**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examinations – June 2016**

**Subject Title: COMPUTATIONAL METHODS AND TECHNIQUES Time : 3 hours**

**Subject Code: 14CE3030 Maximum Marks: 100**

**Answer ALL questions (5 x 20 = 100 Marks)**

1. a. Derive forward, backward and centered difference scheme using Taylor’s series. (10)

b. The buildup of the concentration C in a lake due to a new step waste load input can be described by the following equation dc/dt + 1.23C = 2.0. The initial concentration of the waste material in the lake = 0. Solve the ODE using Euler’s method and compare with midpoint scheme of Runge Kutta second order. Find out the error. Take the step size as 0.05 year. (10)

**(OR)**

2. a. An experiment is conducted to determine the Freundlich isotherm parameters for sorption

of tetrachloroethylene onto a particular soil sample. Written using conventional notation

the Fruendlich equation is q=KFCn. The data are shown in the table below. Estimate the model parameters. (15)

|  |  |
| --- | --- |
| C | q |
| 9.99 | 0.512 |
| 21.6 | 0.435 |
| 44.9 | 2.2 |
| 102.3 | 2.37 |
| 216.1 | 5.04 |
| 463.5 | 11.6 |
| 986 | 19.9 |
| 2130 | 22.4 |
| 4538 | 140 |
| 9852 | 122.9 |

b. Explain with an example how regression and correlation can be applied in the field of water resources management. (5)

3. a. Write short notes on

i. Data reduction technique (3)

ii. Scree plot and Kaiser criterion (3)

iii. Correlation matrix in Factor analysis (3)

iv. Extraction method (3)

v. Rotation methods (3)

b. How histogram and scatterplot can be applied in data analysis with an example? (5)

**(OR)**

4. a. Explain with an example how Database Management is helpful in water resources problems. Mention its advantages and limitations. (12)

b. What is SPSS? And list down its applications. (3)

c. Mention different type of relationship with tables in RDMBS with example. (5)

5. How Fuzzy logic can be applied in Integrated Water Resources Management?

**(OR)**

[P.T.O]

6. Present a case study where neural network can be used in prediction and forecasting of rainfall.

7. Describe in detail about how SWAT model can be applied in rainfall runoff modeling. Explain how the calibration is done.

**(OR)**

8. Explain in detail about the principles involved in Groundwater flow and transport modelling. How the initial and boundary conditions are assigned in MODFLOW? How the groundwater flow and contaminant transport can be simulated in MODFLOW.

**Compulsory:**

9. a. Explain the different types of models with examples? List down all the steps involved in modelling. (12)

b. How the verification and validation of model is done? (4)

c. What is sensitivity analysis? (4)