
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2008/2009

November 2008

EAD 513/4 – Hydroinformatics

Duration: 3 hours

Please check that this examination paper consists of SEVEN (7) pages of printed material including appendix before you begin the examination.

Instructions: Answer **FOUR (4)** questions. All questions carry the same marks.

You may answer the question either in Bahasa Malaysia or English.

All questions **MUST BE** answered on a new sheet.

Write the answered question numbers on the cover sheet of the answer script.

1. (a) Name **THREE (3)** GIS themes and **TWO (2)** types of periodical data required for the development of a SWAT project.

[5 marks]

- (b) Briefly describe **THREE (3)** types of database (DBF) files need to be prepared prior to the development of a SWAT project

[6 marks]

- (c) With the data above, explain the processes involve in the development of a new SWAT project.

[14 marks]

2. (a) Discuss on **FIVE (5)** typical applications of Stormwater Water Management Model (SWMM).

[6 marks]

- (b) Stormwater Management Model (SWMM) conceptualizes a drainage system as a series of water and materials flows between several major environmental compartments. Briefly discuss **FIVE (5)** of those compartments.

[6 marks]

- (c) Give **NINE (9)** principal input parameters for sub-catchment in Stormwater Management Model (SWMM) and outline the effect of each input parameter to the generation of surface runoff.

[13 marks]

3. (a) Describe the rainfall – run off modelling for HEC - HMS model?

[8 marks]

- (b) Explain 2 methods for transformation of effective rainfall to direct run-off hydrograph in HEC- HMS model?

[8 marks]

(c) Explain 3 methods for reach routing for HEC-HMS model?

[9 marks]

4. (a) Describe the calibration and validation procedure for rainfall - run off modeling and also explain the indices that can be used to measure the goodness - of - fit for simulated and observed hydrographs?

[15 marks]

(b) Describe **THREE (3)** approaches to estimate the base flow in HEC – HMS model?

[10 marks]

5. (a) List the processes for designing river modification works using mathematical model

[5 Marks]

(b) Hec-RAS is able to perform one-dimensional steady flow, unsteady flow, and sediment transport/ moveable computation. List the required data input for each type of simulation and also for hydraulic design of a culvert.

[5 Marks]

(c) Use figures shown in Appendix A, describe the processes involved to perform steady flow analysis of the river system in Figure 1.

(15 Marks)

Junction Data

Junction Name: **Computation Mode**
 Energy
 Momentum
 Add Friction
 Add Weight

Description:

Length across Junction Reaches	Junction Length (m)	Tributary Angle (Deg)

Select Junction to Edit:

Plate 4

Steady Flow Data

File Options Help

Enter/Edit Number of Profiles (25000 max):

Locations of Flow Data Changes

River:

Reach: River Sta.:

Flow Change Location			Profile Names and Flow Rates	
River	Reach	RS	PF 1	
1	1	12		

Plate 5

Steady Flow Boundary Conditions

Set boundary for all profiles Set boundary for one profile at a time

Available External Boundary Condition Types

Selected Boundary Condition Locations and Types

River	Reach	Profile	Upstream	Downstream
1	1	all		Junction=J
2	1	all		Junction=J
3	1	all	Junction=J	

Enter to accept data changes.

Plate 6

APPENDIX A

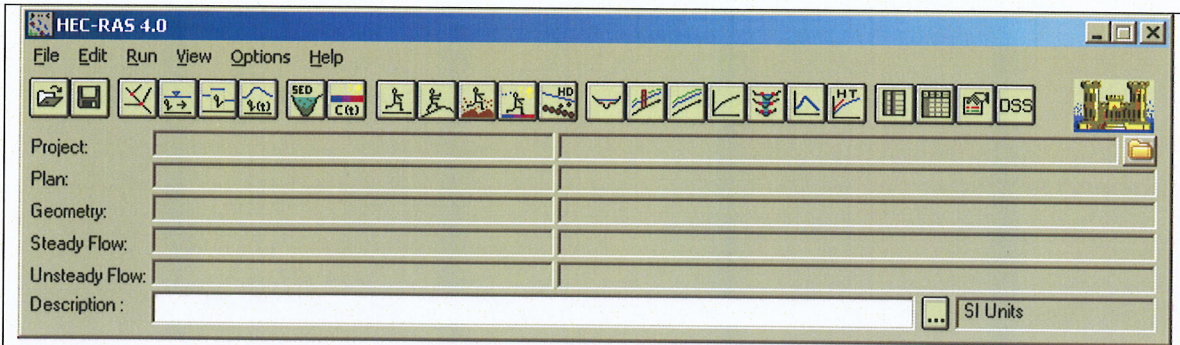


Plate 1

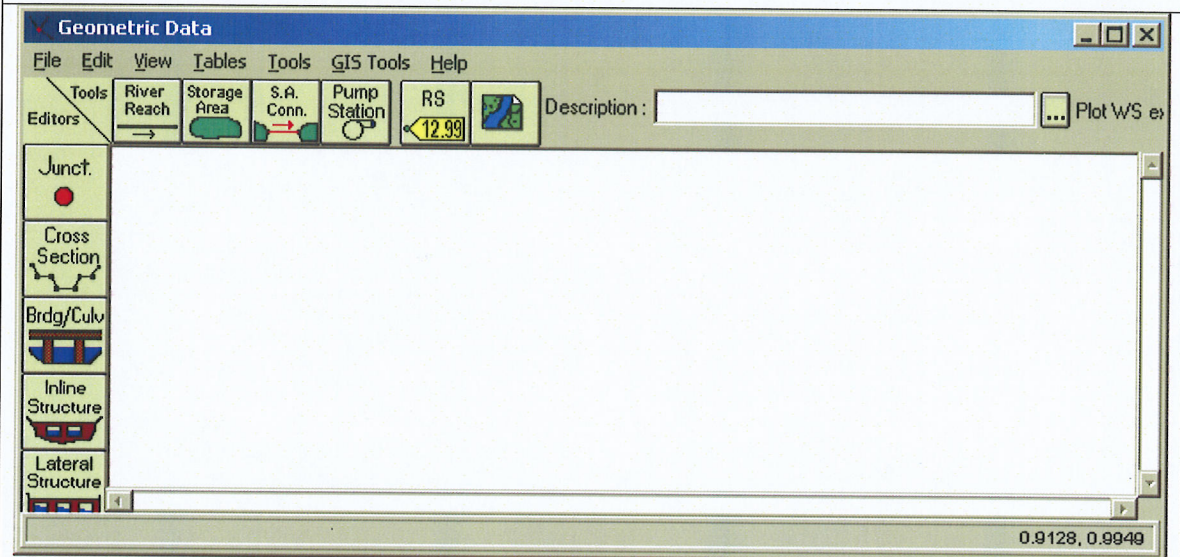


Plate 2

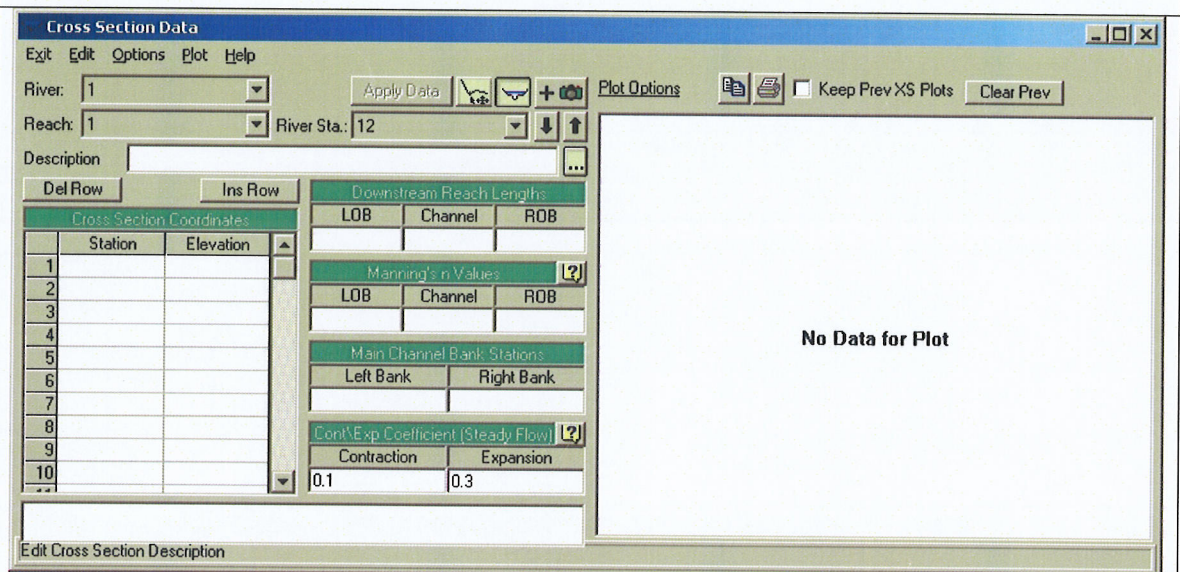


Plate 3

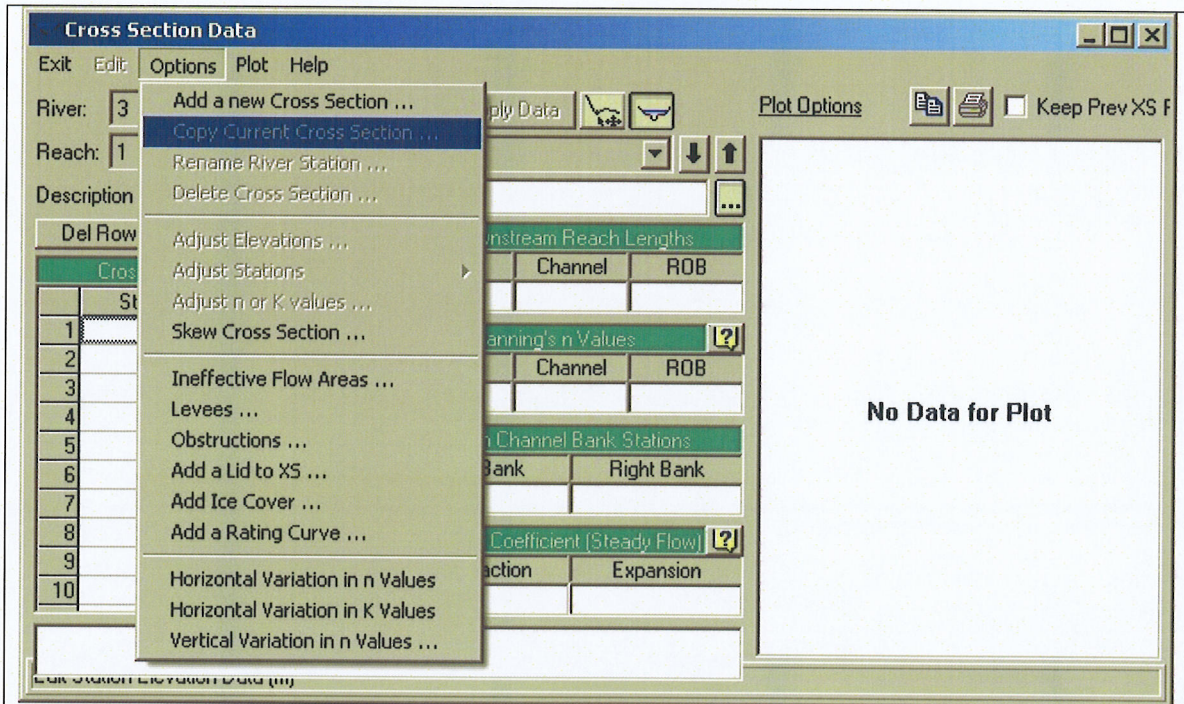


Plate 7