

M.Sc Geo-informatics

Scheme of Examination

Sr No.	Paper No	Name of the Paper	Max. Marks	Internal Assessment	End Sem. Exam	Duration of Exam.
SEMESTER-I						
1	I	Advanced Course on Physical Geography	100	20	80	3 Hours
2	II	Photogrammetry	100	20	80	3 Hours
3	III	Principles of Remote Sensing and Satellite Missions	100	20	80	3 Hours
4	IV	Lab Work on Aerial Photographs	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
5	V	Lab Work on Satellite Images	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
SEMESTER-II						
6	VI	Advanced Course on Human Geography	100	20	80	3 Hours
7	VII	Digital Image Processing	100	20	80	3 Hours
8	VIII	Principles and Applications of Geographical Information System	100	20	80	3 Hours
9	IX	Lab Work on Image Processing	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
10	X	Lab Work on GIS	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
SEMESTER-III						
11	XI	Geography of India with reference to Human Aspects	100	20	80	3 Hours
12	XII	Advanced Course on Cartography	100	20	80	3 Hours
13	XIII	Principles and Applications of Global Positioning System	100	20	80	3 Hours
14	XIV	Lab Work on Cartographic Techniques	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
15	XV	Lab Work on GPS and Thematic Mapping	100	Distribution of marks Lab work test : 60 Record on Lab work : 20		4 Hours

				Viva Voce : 20		
SEMESTER-IV						
16	XVI	Research Methodology	100	20	80	3 Hours
17	XVII	Application of Geo-informatics with reference to any one of following: I. Geomorphology II. Resource Planning and Management III. Urban and Regional Planning	100	20	80	3 Hours
18	XVIII	Lab Work on Paper XVII	100	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		4 Hours
19	XIX	Dissertation	200			
Total			2000			

M.Sc Geo-informatics Semester –I

Paper I : Advanced Course on Physical geography

Max Marks : 80

Time : 3 hrs.

Unit –I

Rocks : their formation and identification; Endogenetic and exogenetic forces; Folds and faults; Theory of plate tectonics; Earthquakes; Vulcanism and associated landforms. Application of geo-informatics in physical geography

Unit –II

Weathering and mass wasting, Processes of Denudation; Landforms produced by River, Wind, Glacier, Sea waves and Underground water; Drainage patterns.

Unit –III

Composition and Structure of atmosphere; Insolation and heat budget; Distribution of temperature; Atmospheric circulation: planetary, seasonal and local winds.

Unit –IV

Configuration of ocean floor; Relief of Indian ,Atlantic and Pacific ocean ; Temperature of oceans/seas; Salinity; Ocean deposits; Circulation of ocean waters.

Note:

1. A compulsory question containing 8 short answer type questions shall be set out covering the whole syllabus. Each question shall carry 2 marks (total 16 marks).
2. A total of eight questions in addition to question no. 1(compulsory) will be set out of the whole syllabus, at least 2 from each unit. The candidate will attempt 4 questions in all selecting one from each unit. Each question shall carry 16 marks.

Reccomended Readings:

1. Barry, R.G. and Chorley, R.J., Atmosphere, Weather and Climate, ELBS, Methuen & Co. Ltd.London.
2. Bloom, A.L. (1992) Geomorphology, Second Edition, Prentice Hall of India, New Delhi.
3. Critchfield, H.J. (1987) Climatology, Prentice Hall of India, New Delhi.
4. Denny, M., 2008 How the Ocean works : An introduction to Oceanography,
i. princeton University Press, New Jersey.
5. Garrison, T., 1995, Essentials of Oceanography Wardsworth Pub. Co., London.
6. Husain Majid (2002), Fundamentals of Physical Geography, Second Edition, Rawat
7. Kerhsaw, S., 2004, Oceanography : An Earth Science Perspective, Routledge, UK.
8. Lal, D.S. (1993) Climatology, Chaitanya Publishing House, Allahabad.
9. Riehl, H. (1968), Introduction to Atmosphere, Mc Graw Hill, New York.
10. Singh Savindra (1993), Physical Geography, Prayag Pustak Bhawan, Allahabad.
11. _____(1998), Geomorphology, Prayag Pustak Bhawan, Allahabad.
12. Strahler, A.N. and Strahler, A.H.(1996), Introducing Physical Geography, John Willey and Sons, New York.
13. Thornbury, W.D. (1991), Principles of Geomorphology, John Wiley, New Delhi (Indian reprint)
14. S. W and Morgan, R.S. (1991), An Outline of Geomorphology, Orient Longmans, Calcutta
15. Trewartha, G.T. (Latest edition) Introduction to Climate, McGraw Hill, New York.

Paper-II

Photogrammetry

Max Marks : 80

Time : 3 hrs.

Unit-I

Introduction, history and development of photogrammetry; Types of photogrammetry; Professional photogrammetry set up in India and world; Uses of photogrammetry; Comparison between analog and digital photogrammetry.

Lens Formula ,Aerial Camera Specifications; Optical aspects of aerial camera:Aberrations-Spherical,Coma,Astigmatism,Chromatic,curvature of the field

Unit-II

Principles of Photography: illuminance,diaphragm opening and shutter speed, Characteristics of photographic emulsions,

Geometry of aerial photographs; Types of aerial photographs; Scale determination of vertical photographs; Displacement.

Unit III

Basic information and specification of aerial photography-area to be photographed ,purpose, type of photography ;flight direction, time and season of photography;Planning and execution of photography:Selection of aerial camera,flight altitude,format overlap,lateral overlap;Availability and acquisition of aerial photographs in India.

Unit IV

Introduction and principles of stereo photogrammetry; Stereoscopic vision; Stereoscopes;

Height measurement from vertical photograph; Parallax and its measurement.

Orientation-inner and exterior orientation.

Stereo plotting instruments.

Digital orthophotos: Meaning and application

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Recommended Readings:

1. American Society Of Photogrammetry, 1983: Manual Of Remote Sensing (2nd Edition), ASP Falls Church, Virginia.
2. Aerial photographic interpretation, Lueder, D.R., McGraw Hill Book Co., 1959 Elements of Photogrammetry, Paul R. Wolf, McGraw-Hill, 2000.
3. Digital Elevation Model Technologies and Applications: The DEM user Manual,
4. David F. Maune (ed), American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, USA, 2001.
5. Drury S.A, 1990: A Guide To Remote Sensing - Interpreting Images Of Earth, Oxford Science Publications, Oxford.
6. Lecture notes, 1st module ,PRS division IIRS Dehradun.2007
7. Leica Photogrammetry Suite – Orthobase and Orthobase Pro User Guide, Leica Geosystems, GIS & Mapping, Atlanta, USA, 2003.
8. Lillisand, T.M. And P.W.Kiefer, 1986: Remote Sensing And Image Interpretation, John Wiley & Sons, New York.
9. Manual Photogrammetry, McGlone, C., Edward, M. and Bethel, J, American Society For Photogrammetry and Remote Sensing, Bethesda, Maryland, USA. 2005.
10. Wolf, Paul.R., *Elements of Photogrammetry* ,2nd ed., McGraw-Hill, New York, 1983.

Paper-III : Principles of Remote Sensing and Satellite Missions

Max Marks : 80

Time : 3 hrs.

UNIT-I

Remote Sensing: Definition and Applications;
Radiation principles and EMR (Electromagnetic Radiation);
Energy interactions in atmosphere and Atmospheric Window;
Energy interactions on earth surface and Spectral Signature;
Spectral reflectance curves of earth surface features and their comparative analysis.

Unit-II

Remote Sensing Platforms: Airborne and Spaceborne;
Comparison between images acquired from Airborne and Spaceborne platforms;
Satellite orbits: Near polar orbits and Geostationary orbits;

UNIT-III

Basic concepts and advantages of -Thermal Remote Sensing; Microwave Remote Sensing;
Hyper spectral Remote Sensing; Remote Sensing below Ground Surface; Ground investigations in
Remote Sensing.

UNIT-IV

History and development of Space Programme with special reference to
Indian Space Programme; IRS Satellite Series; INSAT Series,
Future Satellite Missions of ISRO;
Space programmes of :USA, ESA, Russia and China.

Notes:

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Recommended Readings:

1. American society for Photogrammetry and Remote Sensing, 1999, *Remote Sensing for the Earth Sciences*, Manual of Remote Sensing, 3rd ed., vol. 3, Wiley, New York.
2. Avery, T.E., and G.L. Berlin, 1992, *Fundamentals of Remote Sensing and Airphoto Interpretation*, 5th ed., Macmillan, New York.
3. Campbell, J.B., 1996, *Introduction to Remote Sensing*, 2nd ed., Guilford, New York.
4. Curran, Paul J., (1985); *Principles of Remote Sensing*, Longman, London & New York.
5. Drury, S.A., *Images of the Earth: A Guide to Remote Sensing*, 2nd ed., Oxford University Press, Oxford.
6. Elachi, C., 1987, *Introduction to the Physics and Techniques of Remote Sensing*, Wiley, New York.
7. Gupta, R.P., (2003) : *Remote Sensing Geology*, Springer-Verlag.
8. Jensen, J.R., (2004); *Remote Sensing of the Environment: An Earth Resource Perspective*, Pearson Education.
9. Joseph, G., 2003: *Fundamentals of Remote Sensing*, Universities Press, Hyderabad.
10. Lillesand, T. and Kiefer, R., 1999: *Remote Sensing and Image Interpretation*, Wiley, London.
11. Mather, P.M. (1999). *Computer processing of remotely sensed images: an introduction*, Wiley, Chichester.
12. Sabins, F. F., Jr., (1997): *Remote Sensing: Principles and Interpretation*, 3rd ed., W.H. Freeman, New York.
13. Singh, R.B. and Murai, S. ed., 1998 : *Space Informatics for Sustainable Development*, Oxford University Press, Oxford
14. Star, J.L., J.E. Estes, and K.C. McGwire, 1997, *Integration of GIS and Remote Sensing*, Cambridge University Press, .

Paper IV: Lab Work on Aerial Photographs

Time: 4 hrs

Max Marks:100

Exercises will be taken on following topics

1. Stereo test.
2. Determination of Photo scale (various methods).
3. Orientation of stereo model under Mirror Stereoscope.
4. Determination of heights from single vertical aerial photograph.
5. Use of parallax bar and height measurement.
6. Determination of height from stereo pair.
7. Feature extraction and tracing of details from stereo pairs.
8. Interpretation of Aerial photographs : Identification, mapping and interpretation of Natural and Cultural features (at least four exercises);
9. Demonstration on digital photogrammetric station and LPS software.
10. Orthophoto generation.

Distribution of Marks:

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|------|----------------------|---|-------------|
| (i) | Lab Work Test | : | 60 Marks |
| (ii) | Record and Viva-Voce | : | 20+20 Marks |

Note: (a) The Lab Work test shall consist of six questions. Candidates are required to attempt any three questions. All questions carry equal marks.

(b) Candidates shall produce their lab work record before the Board of Examiners for evaluation at the time of their viva-voce examination.

Recommended Readings:

1. American Society Of Photogrammetry, 1983: Manual Of Remote Sensing (2nd Edition), ASP Falls Church, Virginia.
2. David F. Maune (ed), American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, USA, 2001.
3. Drury S.A, 1990: A Guide To Remote Sensing - Interpreting Images Of Earth, Oxford Science Publications, Oxford.
4. Lecture notes, 1st module ,PRS division IIRS Dehradun.2007
5. Leica Photogrammetry Suite – Orthobase and Orthobase Pro User Guide, Leica Geosystems, GIS & Mapping, Atlanta, USA, 2003.
6. Lillisand, T.M. And P.W.Kiefer, 1986: Remote Sensing And Image Interpretation, John Wiley & Sons, New York.
7. Manual Photogrammetry, McGlone, C., Edward, M. and Bethel, J, American Society For Photogrammetry and Remote Sensing, Bethesda, Maryland, USA. 2005.
8. Wolf, Paul.R.,*Elements of Photogrammetry* ,2nd ed.,McGraw-Hill,New York,1983.

Paper VI: Lab Work on Satellite Images

Time: 4 hrs

Max Marks:100

Exercises will be taken on following topics:

1. Study of a satellite image – annotation (IRS-1B,IRS-1C etc.) .
2. Field visit and comparison of ground details with details on image.
3. Identification and comparison of objects on panchromatic, multiband and FCC images.
4. Preparation of image interpretation keys.
5. Visual interpretation and separation of physical and cultural features .
6. Interpretation and delineation of land-use/ land cover.
7. Interpretation of thermal image.(At least two exercises)
8. Interpretation of microwave image. (At least two exercises)
9. Collection of radiant temperatures and plotting of diurnal values.
10. Spectroradiometer-production and analysis of spectral reflectance curves.

Distribution of Marks:

- | | | | |
|------|----------------------|---|-------------|
| (i) | Lab Work Test | : | 60 Marks |
| (ii) | Record and Viva-Voce | : | 20+20 Marks |

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9. American Society Of Photogrammetry, 1983: Manual Of Remote Sensing (2nd Edition), ASP Falls Church, Virginia.
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 13. Leica Photogrammetry Suite – Orthobase and Orthobase Pro User Guide, Leica Geosystems, GIS & Mapping, Atlanta, USA, 2003.
 14. Lillisand, T.M. And P.W.Kiefer, 1986: Remote Sensing And Image Interpretation, John Wiley & Sons, New York.
 15. Manual Photogrammetry, McGlone, C., Edward, M. and Bethel, J, American Society For Photogrammetry and Remote Sensing, Bethesda, Maryland, USA. 2005.
- Wolf, Paul.R.,*Elements of Photogrammetry ,2nd ed.,McGraw-Hill,New York,1983.*