PROGRAM	:	BACHELOR DEGREE *Urban and Regional Planning*
SUBJECT	:	CIVIL ENGINEERING FOR PLANNING
CODE	:	CIPTRB1
DATE	:	SSA EXAMINATION 2019
DURATION	:	3 HOURS
WEIGHT	:	50: 50
TOTAL MARKS	:	100

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NUMBER OF PAGES	:	3 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 With clear diagram, show the combined pumping station and gravity feed water supply engineering design. What is its main benefit in water supply chain?

1.2. Explain very briefly the main principle of road layout hierarchy.

TOTAL FOR QUESTION 1 – 20 MARKS

Question 2

2.1 Briefly explain the two types of transformers used for power generation and distribution.

2.2 Discuss clearly in a sequential order the 7-stages requirement on water treatment before it becomes suitable for delivery to residential settlements.

2.3 Power generation mainly in South Africa is mostly by thermal power and hydro-power plant generation. Briefly explain this practice highlighting the economic contribution as well as challenges on this type electricity production.

2.4 Discuss briefly the philosophy of civil engineering for planning and development.

TOTAL FOR QUESTION 2– 20 MARKS

Question 3

3.1 Illustrate the direct water pumping station from river to distribution systems. What could you say is the disadvantage of this type of water pumping and distribution?

3.2 Describe storm water and its management importance in planning and development.

3.3. List the 3 (three) types of soil zones in South Africa and explain their effects to planning.

3.4. Explain strip foundation and its usage for civil engineering structural developments.

TOTAL FOR QUESTION 3– 20 MARKS

Question 4

4.1 It is expected as a result of increase in population which puts more pressure on land use, that an altogether new residential /light industrial development will consist of the following types of development by the year 2020.

- A central CBD of 8ha
- A commercial area of 4ha
- A light industrial area of 5ha
- A population of 10000 persons at an average density of 30 persons /ha
- Four-day schools occupying 4ha altogether
- A hospital with 60 beds
- Garage occupying 2ha

Using the design guidelines provided with this paper and assuming, that they are applicable to the year 2050:

a. Calculate the average daily water demand of the whole development in m^3/d.
b. Calculate the summer and maximum summer peaks water demand of the whole development in ℓ /s.
Summer and maximum summer peaks factors are **1.5** and **4.5** respectively.
Note; ($1m^3 = 1000$ ℓ $= 1kl$)

4.2 Briefly explain these waste disposal types with regards to environmental friendliness.

UESTION 4– 20 MARKS

Question 5

5.1 Groundwater poses a threat on building foundation explain this concept and how to alleviate it.

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

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.