P.G. Diploma in Watershed Technology and Management

SANT GADGE BABA AMRAVATI UNIVERSITY

FACULTY OF SCIENCE

PROSPECTUS

OF

P.G. DIPLOMA IN WATERSHED TECHNOLOGY AND MANAGEMENT

2012

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Price Rs.    /-

PUBLISHED BY
D.K. Joshi
Registrar
Sant Gadge Baba
Amravati University
Amravati-444602

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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 Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency 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. 138 : 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.

D.K.Joshi
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 broadly 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.
% Ordinance No. 8 of 2009
Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G. Diploma Course] in the faculty of Science, Ordinance, 2009.

Whereas it is expedient to frame an Ordinance in respect of Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G. Diploma Course] in the faculty of Science, Ordinance, 2009, for the purposes hereinafter appearing the Management Council is hereby pleased to make the following Ordinance.

1) This Ordinance may be called “Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G. Diploma Course] in the faculty of Science, Ordinance, 2009.”

2) This Ordinance shall come into force w.e.f. the date of its approval by the Management Council.

3) Following shall be the Examinations leading to the Post-Graduate Diploma in-
   (i) Post Graduate Diploma in Watershed Technology and Management Semester-I-Examination
   (ii) Post Graduate Diploma Watershed Technology and Management, Semester-II-Examination

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

5) (i) The examinations specified in paragraph 3 above shall be held twice a 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 Ordinance and other Ordinances in force from time to time following candidates are eligible for admission to the Post-Graduate Diploma in Watershed Technology and Management [Semester Pattern....One Year (Full Time) P.G.Diploma Course]:- M.Sc.(Geology) or M.Sc.(Tech.) Geophysics or M.Sc. Earth System Science or M.Sc. Remote Sensing and GIS or M.Sc.(Tech.) Applied Geology or M.Sc. Geoinformatics or M.Sc. Environmental Science or M.A., M.Sc. Geography or B.Tech./B.E. Remote Sensing/Civil Engineering/Water Resources.

7) Subject to his/her compliance with the provisions of this Ordinance and of other Ordinances (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 condition in the table and the Provision there under:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of examination</th>
<th>The student should have completed the term satisfactorily</th>
<th>The student should have passed following examination</th>
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<tr>
<td>1.</td>
<td>Diploma in Watershed Technology and Management Semester-I</td>
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<td>Diploma in Watershed Technology and Management Semester-II</td>
<td>Semester-II</td>
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   (Note:-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.)
   (i) He/She has complied with provisions of Ordinance pertaining to Examination in general.
   (ii) 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 which an examinee is to examined, maximum marks for these and the minimum pass marks which an examinee must obtain in order to pass in the subject and the examination are declared in the Examination Scheme appended herewith as Appendix-A with this Ordinance.

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

10) An examinee who is successful at Semester-I, Semester-II examination under this Ordinance 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 examinees shall be placed in the Second Division.
11) (i) Scope of the subjects shall be as indicated in the syllabus
(ii) Medium of instruction 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 condonation 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 Ordinance.

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 examination 
shall be classified as above and merit list shall be notified as per 
Ordinance No. 6.

15) Notwithstanding anything to the contrary in this Ordinance no one 
shall be admitted to an examination under this Ordinance, 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 subject prescribed for 
Semester-I, Semester-II of the examination of the Diploma course 
shall be eligible for award of the Post-Graduate Diploma in Watershed 
Technology and Management [Semester Pattern.......One Year (Full 
Time) P.G. Diploma Course].
PROJECT WORK :- * Each student should undertake project work allotted by the concern teacher with prior approval of the Head of the Department in a given area pertaining to Watershed Management. Each student will be responsible for assessing the characteristics of at least one watershed and shall submit project report by the end of Semester-II.

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<th>Examination Scheme</th>
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<td>Total Periods / Week</td>
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<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>1</td>
<td>1T1</td>
<td>Fundamentals of Geology and Watershed</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>1T2</td>
<td>Advanced Remote Sensing in Geosciences and GIS</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>1T3</td>
<td>Exploration Geochemistry and Geophysical Exploration</td>
<td>5</td>
<td>-</td>
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</tr>
<tr>
<td>4</td>
<td>1T4</td>
<td>Introduction to Watershed Technology and Management</td>
<td>5</td>
<td>-</td>
<td>5</td>
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<tr>
<td>5</td>
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<td>Remote Sensing and GIS applications in Water resource Technology and Management</td>
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<td>6</td>
<td>1P2</td>
<td>Geochemical and Geophysical Exploration and Hydrogeology</td>
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<table>
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<td>4</td>
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<td>6</td>
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Sang Gadge Baba Amravati University, Amravati

DIRECTION
No. : 20 / 2011 Date : 20.5.2011

Subject : Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, Direction, 2011.

Whereas, Ordinance No.8 of 2009 in respect of Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, Ordinance, 2009 is in existence in the University.

AND
Whereas, the Academic Council in its meeting held on 30.3.2011 vide item No.24 (7) D) R-2 has resolved to accept for addition in eligibility criteria for admission to P.G. Diploma in Watershed Technology and Management and the Council further resolved to refer the matter to Ordinance Committee for amending the respective Ordinance.

AND
Whereas, the matter relating to amendment in eligibility criteria for admission to P.G. Diploma in Watershed Technology and Management is required to be regulated by an Ordinance.

AND
Whereas, making amendments in Original Ordinance No.8 of 2009 is likely to take some time.

AND
Whereas, the admission to student for P.G. Diploma in Watershed Technology and Management course are to be made in the Academic Session 2011-12.

Now, therefore, I, Dr. Mohan K. Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, 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 “ Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, (Amendment), Direction, 2011”.
2. This direction shall come into force from the date of its issuance.
3. The students passing B.Tech.in Agriculture Engineering and M.Sc. Agriculture shall be eligible for admission in the course of Post Graduate Diploma in Watershed Technology and Management.

Sd/-
Amravati
(Dr. Mohan K. Khedkar)
Date : 19./5/2011

Vice-Chancellor

Sang Gadge Baba Amravati University, Amravati

DIRECTION
No. : 18 / 2012 Date : 20/4/2012

Subject : Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, Direction, 2012.

Whereas, Ordinance No.8 of 2009 in respect of Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, Ordinance, 2009 is in existence in the University.

AND
Whereas, the Academic Council in its meeting held on 13.1.2012 vide item No.14 (5) D) R-2 has resolved to accept the revised syllabi of P.G Diploma in Watershed Technology and Management.

AND
Whereas, the Academic Council further resolved to refer the matter regarding changes in the title of the paper in the scheme of examination to Ordinance Committee for amending the Ordinance.

AND
Whereas, making amendments in Original Ordinance No.8 of 2009 is likely to take some time.

AND
Whereas, the syllabi for the Session 2012-13 has to be sent for printing and the admission to student for P.G. Diploma in Watershed Technology and Management course are to be made in the Academic Session 2011-12.

Now, therefore, I, Dr. Mohan K. Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, 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 “ Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G Diploma Course] in the faculty of Science, Direction, 2012”.
2. This direction shall come into force from the date of its issuance.
3. In Appendix-A, appended to Ordinance relating to Examinations leading to the Post Graduate Diploma in Watershed Technology and Management [Semester Pattern.....One Year (Full Time) P.G.
Diploma Course] i.e. Original Ordinance No.8 of 2009, following corrections shall be carried out.

i) under the column No.3 of subject, the subject title of papers No.2 and 3 be substituted as “Remote Sensing in Geosciences and GIS” and “Ground Water Hydrology and Geophysical Exploration” respectively.

ii) the notes printed under Appendix-'A' regarding ‘PROJECT WORK’ shall be substituted as given below-

PROJECT WORK :- * Each student should undertake PROJECT WORK allotted by the Head of the Department in a given area pertaining to Watershed Management. Each student will be responsible for assessing the characteristics of at least one watershed and should submit Project Report (Two copies) by the end of Semester Second.

Sd/-

Amravati
(Dr. Mohan K. Khedkar)
Date: 19/4/2012

Vice-Chancellor

*****

--- Syllabus Prescribed for P. G. Diploma in Watershed Technology and Management

First Semester

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<tr>
<th>Theory</th>
<th>Marks</th>
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<tr>
<td>Paper I Fundamentals of Geology and Watershed</td>
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<tr>
<td>Paper II Remote Sensing in Geosciences and GIS</td>
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</tr>
<tr>
<td>Paper III Groundwater Hydrology and Geophysical Exploration</td>
<td>50</td>
</tr>
<tr>
<td>Paper IV Introduction to Watershed Technology and Management</td>
<td>50</td>
</tr>
</tbody>
</table>

Practicals

| Practical I Remote Sensing and GIS applications in Water Resource Technology and Management. | 25 |
| Practical II Geochemical, Geophysical Exploration and Hydrogeology | 25 |

Total – 250

Second Semester

<table>
<thead>
<tr>
<th>Theory</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper V Basics of Information Technology and Digital Image Processing</td>
<td>50</td>
</tr>
<tr>
<td>Paper VI Advance Hydrogeology</td>
<td>50</td>
</tr>
<tr>
<td>Paper VIII GIS Applications in Water Resource Management</td>
<td>50</td>
</tr>
</tbody>
</table>

Practicals

| Practical III Remote Sensing interpretation in Water Resources | 25 |
| Practical IV Project Report* | 25 |

Total – 250

Grand Total - 500

Project Work

* Each student should undertake Project Work allotted by the Head of the Department in a given area pertaining to Watershed Management. Each student will be responsible for assessing the characteristics of at least one watershed and should submit Project Report (Two copies) by the end of Semester Second.
FIRST SEMESTER

Theory

Paper I

Fundamentals of Geology and Watershed


Paper – II

Advanced Remote Sensing in Geo-Sciences and GIS

Unit-I: Elements of photogrammetry, Aerial photo-interpretation techniques, recognition of photo-elements and terrain elements, landform characteristics, erosion behavior of rocks and soil material, vegetation characteristics, land use and associations.


Unit-III: Photo-interpretation of structural and landform elements, tectonic features, Interpretation of lithology, rock types, Geomorphologic mapping and terrain evaluation, terrain classification, terrain mapping by remote sensing.

Unit-IV: Remote sensing applications in interpreting geomorphology, structure and tectonics. Lithological mapping, groundwater potentials and environmental monitoring. Study of soils and relationship of rock type and geomorphology to various types of soils, soil mapping, land use and land cover mapping.

Unit V: Geographic information System – Principals and components, data presentation, Vector and raster methods, database design and structure and analysis, Digital elevation model. Remote sensing data integration with GIS, applications of GIS in various watershed studies.

PAPER – III

Groundwater Hydrology and Geophysical Exploration

Unit-I: Role of groundwater in the hydrological cycle; Controls of geology on groundwater occurrence and distribution; Classification of aquifers and aquifer systems, geological formations as aquifers, types of aquifers. Mode of occurrence of groundwater in different geological terrains of India.


Unit-III: Groundwater exploration. Geological and surface geophysical methods for the selection of suitable site for well construction. Type and design of wells, methods of well construction, well completion and well development.

Unit-IV: Geophysical Exploration - Resistivity method: basic principles, types of electrode configuration, field procedure, profiling and sounding, application of electrical methods in ground water prospecting. Interpretation of data and applications.

Paper – IV
Introduction to Watershed Technology and Management

Unit – I: Basics for watershed Management, Watershed problems (water supply/quality/flooding, etc.) Goals/objectives, Stakeholders (governmental/environmentalists), Watershed managements practices, Policies, and coordination.

Unit – II: Mitigating measures for watershed harvesting- Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks. Measures to control erosion – counter trenching, plouging, furrowing, trenching, bunding, terracing, gully control, rock fill dams, brushwood dams, and gabion.

Unit III: Land use / land cover management, crop pattern management. Forest, agriculture, grassland and wasteland management. Soil enrichment. Inter, mixed and strip cropping pattern. Sustainable agriculture, dry land agriculture. Social forestry and aorestation.


Unit-V: GIS as a watershed tool for developing a watershed management plan, GIS delineation of watershed, Development of a watershed Management plan, activity, people participation, preparation of action plan, administrative requirements.

Practical - I
Remote Sensing and GIS Application in Water Resource Technology Management

Interpretation of aerial photographs and satellite imageries: resolution mosaics symbols, gully pattern and drainage analysis, vertical exaggeration and image distortion. Exercise on Photographs and imageries for geological and geomorphologic mapping, geo-resources (vegetation, water and mineral) evaluation. Study of water resources, environmental hazard maps, Exercise on ground water exploration using remote sensing techniques and preparation of theme based maps, pre-field interpretation and field checks.

Practical – II
Geochemical, Geophysical Exploration and Hydrogeology


Seminar, assignment and field visit to different watersheds.

SECOND SEMESTER
Theory

Paper V
Basics of Information Technology and Digital Image Processing

Unit-I: Computers :Components – CPU, Input devices , key-board, floppy, scanner, CD ROM, output devices, Monitor, printer, and plotter, Operating system : DOS Windows, Unix, Local Area Network, file management, function keys.

Unit-II: Information Technology: Communication- types- evolution- significance of communication in the modern world - global village and information revolution.

Unit-III: Internet and World Wide Web browsing- advantages and limitations in information revolution- Computer viruses and management, multimedia; tools, applications- graphic effects and techniques.

Unit-IV: Study of digital image processing system, Histogram generation/Equalization, local and global contrast enhancement, arithmetic manipulations, statistical enhancement and Filtering, Generation of Linearly Stretched and Non-linearly stretched outputs and their analysis, generation of different filtered outputs and analysis.
Unit-V: Generation of images using image processing system, data fusion, change detection, supervise classification using image processing system, Geo-referencing, projection, on screen digitization and preparation of vector and raster layers, GIS data presentation.

Paper VI
ADANCED HYDROGEOLOGY

Unit-I: Hydrologic cycle, hydrographic analysis water balance studies, ground water in hydrological cycle.

Unit-II: Distribution of groundwater in Earth’s crust, Springs, (including thermal); origin and movement of water, geologic structures favouring groundwater occurrence, methods of identification of groundwater reservoir properties.

Unit-III: Force and laws of groundwater movement, groundwater recharge, artificial and natural. Factors controlling recharge, conjunctive and consumptive use of groundwater.

Unit-IV: Groundwater in arid, semi arid, coastal and alluvial regions, Groundwater in hard rocks, and limestone terrains with reference to Indian conditions. Chemical characteristics of groundwater in relation to various uses- domestic; industrial and irrigation.

Unit-V: Rainwater harvesting technique: Water pollution and treatment environmental impact of groundwater extraction. Well construction and design, Prospecting of groundwater, Watershed management techniques.

Paper VII
Remote sensing in Water Resource Management


Unit-II: Water quality: Monitoring and mapping through remote sensing, Basic principles of groundwater Hydrology, Crystalline Aquifer Systems; Characteristics-Lithological Assemblage, aspects of Weathering, Mapping of modeling of Fractures.
Practical – III : Remote Sensing Interpretation in water resources.
1. Spectro Radiometric Survey of Water bodies.
2. Analysis of Aerial photographs and satellite images for drainage morphometry and watershed demarcation.
3. Analysis of satellite and aerial photographs for surface water resources mapping.
4. Analysis of satellite and aerial photographs for mapping Lithologically and structurally controlled aquifer systems.
5. Mapping of geomorphic aquifers
6. Identification of recharge areas using remotely sensed data.
7. Analysis of thermal and microwave data for ground water Targeting.
8. Land use/land cover mapping up to level II using aerial photos and satellite images.

Practical IV
Project Report*
* Each student should undertake Project work allotted by the Head of the Department in a given area pertaining to watershed management. Each student will be responsible for assessing the characteristics of at least one watershed and should submit project report by the end of Semester II.

Seminar, assignment and field visit to different watersheds :
Educational tour to visit different watersheds, soil and conservation structures, government organizations, laboratories and NGO's.

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