53 (CE 711) HYLG

2016

HYDROLOGY

Paper : CE 711

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***all*** *questions.*

1. Answer the following questions : 10×2=20

   (a) Describe the differences between the hydrograph and hyetograph.

   (b) What do you mean by stage hydrograph ?

   (c) Describe the Darey's law.

   (d) Describe the differences between aquitard and aquiclade.

   (e) What do you mean by radius of influence in well hydraulics ?

(f) What do you mean by flood routing?

(g) Write down the definition of cone of depression in well hydraulics.

(h) What do you mean by "lag time" and "time of rise" in unit hydrograph?

(i) Write down the definition of "control" in stage-discharge relationship.

(j) Write down the water budget equation in hydrological study.

2. (a) What are the methods to calculate average precipitation over an area? Describe in details *any two* methods among them.

(b) What are the manual gauges available for measuring stage of river? Describe all of them in details (draw the figures, if required). 10+10=20

3. (a) A catchment has six raingauges station. In a year annual rainfall recorded by the gauges are as follows:

Station	A	B	C	D	E	F
Rainfall *(cm)*	82·6	102·9	180·3	110·3	98·8	136·7

(i) Determine the standard error in the estimation of mean rainfall in the existing set of raingauges.

(ii) For a 10% error in the estimation of mean rainfall, calculate the optimum number of stations in the catchment.

(b) The peak of flood hydrograph due to 3-hour duration isolated storm in a catchment is 270 m^3/s. The total depth of rainfall is 5·9cm. Assuming an average infiltration loss of 0·3$cm/hour$ and constant baseflow of 20m^3/s, estimate the peak 3-hour unit hydrograph of the catchment.

If the area of catchment is 567Km^2 then determine the base width of 3-hour unit hydrograph by assuming it to be triangular in shape. 10+10=20

4. (a) Derive the governing equation of motion for homogeneous, isotropic, steady confined aquifer.

(b) A 45cm diameter well completely penetrates a confined aquifer of permeability 45m/day. The length of strainer is 20m. Under steady state of pumping the drawdown at the wall was found to be 3·0m and radius of influence was 300m. Calculate the discharge.

If the drawdown is increased to 4·5m then what will be the discharge ?

10+10=20

5. *(a)* What are the different phases of sediment transport ? Discuss in details each process.

(b) What do you mean by river training ? What are the general techniques for protecting the river bank ? Describe *four* techniques of them with appropriate figure. 10+10=20