P.G. Diploma in
Remote Sensing and GIS
(Semester Pattern - One Year)

Prospectus No.20151247

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

PROSPECTUS
OF
The Examination for the Post Graduate Diploma in Remote Sensing and GIS (Semester Pattern-One Year)
Semester-I, Winter-2014
Semester-II, Summer-2015 & onwards

2014

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Amravati University
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Post Graduate Diploma in Photonics (One Year – Semester Pattern)
(Semester-I & II)

(Prospectus No. 20151248)

SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.

Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.
Ordinance No. 6 of 2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Registrar
Sant Gadge Baba Amravati University

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM

The pattern of question paper as per unit system will be boradly based on the following pattern.

(1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.

(2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.

(3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.

(4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.

(5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.

*****

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION

No. : 13 of 2013 Date : 15/ 06/ 2013

Subject : Examinations leading to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) Course, Direction, 2013.

Whereas, University Grants Commission, New Delhi, vide its letter No.F.14-35/2013 (Inno/ASIST.), dated 29th March, 2013 has granted approval to the Department of Geology, Sant Gadge Baba Amravati University for Post-Graduate Diploma in Remote Sensing and GIS (One Year) course under Innovative Programme - Teaching & Research in Interdisciplinary & Emerging areas.

AND

Whereas, Development Section of the University vide its note dated 8.4.2013 has conveyed to prepare the syllabus and other details in consultation with H.O.D. Geology.

AND

Whereas, the Scheme of Examination, Syllabi and other details has prepared by the Head, P.G.Department of Geology and submitted to the office.

AND

Whereas, the Honôble Vice-Chancellor has accepted the Scheme of examination along with syllabus and other details of above said course u/s 14(7) of the Maharashtra Universities Act, 1994 to be implemented from the Academic Session 2013-14 & onwards on behalf of B.O.S. in Geology, Faculty of Science & Academic Council.

AND

Whereas, the Scheme of examination and other details are to be regulated by an Ordinance.

AND

Whereas, making of an Ordinance is time consuming process.

AND

Whereas, the admission to above course are to be made in the Academic Session 2013-14, and the said session is commencing from June 2013.

Now, therefore, I, Dr. M. K. Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:-

1) This Direction may be called, ñExaminations leading to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) course, Direction, 2013ò.

2) This Direction shall come into force from the Academic Session 2013-14.

3) Following shall be the Examinations leading to the-
   (i) Post Graduate Diploma in Remote Sensing and GIS, Semester-I - Examination
   (ii) Post Graduate Diploma in Remote Sensing and GIS, Semester-II - Examination

4) Duration of each of the above semester shall be six months with an examination at the end of each semester.

5) (i) The examinations specified in paragraph 3 above shall be held twice in a calendar year at such places and on such dates as may be appointed by the Board of Examinations.
   (ii) Main Examination of Semester-I shall be held in Winter and Supplementary Examination in Summer.
   (iii) Main Examination of Semester-II shall be held in Summer and Supplementary Examination in Winter.

6) Subject to his/her compliance with the provisions of this Direction and of other Ordinance in force from time to time, the following candidates shall be eligible for admission to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) course Examinations namely:-

   Candidates having Post Graduation in any discipline of this University or equivalent or of any other recognized University. Preference will be given to students having knowledge of Geology, Geography, Remote Sensing and GIS, Water resources, Disaster management, Agriculture and Computer applications are eligible to apply for the diploma course.

7) Subject to his/her compliance with the provisions of this Direction and of other Ordinance (Pertaining to examination in General) in force from time to time, the applicant for admission to examination at the end

of the course of study of a particular Semester shall be eligible to appear at it, if:

(i) he/she satisfied the conditions in the table and the provisions there under:-

TABLE

Sr.No.	Name of examination	The student should have completed the term satisfactorily	The student should have passed following e examination
1	2	3	4
1	Diploma in Remote Sensing and GIS Semester-I	Semester-I	As indicated in Para 6.
2	Diploma in Remote Sensing and GIS Semester-II	Semester-II	--------

(**Note** ï (i) Subjects prescribed and numbered in the scheme of Examinations shall be treated as separate subjects, however, the theory and practical, if any, of the subject shall be treated as separate Head of Passing.

(ii) He/She has complied with provisions of Ordinance pertaining to Examination in general.

(iii) He/ She has prosecuted a regular course of study in University Department/College affiliated to the University.

(iv) He/She has in the opinion of the Head of the Department/ Principal, shown satisfactory progress in his/her studies.)

8) Papers and the Practicals in ówhich an examinee is to examined, maximum marks for these and the minimum pass mark which an examinee must obtain in order to pass in the subject and the examination are detailed in the Examination Scheme as **Appendix-A** appended with this Direction.

9) Examination fees for each semester for theory and practical examination shall be as prescribed by the University from time to time.

10) An examinee who is successful at Semester-I, Semester-II examinations under this Direction and who obtained 75% or more marks in aggregate of Semester-I, Semester-II Examinations shall be placed in the First Division with Distinction, those obtaining 60% or more but less than 75% shall be placed in the First Division and all other successful examines shall be placed in the Second Division.

11) (i) Scope of the subjects shall be as indicated in the syllabus.
(ii) Medium of instruction and examination shall be English.

12) Provision of Ordinance No.18 of 2001 relating to an Ordinance to provide grace marks for passing in a head of passing and Improvement of Division (Higher Class) and getting distinction in the subject and condo-nation of deficiency of marks in a subject in all the faculties prescribed by the Statute No.18, and of Ordinance No.10 relating to Providing for Exemptions and Compartments shall apply to the examination under this Direction.

13) An examinee who does not pass or who fails to present himself/herself for the examination shall be eligible for readmission to the same examination on payment of fresh fees and such other fees as may be prescribed.

14) As soon as possible after the examination, the Board of Examinations shall publish a result of the examinees. The result of the examinations shall be classified as above and merit list shall be notified as per Ordinance No. 6

15) Notwithstanding anything to the contrary in this Direction no one shall be admitted to an examination under this Direction, if he/she has already passed the same examination or an equivalent examination of any Statutory University.

16) Examinees who have passed in all the subjects prescribed for Semester-I and Semester-II of the Diploma course shall be eligible for award of the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) course.

Amravati
Date : 14/6/2013

Sd/-
(Dr. M. K. Khedkar)
Vice-Chancellor

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Appendix-A

Scheme of Teaching and Examination for the Post Graduate Diploma in Remote Sensing and GIS (Semester Pattern-One Year) course.

Sr. No.	Sub. Code No.	Paper / Practical No.	Subject	Teaching Scheme in Hours.			Duration of Papers/ Laboratory Examination in Hrs	Examination Scheme								Grand Total Marks
								Theory				Practical				
				Theory	Practical	Total Hours / week		Max. Marks Theory Papers	Max. Marks Internal Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks Internal Assessment	Total	Min. Pass Marks	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Semester-I																
1	1PGDRSGIS1	I	Principles of Aerial Remote Sensing	4	--	4	03	80	20	100	40	--	--	--	--	100
2	1 PGDRSGIS 2	II	Satellite Remote Sensing	4	--	4	03	80	20	100	40	--	--	--	--	100
3	1 PGDRSGIS 3	III	Fundamentals of Geomorphology and Cartography	4	--	4	03	80	20	100	40	--	--	--	--	100
4	1 PGDRSGIS 4	IV	Principles of Digital Image Processing	4	--	4	03	80	20	100	40	--	--	--	--	100
5	1 PGDRSGIS 5	P-I	Aerial & Satellite Remote Sensing	--	09	09	03	--	--	--	--	80	20	100	40	100
6	1 PGDRSGIS 6	P-II	GIS Data Analysis and Digital Image Processing	--	09	09	03	--	--	--	--	80	20	100	40	100
			Total	**16**	**18**	**34**				**400**				**200**		**600**
Semester-II																
1	2 PGDRSGIS 1	V	Principles of Geographic Information System	4	--	4	03	80	20	100	40	--	--	--	--	100
2	2 PGDRSGIS 2	VI	Advances in Remote Sensing and GIS	4	--	4	03	80	20	100	40	--	--	--	--	100
3	2 PGDRSGIS 3	VII	Thermal and Radar Remote Sensing	4	--	4	03	80	20	100	40	--	--	--	--	100
4	2 PGDRSGIS 4	VIII	Remote Sensing and GIS Applications	4	--	4	03	80	20	100	40	--	--	--	--	100
5	2 PGDRSGIS 5	P-III	Remote Sensing and GIS Applications	--	09	09	03	--	--	--	--	80	20	100	40	100
6	2 PGDRSGIS 6	P-IV	Project Work	--	09	09	03	--	--	--	--	80	20	100	40	100
			Total	**16**	**18**	**34**				**400**				**200**		**600**
															Grand Total of Semester-I & II	**1200**

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

DIRECTION

No. : 19 of 2013 Date : 09/10 /2013

Subject : Corrigendum to Direction No.13/2013 in respect of Examinations leading to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) Course, Direction, 2013.

Whereas, Direction No.13/2013 in respect of Examinations leading to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) Course is in existence.

AND

Whereas, the B.O.S. in Geology in its meeting held on 27.8.2013 has recommended the change in eligibility criteria which is to be implemented from the Academic Session 2013-14.

AND

Whereas, the Academic Council in its meeting held on 31.8.2013 while considering the item No.49 in respect of Actions taken by the Hon'ble Vice-Chancellor has approved the action along with the above mentioned change in eligibility criteria to be implemented from the Academic Session 2013-14.

AND

Whereas, the aforesaid change is to be regulated by framing an Ordinance.

AND

Whereas, making of an Ordinance is a time consuming process.

AND

Whereas, the Academic Session 2013-14 is already commenced and the aforesaid change is to be provided in the current session.

Now, therefore, I, Dr. M. K. Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:-

1) This Direction may be called, ñExaminations leading to the Post-Graduate Diploma in Remote Sensing and GIS (Semester Pattern.....One Year) course, Direction, 2013ò.

2) This Direction shall come into force from the Academic Session 2013-14.

3) In Direction No.13 of 2013, in para 6) the words ñ(any discipline)ò be substituted by the words ñScience, Engineering & Technology, Agriculture, Forestry and Geographyò

Amravati
Date : 08/10/2013

Sd/-
(Dr. M. K. Khedkar)
Vice-Chancellor

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FIRST SEMESTER

Paper I (1PGDRSGIS1)
PRINCIPLES OF AERIAL REMOTE SENSING

Unit-I : History of Aerial Photography: Historical development of aerial remote sensing - EMR, photographic bands, principles of photography.

Unit-II : Types of Photographs**:** Based on camera axis (vertical, oblique) angle of coverage (narrow, standard, wide angle, super-wide angle) lens (single, double, triple, four five and nine lens) and spectral characteristics (ultra-violet, ortho-chrome, panchromatic, black and white infra-red, colour, colour infrared), Negative (glass plate, film), Reseau photograph, (plain and reseau) Multiband.

Unit-III : Elements of Photograph**:** Marginal Information - scale of vertical photo: scale, determination of scale, scale distortion ï relief displacement - tilted photographs - comparison of maps and aerial photographs ï photo interpretation elements.

Unit-IV : Aerial Cameras**:** Simple camera and lens formulae - parts of aerial camera: [a] lens cone assembly: filter, lens, shutter and diaphragm - camera coverage ï [b] camera body: camera cone: spider, fiducial mark, advancing film, flattening the film, cocking and tripping the shutter, focal plane, [c] magazine: film advancing and flattening mechanism.

Unit-V : Stereoscopic viewing**:** Anatomy of the human eye - Monoscopy, psuedoscopy and stereoscopy - depth perception - stereoscopic depth perception - stereo model.

REFERENCES

1. American Society of Photogrammetry, (1983). Manual of Remote Sensing, (2nd edition), ASP, Falls Church, Virginia
2. S.N.Pande, Fundamentals of Photogeology, Wiley International, New Delhi.
3. Moffit, H.F., and Edward, M.M., (1980). Photogrammetry, Harperand Row Publishers, New York.

4. Wolf.P.R.,(1974).Elements of Photogrammetry, McGraw Hill books Co., London.

Paper II (1PGDRSGIS2)
SATELLITE REMOTE SENSING

Unit-I : Fundamentals: Definition - Scope - types and chronological development ï ideal and real remote sensing system. Comparison of conventional survey, aerial remote sensing and satellite remote sensing - advantages and limitation of satellite remote sensing.

Unit-II : EMR and Remote Sensing: Energy sources - Electro Magnetic Radiation ï Spectral regions - Energy Interaction in the atmosphere - atmospheric windows ï Energy interaction with earth surface features - spectral reflectance patterns for different region of EMR. Factors affecting remote sensing signatures. Platforms ï data capture types and systems - data recording method.

Unit-III : Remote Sensors: Electro-optical sensor systems - LANDSAT, SPOT, IRS and IKONOS sensors - scanning and orbiting mechanisms - resolution: spatial, spectral, radiometric and temporal resolution of the satellites. Multi concepts in remote sensing

Unit-IV : Other resources satellite programs of the world - need for geo-stationary satellite and polar orbiting programs - sensor characteristics - meteorological, ocean monitoring and telecommunication satellites.

Unit-V : Satellite Data Product: Types ï visual and digital ï standard ï special products ï referencing system ï annotation ï image interpretation elements.

REFERENCES

1. Curran P.J (1985) Principles of Remote Sensing, Longman, Essek.
2. Lillisand T.M and R.W.Kiefer (1994) 3rd edition.Remote sensing and image interpretation, John Wiley & Sons, New York.
3. Sabins F.F Jr. (1987) Remote Sensing: Principles and Interpretation, W.H.Freeman & Co., New York.

Paper III (1PGDRSGIS3)

FUNDAMENTALS OF GEOMORPHOLOGY AND CARTOGRAPHY

Unit-I : Lithosphere: Earthôs Interior and Crust; Rocks; Volcanism; Earthquakes; Faults, Folds and Topography; Mountain Building; Types of Mountains. Development of Regional Geomorphology. Practical Application of Geomorphology.

Unit-II : Geomorphic Processes and Landforms: Geomorphic Processesð Weathering, Mass Movements, Erosion, Transportation and Deposition; Landforms in Humid, Arid, Karst, Glacial and Coastal Environments. Application of laws of hydro dynamics to the study of geomorphic processes

Unit-III: Drainage analysis and its applications. Applications of geomorphology in aerial photo interpretation and remote sensing data analysis. Geomorphological applications in natural resources, mineral exploration and hydrocarbon exploration.

Unit-IV : Cartography: Earthôs Size and Shapeð Spherical, Ellipsoidal and Geoidal Earth; Spheroidal and Geoidal Datums; Co-ordinate Systemsð Cartesian, Rectangular and Geographical; Grid Systems; Map Projectionsð Polyconic, Albers Conical Equal Area, LCC, Mercator and UTM.

Unit-V : Biosphere: Human Settlements and Economic Activities; Biodiversity; Natural Resources exploitation and conservation; Energy resources; Earthôs forest and environment; Natural Hazards and Disasters and their management.

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1. Bloom,A.L. 2001 Geomorphology, Prentice Hall of India, New Delhi.
2. Burton, I. and Rates, R.W. 1978 Readings in Resource Management and Conservation, McGraw Hill, NY.
3. Clark, G.L., Feldman, M.P. and Gertler, M.S., (Ed.) 2000 The Oxford Handbook of Economic Geography, Oxford Univeristy Press, Oxford.

4. Ehrlich, P.R., Ehrlich, R.H. and Holdren, J.P., 1998 Ecoscience: Population, Resources and Development, Freeman & Co., San Francisco.
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6. King, C.A.M., 1966 Tehniques in Geomorphology, Edward Arnold, London.
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8. Peter M. Atkinson and Nicholas M Tate, Editors, 1999. Advances in remote sensing and GIS analysis. John Wiley and Sons, Ltd., Chichester, 273 pages.
9. Raisz, E., 1962 Principles of Cartography, McGraw Hill Books Co., Inc. NY.
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11. Robinson A.H. et al., 2002 Elements of Cartography, John Wiley & Sons, NY.
12. Sparks, B.W., 1960 Geomorphology, Longmans, London.
13. Strahler, A.N., 1971 The Earth Science, Harper and Row, NY.
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15. Wooldridge, S.W. and Morgan, R.S., 1959 The Physical Basis of Geography, Longman, London.

Paper IV (1PGDRSGIS4)

PRINCIPLES OF DIGITAL IMAGE PROCESSING

Unit-I : Principles: Data encoding and decoding - digital image formats ï band sequential and band interleaved - characteristic features. Software - raster and vector files. Statistical Computations from Remote Sensing Data; Histogram Significance

Unit-II : Image Rectification and Restoration: geometric correction, radiometric correction - noise removal - image enhancement: contrast manipulation ï gray level threshold, level slicing, and contrast stretching. Linear and Non-linear Transformations for Geometric Corrections;

Unit-III : Spatial Feature Manipulation: spatial filtering - convolution ï edge enhancement - fourier analysis. multi image manipulation: spectral rating -principles and cannel components - vegetation components - intensity - hue - specturation color space transformation. Pattern Resolution: concepts - linear and non- linear discriminate function.

Unit-IV : Thematic Information Extraction Procedures: Multi-spectral Patterns; Spectral Discrimination and Signature Bank; Parametric and Non-parametric Classifiers; Supervised classification - classification stage - minimum distance to Means classifier - parallelepiped classifier - Gauss maximum likelihood classifier - training stage.

Unit-V **:** Unsupervised classification-output stage post classification smoothing classification accuracy assessment. Multi-date Data Analysis and Change Detection Processes. Radiometric Enhancement; Spatial Enhancements; Contrast stretchingð Linear and Non-linear Methods; Multi-band Enhancement Techniques

REFERENCES:

1. American Society of Photogrammetry, (1983). Manual of Remote Sensing, (2nd edition), ASP, Falls Church, Virginia
2. Campbell, J. B. (2002): *Introduction to Remote Sensing*. 5th ed. Taylor & Francis, London.
3. Cracknell, A. *et al.* (1990): *Remote Sensing Year Book*, Taylor and Francis, London.
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PRACTICAL- I (1PGDRSGIS5)
AERIAL AND SATELLITE REMOTE SENSING

Interpretation of aerial photography for:

1. Structural landforms
2. Fluvial landforms
3. Coastal landforms
4. Land use/Land cover mapping
5. Transport and settlement
6. Constructing spectral reflectance curves.

Interpretation of Satellite Images for:

1. Structure and lineament
2. Fluvial landforms
3. Eolean landforms
4. Coastal landforms
5. Glacial landforms
6. Land use/ Land cover mapping
7. Urban land use
8. Soil mapping
9. Forest Cover
10. Digital data classification of land use

Distribution of Marks :-

1)	**Aerial and Satellite Remote sensing**	**40+40= 80**
2)	**Practical Record**	**07**
3)	**Viva-Voce**	**05**
4)	**Seminar related to Theory**	**08**
	Total	100

References

1. American Society of Photogrammetry, (1983). Manual of Remote Sensing, (2nd edition), ASP, Falls Church, Virginia
2. Lillisand. T.M, and Kiefer, P.W., (1998). Remote Sensing And Image Interpretation, John Wiley & Sons, New York.
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PRACTICAL-II (1PGDRSGIS6)
GIS DATAANALYSIS AND DIGITAL IMAGE PROCESSING

GIS Data analysis

1. Identification of Forms and Features from imageriesð Lithology, Structure, Geomorphology, Land use;
2. Preparation of Thematic Maps from Remote Sensing and GIS Data analysisð Lithology, Structure, Geomorphology; Land Use, Soils, Groundwater Potential Zones.

Digital image processing

1. Histogram construction for digital data.
2. Outputs of linear and non-linear sketch.
3. Filtered outputs.
4. Ratio images.

5. Change detection analysis.
6. Supervised classification.
7. Unsupervised classification.
8. Cell encoding by point, line and area features.
9. Run length encoding.
10. Leaf coding.
11. Map layers and raster layers.
12. Construction of DEM.
13. Encoding point, line and polygon features using vector data.
14. Label encoding.
15. Coding and referencing DEM, GRID and TIN.

Distribution of Marks :-

1)	**GIS Data Analysis and Digital Image Processing**	**40+40= 80**
2)	**Practical Record**	**07**
3)	**Viva-Voce**	**05**
4)	**Seminar related to Theory.**	**08**
	Total	100

REFERENCES :

1 American Society of Photogrammetry, (1983). Manual of Remote Sensing, (2nd edition), ASP, Falls Church, Virginia
2. Lillisand.T.M, and Kiefer, P.W., (1998). Remote Sensing And Image Interpretation,John Wiley & Sons, New York.
3. Moffit, H.F., and Edward, M.M., (1980). Photogrammetry, Harperand RowPublishers, New York.
4. Wolf.P.R.,(1974).Elements of Photogrammetry, McGraw Hill books Co., London.

SECOND SEMESTER

Paper V (2PGDRSGIS1)
PRINCIPLES OF GEOGRAPHICAL INFORMATION SYSTEM

Unit-I : Introducing GIS and spatial data: Definition - maps and spatial information - computer assisted mapping and map analysis - components of GIS - Spatial and Non-Spatial Data - thematic characteristics of spatial data - other sources of spatial data: census and survey data, air photos, satellite images, field data.

Unit-II : Spatial and attributes data modeling and Management: Spatial entities - Raster and Vector spatial data structures - comparison of Vector and Raster Methods ï Raster and Vector approach to digital terrain modeling- modeling network ï layered approach and object - oriented approach - modeling third and fourth dimension - problem of data management - database management system - relational database model - liking spatial and attribute data - GIS database application and development.

Unit-III : Data Input and Editing: Integrated GIS database - Encoding methods of data input: keyboard, manual digitizing scanning and automatic digitizing methods, electronic data transfer - data editing: methods of developing and correcting errors in attributes and Spatial data: reproduction, transformation and Generalization ï edge matching and rubber sheeting - integrated database.

Unit-IV : Data Analyzing Operation in GIS: Terminologyôs - Measurements of lengths, perimeter and area in GIS - queries - reclassification - buffering and neighborhood functions - integrated data - Raster and Vector overlay method: point-in-polygon, line-in-polygon and polygon-in-polygon - problems of Raster and Vector overlays - spatial interpolation - GIS for surface analysis - network analysis: shortest path, travailing problem, travelling path, location - allocation of resources - route tracing.

Unit-V : GIS Modeling and Decision support system: Models of spatial processes: natural and scale analogue models - conceptual models - mathematical model - models of physical and environmental processes - modeling human process - problems related to using GIS to model spatial Processes. maps as output - alternative cartographic outputs - non-cartographic outputs - spatial multimedia - delivery mechanism - GIS and spatial decision supports - maps as decision tools.

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1. Bonham, Carter G.F. (1995): *Information Systems for Geoscientists – Modelling with GIS*. Pergamon, Oxford.
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Paper VI (2PGDRSGIS2)
ADVANCES IN REMOTE SENSING AND GIS

Unit-I : Thermal and Microwave Remote Sensing: Factors affecting Thermal Imagery; Thermal Data Interpretationð Qualitative and Quantitative; Principles of Microwave Remote Sensing; Characteristics of Microwave remote sensing Data

Unit-II : Recent Advances in Remote Sensing: Hyper spectral Remote Sensing; LIDAR; Image Fusions; Object oriented classification; Satellite Photogrammetry and Information Extraction Techniques

Unit-III : Spatial Analysis and Modeling: Spatial Interaction Models; Network Analysis; Spatial Decision Support System; Spatial Data Infrastructures (NSDIs); Multi-criteria Decision Analysis

Unit-IV : Recent Advances in GIS: 3D Virtual GIS; Internet and WEB GIS; GPS in GIS Applications; Mobile Computing; Interoperability and Open GIS; Internet GIS; Dynamic Maps

and Cartographic Animation; Geography of Information Economy. Orthophotography: Meaning, need, procedure, characteristics, uses and problems ï Digital Photogrammetry

Unit-V : Introduction to GPS Technology ï Component of GPS, difference between GPS & GPRS. GIS applications in land cover and land use mapping, cloud tracking, snow cover mapping and air temperature monitoring, topographic mapping, geological classification and soil erosion modeling.

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Paper VII (2PGDRSGIS3)
THERMAL AND RADAR REMOTE SENSING

Unit-I : Thermal Remote Sensing: Radiant flux ï heat transfer ï thermal infrared radiation ï thermal properties of materials ï emissivity of materials ï thermal inertia of Earth surface features.

Unit-II : Thermal IR detection and imaging - characteristics of TIR images. Factors controlling IR Survey ï applications - comparison of IR images with other TM band and air photographs.

Unit-III : Radar Remote Sensing: Meaning ï aircraft radar system ï SLAR - components, imaging system, wavelengths ï range and azimuth resolution - real aperture and synthetic aperture systems.

Unit-IV : Satellite Radar system: Seasat SIR ï radar return and image signatures ï geometry of radar Images ï geometry of radar images ï mosaics. Image Characteristics: Polarization, look direction and image irregularity -image interpretation ï terrain, structures, vegetation, sand, land use and land cover.

Unit-V : Remote Sensing Data: Types ï digital, analogue ï fluvial land forms ï drainage pattern ï erosional and depositional landforms ï flood plain mapping - coastal landforms ï erosional and depositional features ï glacial landforms.

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Paper VIII (2PGDRSGIS4)
REMOTE SENSING AND GIS APPLICATIONS

Unit-I : Land Use/Land Cover: concepts ï classification: USGS, NRSA - land use mapping ï land evaluation. Agriculture: crop assessment, disease detection, forestry: types ï species identification and disease detection. Hazards: Analysis ï earthquake and volcanoes ï landslides ï land subsidence ï flooding ï forest fire, desertification ï coastal erosion ï oil spill.

Unit-II : Soils: soil mapping - soil moisture ï soil erosion ï reservoir siltation ï soil salinity ï soil conservation. Water Resources: surface water resources ï water quality monitoring and mapping ï water pollution, identification of ground water potential and recharge areas ï integrated watershed development.

Unit-III : Remote Sensing Applications: Natural Resource Mapping; Environmental Mapping and Monitoring; Geomorphic/ Geological Mappingð Lithology and Structure; Mineral Resource Identification and Assessment Methods; Remote sensing application in water resources and environmental impact assessment.

Unit-IV : Land Use Mapping; Evaluation of Surface Water Resources; Ground Water Exploration; Flood Zones; Surface and Snowmelt Runoff Modeling; Disease and Stress Detection; Soils and Soil Salinity Discrimination; Crop Types and Crop Yield Estimations

Unit-V : GIS Applications: Rural and Urban Land Use; Rural and Urban Change; Rural and Urban Information System; Transportation Network and Traffic System; Detailed Development Plans; GIS in Planning; GIS in Health Services and Disease Mapping; NPS Pollution Assessment and Information; Priority Sites; Habitat Suitability Studies; Shortest Path Characteristics; Spatial Decision Support System

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PRACTICAL–III (2PGDRSGIS5)

REMOTE SENSING AND GIS APPLICATIONS

Remote sensing and GIS applications in natural resource and disaster management, Georefrencing; Creation of PGDB; Creation of Shape Files, Layers; On-Screen Digitization of Polygons, Points and Lines and adding Attributes; Conversions and Topology; Spatial Analysis

Surface Analysis

1. Contour
2. Slope
3. Aspect
4. Hill Shade
5. Shortest Path Analysis
6. Mapping Density Spatial Modeling
7. Site Suitability Model
8. DEM and SRTM Models
9. Creating TIN surface from Vector Data
10. Creating TIN from Raster Data
11. Coverages in Arc Info; Editing of Coverages; Source Data Registration;
12. Spatial Modeling and Analysis; Query building; Network Analysis; TIN/DEM models and derivatives; 3D Virtual GIS; GPS Survey and Plotting

Distribution of Marks :-

1) Remote Sensing and GIS Applications	**40+40=**	**80**
2) Practical Record		**07**
3) Viva-Voce		**05**
4) Assignment		**08**
Total		**100**

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PRACTICAL –IV (2PGDRSGIS6)

Project work

- Each student should undertake Project work allotted by the Coordinator and Head of the Department in a given area pertaining to Remote Sensing and GIS applications and should submit project report by the end of Semester-II.

- The topic of the project work is to be finalized and assigned within the First Semester; laboratory and/or field work based; to be done in the department/elsewhere; Project report to be submitted at least 15 days before the beginning of second semester practical examinations.

*Specialization in :
(i) GIS data organization and analysis in water resources
(ii) GIS Web Services and applications in natural resources
(iii) Natural Resource & Environment Mapping and Monitoring
(iv) Spatial Decision Support System for disaster management

(v) Digital Image Analysis and Accuracy Assessment
(vi) Automated Information Extraction Methods
(vii) Rural and Urban Land Use Planning for sustainable development
(viii) Any other topic suggested by the Coordinator and Head
(ix) Agriculture, &
(x) Forestry.

Distribution of Marks :-

1)	**Project Report - Submission and Presentation**	**60+20= 80**
2)	**Field Tour and Submission of Report**	**08**
3)	**Practrical Record**	**07**
4)	**Viva-voce**	**05**
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	Total	100
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