Masoura University | **4th Year civil Enineering**
Faculty of Engineering | **June 2012**
Irrigation and Hydraulic Dept. | **Time allowed: 2 Hours**

(Design of Irrigation Works III)

N.B.
- This examination is **open book** exam and the use of lectures notes and text books is permitted.
- Any missing data may be reasonably assumed
- Total mark : 50 marks.

Question. 1 **(12 marks)**

a) Discuss the different forces acting on gravity dam.

b) Discuss the environmental impacts of dams.

c) Discuss the classification of dams based on

(i) hydraulic criteria and (ii) stability criteria.

d) Why are spillways necessary in dams? Give a list for the classification of spillways.

e) Discuss the typical cycle of functioning of Syphon Spillway.

Question. 2 **(12 marks)**

a) Use the given annual inflow time series (Table 1) to calculate the long-term storage capacity of the reservoir.

b) Use the shown mass inflow curve (Figure 1) to calculate the annual storage capacity of the reservoir assuming that: the monthly demand is 18 million m^3, the accumulated inflow at the apices e and g are 466 and 675 million m^3 respectively and the accumulated inflow at f and i are 470 and 691 million m^3 respectively.

Question. 3 **(26 marks)**

a) Panchet dam was constructed across the Damodar River (India). It is mainly an earthen dam with a concrete gravity Ogee-shaped spillway in the river bed near the left bank. Determine the maximum flood discharge for the ogee gated spillway for following conditions:
   - Pier have rounded nose. Abutment radius = 5 m, and approach wall at 29°from flow axis,
   - Normal conservation level = 105.00 m,
   - maximum flood surcharge = 1.90 m,
   - Spillway crest level = 94.0 m,
   - Width of pier 2.44 m,
   - Width of bay 16.15 m,
   - Total number of bays 10,
   - Approach channel floor level = 87.0 m, length = 120 m.

b) Design a syphon spillway for the following data:
   - High flood discharge (Q) = 1050 m^3/sec,
   - Full reservoir level = (97.45) m,
   - High flood level = (98.85) m,
   - Level of center of the outlet = (91.90) m.

My best wishes

Prof. Dr. Mahmoud Elgamal
Dr. Samer Elabd

P.T.O.

Table 1

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inflow (million m^3)	165	200	204	189	199	197	187	150	202

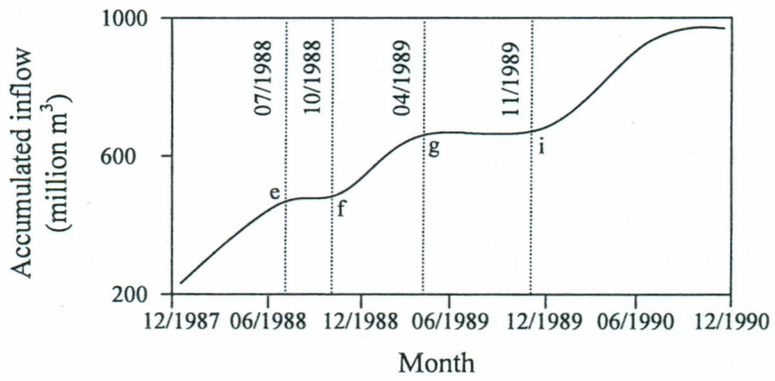

Figure 1