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)

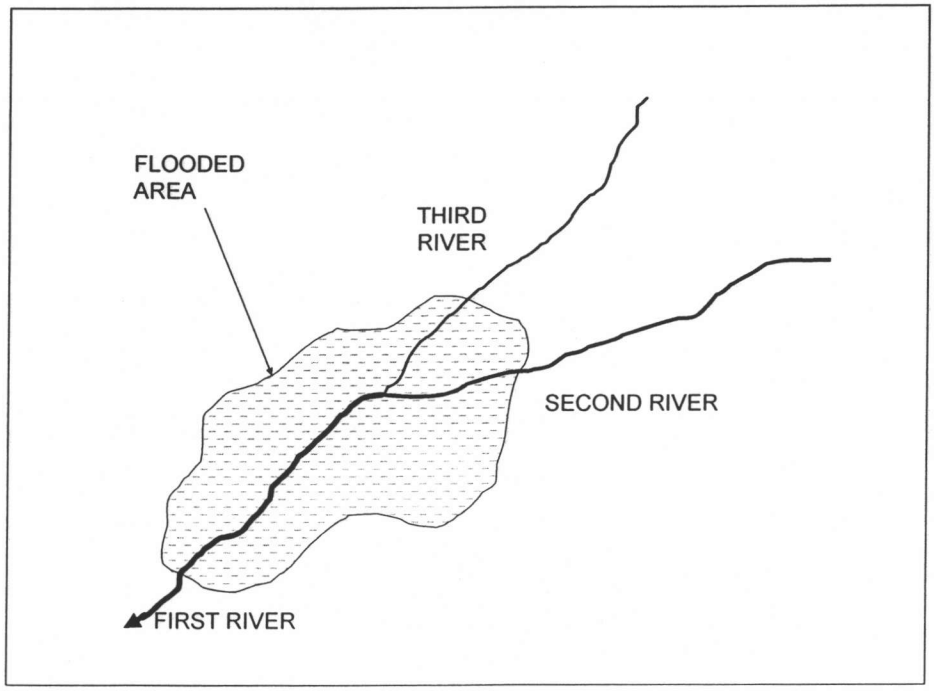


Figure 1

- ooo OOO ooo -

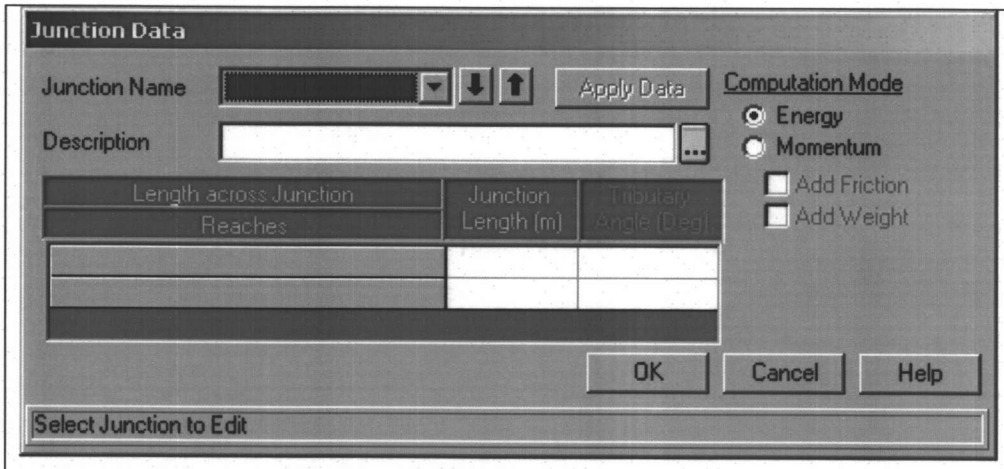
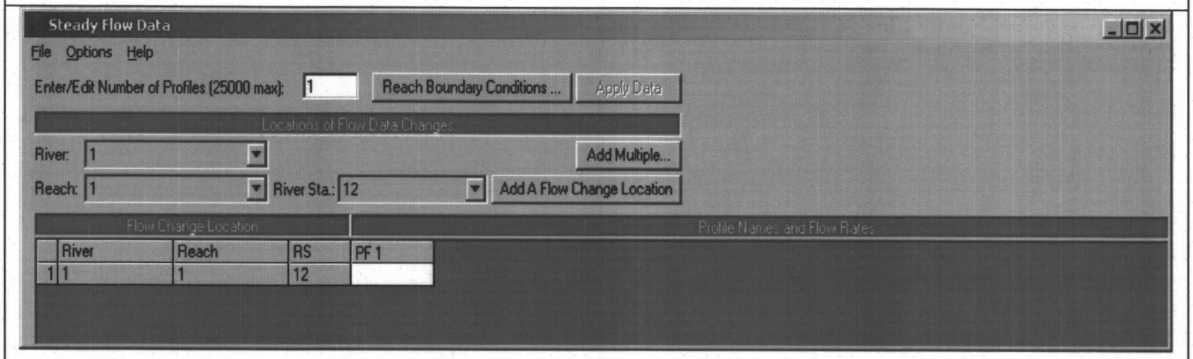


Plate 4



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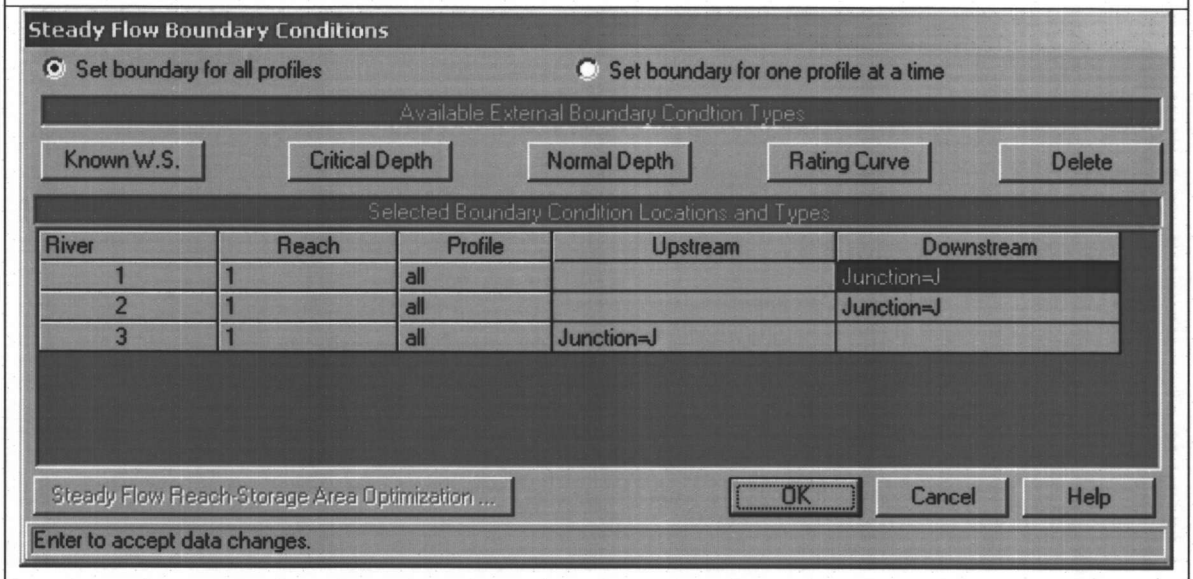

Plate 6

APPENDIX A

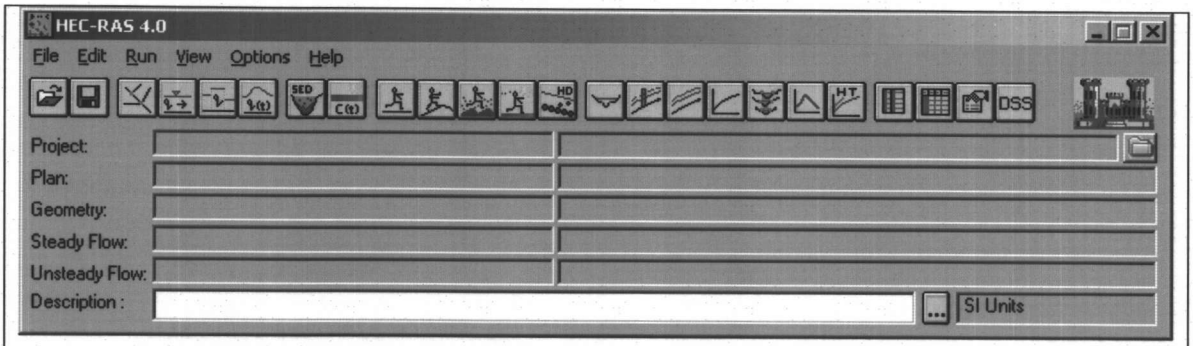

Plate 1

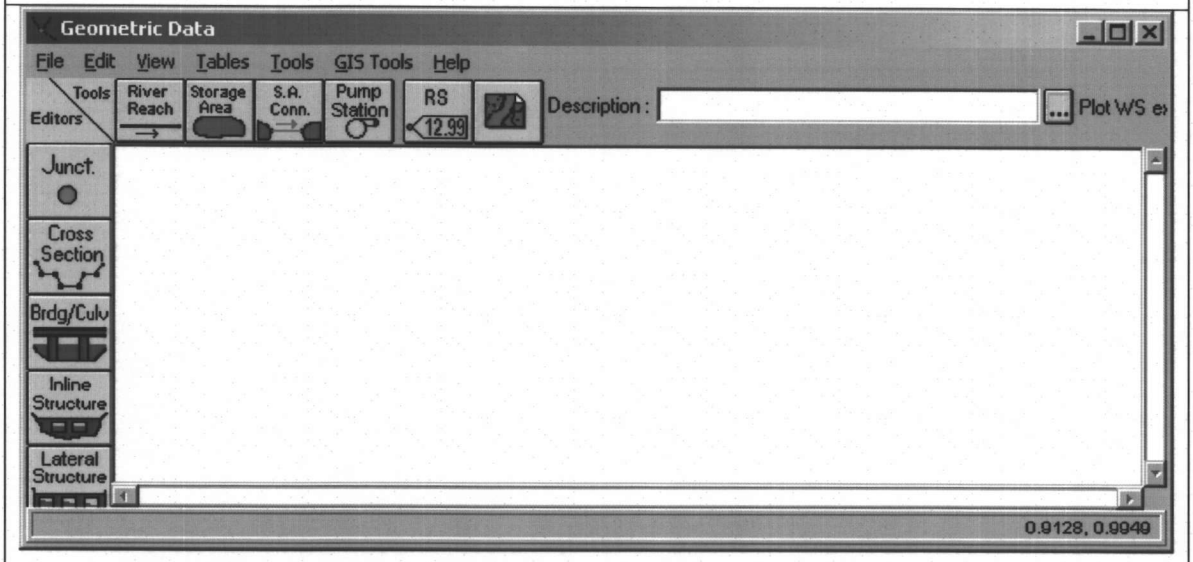

Plate 2

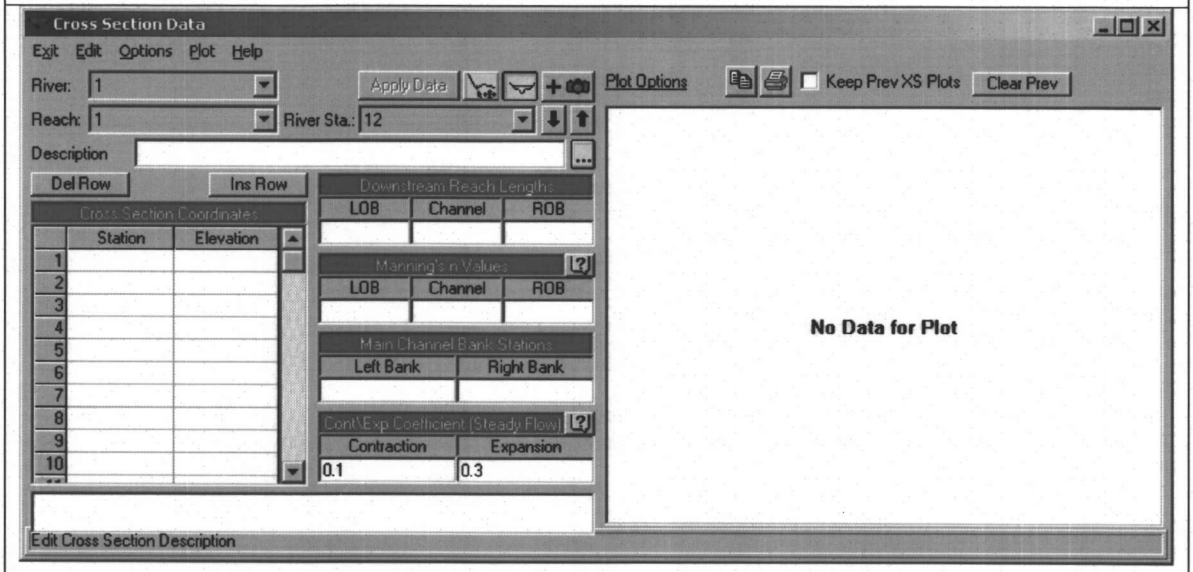

Plate 3

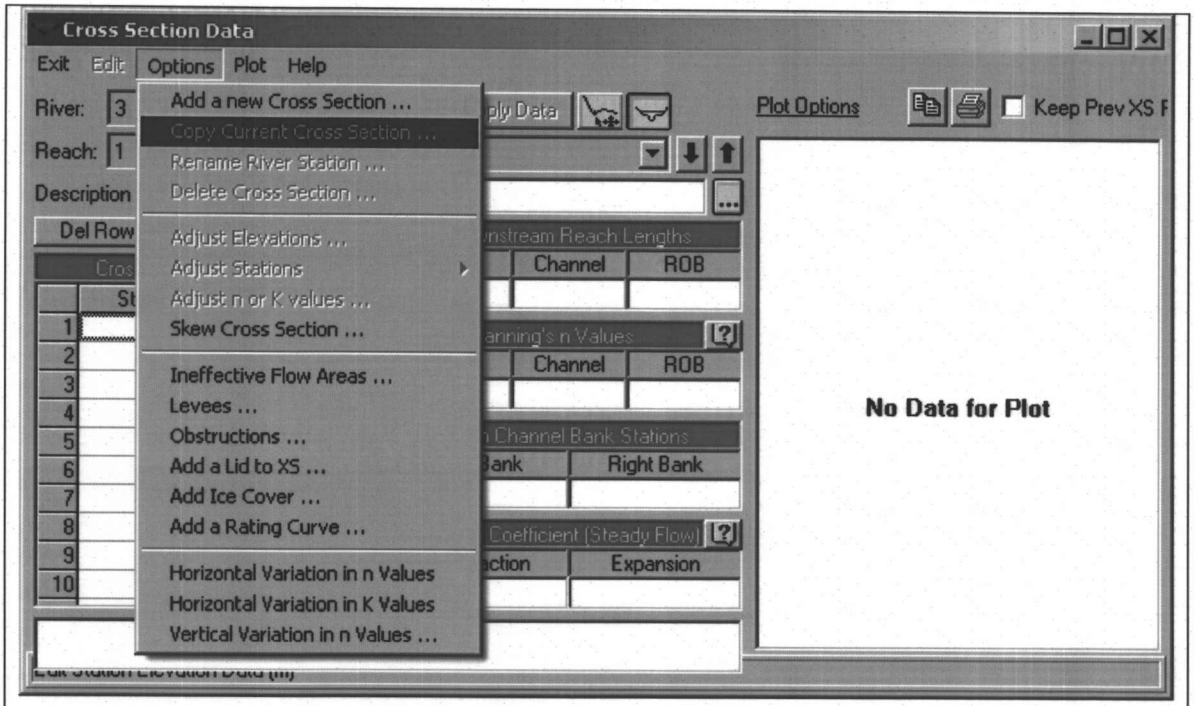
Cross Section Data
Exit
Edit
Options
Plot
Help
River:
Reach:
Description
Del Row
Add a new Cross Section ...
Copy Current Cross Section ...
Rename River Station ...
Delete Cross Section ...
Adjust Elevations ...
Adjust Stations
Adjust n or K values ...
Skew Cross Section ...
Ineffective Flow Areas ...
Levees ...
Obstructions ...
Add a Lid to XS ...
Add Ice Cover ...
Add a Rating Curve ...
Horizontal Variation in n Values
Horizontal Variation in K Values
Vertical Variation in n Values ...
Channel
ROB
Right Bank
Expansion
Plot Options
Keep Prev XS
No Data for Plot

Plate 7