2.4 Darcy's law and Groundwater flow, surface and groundwater interaction, control and occurrence of groundwater movement

Unit – 3

3.1. Remote sensing in evaluating hydrogeological features and elements

3.2 Significance of geological mapping of rocks and structures and their hydrogeological properties in groundwater exploration

3.3 Ground water targeting in various terrain types - hard rock terrain and in alluvial terrain

3.5 Geophysical investigation and satellite based measurements for groundwater studies

Unit –4

4.1 Watershed management- introduction, philosophy and concept and role of remote Sensing and GIS in watershed conservation, planning and management

4.2 Geospatial methods for Watershed mapping and physical characterization

4.3 Soil erosion and Runoff estimation using hydrological modeling

4.4 Water harvesting structures and optimum site selection for rain water harvesting

Unit – 5

5.1 Snow and glacial runoff modeling

5.2 Flood and flood plain mapping, monitoring and zoning

5.3 Water quality monitoring and hydrogeological modeling using RS and GIS

5.4 Hydrological response to climate change and land use/ land cover change

Books Recommended

Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications

Chow, V.T., 1988: Advances in Hydro Science McGraw Hill

Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin

Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.

Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC302 **TITLE: Remote Sensing and GIS in Water Resources**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer type questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer type questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hour Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC303 **TITLE: Remote Sensing and GIS in Agriculture, Soil and Land Evaluation Studies**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60
Minor Examination: 40

Unit -1

1.1 Remote sensing in agriculture - an overview
1.2 Spectral characteristics of crops and factors affecting spectral signatures of crops
1.3 Principles of crop identification and crop acreage estimation
1.4 RS and GIS applications in crop inventory

Unit – 2

2.1 Crop condition and stress assessment using RS techniques
2.2 Agro-meteorology -its importance and application of RS in agro-meteorology
2.3 Crop yield modeling using remote sensing
2.4 Drought assessment and monitoring through remote sensing

Unit –3

3.1 Land use / land cover - basic concept, classification and mapping using remote sensing
3.2 Soil physical properties and classification schemes
3.3 Soil mapping using aerial and satellite remote sensing data
3.4 Distribution of soil types in India and introduction of remote sensing in soil survey

Unit – 4

4.1 Wasteland: mapping and management using remote sensing
4.2 Land degradation -degraded soils, their identification and mapping of degraded lands
4.3 Salt affected soil and mapping of salt affected soil using remote sensing
4.4 Soil erosion and erosion hazard assessment through remote sensing

Unit –5

5.1 Land use capability classification (LUCC), Land irrigability classification (LCC)
5.2 Irrigation infrastructure and command area mapping using remote sensing and GIS
5.3 Soil moisture estimation and crop water requirement assessment using RS
5.4 Land evaluation for optimal land use planning

Books Recommended

Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Skidmore A.2002: Environmental Modeling with GIS and Remote Sensing. Taylor and Francis

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC303 TITLE: Remote Sensing and GIS in Agriculture, Soil and Land Evaluation Studies

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer type questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer type questions (10 marks) from second 5 sub-units (2.2-3.2)
Major Test (80% weightage for last 10 sub-units (3.3-5.4), and 20% weightage for the first 10 sub-units (1.1-3.2). Time allowed 03 hour Question 1: 10 multiple choice type question (15 marks) to be set from the first 10 sub-units (3 marks) and from the last 10 subunits (12 marks) Question 2: 5 short answer questions (15 marks) to be set from first 10 sub-units (09 marks) and from the last 10 sub-units (06 marks) Questions 3 & 4: two long answer type questions (Essay type) with internal choice (15 marks each) to be set from the last 10 sub-units only

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC304 **TITLE: Remote Sensing and GIS in Forestry**
Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**
Major Examination: 60
Minor Examination: 40

Unit – 1
1.1 Forest: Introduction and distribution of forests
1.2 Forest types of India
1.3 Forestry: Introduction and concept of forestry
1.4 Role of RS and GIS in forestry

Unit – 2
2.1 Interaction of EMR with vegetation and spectral characteristics of vegetation
2.2 Temporal characteristics of vegetation
2.3 Vegetation indices for monitoring vegetation health and forest fires
2.4 Forest cover mapping through RS and GIS

Unit – 3
3.1 Forest types and forest density mapping
3.2 Remote Sensing application in forest cover change detection
3.3 Remote Sensing application in mapping of stressed vegetation
3.4 Study of association between rock and forest types using RS and GIS

Unit – 4
4.1 Biomass estimation by non-destructive method
4.2 Growing stock estimation using RS and GIS
4.3 Remote sensing application in formulation of forest working plan
4.4 Role of advanced remote sensing techniques in forest studies

Unit – 5
5.1 Bio diversity studies using RS and GIS
5.2 Wildlife habitat analysis using RS and GIS
5.3 Biological invasion and monitoring of invasive species through RS and GIS
5.4 Forest management information system (FMIS)

Books Recommended
Anji Reddy, M. 2004: Geoinformatics for Environmental Management. B.S. Publications
Franklin S.E. 2001. Remote Sensing for Sustainable Forest Management. Lewis Publication
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

The Syllabi M.Sc. Remote Sensing and GIS Third Semester for the Examination to be held in the year of Dec. 2024, Dec. 2025 and Dec. 2026

COURSE NO. PSRSGTC304 **TITLE: Remote Sensing and GIS in Forestry**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
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COURSE NO. PSRSGPC305 **TITLE: PRACTICALS RELATING TO COURSE No. PSRSGTC301 and PSRSGTC302**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- Visual interpretation of satellite images and aerial photographs to study the following: geomorphology, lithology, geology and structure, surface water, snow and glacier
- Digital image processing for the study of geomorphology, structure, and lineaments
- Digital Terrain Modeling
- Geomorphic mapping
- Structural/ Lineament mapping
- Drainage mapping and morphometric analysis
- Hydrogeomorphology interpretation
- Preparation of groundwater potential zone maps
- Estimation of evapotranspiration using remote sensing based energy balance
- Climatic water balance through empirical method

COURSE NO. PSRSGPC306 **TITLE: PRACTICALS RELATING TO COURSE No. PSRSGTC303 and PSRSGTC304**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**

Semester Examination: 50
Internal Assessment: 50

- Land use / land cover mapping
- Waste land mapping
- Soil erosion mapping
- Identification of degraded lands
- Spectral indices for vegetation and soil monitoring
- Crop acreage estimation studies
- Digital image enhancements for vegetation/forest
- Vegetation mapping from satellite images
- Digital classification for forest cover mapping
- Identification of forest species from aerial photographs/ high resolution images
- Forest change detection studies

GEOSCIENCES FIELD WORK (GROUND TRUTH)

Pre field preparations

- Preparation of various thematic maps in the lab
- Image Classification in the lab for lithological Mapping

Field work

- Field validation of the above-mentioned themes and maps in the field
- Study of the different signatures for the different different rock & mineral in the field.
- Ground truth collection for lithological Mapping
- Any other relevant data collection in the field

Post Field work in the lab

- Training site selection for supervised classification
- Thematic map generation
- Thematic maps correction after the field checking

Report submission

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTC401 **TITLE: Remote Sensing and GIS in Urban Studies**

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**
Major Examination: 60
Minor Examination: 40

Unit – 1
1.1 Remote sensing in human settlement and urban planning - an overview
1.2 Principles of urban area development planning and land use
1.3 Data requirement for urban and regional planning
1.4 Large scale mapping for cadastral database in urban areas

Unit – 2
2.1 Settlement patterns – image characterization and recognition
2.2 Urban and Rural settlements - detection, interpretation, delineation and analysis
2.3 Methods of population estimation using remote sensing
2.4 Concepts of URDPFI guidelines

Unit – 3

3.1 Slum, squatter settlement - detection, interpretation, delineation and analysis
3.2 Built up extraction and Urban material characterization using microwave and hyperspectral data
3.3 Urban sprawl and change detection studies
3.4 Transportation/ road network analysis through RS and GIS

Unit - 4
4.1 Urban land use classification, mapping and analysis
4.2 Remote sensing applications in regional and district level planning
4.3 Site selection and suitability analysis for urban development
4.4 Remote sensing in monitoring master plan / new town development area

Unit – 5
5.1 Urban environment studies: Green spaces, Solid waste management, Urban pollution
5.2 Urban growth modeling
5.3 Urban hazards and risk management through RS and GIS
5.4 Government of India initiatives for urban planning: Smart cities, AMRUT, Swachch Bharat, Housing for all, HRIDAY

Books Recommended
Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTC401 **TITLE: Remote Sensing and GIS in Urban Studies**

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
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The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTC402 TITLE: Remote Sensing and GIS in Environmental Sciences

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**
Major Examination: 60
Minor Examination: 40

Unit –1
1.1 Ecological, biological aspects of environment
1.2 Environmental pollution and types of environmental pollution
1.3 Change detection studies with the help of multi temporal data
1.4 Remote sensing in pollution monitoring

Unit – 2
2.1 Air quality mapping and monitoring
2.2 Remote sensing in water quality mapping, monitoring and management
2.3 Solid waste management – introduction classification and environmental problems
2.4 Remote sensing and GIS in solid waste & waste water management

Unit – 3
3.1 Man made disasters: introduction and types
3.2 Application of remote sensing & GIS in management of man-made disasters
3.3 Nuclear fuel, power plants, nuclear waste management, global and Indian scenario
3.4 Forest fire and fire risk assessment and management using RS & GIS

Unit – 4
4.1 Natural disasters – introduction and types
4.2 Disaster management cycle and role of remote sensing and GIS in disasters management
4.3 Remote sensing and GIS application in hazard zonation mapping
4.4 Remote sensing and GIS application in post disasters

Unit – 5
5.1 Overview of UN sustainable development goals (SDG) and potential remote sensing applications
5.2 Impact assessment – basic concepts, environmental impact assessment (EIA) methods
5.3 EIA of mining areas and river valley project through remote sensing
5.4 Environmental management plan (EMP), its importance and role of GIS in preparation of EMP

Books Recommended
Anji Reddy, M. 2004: Geoinformatics for Environmental Management.B.S. Publications
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J. R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Skidmore A.2002: Environmental Modeling with GIS and Remote Sensing. Taylor and Francis

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTC402 TITLE: Remote Sensing and GIS in Environmental Sciences

Guidelines for setting of question paper

Minor test I (25% weightage for first 5 sub-units (1.1-2.1), Time: 1½ hour Question 1: 10 multiple choice type question (10 marks) to set from first 5 sub-units (1.1-2.1) Question 2: Four short answer types questions (10 marks) from first 5 sub-units (1.1-2.1) **Minor test II** (Up to 50% syllabus) Time: 1½ hour 80% weightage for second 5 sub-units (2.2-3.2) and 20% weightage for first 5 sub-units i.e. 1.1-2.1) Question 1: 10 multiple choice type question (10 marks) to be set from second 5 sub-units (2.2-3.2) Question 2: Four short answer types questions (10 marks) from second 5 sub-units (2.2-3.2)
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The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO.: PSRSGTE403 Title: Cryospheric Systems and Climate Change Science

Maximum Marks: 100 Credit: 4 Time allowed: 3 hours

Minor Examination: 40 & Major Examination: 60 marks

Unit -I

1.1 Elements of the cryosphere; importance of the cryosphere, role of the cryosphere, in the climate system

1.2 Glaciers: Glacier formation, glacier types and facies.

1.3 Dry and wet based glaciers and factors responsible, sediment transport and deposition by glaciers, physics of glacier ice and snow.

1.4 Glacier movement. Glacial erosional and depositional features; surface and subsurface features of glacier using Remote Sensing and GIS technique.

Unit-2

2.1 Glacier drainage characteristics, geochronology of glacial landforms using space based inputs

2.2 Origin of ice-ages, Glacial and interglacial periods. Concepts of Last Glacial Maximum; Younger Drya; Ice age; Little ice age.

2.3 Instrumentation for glaciological studies.

2.4 Techniques employed for the dating of glaciogenic deposits and their limitations, sediment discharge by meltwater and chemistry of meltwater.

Unit -3

3.1 Meteorological parameters vis-a-vis glacier, affect of debris/aerosols on glacier surface.

3.2 Energy balance, mass balance study of glaciers, various methods of mass balance study, glacier dynamics and snout monitoring techniques.

3.3 Isotope study of glacier ice and snow vis-a-vis climate change, chemistry of snow/ice.

3.4 Characteristics of permafrost areas, rock and soil characters in cryosphere, mass movement in permafrost areas – causes and mitigation.

Unit- 4

4.1 Snow and glacial runoff modeling using geospatial techniques

4.2 Galcier lakes, classification, characteristics

4.3 Glacier recession and Glacier Lake Outburst Floods (GLOFs) and concept of Potential Dangerous Glacier Lakes (PDGLs) and its hazards

4.4 Black carbon deposition on glaciers and its impacts on melting, and its impact on climate change

Unit -5

5.1 Carbon Cycling: physical carbon pump, biological carbon pump, marine carbon cycle, terrestrial carbon cycle.

5.2 El Niño and the Southern Oscillation, El Niño and its Effects, upwelling and climate.

5.3 Global Ocean Circulation –Introduction and Overview, Strawberries in Norway, Icelandic Whirpool, Origin of the Gulf Stream, The Deep Atlantic Conveyor.

5.4 Global Wind Systems: Trade Winds, Hadley Cell, Highs and Lows of Westerlies, Concept and importance of Indian Summer Monsoon and Winter monsoon.

Books Recommended

Bigg, G., 1999 Ocean and Climate. Springer- Verlag

Bradley, F., 2000. Paleoclimatology: Reconstructing Climates of the Quaternary. Springer- Verlag.

Evelyn Brown et al. 2001. Ocean Circulation. Elsevier.

Davind Randall 2015 Introduction to the Global Circulation of the atmosphere. Princeton Press.

M. Satoh 2014. Atmospheric Circulation dynamics and general circulation models. Sprinder- Verlag.

Taloor, A K., Kotlia B.S., Kireet Kumar 2021. Water Cryosphere and Climate changes in the Himalayas: A geospatial approach

Petri Pellikka, W. Gareth Rees 2010. Remote Sensing of Glaciers Techniques for Topographic, Spatial and Thematic Mapping of Glaciers

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTE403 TITLE: Cryospheric Systems and Climate Change Science

Guidelines for setting of question paper

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The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO.: PSRSGTE404 Title: Disaster, Risk Reduction and Hazard Assessment

Maximum Marks: 100 **Credit: 4** **Time allowed: 3 hours**

Major Examination: 60

Minor Examination: 40

Unit -I

1.1 Understanding natural disaster, differentiate hazard, disaster, risk and vulnerability, disaster vulnerability

1.2 Preparedness and mitigation measures for various disasters.

1.3 Disaster management, effects and efforts to mitigate disaster

1.4 Anthropogenic disasters; disaster vulnerability assessment of a location and vulnerable groups.

Unit-2

2.1 Remote sensing for disaster assessment Satellite remote sensing for disaster assessment, real time disaster analysis and management,

2.2 Post disaster analysis of inundated areas, earthquake-hit areas and post-flood, c using Remote Sensing and GIS

2.3 Crop loss estimation using Remote sensing and GIS

2.4 Forest fire risk modelling and its impact on climate change using geospatial technique

Unit-3

3.1 GPS for early warning system for disasters.

3.2 GIS for Risk assessment analysis for natural disaster,

3.3 Recent trends in geoinformatics for disaster management.

3.4 Seismic microzonation using geological, geophysical and GNSS data

Unit -4

4.1 Characteristics of heat waves from a disaster perspective

4.2 Spatial & temporal analysis of cold-wave incidences using GIS

4.3 Drought, types and causes space and time characteristics of droughts.

4.4 Avalanches, formation, types and classification mitigation and management plans using geospatial technology

Unit -5

5.1 Earthquakes occurrence and measurement new techniques hazards and its impacts and risk mitigation

5.2 Flood hazards, zonation and risk management studies using geospatial techniques

5.3 Landslides classification of landslides, causes of landslides, management, and Role of RS and GIS Studies

5.4 Glacier Lakes Outburst floods hazards and avalanches studies using geospatial techniques

Books Recommended

Aki, K. and Richards P.G. 2002. Quantitative Seismology, University Science Books, S,C A.

Bolt, B.A. 1992. Inside the Earth, W.H. Freeman, San Francisco.

R P GUPTA 2014 2nd edition Remote Sensing of Geology Springer publisher

Pascale Zarate 2008. Collaborative Decision Making: Perspectives and Challenges, James and James Science publisher

Fowler, C.M.R. 1990.The Solid Earth: An Introduction to Global Geophysics, C. Press

Demer, Michael, N. 2000. Fundamentals of Geographic Information Systems: John Wiley and Sons, Inc.

Iyer, H.M. and Hirahara K. (Eds.) 1993. Seismic Tomography Theory and Practice,

Kyoji S., Paolo C. 2008. Landslides-Risk reduction, Kluwer Academic Publisherss

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

COURSE NO. PSRSGTE404 TITLE: Disaster, Risk Reduction and Hazard Assessment

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The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

Course No. PSRSGTO405* Title: Fundamentals of Geographical Information System**

Maximum Marks: 100 Credit: 4 Time allowed: 3 hours

Major Examination: 60

Minor Examination: 40

Unit –1

1.1 Introduction- definition, historical perspective, components of GIS and types of GIS

1.2 Technology trends in GIS, relationship between geoinformatics, information technology and sensor technology, distributing computing (cloud GIS, SDI)

1.3 Concept of data, geographic data sources (Remote Sensing, GNSS, maps and field observations)

1.4 Introduction to spatial decision problem, decision sport system, overview of internet GIS, location based services

Unit -2

2.1 Data models: Concept and types, Raster data model, Vector data model

2.2 Data input: methods, data quality, data errors, data editing

2.3 Databases: Database concepts, development, implementation and design

2.4 Database management system (DBMS): Network DBMS, Hierarchical DBMS, Relational DBMS, object oriented DBMS

Unit-3

3.1 Introduction to interpolation, types of interpolation: thiessen polygons, inverse distance, weighted splines and krigging

3.2 Geospatial analysis: introduction, vector-based analysis and raster-based analysis

3.3 Digital Elevation Model (DEM): definition, methods of development, and applications of DEM

3.4 Network analysis: concept and models

Unit -4

4.1 Basic concepts of (GNSS), accuracy and error corrections in GNSS

4.2 Fundamental of mobile mapping, application of GNSS in resources surveys and mapping

4.3 Concept of absolute and differential global positioning system

4.4 Types of GNSS receivers, GNSS satellite signal, GNSS data, error correction techniques in GNSS

Unit -5

5.1 Utility mapping using GIS, land suitability analysis

5.2 GIS for environmental impact analysis (EIA)

5.3 Disaster vulnerability analysis (landslide hazard zonation)

5.4 Geospatial modeling: introduction, importance and techniques, land degradation modeling

Books Recommended

Geographic Information Systems for Land Resources Assessment. Burrough, P.A.: Oxford: Oxford University Press.

Fundamentals of Geographic Information Systems, Michael N. Demers: John Wiley and Sons, Inc.

Fundamentals of Spatial Information Systems, Laurini, R and Thompson, D.: Academic Press London

Exploring Spatial Analysis in Geographical Information Systems, Chou, Y. H.: Onward Press, New Mexico, US

International Journal of Geographical Information Systems

ESRI Map book: GIS the Language of Geography by ESRI-USA ESRI-2004 Satellite Geodesy: Gunter Seeba

The Syllabi M.Sc. Remote Sensing and GIS Fourth Semester for the Examination to be held in the year of May 2025, May 2026 and May 2027

Course No.*PSRSGTO405** **Title: Fundamentals of Geographical Information System**

Guidelines for setting of question paper

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COURSE NO. PSRSGPC406 **TITLE: PRACTICALS RELATING TO COURSE No. PSRSGTC401 and PSRSGTC402**

Maximum Marks: 100 **Credit: 4** **Time allowed: 4 hours**
Semester Examination: 50
Internal Assessment: 50

- Urban land use mapping
- Indices for built up area extraction
- Determination and delineation of settlement – urban, rural
- Highway, canal, sewage alignment
- Land use change detection
- Forest fire risk generation
- Water turbidity analysis
- Identification of land slides
- Hazard zonation mapping
- Mapping of mining areas to identify the overburdens and land degradation
- Impact assessment of road construction and site identification for setting of industries etc.

COURSE NO. PSRSGDC407 **PROJECT WORK**

- To carry out project work on a problem based on Remote Sensing and GIS application in the available Infrastructures in their own Institution or one of the national Remote Sensing Institutes/ laboratories /GIS Companies etc. to get aquainted with various image processing and GIS softwares.