UNIVERSITI SAINS MALAYSIA

Second Semester Examination
2009/2010 Academic Session

April/May 2010

RLD 512 – Hydrology and Watershed
(Hidrologi dan Kawasan Tadahan)

Duration: 2 hours
[*Masa: 2 jam*]

Please check that this examination paper consists of FIVE pages of printed material before you begin the examination.

Sila pastikan bahawa kertas peperiksaan ini mengandungi LIMA muka surat yang tercetak sebelum anda memulakan peperiksaan ini.

Students are allowed to answer all questions either in English OR Bahasa Malaysia only.

Pelajar dibenarkan menjawab semua soalan dalam Bahasa Inggeris ATAU Bahasa Malaysia sahaja.

Answer **ALL** questions.

*Jawab **SEMUA** soalan.*

In the event of any discrepancies, the English version shall be used.

Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai.

1. Initial pressure after the water meter is 2.8 bar (at a branch tee). A 25mm PVC 1120 Class 200 with internal diameter 30mm, 225 meter in length connect the branch tee to a tap in a garden. With the help of a drawing, determine the static water pressure at the tap.

(6 marks/*markah*)

2. What is the dynamic water pressure (bar) at the end of a 32mm schedule 40 standard steel pipe which is connected 220 meter away from a water tank if the end of the pipe is at an elevation 212 meter above sea level and the volume of water in the tank is 484 cubic meter. The water level inside the water tank is 300 meter above sea level and is flowing at 0.757 liter per second. (Assuming there is no friction loss in the pipe).

(8 marks/*markah*)

3. What is the residual pressure at a sprinkler head using 1.514 liter per second of water when the water has travelled 40 meter of 40mm PVC 1120 class 200 with initial pressure at the source is 4.8 bar.

(6 marks/*markah*)

4. Calculate the water flow rate the pump need to deliver and its pressure required?

   Design specifications:
   The pump is pumping up water from a lake with the water level 5.3 meter below the pump.
   19 nos. rotor pop-up sprinkler which require 0.23 l/s water flow, and 0.8 bar pressure each to operate.
   All piping used Class 200 PVC, distance is in meter.
   Assume pressure loss through all fittings are 10% of the total friction loss through piping.

(20 marks/*markah*)

5. Use the following information to calculate rainfall intensities for 5 year design ARI (minor systems) for Alor Star area. Draw Intensity-Duration Curve for 5 year frequency and identify the design rainfall intensity for Tc = 26 minutes from the curve.

Table 1: Coefficient of Polynomial Equation – Alor Star

State	Location	Date Period	ARI (year)	Coefficients of the IDF Polynomial Equation			
				a	b	c	d
KEDAH	Alor Setar	1951-1983	2	5.6790	-0.0276	-0.0993	0.0033
			5	4.9709	0.5460	-0.2176	0.0113
			10	5.6422	0.1575	-0.1329	0.0056
			20	5.8203	0.1093	-0.1329	0.0053
			50	5.7420	0.2273	-0.1481	0.0068
			100	6.3202	-0.0778	-0.0849	0.0026

Given:

$$\mathbf{Ln\ ({}^{R}i_t) = a + b\ ln\ (t) + c\ [\ ln\ (t)\ ]^{2} + d\ [\ ln\ (t)\ ]^{3}}$$

where ;

${}^{R}i_t$ = intensity (mm/hr) for ARI (R) and t duration

R = Average Recurrence Interval

t = duration (minutes)

Duration (minutes)	Fd
5	1.85
10	1.13
15	0.72
20	0.42
30	0

$$P_d = P_{30} - F_d\ (P_{60} - P_{30})$$

(20 marks/*markah*)

…4/-

6. Make an argument, using supporting evidence, that landslides is having a detrimental effect on sustainable development in Malaysia. Present at least Four (4) reasons to support your arguments. Then make a counter-argument refuting the evidence you presented.

   Indicate what you feel we should or shouldn't be doing politically and/or technologically about the problem.

   (20 marks/*markah*)

7. In laying out the road system for the watershed, discuss the following parameters of the basin.

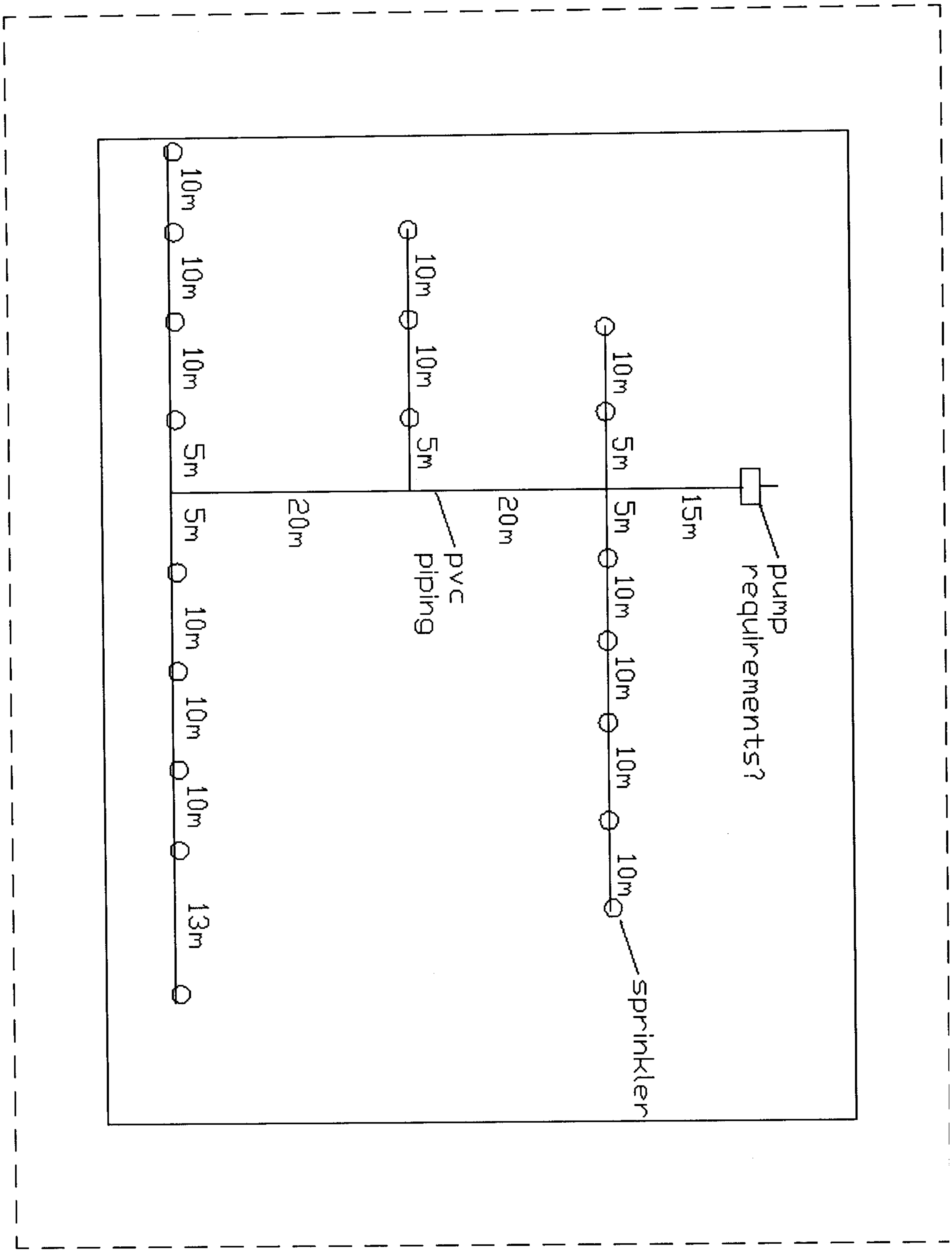
   (a) Stream orders using either Strahler's or Shreve's system.

   (b) Perimeter and area of the drainage basin.

   (c) Drainage density.

   (d) Stream types – effluent, influent, insulated, perched.

   (20 marks/*markah*)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