M.Sc Geo-informatics Semester –II
Paper-VI : Advanced Course on Human Geography

Max Marks : 80
Time : 3 hrs.

Unit 1

Human Geography: meaning, nature and approaches; human-environment relationship: determinism, possibilism and neo-determinism; Evolution of Man and human races; cultural realms of the world.

Unit II

World population: growth, distribution and density; theories of population: Malthus, Ricardo, and others; urban settlements, functional classification of urban settlements, problems of urban areas in developing countries.

Unit III

Human occupations; major agricultural regions of the world; world distribution of mineral and power resources: iron ore, coal, petroleum and hydro electricity; major industrial regions of the world.

Unit IV

Economic, social and demographic characteristics and measures: implications for development; Rostow's model of development; development regions of the world; HDI (Human Development Index) : measurement and spatial distribution.

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:

Gregory, D. 1985: *The Geographical Imagination , Social Theory and Human Geography*, London, Hutchinson.

Haddon, A.C., 1925, *The Races of Man and their Distribution*, New York.

Haq, M.U., 1998, *New Perspectives on Human Development*, New York.

Hartshorn T.A. and J.W.Alexander, 1988, *Economic Geography* 3rd edn. Prentice Hall, London.

Hassan, M.I., 2005, *Population Geography,* Rawat Publications, Jaipur.

Hussain, Majid., 2001, *Human Geography* 2nd edition,Rawat Publications, Jaipur.

Malthus, T., 1926, *An Essay on the Principles of Population,1798*, Reprint,London.

Maurya, S.D., 2012, *Human and Economic Geography* (Hindi Edition),Sharda Pustak Bhavan, Allahabad.

Smith, D.M. 1977: *Human Geography: A Welfare Approach*, London, Edward Arnold.

World Bank, *World Development Reports,* Oxford University Press, New York.

M.Sc Geo-informatics Semester –II

Paper-VII: Digital Image Processing

Max Marks : 80
Time : 3 hrs.

UNIT-I

Image Processing: Visual Interpretation – Introduction and need of image interpretation; Image quality; Elements of image interpretation and Convergence of evidence; Multiple images in image interpretation; Equipments of image interpretation.

Digital Processing: Introduction and need of digital image processing; Digital image; Digital image data format; Colour Composites; Best Band Combination, False Colour Composite (FCC) display.

UNIT-II

Image Restoration: Radiometric and Geometric distortions; Radiometric correction – techniques; Geometric correction- input, output driven resampling; Interpolation techniques – Nearest Neighbour, Bilinear and Cubic Convolution.

UNIT-III

Image Enhancement: Contrast, causes of low contrast in image; Contrast enhancement- linear and non-linear; Histogram Equalization; Density Slicing; Spatial Filtering – low pass and high pass, edge enhancement; Image transformation- Band Rationing and Principal Component Analysis.

UNIT-IV

Image Classification: Unsupervised classification; Supervised classification-various classification algorithms i.e. Parallelepiped ; Miniumum Distance to Means; Gaussian Maximum likelihood; Accuracy assessment; Image fusion; Texture transformations; Image segmentation.

Note:

1. **A compulsory question containing 8 short answer type questions shall be set 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.**

Recommended Readings:

1. **Jahne, B. 1991 Digital Image Processing New York: Springer-Verlag, 3958**
2. **Jain, A.K. 1989 Fundamentals of Digital Image Processing Englewood Cliffs, NJ, Prentice Hall.**
3. **Jonson, J.R. 1996 Introductory Digital Image Processing Printice-Hall, Inc.**
4. **Lillsand, R.M. and R.W. Kiefer, 1999 Remote Sensing and Image Interpretation 4th Ed., New York: Wiley, 7249.**
5. **Mathur, P.M. 1999 Computer Processing of Remotely Sensed Images : an introduction, Wiley, Chichester.**
6. **Mullar J.P. 1986 Digital Image Processing in Remote Sensing, Taylor & Francis.**
7. **Pratt, W.K., 1991 Digital Image Processing 2nd ed., New York Wiley, 698p**
8. **Richards, J.A,, 1986 Remote Sensing Digital Image Analysis, New York: Springer-Verlag, 281 p.**
9. **Russ, J.C. 1992, Image Processing Handbook. Boca Raton, FL: CRC Press 445p**
10. **Schowengerdt, R.A., 1983, Techniques for image processing and classification in Remote Sensing, New York: Academic Press, 249 p.**

M.Sc Geo-informatics Semester –II
Paper-VIII: Principles and Applications of Geographical Information System (GIS)

Max Marks : 80
Time : 3 hrs.

UNIT-I

Concepts and Definitions: Geographic Information System (GIS): Definition and applications; Development of GIS technology; Components and elements of GIS; Geographic objects: point, line, area and their computer representation; analog and digital maps; GIS and Remote Sensing interface.

UNIT-II

Functional Components: Data capturing; Input; Storage and Manipulation; Query; Analysis; Presentation, Topology creation; Errors and their rectification in GIS.

UNIT-III

Data Management and Structure: Nature of Geographic data; Spatial and attribute data; Sources of data; Concept of vector and raster based models; Attribute data management: Data base management system (DBMS); Data structures-Relational, hierarchical and network; Linking spatial and attribute data.

UNIT-IV

GIS and Spatial Analysis: Neighbourhood analysis- buffers; Network analysis; Overlays analysis – raster and vector based overlay and their applications in geography; Presentation of GIS output.

Note: A compulsory question containing 8 short answer type questions shall be set covering the whole syllabus. Each question shall carry 2 marks (total 16 marks). 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.

Recommended Readings:

Curran, Paul J., 1985: Principles of Remote Sensing, Longman, London & New York.

Gupta, R.P., 2003: Remote Sensing Geology, Springer-Verlag.

Jensen, J.R., 2004 : Remote Sensing of the Environment : An Earth Resource Perspective, Pearson Education.

Joseph, G., 2005 : Fundamentals of Remote Sensing, Universities Press, Hyderabad.

Lillesand, T. and Kiefer, R., 1999 : Remote Sensing and Image Interpretation, Wiley, London.

Sabins, Floyd F. Jr., 1997 : Remote Sensing: Principles and Interpretation, W.H. Freeman, New York.

Singh, R.B. (ed.), 1991: Environmental Monitoring: Application of Remote Sensing and GIS, Geocarto Int. Centre, Hong Kond.

Singh, R.B. and Murai, S. (eds.), 1998 : Space Informatics for Sustainable Development, Oxford University Press, Oxford.

Burrough, p.a. AND McDonnell, R.A., 1998 : Principles of Geographic Information System, Oxford University Press, Oxford.

Chang, K.t., 2006 : Introduction to Geographic Information System, Tata McGraw-Hill.

De Mers, Michael N., 1999 : Fundamentals of Geographic Information System, John Wiley & Sons, New York.

Environmental Systems Research Institute (ESRI), 1997 : Getting to know Arc View GIS, Cambridge : Geoinformation International.

Heywood, I. et al. 2004 : An Introduction to Geographic Information Systems, Pearson Eduction.

Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., 2001, Geographic Information Systems and Science, Wiley, Chichester. Page 11 to 57.

M. Sc. Geo-informatics Semester–II

Paper- IX: Lab Work on Image Processing

Time: 4 hrs
Max Marks:100
Distribution of marks
Lab work test : 60
Record on Lab work : 20
Viva Voce : 20

Exercises will be taken on the following topics:

1. **Familiarization with ERDAS Imagine/Geomatica software.**
2. **Visualization; Import and Export of Satellite Data to various formats.**
3. **Geocoding of Toposheet and Georeferencing of Satellite Data.**
4. **Creating subset of Satelite Image/Topo Sheet.**
5. **Resolution merge and Mosaic.**
6. **Displaying Individual Pixel Value and Image Information.**
7. **Image Enhancement Techniques- Image Contrast, Histogram Equalization and Density Slicing.**
8. **Band Rationing; Filtering Techniques; Principal Component Analysis.**
9. **Classification – Supervised and Unsupervised.**
10. **Change Detection.**

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.**

M.Sc Geo-informatics Semester –II

Paper X: Lab Work on Geographic Information Systems (GIS)

Time: 4 hrs
Max Marks:100
Distribution of marks
Lab work test : 60
Record on Lab work : 20
Viva Voce : 20

Exercises in digital environment will be taken on following topics:

1. Window/ Digital environment-basics, file and directory organization and management.
2. Familiarization with GIS software.
3. Spatial data creation – creating shape files and digitization
4. Editing layers : Snap tolerance, editing point, line and polygon.
5. Calculation of area/ perimeter.
6. Joint and link operations.
7. Buffer creation and analysis.
8. Overlay analysis.
9. Software based preparation of thematic maps (atleast ten exercises)
10. Exercises on data structures : a. hierarchical
    b. relational
    c. network

Note: (a) The Lab Work test shall consist of four questions. Candidates are required to attempt any two 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.