UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	ENVIRONMENTAL RISK ASSESSMENT
COURSE CODE	:	BNA 30903
PROGRAMME	:	BNA
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTIONS	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1   (a)   List **THREE (3)** Environmental Risk Assessment advantages.

(3 marks)

b)   Explain **THREE (3)** types of hazard that can affected human being during their working at workplace.

(6 marks)

c)   Discuss **TWO (2)** methods that can be used in hazard identification process.

(6 marks)

d)   Analyze how the HAZOP study process being conducted for construction of Sewage Treatment Plant with capacity of 25,000 PE at Pasir Gudang, Johor

(10 marks)

Q2   (a)   Define the exposure duration of the following terms :

(i)   Acute

(ii)   Short term

(iii)   Long term

(iv)   Chronic

(8 marks)

(b)   Describe **THREE (3)** types of exposure route into the body of an exposed human.

(6 marks)

(c)   Ahmad drinks water from a contaminated well for 20 years. The resulting dose rate changes because of the concentration of the contaminant in the well decrease over time. If the dose rate is given by,

$\dot{D}(t) = 0.05 \exp(-t/7000d)$ mg(c)/kg.d, where t has unit of days, calculate :

(i)   The total dose.

(ii)   The daily dose rate averaged over the exposure period.

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(iii)   The dose averaged over an averaging time 80 years (i.e. lifetime average daily dose)

(11 marks)

Q3   (a)   Differentiate between Graded and Quantal dose-response curves

(6 marks)

(b)   Briefly describe the term Therapeutic Index (TI).

(3 marks)

(c)   With aid of diagram, define the term of TD_{50} and LD_{50}

(6 marks)

(d)   Pharmaceutical industry produced diuretic drug to treat patient with chronic problem. Drug X and Y have the same mechanism of diuretic action. Drug X in a dose of 20mg produces the same magnitude of diuresis as 200mg of drug Y.

(i)   State which drug is less efficacious.

(ii)   State which drug is more potent.

(iii)   State which drug has a lower toxicity.

(iv)   State which drug is safer.

(v)   State which drug will have a longer duration of action.

(10 marks)

Q4   (a)   Define the meaning of Risk Characterization on dose response

(3 marks)

(b)   Briefly describe **THREE (3)** factors affecting risk on dose response

(6 marks)

(c)   Base on experiment conducted, a human threshold dose for chronic ingestion exposure to solvent is estimated 30mg/(kg.d). An assessment of minimum exposure to the solvent in contaminated groundwater was 0.894mg/(kg.d). Calculate the daily margin of safety at this level of exposure.

(4 marks)

(d) A population is exposed to polychorinated biphenyls (PCB) at a dose of 6×10^{-6} mg/(kg.d) and dieldrin at a dose of 5×10^{-5} mg/(kg.d). Assume that the cancer slope for PCB and dieldrin is 6.5 $(mg/(kg.d))^{-1}$ and 20 $(mg/(kg.d))^{-1}$ respectively.

  (i) Calculate the combined risk of these two contaminants

(4 marks)

  (ii) If 12,000 people are exposed at this level, calculate the upper bound on the number of contaminant-induced cancers

(2 marks)

(e) Demonstrate **THREE (3)** graded dose responses to relate with drug dose with percentage of maximal effect

(6 marks)

-   **END OF QUESTIONS-**

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ASSESSMENT

LIST OF FORMULAS

$$D_T = \int_0^{t_\varepsilon} \dot{D}(t)\,dt$$

$$\tilde{D} = \frac{\int_0^{t_\varepsilon} \dot{D}(t)\,dt}{t_{avg}} = \frac{D_t}{t_{avg}}$$

$$\int e^{-x}\,dx = -e^{-x}$$

$$\int e^{ax}\,dx = \frac{1}{a}e^{ax}$$

$$R \approx \rho D$$

$$R \approx \rho E$$

$$I = RP$$

$$I = \rho DP$$

$$I = \rho EP$$

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