Code No.: 6327

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II Semester (Main) Examination, June 2010

WATER RESOURCES ENGINEERING AND MANAGEMENT – I

Time : 3 Hours] [Max. Marks : 75

Answer **all** *questions from* Part A.
Answer any **five** *questions from* Part B.
Khoshla's Charts are Permitted.

Part A – (Marks : 25)

1. List out importance of hydrologic cycle study in engineering.
2. Define unit hydrograph.
3. Differentiate between kor period and gross duty.
4. Explain briefly initial regime and final regime conditions in a alluvial canal.
5. Differentiate between weir and barrage.
6. Differentiate between super passage and aqueduct.
7. List out various disadvantages of unlined canal.
8. What is the need of farmers participation in water management?
9. What is meant by sustainable water resources management?
10. Define Warabandhi system.

Part B – (Marks : 50)

11. (a) Explain rainfall runoff process along with the importance of actual Evapotranspiration.

    (b) There are four rain gauges stations existing in the catchment of a river. The average annual rainfall values at these stations are 780, 520, 800 and 540 mm respectively.

        (i) Determine the optimum number of rain gauges in the catchment, if it is desired to limit the error in the mean value of rainfall in the catchment to 13%.

        (ii) How many more gauges will then be required to be installed.

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12. (a) Explain the following :

(i) leaky aquifer and perched aquifer

(ii) Explain Darcy's law and its assumptions

(iii) Storage coefficient of an aquifer and specific capacity of a well.

(b) The following data from an unconfined aquifer of area 2 Km^2 were given for a specific time period :

Rainfall in the area = 700mm

Aquifer water recharge = 10% of rainfall

Net decline in water level = 1.2m

Specific yield of the aquifer = 15%

Return flow from irrigation = $3 \times 10^5 m^3$

Assuming pumping withdrawal from the aquifer is the only loss, compute the total quantity of ground water pumped out from the unconfined aquifer.

13. (a) What is meant by duty, delta, flow duty and quantity duty?

(b) After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if

(i) Field capacity of the soil = 28%

(ii) Permanent wilting point = 13%

(iii) Density of soil = 1.3 gm/c.c

(iv) Effective depth of root zone = 70 cm

(v) Daily consumptive use of water for the given crop = 12 mm,

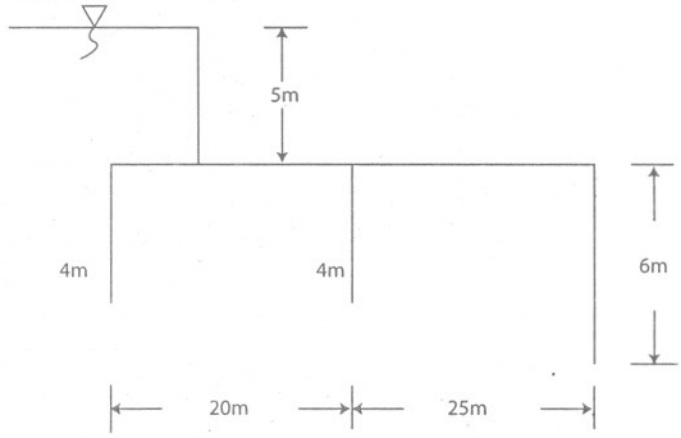
Assume any other data, not given.

14. (a) How will you justify economically the necessity of lining an existing canal? What additional benefits you will expect; if the canal to be lined is new and yet to be constructed.

(b) Design a concrete lined channel to carry a discharge of 250 cumecs at a slope of 1 in 5500. The side slopes of the channel may be taken as 1.5:1. The value of 'n' for lining is 0.015. Assume limiting velocity in the channel as 1.75 m/sec.

15. (a) Draw a neat sectional view of a weir showing the various parts. What is exit gradient? How does it affect the design of a weir?

(b) The line diagram of a cross drainage work (Barrage) is shown in Figure 1. Compute the seepage pressure at key points using Khoshla's method of independent variables. Also compute exit gradient. Assume thickness of flooring as uniform and 2.00m.



16. (a) Enumerate the various types of canal drops which have been used since olden days. Explain in detail the design principles governing any one of the modern types.

(b) Design the size number of notches required for a canal drop with the following particulars :

Full supply discharge = 4 cumecs

Bed width = 6.0m

F.S depth = 1.5m

Half supply depth = 1.0m

Assume any other data if required.

17. (a) Discuss Warabandhi system along with its advantages.

(b) Explain the following :

(i) Project formulation

(ii) Project evaluation