UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	DESIGN OF WATER SUPPLY
COURSE CODE	:	BFA 40203
PROGRAMME CODE	:	BFF
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **ALL** QUESTIONS

THIS PAPER CONSISTS OF **THREE (3)** PAGES

Q1 (a) Sketch and label a complete process of water supply system.

(5 marks)

(b) New development areas have been proposed by local authority involving of new residence area, school and institutional, commercial and industrial zone, golf course etc. Design and draw a graph of water demand project for 50 years with 10 years of increments.

(i) The proposed area for year 2010:

Residence area	=	100,000.00 Acres
School and Institutional	=	1,500.00 Acres
Industrial area (existing)	=	2,500.00 Acres
Industrial area (proposed)	=	5,000.00 Acres
Tourisme zon	=	500.00 Acres
Goft course	=	300.00 Acres

(ii) Consider the NRW of 25%

(iii) Water demand criteria:
Residence area = 0.3 m^3/Acres.day
School and Institutional/Tourism zon/Golf Course = 6m^3/Acres.day
Industrial area = 202.2 m^3/Acres.day

(20 marks)

Q2 (a) State the global root mean square (RMS) velocity gradient according to Camp and Stein (1943)

(4 marks)

(b) Explain the mixing time in coagulation process.

(6 marks)

(c) Design a cylindrical flash mixing basin by determining the basin volume, tank dimensions, required input power and rotational speed using the following data:

Design flowrate, Q	= 11,500 m^3/day
Rapid mix, t	= 5 s
Ratio water depth (H) to Equivalent tank diameter (T)	= 2
Diameter impeller	= 4 cm
Velocity Gradient, G	= 600 s^{-1}
Power number, N_P	= 5.7
Dynamic viscosity at 24°C	= 0.000911 Pa.s
Efficiency of transfer of motor power to water power	= 80%

Impeller placement at one-third of water depth

(15 marks)

Q3 (a) State the objectives of flocculation.

(4 marks)

(b) Explain the design criteria for a flocculation basin with a baffle wall.

(6 marks)

(c) Design a flocculation basin by determining the basin volume, tank dimensions, required input power, and impeller location using the following data:

Flocculation basin	=	2 unit
Design flowrate	=	12 m^3/min
Detention time	=	30 min
Water depth	=	4 m
Compartment	=	3
Velocity gradient, G in each compartment	=	70, 50 and 30 s^{-1}
Dynamic viscosity at 24°C	=	0.000911 Pa.s
Efficiency of transfer of motor power to water power	=	80%
Impeller placement at one-third of water depth		

(15 marks)

Q4 (a) With the aid of sketches, illustrate the mechanisms of granular filtration.

(5 marks)

(b) Discuss the design requirements for direct filtration to treat raw river water with low turbidity and colour.

(10 marks)

(c) Design a rapid sand filter by determing the area, length, and width of each filter using the following data:

Design flowrate	=	20,000 m^3/day
Filtration rate	=	250 m^3/day.m^2
Number of filter	=	4 unit
Area increment for each filter	=	1/3
Width (W) of filter with two (2) cells	=	5 m
Length-width ratio	=	3:1

(10 marks)

- END OF QUESTIONS -