



## UNIVERSITY OF JAMMU

### NOTIFICATION

(12/Sept./ADP/12)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, has been pleased to authorize adoption of the Syllabi and Courses of Study for III & IV Semesters of Master's Degree Programme in the subject of Geology (Hydrology & Soil Dynamics) (given at annexure) for the examinations to be held in the years given below:

<u>Class</u>	<u>Semester</u>	<u>For the Examinations to be held in the year</u>	<u>Course No</u>
M.Sc	III	Dec. 2012, 2013 & 2014	GEO-301 GEO-302 GEO-303 GEO-304 GEO-305 GEO-306(Field Report & Viva-Voce)
M.Sc	IV	May 2013, 2014, 2015 (Industrial Training)	

Sd/-  
REGISTRAR

No. F.Acd./II/26/12/9645-64

Dated: 07/09/2012

Copy for information and necessary action to:

1. P.S. Vice-Chancellor
2. P.S. to Dean Academic Affairs
3. P.A. to Registrar
4. Sr. P.A. to Controller of Examinations
5. Dean, Faculty of Science
6. Convener/All the members of the Board of Studies in Geology
7. Director, Kishtwar Campus
8. C.A. to Controller of Examinations
9. I/c Deputy Registrar (Publication)
10. Asst. Registrar (Conf./Exams. P/G /Inf.)
11. S.O (Confidential)
12. Content Manager, University Website

(Vivek Sharma)

Deputy Registrar (Academic)

2419

**SYLLABUS OF MASTERS PROGRAMME IN GEOLOGY**  
**(HYDROLOGY AND SOIL DYNAMICS)**

**SEMESTER –III**

(Examinations to be held in the years December 2012, 2013 & 2014)

**Course No. GEO-301**

**Water Resources Engineering**

**Credits: 4**

**Maximum Marks: 100**

**Duration of examination: 3 hours**

**Semester Examination: 100**

**Unit – 1**

- 1.1 Water resources – global perspective-surface, glaciers and ice caps, and groundwater, uses of fresh water and water stress
- 1.2 Fields of water resources engineering,
- 1.3 Hydrological cycle, precipitation and its measurement
- 1.4 Precipitation data processing & analysis

**Unit – 2**

- 2.1 Abstractions of precipitation
- 2.2 Hydrological data and their measurements
- 2.3 Stream flow measurement and analysis
- 2.4 Runoff – flow-duration curve, flow mass curve

**Unit -3**

- 3.1 Hydrograph – its components
- 3.2 Description of UH, S-curve, IUH
- 3.3 Flood routing, hydrologic storage routing
- 3.4 Channel routing- method and purpose

**Unit – 4**

- 4.1 Flood flows – estimation and control measures

*C. S. Rao*

- 4.2 Flood forecasting techniques
- 4.3 Surface water and storage reservoir
- 4.4 Conveyance of surface water through river intakes and dam outlet

#### **Unit - 5**

- 5.1 Groundwater hydrology – well hydraulics
- 5.2 Drainage and reclamation of water logged lands
- 5.3 Water quality, desalination of brackish water
- 5.4 Cost benefit considerations in water resources planning

#### **Books recommended**

1. Water Resources Engineering: Larry W. Mays
2. Water Resources Engineering : Linsley and Franzin
3. Principles of Water Resources Planning: Alvin, S. Goodman
4. Engineering Hydrology: R.S. Varshaney
5. Hand Book of Applied Hydrology: (Ed) Ven T. Chow
6. Remote Sensing in Hydrology: E.T. Engman & R.J. Gurney
7. Engineering Hydrology: K. Subramanya
8. Water Resources Engineering: Linseley
9. Flow in open channels: K. Subramanya
10. Elementary Hydrology: V. P. Singh

#### **Note for paper setter**

The question paper shall consist of three parts. Part 1 (compulsory) shall consist of 20 multiple choice questions having one mark each. Part 2 shall consist of 10 questions (compulsory) each question carrying 4 marks. The answer should be restricted to 100 words for each question.

Part 3 shall consist of two questions with internal choice; each question shall be of 20 marks. The distribution of questions in all the 3 parts shall be equally distributed over all the units and as far as possible equally distributed within the sub-units.

*Linsley Franzin*

Course No. GEO-302

**River Hydraulics & Engineering**

Credits: 4

Maximum Marks: 100

Duration of examination: 3 hours

Semester Examination: 100

**Unit -1**

- 1.1 River morphology, bars, meandering and braiding
- 1.2 Sediment transport- different ways of transport in rivers
- 1.3 Measurement of stream flow and sediment
- 1.4 Stabilization and rectification of rivers

**Unit -2**

- 2.1 Dredging- purpose and types of dredging vessels
- 2.2 General concept of Inland navigation and purpose
- 2.3 Canalization-meaning, importance and purpose
- 2.4 Diversion and cofferdams- general concept and difference

**Unit -3**

- 3.1 Levees and associated flood control works
- 3.2 River model- general idea
- 3.3 Channel control and transitions,
- 3.4 Discharge measurement methods

**Unit -4**

- 4.1 Flow resistance- general concept
- 4.2 Composite roughness and compound channels
- 4.3 Continuity and dynamic equations of unsteady flow
- 4.4 Method of characteristics for Continuity and dynamic equations of unsteady flow in open channels

**Unit -5**

- 5.1 Dam-break problems
- 5.2 Density current in ocean waters and causes
- 5.3 Flow in channel bends
- 5.4 Tides and surges in rivers

**Books recommended**

*Assno/ane*

1. River Engineering: M. S. Peterson
2. Fundamentals of Fluvial Geomorphology: Ro Charlton
3. Loose Boundary Hydraulics: A. j. Raudkivi
4. Fluvial Processes in River Engineering: H. H. Chnag
5. River Mechanics: Pierre Y. Julien
6. River Basin Planning (Theory and practice): Suranjit K. Saha and Christopher J. Barrow
7. Hydraulics in Civil and Environmental Engineering: Andrew Chadwick, John Morfett and Martin Borthwick
- 8 web address:- [www.nptel.iitm.co.in](http://www.nptel.iitm.co.in)

**Note for paper setter**

The question paper shall consist of three parts. Part 1 (compulsory) shall consist of 20 multiple choice questions having one mark each. Part 2 shall consist of 10 questions (compulsory) each question carrying 4 marks. The answer should be restricted to 100 words for each question.

Part 3 shall consist of two questions with internal choice; each question shall be of 20 marks. The distribution of questions in all the 3 parts shall be equally distributed over all the units and as far as possible equally distributed within the sub-units.

**Course No. GEO-303**

**Rock Mechanics and Subsoil Investigation**

**Credits: 4**

**Maximum Marks: 100**

**Duration of examination: 3 hours**

**Unit -1**

- 1.1 Geological survey and exploration
- 1.2 Classification and characterisation of rock mass
- 1.3 In-situ determination of engineering properties of rock mass
- 1.4 In-situ stresses on rock foundations

*Cserofan*

## Unit – 2

- 2.1 Underground openings
- 2.2 Structural geology in rock tunneling
- 2.3 Rock slopes, Rock foundations
- 2.4 Bearing Capacity of Rocks

## Unit -3

- 3.1 Drilling and blasting of rocks
- 3.2 Grouting; Instrumentation and measurements in tunneling
- 3.3 Problems and phases of foundation investigations
- 3.4 Methods of exploration, geophysical and conventional methods

## Unit- 4

- 4.1 Sounding, drilling and boring technique
- 4.2 Ground water table determination
- 4.3 Field tests – penetration tests, vane shear tests
- 4.4 Pressure-meter test, plate load test, field permeability test

## Unit - 5

- 5.1 Critical evaluation of different tests
- 5.2 Preservation and transportation of samples
- 5.3 Selection of type of laboratory tests
- 5.4 Analysis and interpretation of results, site evaluation and reporting

## Selected reference books

1. Water Resources Engineering: Larry W. Mays
2. Water Resources Engineering : Linsley and Franzin
3. Principles of Water Resources Planning: Alvin, S. Goodman
4. Engineering Hydrology: R.S. Varshaney
5. Hand Book of Applied Hydrology: (Ed) Ven T. Chow
6. Remote Sensing in Hydrology: E.T. Engman & R.J. Gurney
7. Engineering Hydrology: K. Subramanya
8. Water Resources Engineering: Linseley
9. Flow in open channels: K. Subramanya
10. Elementary Hydrology: V. P. Singh

*Dr. S. S. Srinivasan*

**Note for paper setter**

The question paper shall consist of three parts. Part 1 (compulsory) shall consist of 20 multiple choice questions having one mark each. Part 2 shall consist of 10 questions (compulsory) each question carrying 4 marks. The answer should be restricted to 100 words for each question.

Part 3 shall consist of two questions with internal choice; each question shall be of 20 marks. The distribution of questions in all the 3 parts shall be equally distributed over all the units and as far as possible equally distributed within the sub-units.

*Assistan*

Course No. GEO-304

Kinematics and Rock Mass Rating

Credits: 4

Maximum Marks: 100

Duration of examination: 3 hours

**Unit -1**

- 1.1 Classification of rock materials – based on unconfined compressive strength
- 1.2 Class I and II rocks, Uniaxial compression based on cleavage and shear failure
- 1.3 Stability in water, classification based on slake durability Index
- 1.4 Rock Quality Designation, direct and indirect methods, weighted joint density

**Unit – 2**

- 2.1 RMR, Collection of field data
- 2.2 Estimation of RMR and its application
- 2.3 Inter-relation between RMR and Q
- 2.4 Assessing tunneling conditions, different approaches

**Unit – 3**

- 3.1 The joint orientation and the Q-system
- 3.2 Collection of field data, classification of rock mass
- 3.3 Estimation of support pressure, unsupported span and design of supports
- 3.4 Different tunneling methods (NATTM and NTM)

**Unit – 4**

- 4.1 Joint wall roughness coefficient (JCR)
- 4.2 Joint wall compressive strength (JCS)
- 4.3 Joint matching coefficient ((JMC)
- 4.4 Angle of internal friction and shear strength of joints

**Unit -5**

- 5.1 Slope failures, different types of slop failures

*Assudfan*



- 5.2 Slope mass rating (SMR), modified SMR approach
- 5.3 Effects of height and ground water conditions on safe slope angle
- 5.4 Factor of safety and stability analysis using different approaches

**Selected reference books**

- 1. Rock Mass Classification, A practical Approach in Civil Engineering by B. Singh and R. K. Goel
- 2. A field Manual for Landslide Investigations by R. Anabalgan, Bhoop Singh, D. Chakraborty and Atul Kohli
- 3. Rock Slope Engineering by Hoek and Bray
- 4. Rock Engineering: Course notes by Evert Hoek
- 5. Geoenvironment: Challenges Ahead; Bhat, G. M., Pandita, S. K., Singh, Y. and Lone, B. A.

**Note for paper setter**

The question paper shall consist of three parts. Part 1 (compulsory) shall consist of 20 multiple choice questions having one mark each. Part 2 shall consist of 10 questions (compulsory) each question carrying 4 marks. The answer should be restricted to 100 words for each question.

Part 3 shall consist of two questions with internal choice; each question shall be of 20 marks. The distribution of questions in all the 3 parts shall be equally distributed over all the units and as far as possible equally distributed within the sub-units.

Course No. GEO-305

Practicals

Credits: 4

Maximum Marks: 100

Duration of examination: 4 hours

Internal Examination: 50

External Examination 50

This practical test shall consist of practical work of the courses: GEO-301, GEO-302, GEO-303 & GEO-304. It shall have two components:

- 1. Internal component to be conducted internally by the Department
- 2. External Component to be conducted jointly by an external examiner with the internal examiner

*B. S. S. S. S. S.*

Course No. GEO 306

Field Work

Credits: 4

Field Report & Viva Voce: 100

This course shall consist of week-end and annual geological (3 weeks) field trips to the important geological sections within the state of Jammu and Kashmir. The students shall be exposed to different geological problems in the field and shall be assigned tasks in groups to study the outcrops, field data collection, maintain field diaries and prepare a field report. The field report shall be submitted to the Department at the end of the semester and shall be evaluated by the teacher concerned and an external examiner. The evaluation process shall consist of the following components:

- |    |                            |          |
|----|----------------------------|----------|
| 1. | Content of the report      | 50 marks |
| 2. | Presentation of the report | 25 marks |
| 3. | Defence (viva-voce)        | 25 marks |

#### SYLLABUS OF MASTERS PROGRAMME IN GEOLOGY

(HYDROLOGY AND SOIL DYNAMICS)

#### SEMESTER -IV

(Examinations to be held in the years May 2013, 2014 & 2015)

Each student will devote full time in the fourth Semester on industrial training with a construction/exploration company. He/She shall work on a dissertation on an assigned research problem under the supervision of a Faculty Member. He/She shall present a Project Report at the end of the fourth Semester which will be evaluated by a Board of Examiners consisting of the Supervisor(s) and an External Examiner. The evaluation of the dissertation and viva-voce shall be conducted by an external examiner and shall be followed by presentation and open defense by the candidate in front of the faculty members and post-graduate students (Evaluation shall be done by respective external and internal examiners).

The evaluation shall be done according to the following scheme:

- |    |                                      |           |
|----|--------------------------------------|-----------|
| 1. | Content and quality of the work done | 400 marks |
| 2. | Viva-voce (external examiner)        | 100 marks |
| 3. | Presentation and defense             | 100 marks |

*Asundam*