UNIVERSITY OF JOHANNESBURG

PROGRAM	:	BACHELOR DEGREE *Urban and Regional Planning*
SUBJECT	:	CIVIL ENGINEERING FOR PLANNING
CODE	:	CIPTRB1
DATE	:	SUMMER EXAMINATION 2017 21 NOVEMBER 2017
DURATION	:	(SESSION 1) 08:30 - 11:30
WEIGHT	:	50: 50
TOTAL MARKS	:	100

ASSESSOR	:	MR. J. OKAFOR
MODERATOR	:	MR. E. MAKONI
NUMBER OF PAGES	:	4 PAGES

INSTRUCTIONS

1. THIS IS NOT AN OPEN BOOK EXAM.
2. READ THE QUESTIONS CAREFULLY.
3. WRITE NEATLY AND LEGIBLY.
4. PLEASE ANSWER ALL QUESTIONS.

Question 1

1.1 Explain the three (3) types of soil zones in South Africa, why are they crucial in planning? (5)

1.2 Clarify the planning strategy of having trees and open spaces in built up areas. (5)

1.3 Geotechnical aspect is very crucial in planning, write briefly on this. (5)

1.4 Waste and sanitation are key parts in urban growth planning analysis, as planners, explain how these apply. (5)

TOTAL FOR QUESTION 1 – 20 MARKS

Question 2

2.1 Township roads development is generally governed in terms of layout design and conflicting interests, explain how this works. (10)

2.2 Describe storm water and explain its importance during development. What lessons can be learnt from storm water management by planners? (10)

TOTAL FOR QUESTION 2 – 20 MARKS

Question 3

3.1 South African electricity generation mainly is by thermal power and hydro-power plant generation. Briefly state how these apply in electricity production. (5)

3.2 The functioning of water supply chain to settlements depends on various institutions amongst which are these below. Therefore, explain the responsibility of these units. (5)
a. Department of water affairs and forestry **b**. Rand Water **c**. Local authorities

3.3 What is traffic impact assessments and why has it become a significant element of many planning processes? (10)

TOTAL FOR QUESTION 3 – 20 MARKS

Question 4

4.1 How do transformer types work in power distribution to developments? (5)

4.3 Explain very briefly the main principle of road layout hierarchy. (5)

4.3 Draw and label full cloverleaf. State one advantage and disadvantage of this engineering provision. (10)

TOTAL FOR QUESTION 4 – 20 MARKS

Question 5

5.1 With clear diagram, show the combined pumping station and gravity feed water supply engineering design. What is its main benefit in water supply chain? (5)

5.2 The length of a trench excavation for water supply pipelines for a new development measures **10.011 km** in total. The average width of the trenches is **22.08 mm** and the average depth is **2.15 m**. What volume of the material measured in **m^3** had to be excavated? Leave your answer in three decimal places (5)

5.3 It is anticipated that an altogether new residential /light industrial development will consist of the following types of development by the year 2022

- A central CBD of 8ha
- A commercial area of 4ha
- A light industrial area of 5ha
- A population of 10 000 persons at an average density of 30 persons /ha
- Two-day schools occupying 4ha together
- A hospital with 60 beds
- A garage occupying 2ha

Using the design guidelines provided with this paper and assuming, that they are applicable to the year 2022:

a. Calculate the average daily water demand of the whole development
b. Calculate the summer peak water demand of the whole development in ℓ /s. (10)
Use peak factor of 1.5. maximum summer peak factor = 4.5; (1000 ℓ = 1K ℓ =$1m^3$)

TOTAL FOR QUESTION 5– 20 MARKS

TOTAL: 100 MARKS

Annexure

DESIGN GUIDELINES FOR WATER SUPPLY

1. GENERAL

1.1 *Definitions*

An *equivalent erf* is a unit that uses 1000ℓ water per day on average. This unit is not related to the size of the erf.

2. DESIGN STANDARDS – PIPES

2.1 *Average daily demand*

Agricultural holdings		
- Undeveloped	:	2,25kℓ/bruto ha/day
- Developed areas already subdivided	:	2,25kℓ/holding/day
- Developed areas not yet subdivided	:	4,5kℓ/holding/day for one possible subdivision 6,75kℓ/holding/day for two possible subdivisions
Residential		
- Density 30 persons/ha	:	400ℓ/person/day = 12kℓ/ha/day
- 60 persons/ha	:	250ℓ/person/day = 15kℓ/ha/day
- 90 persons/ha	:	200ℓ/person/day = 18kℓ/ha/day
Average number of persons per household (houses or flats)	:	3,1 persons/household
Commercial	:	10kℓ/ha/day
Offices FSR = 0,2	:	6kℓ/ha/day
FSR = 0,3	:	9kℓ/ha/day
FSR = 0,4	:	12kℓ/ha/day
CBD General	:	16kℓ/ha/day
Light industrial	:	12,5kℓ/ha/day
General industrial	:	25kℓ/ha/day
Office park	:	10kℓ/ha/day
Water intensive industries	:	As per specific request
Special		
Garage	:	8kℓ/ha
Hospital	:	0,6kℓ/bed
Café	:	4ℓ/m²
Hotel	:	4ℓ/m²
Old age home	:	0,4kℓ/inhabitant
Schools with hostels	:	8kℓ/ha + 150ℓ/inhabitant
Day schools etc.	:	8kℓ/ha

2.2 *Peak factors*

Average peak factor	-	3 x average daily demand
Summer peak	-	1,5 x average daily demand
Maximum summer peak	-	4,5 x average daily demand

2.3 *Fire fighting*

Agricultural holdings	:	No additional requirement above peak flow
All residential areas	:	15ℓ/s at 7m minimum pressure head
All others	:	100ℓ/s at 15m minimum pressure head

Supply pipelines are sized to convey the maximum summer peak and water required for fire fighting.

2.4 *Spacing of fire hydrants*

Agricultural holdings	:	600m max. spacing
All residential areas	:	250m max. spacing
All others	:	180m max. spacing

2.5 *Duration of fire flow*

Agricultural holdings	:	1 hour
Residential	:	2 hours
All others	:	4 hours

The head of the fire department should also be consulted.