ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL

FACULTAD DE CIENCIAS NATURALES Y MATEMÁTICAS

DEPARTAMENTO DE CIENCIAS QUIMICAS Y AMBIENTALES

SECOND EVALUATION OF ENVIRONMENTAL IMPACT OF PROJECTS (60 PTS)

II SEMESTER 2012-2013

ENERO 31 DE 2013

NOMBRE: …… **PARALELO:…….**

NOTA: Este examen está diseñado para ser resuelto de manera individual, puede usar una calculadora ordinaria para sus cálculos aritméticos, un lápiz o esferográfico. Solo puede comunicarse con la persona responsable de la recepción del examen; y, cualquier instrumento de comunicación que hubiera traído, deberá apagarlo y ponerlo en la parte anterior del aula, junto con algún otro material que se encuentre acompañándolo. No consultará libros, notas, ni algún apunte adicional a las que se entreguen en esta evaluación. *Desarrolle los temas de manera ordenada.* ***Firme como constancia de haber leído lo anterior.***

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Firma

1. Write the letter according to the concept of each term (0.5 e/o) pts)

	Term	Concept	
A	Mathematic models	relative knowledge or ignorance common to every EIA process which is also critical for the impact prediction	
B	Environmental index	determines the focus and methods to be applied in the elaboration of the environmental impact assessments	
C	Primary source	Methodology for Impacts Valuation	
D	Doubt	representative number or a descriptive classification of environmental data	
E	Scope	environmental index value	
F	Environmental risk	Impact prediction method	
G	Importance	A way to compensate Impacts	
H	VIA	Potential danger that affects the environmet, derived from the probability of occurrence and severity of the damage caused by accidents	
I	Leopold Matrix	Subjective valuation of the consultancy team	
J	Restore	Questionaries	

2. Read the following cases and then answer the questions in each case

CASE 1 (15 pts)

A chemical industry has been working in an industrial area for about 15 yrs. Recently in the last 3 years its production has increased to the double. In the surroundings of this industrial area now is located an urban area, which in the last year has been complaining about the quality of the air in that place. For this reason they ask the Municipality to perform the environmental studies, therefore, the fabric will temporally close or continue working according to the results obtained. You are part of the environmental team and you have to indicate the Municipality what is the level of the air quality in the area and the effect it has to the health. You have gone to the fabric surroundings and perform the measurements of the environmental parameters of the air, with the following results:

SO_2 = 1.32 ppm NO_2 = 1.8 ppm CO_2 = 3.65 ppm O_3 = 0.75 ppm Particulate matter (>10um) = 65 ug/m_3

a. Choose the correct formula (a, b or c) (1 pts)
b. Calculate the value of the air quality index. Write your calculations (5 pts)
c. According to the table given below what is the level of the air quality and what is the impact to health (3 pts)
d. Which are the sensitive groups? And **why** are they called sensitive groups? (3 pts)
e. Mention two reasons of why environmental indexes are useful (3 pt)

AQI	Level of the quality of the air	Impact to health
0-50	Good	Good
51-100	Moderate	Moderate
101-150	Alert	Not Good for sensitive groups
151-200	Aware	Bad
201-300	Emergency	Very bad
301-500	Significant harmful	Dangerous

Possible formulas to be used for calculating the air quality index (CHOOSE the correct one):

a. $AQI_{cont} = AQI_{high}/AQI_{low} + BP_{high}/BP_{low}$
b. $AQI_{cont} = BP_{high} + BA_{low}$
c. $AQI_{cont} = ((AQI_{high} - AQI_{low})/(BP_{high} - BP_{low}))* (C_{cont} - BP_{low}) + AQI_{low}$

PM_{10} ug/m_3				SO^2 ppm				NO_2 ppm				CO_2 ppm				O_3 ppm			
BP low	**BP high**	**AQI low**	**AQI high**	**BP low**	**BP high**	**AQI low**	**AQI high**	**BP low**	**BP high**	**AQI low**	**AQI high**	**BP low**	**BP high**	**AQI low**	**AQI high**	**BP low**	**BP high**	**AQI low**	**AQI high**
0	54	0	50	NA	NA	101	150	0.5	1.0	95	130	0.5	1.5	115	200	0.3	1.0	100	180
55	154	51	100	0.65	1.24	201	300	1.1	2.5	180	301	1.6	3.5	201	310	1.1	2.5	200	350
155	254	101	150	1.25	2.04	301	500	2.6	4.0	350	550	3.6	4.5	315	450	2.6	3.0	380	580

$AQIair = max (AQI_{MP2.5}, AQI_{NO2}, AQI_{SO2}, AQI_{NO2}…..)$

CASE 2 (25 pts)

In a local town in Ecuador, in a hospital zone there is a car vulcanizer. The vulcanizer works 24h/7d. The medical personnel of this health centers ask the local authority to perform and environmental audit, since they complain about the noise that annoys the patients. You are the leader of this audit. You have performed a series of noise measurements and interviews to the medical personnel and patients during your visit and now you have to present the report to the authority. Based on the results obtained during your visit and the national legislation you should elaborate your report.

Table of noise measurements performed during the audit

	Noise (dB)	
Parameter	**06:00-20:00**	**20:00-06:00**
Day 1	43	45
Day 2	44	49
Day 3	41	52
Day 4	41	48
Day 5	40	57

a. What is an audit. Why it is important? How often it must be done? (6 pts)
b. Which are the 2 types of audit discussed in class? Which one are you performing in this case? Explain your answer (7p)
c. What will your report say according to the noise levels you found? Give your conclusions according to the results (3pts)
d. Mention three characteristics of the audit report? (3 pts)
e. Mention all the primary source information you are using in this audit (4 pts)
f. Indicate the type of zone (landuse) from the table that you have chosen as reference for your audit report (2 pts)

CASE 3 (15 pts)

In an area close to Manglaralto there are a group of important aquifers in the area. This zone is well known since the main activity carry on by the local people is agriculture. In order to protect their crops they use two main pesticides **RADIN** 11 and **PESTDIE**. Lately, in the last two years they have noticed that quality of the water in the aquifer has decreased. For this reason they asked the local authority to perform the environmental measurements to determine the water quality in the aquifer. A series of samplings have to be performed in order to determine, the Water Quality Index and to know if the admissible levels have been fulfilled or not. According to the tables included and in the local legislation you should determine if the environmental parameters are exceeding the allowed levels or not and calculate the water quality index for underground water.

a. What is the name of the underground quality index you will use (1 pt)
b. Calculate the underground quality index according to the parameters given in table of information (5 pts).
c. Define how is the quality of the underground water according to table (2 pt)
d. According to the results obtained from your analysis, conclude if the water of the acquifer can be used for irrigation or recreation. Why? (2 pts)

Variable	Characteristics of the aquifer	Calculation	Value	Quality of the underground water according to table
Conductivity	4.5×10^{-2} cm/s			
Surface soil (<2m)	Arcilla arenosa			
Terrain tilt	3 %			
Depth of the aquifer	4 m			
Recharge	90 mm			
Impact Zone Vadosa	Arena or Grava			
Aquifer environment	Arenisca masiva			
Name of Underground water index				

Parameters	Results of the analysis	Fulfill the admissible limits (Y/N)	Irrigation	Recreation
Organoclorados (totals)	0.15 mg/l			
pH	6			
Arsénico (total)	0.05 mg/l			
Mercurio (total)	0.045 Hg			
Litio	2.3 mg/l			
Molibdeno	0.01 mg/l			
Admissible use of the water of the aquifer: irrigation or recreation				

Which of the existing methodologies used for Impacts Valuation you will choose if you need to connect action to effect and identify direct and not direct impacts. (2.5 pts)

Briefly apply the methodology you select in an example where you define the possible impacts related to the use of the aquifer for other activities. (2.5 pts)

CASE 1 - ANSWERS

Formula selected		
AQI PM_{10}	AQI SO_2	AQI CO_2
AQI NO_2	AQI O_3	
Value considered for the calculation of the AQI_{air}		
Level of quality of the air & Impact to health	Level	Impact to health
Sensitive groups	Sensitive Groups	Why are they called sensitive groups
Reasons to use environmental indexes	Reason 1	Reason 2

CASE 2 - ANSWERS

Ecuadorian legislation	
Define audit Importance of the audits How often you do an audit	
Type of audits	
Which audit are you performing	
Conclusions of your audit report according to the noise levels found	
Characteristics of the audit report	
Type of primary source information used in the audit	
Type of zone (landuse) used as reference	