



University Of Technology
Building and Construction Eng. Dept.
Final Exam –1st Attempt – 2013/2014
Subject :Management And
Economic of Water Resources
Branch : Dams and Water Eng.



Cass:4th Year
Time : 3 Hours
Date : 4/ 6/ 2014

Answer Five Questions Only and the Marks are equally divided

Q1: Answer the followings:

- What are the procedures which should be used to find the critical path in planning projects.
- Explain the characteristics which should be considered in system analysis .
- In the evaluation of water resources basin , special data must be collected . Explain them .

Q2: Three flood protections are to be allocated to avoid floods with unit of labors and materials as shown below:

Structures	Unit of Labors	Unit of Materials	Expected Protection
Reservoirs	2	3	300
Flood Plains	1	1	200
Levees	3	2	250
Available	25	50	----

Find the optimal protection by using simplex method .

Q3 : Two power stations are wanted to be used to supply energy. The function of cost in (BID) is given by the following relation:

$$C = 50A + 65B$$

where: (A , B) are the types of power stations.

This function is related to discharge , head of water , and the horsepower with the following restrictions:

- The discharge used is not more than (6 CUMS) and the two types used (2 , 3) CUMS respectively.
- The water head needed is not less than (16)m and the two types work on (6 , 8)m respectively.
- The produced horsepower is not less than (90)HP and the two types product (45,50) HP respectively.

Formulate and solve the problem to find the minimum cost ..

Q4: : A dam project was planning to find the optimal construction program. The project was divided into several activities as shown in table below:

Activity	Period (month)	Activity	Period (month)
1-2	4	4-7	12
1-3	10	5-6	6
2-4	8	6-8	4
2-5	7	7-9	13
3-4	4	8-9	8
4-5	6	*****	

The restrictions in this estimations contains:

1- The activity (3-4) begins after completing the activity (1-2).

2- The activity (7-9) begins after completing the activity (5-6).

Draw the diagram of planning the project and find the critical path, the early and later beginning of each activity in the project.

Q5: The Government of town (L) want to supply it with water from source (A). There are many pipe lines in the distance between them which are shown in table below :

Route		Cost	Route		Cost	Route		Cost
From	To	(\$)	From	To	(\$)	From	To	(\$)
A	B	800	B	F	500	H	K	200
B	E	300	C	E	500	E	G	200
A	C	700	J	L	400	G	J	200
B	D	400	D	H	400	E	H	200
C	D	600	G	I	100	H	I	600
C	F	300	D	G	800	F	H	400
F	G	200	G	K	400	H	J	300
K	L	800	I	L	600	-----	-----	-----

Draw the diagram of the suggested routes and find the route which gives the minimum cost .

Q6: The irrigation water is to be conveyed to agricultural land by three canals . The cost of the conveying in (BID) was related to the discharge passing across them as shown in the following equations:

$$C_1 = 105Q_1^{-1.5} , C_2 = 80Q_2^{-1.4} , C_3 = 120Q_3^{-1.3}$$

The restriction in this project that the total discharge must not exceed (100 CUMS) .

Find the optimal distribution in discharge of canals.

GOOD LUCK

1-1-4: (اقتصادياً)
الإعانة، التزويجية / الإعانة

Q-1

A-))

- 1- The project is divided into activities
- 2- The time for each activity will be estimated.
- 3- Find the sequence of each activity.
- 4- Draw the network drawing for the activities implementation.
- 5- Find the routes that will be possible in the project and calculate its time of implementation.
- 6- The critical path is the route of maximum time.

B-))

- 1- Sharpen the designer's awareness the his objective.
- 2- Provided mechanism and decision.
- 3- Establish procedures for various solutions.
- 4- Assemble optimization.

C-))

- 1- Agriculture : which contains:
 - * Land classification.
 - * Crop requirements.
- 2- Municipal need : includes:
 - * Industrial need.
 - * Domestic need.
- 3- Hydropower : include:
 - * Projected need
 - * Alternative sources
- 4- Flood control : includes:

- * Extend of damage
- * Local storm requirements.

5. Navigation: Contains:

- * Present of traffic Pattern
- * Alternative Sources.

6. Pollution: include:

- * Existing condition
- * Standard.

Q.2

Let: X_1 = reservoir
 X_2 = Flood plain
 X_3 = levees.

$$P = 300X_1 + 200X_2 + 250X_3$$

Subjected to:

$$2X_1 + X_2 + 3X_3 \leq 25$$

$$3X_1 + X_2 + 2X_3 \leq 50$$

$$2X_1 + X_2 + 3X_3 + S_a = 25$$

$$S_a = 25 - 2X_1 - X_2 - 3X_3$$

also $S_b = 50 - 3X_1 - X_2 - 2X_3$

	1	X_1	X_2	X_3
P	0	300	200	250
S_a	25	(-2)	-1	-3
S_b	50	-3	-1	-2

	1	S_a	X_2	X_3
P	3750	-150	50	-200
X_1	12.5	-0.5	(-0.5)	-1.5
S_b	12.5	-1.5	0.5	2.5

	1	S_a	X_1	X_3
P	5000	-200	-100	-350
X_2	25	-1	-2	-3
S_b	25	-2	-1	1

$\therefore X_2 = 25, X_1 = 0, X_3 = 0$

$P = 5000$, To check
 $P = 0 + 200 * 25 + 0 = 5000$
 $\therefore 0 < K$.