INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY-HYDERABAD

MID-SEMESTER 1 EXAM, Spring 2019

TIME: 1hr 30min

Hydroinformatics

Marks: 50

1. Explain in detail the challenges involved in development of a decision support system for watershed landscape given that alternative systems for government and land owners, planners, policy and decision making [10]
2. Explain in detail the vector and raster data and how you can represent a real river basin system with digitized information. [10]
3. Explain your understanding towards the river basin systems and how GIS can be useful in watershed delineation. [10]
4. Explain the scope of Hydroinformatics in solving water related issues, with an example problem. [10]
5. How you use various GIS data layers in analyzing the water availability and demands at various scales: River basin to city water supply. [10]

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MID-SEMESTER 2 EXAM, Spring 2019

TIME: 1hr 30min

Hydroinformatics

Marks: 80

Answer All Questions

1. (a) Explain your understanding towards timber line problem of Indian Himalayan region under climate variability [10]

(b) The possible ways of assessing the variations over latitude, longitude, elevation. precipitation and temperatures data of Sikkim, Himachal Pradesh, Uttarakhand and along the entire timber line stretch of Himalayan region. [10]

2. (a) Explain the spatial data information processing in the context of a river basin scale [10]

(b) Explain how to study the spatial and temporal variability of water availability using river basin information [10]

3. (a) Explain your understanding towards various forms of droughts and how to integrate various climate and hydrological information in drought decision making. [10]

(b) What are the challenges involved in the synthesizing of various forms of data in drought prediction and early warning system development [10]

4. (a) Explain how machine learning algorithms can be applied in drought prediction in terms of step by step procedure with an example of a drought index. [10]

(b) Explain how data driven models can be integrated in drought prediction in terms of feature selection for clustering, input rules for training and testing of the prediction model. [10]

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END-SEMESTER EXAM, Spring 2019

TIME: 3hrs

Hydroinformatics

Marks: 100

Instructions

Answer All Questions

1. Explain in detail the vector and raster data and how you can represent a real river basin system. [10]
2. Explain climate prediction model in terms of predictors, predictands and transfer function along with various types of climate prediction models [10]
3. Explain your understanding towards various forms of droughts and how to integrate various climate and hydrological information in drought risk assessment and decision making. [10]
4. How data driven models such as regression and clustering can be helpful in solving various water related issues with two examples. [10]
5. (a) Over a river basin of South India, about 10 rain gauge network, the rainfalls recorded as 132, 114, 162, 138, 207, 156, 135, 158, 168, and 150 mm. The area weights assigned for these gauges as 0.1, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06, and 0.10 respectively. In the analysis of basin water availability study need to know the basin rainfall. If 35% of the rainfall is lost due to evaporation, then estimate the spatial averaged water availability of the basin [7]

   (b) Explain various spatial interpolation methods to get basin averaged Hydroinformation [3]
6. What is NDVI? Explain how is it generated? Explain why NDVI is essential? Explain in detail how NDVI can be used to study drought conditions in an area. Use a scenario and example graphs to explain the relationship between NDVI and drought. [10]

7. Explain the importance of a watershed? Step involved in watershed delineations using cartography maps and remote sensing data? A sample DEM data is given to you, delineate the watershed around a stream using this data? Extract the stream length for the accumulation threshold greater than 4? Take each cell/pixel side as 1 unit. [10]

156	144	138	142
148	134	112	98
138	106	88	74
128	116	110	44

8. A water distribution system has to be developed for a city water supply. Prepare a detailed framework explaining for the collection of Hydroinformation and integrated approaches to develop a system of city water supply accounting for the future demands. [10]

9. Define Hydroinformatics and explain the integration of information and decision making of water and climate related issues with the help of a flow chart. [10]

10. Define the problem statement of your project and explain how you have resolved it. What are the challenges involved in solving the problem and future scope of the problem? [10]