College of Engineering, Pune
End Semester Exam – April 2013
B. Tech. Civil
(CE 455)- Water Resources Planning and Management

Date- 29/04/2013   Time: - 2 pm to 5pm
Maximum Marks: 50   Duration – 3 hrs.

Instructions:
1. All questions are compulsory.
2. Draw neat figures wherever required.
3. Assume suitable data if necessary.
4. Use of scientific calculator is allowed.

Q.1	a)	Explain continuous hedging rule of reservoir operation.	02
	b)	Differentiate between (i) optimization and simulation (ii) Economic life and physical life	02
	c)	State merits and limitations of benefit- cost ratio method and internal rate of return method.	02
	d	Explain area increment method	02
	e)	State the various methods to estimate evapotranspiration and explain any one in brief.	02
Q.2	a)	Calculate the total energy potential , firm energy and secondary energy of a run-of river hydropower plant from the following data	05

Weekly Flow Duration Curve

% exceedence	10	20	30	40	50	70	90	100
Flow in cumecs	980	590	360	200	120	80	60	50

Take a constant head of 60m. Overall efficiency of generation is 0.85. The design turbine discharge is 350 cumecs. Also calculate installed plant capacity.

	b)	Explain the various steps involved in water resources planning.	05
Q.3	a)	Discuss about Inter-basin river water transfers in Indian rivers.	05
	b)	Carry out water balance of a reservoir from the following data: Reservoir capacity=100 MCM, Dead storage is zero and initial storage at the beginning of time period t=1 is 10 MCM	03

| t	Reservoir inflow	Reservoir evaporation	Water demand
1	200	5	45
2	20	15	60

c) A power project takes 4 years for construction. The contractor is paid Rs. 60 lac, Rs. 120 lac, Rs. 180 lac and Rs. 110 lac at the beginning of 1st year, 2nd year, 3rd year and 4th year, respectively. Calculate the total interest during construction at the rate of 4% annually.   02

Q.4 **a)** From spillway design flow in Fig. calculate the following: 05
  i) Flood control storage in cumecs-hour.
  ii) Maximum discharge from reservoir
  iii) Total outflow volume from reservoir in cumecs- hour
  iv) Total outflow volume from reservoir storage during depletion in cumecs-hr
  v) Time of peak discharge from reservoir
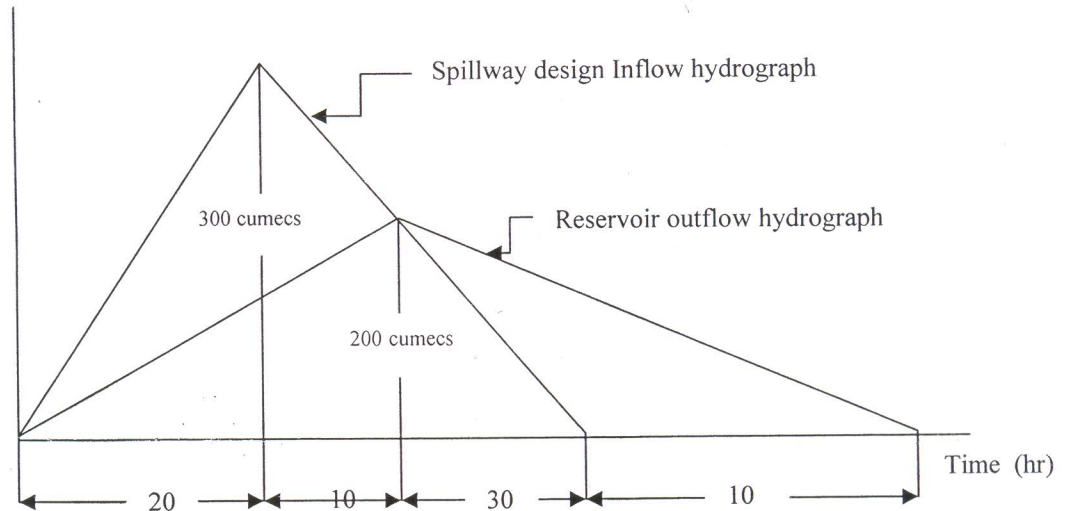
  b) The weekly load curve data is given below: 05
  Peak load = 450 MW, Average load = 300 MW

% energy of system	% peak of system
10	30
30	50

  At a hydroplant site, a firm flow of 210 cumecs with a constant head of 45m is available. Overall efficiency of plant = 0.80, calculate the hydroplant capacity, if the plant is placed (i) at the base of the load and (ii) at the peak of the load.

Q.5 **a)** Two crops are grown on a land of 200 hectare. The cost of growing crop 1 is 3 05 unit/ha, while for crop 2 it is 1 unit/ha. The benefit from crop1 is 5 unit/ha and from crop 2 is 2 unit/ha. A total of 300 units of money is available for growing both crops. Area of crop 1 should not exceed 45 hectare and crop 2 should occupy at least 100 hectare. What should be the cropping plan in order to maximize the total net benefit?

  b) In lift irrigation project a choice is to be made between two pumps, with details 05 given in Table. Which of these two pumps is economically superior at an interest rate of 8 %? Use present worth method of discounting.

Pump	Capital cost (Rs)	Annual OM cost (Rs)	Annual benefit (Rs)	Life (Yrs.)	Salvage value (Rs)
A	40000	6000	15000	10	6000
B	60000	5000	16000	15	8000

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