Student Name: _____ SPRING 2016

CE 3354 Engineering Hydrology
Exam 3, Spring 2016 – CLOSED COMPUTER PORTION

Students should write their name on all sheets of paper. Students are may use printed notes and book excerpts to help answer questions. Students are **NOT** permitted to use laptops, tablets, phones to access the internet or communicate during the exam.

1. What is a hyetograph (as used in this class)?
   a) A record of rainfall rates (inches/hour) versus time.
   b) A record of cumulative rainfall depth (inches) versus time.
   c) A record of discharge rate (cubic feet/second) versus time.
   d) A and B
2. What is a hydrograph (as used in this class)?
   a) A record of rainfall rates (inches/hour) versus time.
   b) A record of cumulative rainfall depth (inches) versus time.
   c) A record of discharge rate (cubic feet/second) versus time.
   d) A and B
3. What is excess precipitation?
   a) The amount of precipitation that falls upon a watershed.
   b) The amount of runoff that is produced from a watershed.
   c) The equivalent depth of uniformly distributed precipitation.
   d) A and B
4. You have build a HEC-HMS model for a 150 acre watershed, comprised of a single sub-basin, using a composite curve number, and you wish to apply a constant rate rainfall. The use of a composite curve number implies which loss model?
   a) Initial Abstraction, Constant Rate model
   b) Green-Ampt Infiltration model
   c) Exponential Loss Rate model
   d) SCS Curve Number model

5. Hydrology is
   a) Study of the atmosphere, ocean, and surface waters
   b) The study of the occurrence, distribution, and movement of water above, on, and below the surface of the earth
   c) A study of the processes of evaporation, infiltration, and storage
   d) The study of the relationship between rainfall and runoff
6. The fundamental unit of hydrology is ?
   a) The rainfall depth
   b) The main channel length
   c) The main channel slope
   d) The watershed
7. An annual recurrence interval of 100-years is equivalent to an AEP of what percent?
   a) 1-percent.
   b) 10-percent.
   c) 50-percent.
   d) 100-percent.
8. In the rational equation, Q = CIA, the intensity, I, is
   a) the ratio of depth to the time of concentration
   b) the ratio of depth to watershed area
   c) the ratio of depth to storm duration
   d) the ratio of depth to watershed impervious cover

9. Figure 1 is a schematic diagram of a creek that penetrates a 3-meter thick confined aquifer. During a long drought the flow in the creek **decreases** by 1.1 cubic meters per second between two gaging stations along the creek located 6 kilometers apart. On the west side of the creek the hydraulic head contours run parallel to the bank of the creek and the contour levels decrease as one moves **away** from the creek at a rate of 0.0007 m/m. The head contours on the east side of the creek are also parallel to the creek and the levels decrease as one moves **towards** the creek at a rate of 0.0003 m/m.

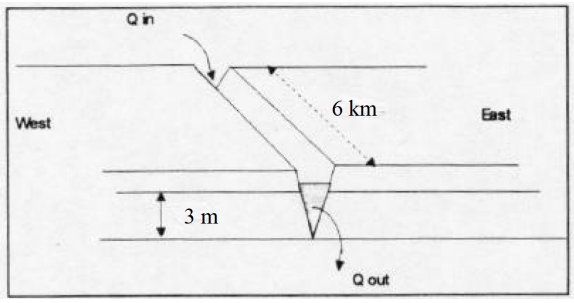

Figure 1: Dog Run Creek Schematic

a) Write a water balance for the **aquifer** in the vicinity of the creek.

b) Use Darcy's Law and the water balance to estimate the hydraulic conductivity of the aquifer.

10. During a drought period the following declines in the water table were recorded in an unconfined aquifer.

Table 1: Water Table Declines

Area	Size (mi2)	Decline (ft)
A	14	2.75
B	7	3.56
C	28	5.42
D	33	7.78

The total volume of water removed from storage in this aquifer during the time period was 5.7385×10^4 acre-feet. Estimate the specific yield of this aquifer.

11. Three wells monitor an aquifer as shown in Figure 2. The head in each well is listed in table 2 below. Determine the magnitude and direction of the hydraulic gradient in this aquifer.

Table 2: Moniotring Well Locations and Head

Area	Size (mi2)	Decline (ft)	
Well ID	X	Y	Head
#1	10	90	93.2
#2	20	5	88
#3	90	95	90

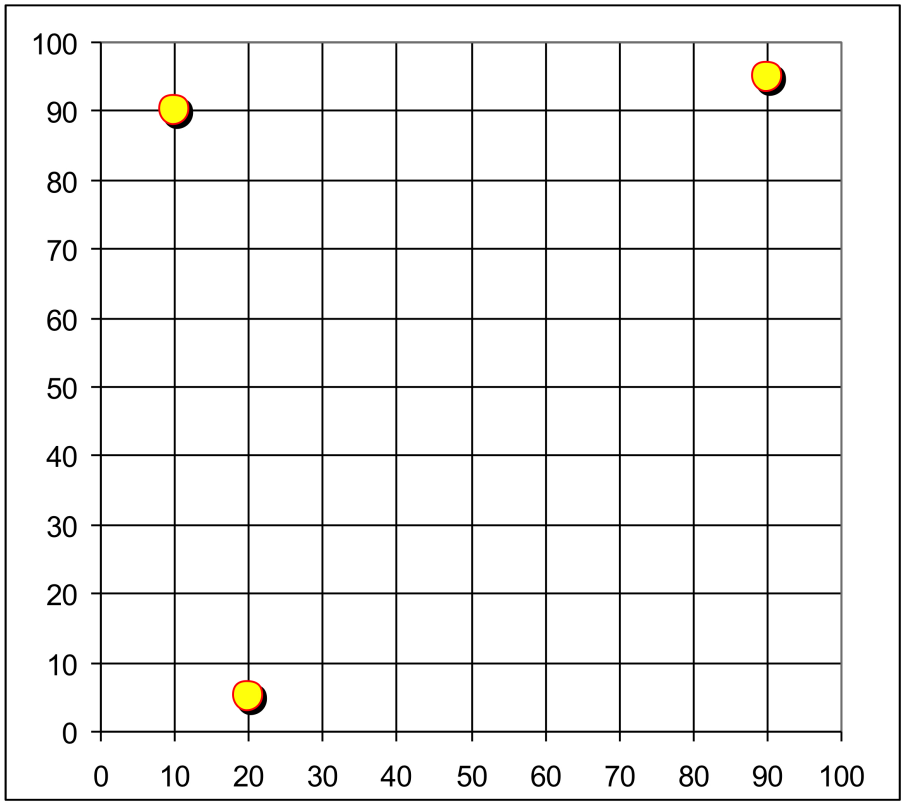

Figure 2: Map of well locations for Table 2

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12. Please complete the peer review form below; this is your assessment of your team-mates (and yourself) in regards to the project and its accompanying report. You may use the space below the form for additional comments.

	Team ID Number =			
	Member Name (include yourself)	Project Contribution	Grade you would assign?	Why?
1				
2				
3				
4				
5				

Figure 3: Team Review Form