



## UNIVERSITY OF JAMMU

### NOTIFICATION

(12/Feb/ADP/03)

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 II Semester of Master's Degree Programme in the subject of Geology (Hydrology & Soil Dynamics) (given in annexure) for the examinations to be held in May 2012, May 2013 & May 2014.

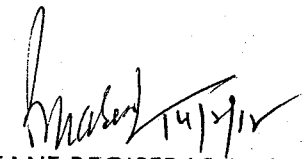
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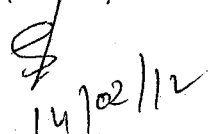
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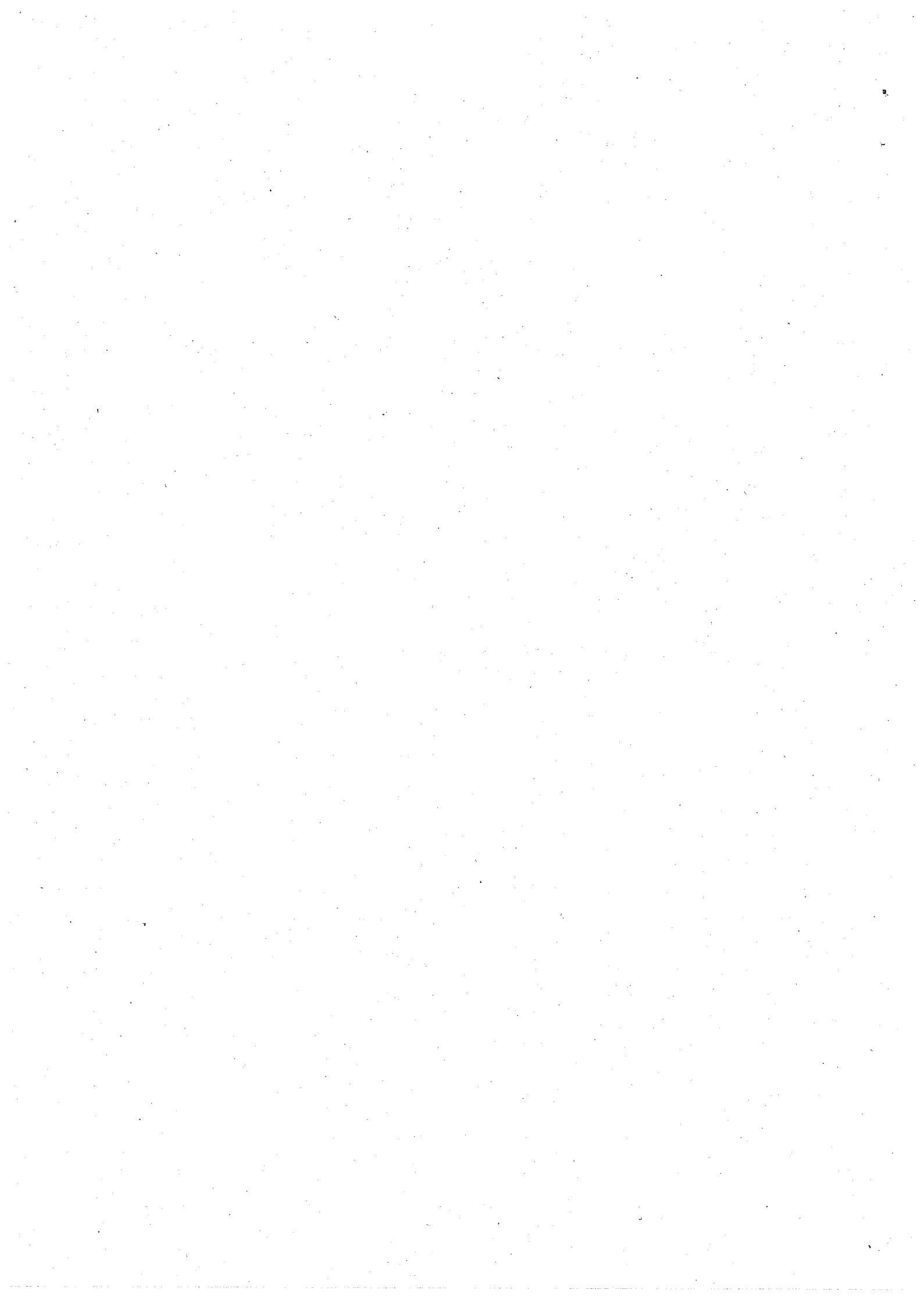
Dated: 15-02-2012

Copy for information and necessary action to:

1. Special Secretary to 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

  
ASSISTANT REGISTRAR (ACAD)

  
14/02/12



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

SEMESTER –II

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

Course No. GEO-201

Credits: 4

Duration of examination: 3 hours

Hydrodynamics

Maximum Marks: 100

Semester Examination: 100

Unit – 1

- 1. Scope of soil and water conservation. Mechanics and types of erosion and their causes.
- 2. Rainfall, runoff and sedimentation relationships and their measurement.
- 3. Soil erosion control measures – biological and engineering including stream bank protection-vegetative barriers, contour bunds, contour trenches, contour stone walls, contour ditches, terraces, outlets and grassed waterways.
- 4. Gully control structures – temporary and permanent – design of permanent soil conservation structures such as chute, drop and drop inlet spillways.

Unit – 2

- 1. Watershed Management – investigation, planning and implementation – selection of priority areas and water shed work plan, water harvesting and moisture conservation.
- 2. Land development – levelling, estimation of earth volumes and costing.
- 3. Wind Erosion process – design to shelter belts and wind breakers and their management.
- 4. Salient features of Forest (Conservation) Act.

Unit – 3

- 1. Wastewater sampling, Waste water characterisation,
- 2. Standards for treated effluents, physico-chemical and biological.
- 3. Wastewater treatment, sludge disposal,
- 4. Tertiary treatment, land application of wastewater effluent and sludge.

Unit – 4

- 1. Hydrology: Hydrologic cycle, precipitation, evaporation, transpiration depression, storage, infiltration,
- 2. Hydrograph unit, hydrograph frequency analysis, flood estimation.
- 3. Ground water flow, Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers.
- 4. Radial flow into a well under confined and unconfined conditions, tube wells pumping and recuperation tests, ground water potential.

Unit – 5

- 1. Water resources planning, ground and surface water resources single and multipurpose projects.
- 2. Storage capacity of reservoirs, reservoir losses, reservoir sedimentation, flood routing through reservoirs.
- 3. Water requirements for crops, consumptive use of water, irrigation methods and their efficiencies.
- 4. Economics of water resources projects

Practicals

- 1. Water & wastewater analysis
- 2. Rainfall data collection by Natural Syphon Recording type Raingauge and determination of mass curve & hyetograph from the obtained chart
- 3. Determination of  $\phi$  index by Double Ring type Infiltrometer
- 4. Measurement of permeability
- 5. Determination of rate of evaporation through PAN Evaporimeter
- 6. Determination of:
  - a. Bacteriological Parameters, b. Nitrate, c. Arsenic, d. Iron, e. Hardness, f. Oil & Grease

*S. Khan*

*Asad Faruq*

**Books recommended**

1. Geophysical Fluid Dynamics: R.S. Long
2. Theory of Rotating Fluid: H.P. Greenspan
3. Natural Aerodynamics: P.S. Scorer
4. Vogel's Qualitative Inorganic Analysis (17th Ed.): G. Svehla, Pearson Education
5. Chemistry for Environmental Engineering and Science: Calir N.Sawyer, Perry L. McCarty & Gene F. Parkin, Tata McGraw-Hill Publishing Company Ltd.
6. Standard Methods for the Examination of Water and Waste Water: American Public Health Association Inc., New York
7. Hand book of Advanced Waste Water Treatment: Russel L Culp and Gordan L Culp. Van Mostrand Reinhold Co. New York

**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.

*Asst. Prof.*

Course No. GEO-202  
Credits: 4  
Duration of examination: 3 hours

Agro-Irrigation Engineering  
Maximum Marks: 100  
Semester Examination: 100

**Unit - 1**

1. Irrigation techniques and quality of irrigation water
2. Water requirement of crops, soil moisture- irrigation relationship
3. Water resources utilization and irrigation development
4. Investigation and preparation of irrigation projects

**Unit -2**

1. Measurement of water, water logging and land reclamation
2. Causes and control of water logging, improvement of irrigation efficiencies
3. Canal irrigation system, design of irrigation channels
4. Surface and sub-surface drainage, estimation of crop water requirement, estimation of irrigation water requirement, scheduling irrigation

**Unit - 3**

1. Agronomy and agro-ecosystem, soil and its composition, crop productivity
2. Climate and climate zoning, soil fertility and fertilizer, plant-water relation
3. Soil and water conservation
4. Distribution system for canal irrigation, canal capacity, canal losses

**Unit -4**

1. Alignment of main and distributory canals, most efficient section, lined channels their design, regime theory,
2. Critical shear stress, bed load and suspended load.
3. Transport cost, analysis of lined and unlined canals, drainage behind lining
4. Lining of irrigation lands including definition and types, economics of lining

**Unit - 5**

1. Canal structures: Design of regulation, cross drainage and communication works
2. Cross regulators, head regulators, canal falls, aqueducts, metering, flumes and outlets
3. Diversion head works, Principles of design of weirs on permeable and impermeable foundations.
4. Khosla's theory of energy dissipation, silting basins, sediments exclusion, storage works

**Practicals**

**Determination of following parameters**

1) Dissolve Oxygen (D.O.), 2) Bio-chemical Oxygen Demand (B.O.D.), 3) Chemical Oxygen Demand (C.O.D.), 4) Turbidity, 5) Sulphate, 6) Phosphate, 7) Chloride, 8) pH Value, 9) TSS (Total Suspended Solid) & TDS (Total Dissolved Solid), 10) Electrical Conductivity

**Books recommended**

1. Irrigation Water Management (Principles and Practice): Dilip Kumar Majumdar
2. Irrigation Engineering & Hydraulic Structure: Santosh Kumar Garg
3. Irrigation Engineering: R. K. Sharma and T. K. Sharma
4. Irrigation Theory & Practice: A.M. Michael
5. Irrigation Engineering: Asawa

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*Asawa*

Course No. GEO-203  
Credits: 4  
Duration of examination: 3 hours

Soil Mechanics and Foundation Engineering  
Maximum Marks: 100  
Semester Examination: 100

**Unit - 1**

1. Soil composition, influence of clay minerals on engineering behaviour
2. Effective stress principles, change in effective stress due to water flow conditions
3. Static water table and steady flow conditions
4. Permeability and compressibility of soils

**Unit - 2**

1. Strength behaviour of soils, strength determination through direct and triaxial tests
2. Total and effective stress strength parameters of soils
3. Total and effective stress paths
4. Methods of site exploration, planning a sub-surface exploration programme

**Unit - 3**

1. Sampling procedures and sampling disturbance
2. Penetration tests and plate load tests and data interpretation
3. Foundation types and selection, footings, rafts and piles
4. Floating foundations, effect of footing shapes and dimensions

**Unit - 4**

1. Depth of embedment load inclination and ground water on bearing capacity of soils
2. Settlement components, computation for immediate and consolidation settlements limits on total and differential settlement correction for rigidity
3. Deep foundations, philosophy of deep foundations, piles, estimation of individual and group capacity
4. Static and dynamic approaches, pile load tests, separation into skin friction and point bearing under-reamed piles.

**Unit - 5**

1. Well foundations for bridges and aspects of design
2. Earth pressure, states of plastic equilibrium
3. Cullman's procedure for determination of lateral, thrust determination of anchor force and depth of penetration.
4. Reinforced earth retaining walls: Concept, materials and applications

**Practicals**

1. Determination of Atterberg' Limits
2. Determination of permeability, porosity
3. Field tests of soils

**Suggested Text Books and References**

1. Lambe and Whitman - Soil Mechanics.
2. Means and Parcher - Physical properties of soils.
3. Bowles - Soil Mechanics
4. Chem - Foundations on expansive soils.
5. R. K. Katti- Behaviour of saturated expansive soil
6. Alam Singh - Soil Engineering.

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*C. Srinivasan*

Course No. GEO-204  
Credits: 4  
Duration of examination: 3 hours

Hydel Power Engineering  
Maximum Marks: 100  
Semester Examination: 100

**Unit – 1**

1. Theories of seepage, wave theory
2. Dams and barrages
3. Design of weirs & barrages
4. Danfs in general – types & selection

**Unit – 2**

1. Designing of reservoir capacity with capacity-elevation & area-elevation curves of a reservoir site
2. Design & construction of gravity dams
3. Water conveying channels and structures
4. Penstocks, water hammer and surge tanks

**Unit – 3**

1. Gates in hydraulic installations
2. Spillways, river training and control works
3. Wind generated waves
4. Shallow and deep water waves,

**Unit -4**

1. Storm surges, harbour resonance
2. Hydraulic loading on structures – static and dynamic effects
3. Codes of practice, design and construction of offshore structures
4. Water for hydroelectric generation, tidal power – principle, components, ebb-cycle, tide-cycle, estimate of energy & power

**Unit – 5**

1. Principles of rigid gravity and earth dams stability analysis, foundation treatment of joints and galleries
2. Control of seepage construction methods and machinery
3. Spillways: Types, crest, gates, energy dissipation
4. River training, objectives of river training, methods of river training

**Practicals**

Estimation of Reservoir capacity by:

- a. Capacity-elevation curves
- b. Area-elevation curves

**Books recommended**

1. Hydraulics in Civil and Environmental Engineering: Andrew Chadwick, John Morfett and Martin Borthwick
2. Engineers for Dams: Creezer, Justin and Hinds (Vol.I, II, III)
3. Designing of Dam Percolation and Erosion: S. Leliavsky
4. Concrete Dams: R.S. Varshaney
5. Hydraulic Structure, Vol. I & II: M. M. Grishin
6. Water Power Engineering: Dandekar & Sharma

**Note for paper setter**

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*Besant*

**Course No. GEO 205**  
**Credits: 4**  
**Duration of examination: 4 hours**

**Practicals**  
**Maximum Marks: 100**  
**Internal Examination: 50**  
**External Examination 50**

This practical test shall consist of practical work of the courses: GEO-201, GEO-202, GEO-203 & GEO-204. 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

**Course No. GEO 206**  
**Credits: 4**

**Field Work**  
**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

*Chandran*