## **Table of Contents**

		4
1	INTRODUCTION	1
_	Background	2
1.2	Study Objectives	2
2.2 2.3 2.4	1 B A - 41- a al	3 3 3 5 11 11 12 12 13
	METHODOLOGY	14
3.1		14
3.1	Unit Hydrograph for Wadi Fara'a Catchment	16
3.3		17 17
	Painfall Analysis	18
3.5	Runoff Analysis and Unit Hydrograph Development	
	ANALYSIS OF RAINFALL DATA	19
	1 Introduction	19
4.		20
7.4	4.2.1 Spatial Homogeneity	24 26
	4 2 2 K-Day Analysis of Rainfall Data	27
	4.2.3 Analysis of Extremes and Exceedances	31
4.	3 Monthly Rainfall Data	34
	4.3.1 Data Completion Through Linear Regression	36
	4.3.2 Double Mass Analysis	39
4	4.3.3 Frequency Distribution  4 Yearly Rainfall Data	44
4	4 4 1 Spearman's Rank Correlation	45
	A A 2 F-test for the Stability of the Variance	46 47
	A A 3 Student's t-test for stability of the mean	48
4	5 Just a point, Duration Frequency (II)F) Curves	49
	4.5.1 Development of the IDF Curve for Bell Dajah Station	55
	4.5.2 Explanation of Results and Conclusions	
5	5 SYNTHETIC UNIT HYDROGRAPH DEVELOPMENT Development of a Model for the Catchment Using GIS 5.1.1 DEM Development 5.1.2 Catchment's Characteristics	<b>56</b> 56 60
	- Combotic Unit Hydrograph Development	71 71
	5.2.1 Snyder Synthetic Unit Hydrograph Development	71

	<ul><li>5.2.2 SCS Synthetic Unit Hydrograph Development</li><li>5.2.3 Clark Instantaneous Unit Hydrograph</li></ul>	75 77
5.3	Excess Rainfall Estimation by the SCS Curve Number Method (SCS-CN)	80
5.4	Storm Selection and Application of the Developed Synthetic Unit Hydrographs	83
6	DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS	94
6.1	Discussion and Conclusion	94
6.2	Recommendations	96
	REFERENCES	98
	ANNEX A	101
	ANNEX B	135