Print Your Name:_____Honor Pledge:_____
FIRST EXAM – ENVR 133 - ENVIRONMENTAL HEALTH MICROBIOLOGY - SPRING
WRITE YOUR ANSWERS ON THESE SHEETS. USE THE PAGE BACK IF NEEDED.

1. List four (4) general classes or taxonomic groups of disease-causing enteric organisms responsible for environmentally transmitted disease.
For each, name an example organism and a typical illness that it causes.

Microbe Group or Class	Organism Name	Illness or Disease

a.

b.

c.

d.

2. List four (4) mechanistic or functional transmission routes of microbial exposure and entry into the body
(i)

(ii)

(iii)

(iv)

3. Indicate (by listing the letters) which of the statements below apply to:

Total coliforms_____

Fecal coliforms_____

*E. coli*_____

NOTE: a statement may apply to none, one, or more than one of the groups/microbes listed.
a. They are gram positive, aerobic cocci.
b. They possess the enzyme Beta-glucuronidase and hydrolyze Beta-glucuronide substrates
c. They possess the enzyme Beta-galactosidase and hydrolyze Beta-galactoside substrates
d. All of them are harmful to humans.
e. None of them are harmful to humans
f. They can reside ONLY in the intestinal tracts of warm-blooded animals.
g. They are gram negative rods
h. They are the taxonomically most diverse of the three listed.
i. They grow at 44.5^{o}C.
j. They ferment lactose with production of acid and gas

4. For the indicators below, indicate which terms/properties apply to them:

Fecal streptococci:_____

Enterococci:_____

a. grow in 6.5% NaCl
b. esculin hydrolysis
c. PYR-positive
d. Lancefield group D
e. growth in 40% bile
f. Gram-positive
g. Grow at pH 9.6
h. Grow in chains
i. Possess the enzyme Beta-glucosidase and hydrolyze Beta-glucoside substrates

5. For the viruses listed below **best** match them with the illness(es) they cause (1 best answer per virus):

Adenoviruses_____	a. aseptic meningitis, cardiomyopathies
Rotaviruses and noroviruses_____	b. infectious hepatitis
Hepatitis A and E viruses_____	c. acute flaccid paralysis
Coxsackieviruses and Echoviruses_____	d. upper respiratory illnesses
Polioviruses_____	e. acute gastroenteritis

6. For the fecal indicators listed below, list the letters of the terms/properties that apply to them.

Somatic coliphages:_____

F+ Coliphages:_____

Sulphite Reducing Clostridia:_____

a. Produce stormy fermentation of iron milk medium
b. Attach directly to the outer cell layer of the host cell to infect
c. Produce hardy spores that are highly persistent in the environment
d. Attach to F-pili on the outer surface of the host cell to infect
e. May indicate “old” fecal contamination due to their great environmental persistence
f. Superficially resemble human enteric viruses
g. Present in both human and animal fecal contamination

7. For the listed disease, name a causative agent and the microbe group or type it belongs to.

Disease/Illness	Name of causative agent	Microbe Type (Class)
a. bacillary dysentery	_____	_____
b. enteric fever	_____	_____
c. meningoencephalitis	_____	_____
d. hemolytic uremic syndrome	_____	_____
e. cholera	_____	_____
f. amoebic dysentery	_____	_____
g. enterocolitis	_____	_____
h. Guillan-Barre Syndrome	_____	_____
j. "the flu"	_____	_____
k. Guillan-Barre Syndrome	_____	_____

8. Briefly explain how the essential elements of the International Life Sciences Institute (ILSI) and US Environmental Protection Agency (EPA) microbial risk assessment. You may use an annotated diagram in answering the question.

9. List and/or briefly describe three (3) factors or elements included in hazard identification:

a.

b.

c.

10. List and/or briefly describe three (3) factors or elements included in pathogen occurrence

a.

b.

c.

11. List and/or briefly describe three (3) factors or elements included in exposure characterization for pathogens

a.

b.

c.

11. List and/or briefly describe three (3) factors or elements included in pathogen characterization

a.

2b.

c.

12. List and/or briefly describe three (3) factors or elements included in host characterization

a.

b.

c.

13. List and/or briefly describe three (3) factors or elements included in human health effects

a.

b.

c.

14. List and/or briefly describe three (3) factors or elements included in dose-response analysis

a.

b.

c.

15. List and/or briefly describes two (3) factors of elements included in risk characterization

a.

b.

c.

16. Match the following enteric protozoan with the correct description:

a. *Giardia lamblia* b. *Cryptosporidium parvum* c. *Entamoeba histolytica* d. *Naegleria fowlerii*

____Coccidian that has a 3-7 micrometer oocyst and produces an infection in persons with AIDs that is not treatable with drugs and is a life-threatening illness .

____Ameba causing dysentery and that can spread to the peritoneum and organs such as the liver and lungs.

____Flagellate having an approximate 10 micrometer diameter cyst and causes gastrointestinal illness that is treatable with drugs.

____Free-living waterborne ameba that can migrate from the sinuses to the brain and cause a fatal infection.

17. Briefly define or describe the meaning of the following terms and give an example for each.

a. Opportunistic pathogen

b. Water-borne disease

c. Water-washed disease

d. Water-associated/water vector-borne disease

18. a. List the features of a systemic or generalized infection AND a localized infection and briefly compare and contrast them

b. List an example of a microbe causing each type of infection (systemic and localized), the target site(s) and of infection and pathology and the features and name of the illness it causes.

19. Briefly define the following terms

a. Microbial Reservoir

b. Microbial Vehicle

c. Biological Vector

d. Fomite

e. Amplifier

20. Draw a diagram illustrating the "iceberg" concept of the process and outcomes of infection and indicate the essential features of this concept at the cellular and whole animal (host) level.

21 a. Define or describe the term epidemic

b. List three (3) key requirements for an epidemic outbreak to occur.

i.

ii.

iii.

22. Of the following statements, which are true (T) and which are false (F):

a. _____It is usually possible to identify an index case in a waterborne outbreak.

b. _____It is often possible to isolate the etiologic agent from water responsible for an outbreak.

c. _____The etiologic agent of a waterborne outbreak is usually identified from clinical specimens taken from the cases (ill persons).

d. _____Infectious diseases causing waterborne outbreaks are never endemic in the population.

e. _____Waterborne outbreaks are efficiently recognized, investigated and reported to the appropriate authorities.

f. _____Waterborne outbreaks are caused only by enteric microbes.

g._____Most outbreaks from groundwater could be prevented if the water was disinfected

h._____Most outbreaks from surface water could be prevented if the water was filtered and disinfected

23. Given a large sample of water with randomly distributed microbes at an average (mean) concentration of 1.5 organisms per ml:

a. Compute the probability of a 1-ml volume containing no (zero) organisms.

b. Compute or show the probability of a 1-ml volume containing 1 or more ($\exists 1$) organisms

Use the Poisson equation and show the key steps of your calculations (i.e., set up the equations)

24. Match the names of the types of epidemiological studies with their correct descriptions.
Names (put letter of correct description in the blank space next to the name):
___Ecological study

___Time series study

___Cohort Study

___Intervention study

___Case-Control Study

Description:
a. Compares rates of diseases in two or more groups of randomly chosen individuals after intervening to change the level of exposure.
b. Determines the relationship between disease and risk factors by comparing incidence of disease in different communities with varying exposure to risk factors.
c. Compares rate of disease in two or more populations with different levels of exposure over a specific period of time on randomly selected individuals.
d. determines the relationship between disease incidence in a population and variation in a risk factor over time.
e. Determines the relationship between disease and risk by comparing the incidence of disease in exposed individuals to matched controls.

25. List 5 desirable attributes of an effective microbial indicator of pathogens in water and other environmental media.

a.

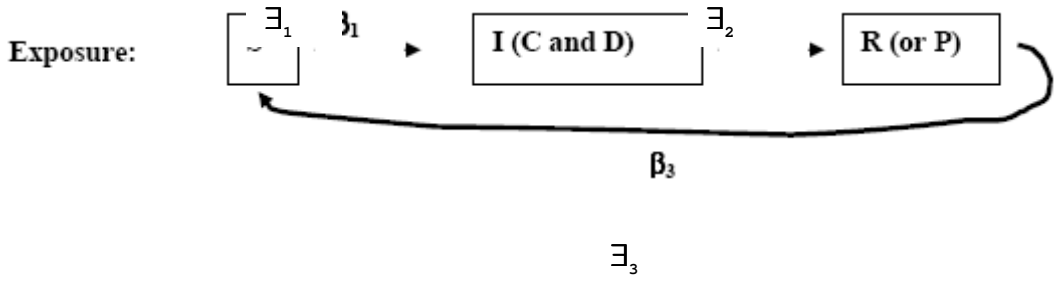
b.

c.

d.

e.

EXTRA CREDIT QUESTION:
Using the diagram shown below for microbial pathogen (infectious disease) transmission, define the terms and briefly explain the events or elements of the processes involved.



S =

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