Solapur University, Solapur.

Skill Development Center

Name of course: **Certificate course in Geoinformatics**

Curriculum of Certificate course in Geoinformatics

Medium of the Course	:	English
Duration of the Certificate Course	:	6 Months
Eligibility	:	12th Passed & Admitted to B.Sc. Course.Geoinformatics

Project to be submitted at the end of Course.

Examination Pattern	:	Annual Examination Pattern
Theory Paper (Duration -2 hrs)	:	50 Marks
Practical (Duration – 3hrs)	:	30 Marks

Oral and Project : 20 Marks

Theory & Practical Examination will be held at the end of academic year and certificate will be issued by the affiliating University.

SYLLABUS

Unit – I	**Fundamentals of Remote Sensing:** Remote Sensing: Basic Principles, Electromagnetic Remote Sensing, Energy Sources, Energy Interactions with Surface Materials, , Energy Interactions with Earth's Atmosphere, Spectral Reflectance Curves
	Fundamentals of aerial photography: Scale, resolution, projections, overlaps, geometric characteristics of photographs. **Platforms:** ground based, air borne, space borne, **Orbits:** Geostationary and polar orbiting satellite.
	Visual Image Interpretation: Information Extraction By human and Computer, Remote sensing Data Products, Image Interpretation, Elements of Image Interpretation
Unit – II	**Introduction to digital image processing:** Digital images, Sources of errors: Radiometric and geometric, image rectification, geometric and radiometric corrections **Image enhancement techniques:** Contrast enhancement, stretching, density slicing, special filtering, edge enhancement, band combination and band ratioing.

Unit – III	**Introduction to GIS:** Definition of GIS, Evolution and components of GIS, Geospatial Data, Geographic Coordinate System, Map Projections, Commonly Used Map Projections, UTM grid system, Map Scale **Data Management, Models and Quality Issues:** Vector Model : Topology, Non topological Vector models, Attribute Data in GIS, Attribute Data Entry, Vector Data Query, Manipulation of Fields and Attribute Data, Raster Data Model : Elements of Raster Data Model, Types of Raster Data, Raster Data Structure, Raster Data Query, Data Compression, Data Conversion, Integration

Unit – IV	**GIS Data Exploration Analysis and Visualization:** Vector Data Analysis: Buffering, Overlay, Distance Measurement, Pattern Analysis, Map Manipulation Raster Data Analysis: Local Operations, Neighborhood Operations, Zonal Operations, Data Extraction, Data Generalization, Comparison of Vector and Raster Based Data **Terrain mapping:** Terrain Mapping and Analysis: Data for Terrain Mapping and Analysis: DIM, TIN, Terrain Mapping, Slope and Aspect, Surface Curvature, Raster versus TIN
Unit – V	**Global Positioning System (GPS):** Concept, Types, Modes of coordinate collection, GPS survey, inputting GPS data into computer

PRACTICAL IN GEOINFORMATICS

PRACTICAL IN REMOTE SENSING:

1. Aerial photographs: Reading peripheral information and measurements of scale of aerial photographs. Interpretation of aerial photographs with stereo-pair. Visual interpretation of physical features, urban, forest, landuse and landcover on digital satellite images of PAN, LISS sensors.
2. Practical in Digital Image Processing: Image data loading in software, Study of histogram and layer information. Linear and non-linear contrast enhancement, band ratioing, edge enhancement, high and low pass filtering. Supervised and Unsupervised classification.

PRACTICAL IN GIS:

1. Introduction to SOI topographical Maps: Numbering, Scales, grid reference, signs and symbols and interpretation. Registration of topomap in GIS software.

2. Spatial and attribute data input, scanning and digitisation editing, topology creation, various measurements, attribute data linking to spatial features.

3. Vector and raster data analysis methods, creation of Digital Elevation Model of terrain. Measurements of slope, aspect and curvature of terrain.

PRACTICAL IN GPS:

1. GPS data collection in the field, GPS survey, importing GPS data to google earth and GIS software.

REFERENCE BOOKS

1. Remote Sensing and Image Interpretation by lillesand T.M., Kiefer R.W., Published by John Wiley & Sons Inc., 2000
2. Fundamentals of Remote Sensing by George Josph, University Press (India) Pvt. Ltd, University Press (India) Pvt. Ltd., 2004
3. Textbook on Remote Sensing by Agrawal C.S. Published by Wheeler A.H., 200.
4. Lecture Notes, Module I, Photogrammetry and Remote Sensing, IIRS
5. Principles of Geographic Information System by Burrough P.A. Published by MacDonneli R.A. Published by Oxford University Press, 2000
6. The GIS Book by Korte G.B. Published by Onward Press, 2001
7. Understanding Map Projection, GIS by ESRI, 2003-2004, USA
8. "Geoinformation" Remote Sensing, Photogrammetry and Geographical Information Systems by Gottfried Konecny Published by Taylor & Francis 11 New Fetter Lane, London EC4P 4EE, 2003
9. Remote Sensing And GIS Integration, Theories, Methods and Applications, by Qihao Weng, Published by The McGraw-Hill Companies, Inc.2010.
10. Introduction to Remote Sensing (5th Edition) by JB Campbell & RH Wynne (2011), Published by The Guilford Press, Inc., 72 Spring Street, New York, NY 10012
11. Introduction to GPS, The Global Positioning System by Ahmed El-Rabbani published by ARTECH HOUSE, INC. 685 Canton Street Norwood, MA 02062, London
12. Understanding GPS Principles and Applications, Elliott D. Kaplan Christopher J. Hegarty published by ARTECH HOUSE, INC. 685 Canton Street Norwood, MA 02062, London
13. Remote Sensing and GIS, by Basudeb Bhatta ,Published by Oxford University Press,2nd Edition
14. "Introduction to Geographical Information Systems", by Kang-tsung Chang, Published by Tata McGraw Hill, Third Edition, 2003
15. "Remote Sensing and Geographical Information Systems", by M. Anji Reddi, Published by B. S. Publications, Second Edition, 2001
16. Remote Sensing and Geographical Information Systems, by A.M. Chandra and S.K.Ghosh, Published by Narosa Publishing House Pvt ltd.
17. "Geographic Information Systems – An Introduction", 3rd edition, by Tor Bernhardsen, Published by Wiley Publications
18. "An Introduction to Geographical Information Systems", 2nd Edition, by Ian Heywood, Sarah Cornelius Published by Pearson Education

Question Paper
Nature

Certificate course in
Geoinformatics

Time: 2 hr **Total Marks: 50**

Q. 1. Choose the **most correct** alternative for the following and rewrite the sentence. 10

1) ----------

a) b) c) d)

2)

3)

4)

5)

6)

7)

8)

9)

10)

Q. 2. Answer ***any five*** of the followings. 10 i)

ii)

iii)

i
v
)
v
)
v
i
)

Q. 3. A) Answer ***any two*** of the followings.
08 i)

i
i
)

i
i
i
)

Q. 4. Answer ***any two*** of the following.
10 i)

ii)

iii)

Q. 5. Write short note/ problem/solve ***any two*** of the following.
12 i)

ii)

iii)