

End Sem Exam-Autumn 2020-21 (ESE - EndSem Exam group)

CH1400/CE1500 Environment and Safety Engg.

1. Which one of the following is more effective and reliable hazard control strategies (0.5 Points)

- Engineering controls
- Substitution
- Administrative controls
- Personal protective equipment

2. The type of bacteria responsible for biological oxidation of dissolved solids in trickling filter are: *
(0.5 Points)

- Aerobic bacteria
- Anaerobic bacteria
- Pathogenic bacteria
- Facultative bacteria

3. A typical example of an unsafe act is
(0.5 Points)

- Defective tools or equipment
- poor house keeping
- Using equipment improperly
- all the above

4. Following scale is used for loudness of sound or noise *****
(0.5 Points)

- curvilinear scale
- linear scale
- logarithmic scale
- none of the above

5. In filtration, the amount of dissolved solids passing through the filters is *****
(0.5 Points)

- Independent of suspended solids
- Suspended solid
- Difference between total solids and suspended solids
- Sum of total solids and suspended solids

6. Mark the sampling techniques used for air pollutants: (Multiple options could be correct)
(0.5 Points)

- Grab sampling
- Hold sampling
- Liquid absorption

Solid adsorption

7. The "Great Smog" incident attracted attention of people across the globe towards particulate matter pollution in air. It was one of the most important event in history corresponding to air pollution related movements. At which place did the great smog incident occurred?

(0.5 Points)

- Ireland
- USA
- Australia
- London

8. High COD to BOD ratio of an organic pollutant represents: *

(0.5 Points)

- Presence of toxic material in the pollutant
- Low biodegradability of the pollutant
- Presence of free oxygen for aerobic decomposition
- High biodegradability of the pollutant

9. To remove floating matters like papers, rags etc, the unit used is: *

(0.5 Points)

- Septic tank
- Imhoff tank
- Grit chamber
- Screens

10. Presence of excess nitrate in river water indicates: *

(0.5 Points)

- Immediate pollution of water with sewage
- Recent pollution of water with sewage
- No pollution of water with sewage
- Past pollution of water with sewage

11. Particulate matter sources are frequently categorized based on whether they come from natural or manmade sources. Volcanic eruptions, bushfires, and pollen dissemination are all natural sources of particles suspended in the atmosphere. Many of these sources can cause the PM10 air pollution. Which of the following best represents the way for PM10 particles causing the harm to human beings: (0.5 Points)

- block nasal ways
- penetrate lungs
- dissolves in blood
- poisons

12. Air sampling is used as needed to determine the numbers and types of particulates. Impingement method corresponds to: (multiple options may be correct)

(0.5 Points)

- charge
- inertia
- density
- size

13. According to Human factors theory which of the following events result in accidents
(0.5 Points)

- inappropriate response and activities
- Overload and inappropriate activities
- overload, inappropriate response and activities
- overload, inappropriate response and activities, system failure

14. The source of Arsenic in water is *
(0.5 Points)

- All of these
- Agricultural pollution
- Industrial waste
- None of these

15. The size of aerosols is (in micrometers):
(0.5 Points)

- < 1
- < 10
- 30 - 50
- 50 - 100

16. For determining Air Quality Standards , the value of annual arithmetic mean is _____ in comparison to 24-h average:
(0.5 Points)

- more
- less
- equal
- similar

17. Calculate the required area for electrostatic precipitator for the following air purification application: air flow rate of 60 m³/s and velocity of 0.12 m/s for efficiency = 99 %.
(0.5 Points)

- 2303
- 5
- 1919
- data insufficient

18. If the total hardness and alkalinity of a water sample are 300 mg/l and 100 mg/l (CaCO₃ scale) respectively, then the carbonate and non-carbonate hardness (mg/l) will be respectively *
(0.5 Points)

- 300 and 100
- 200 and 100
- 100 and 200
- 100 and 300

19. A waste water sample diluted to 100 times with aeration water had an initial D.O of 7.0 mg/l and after 5 days of incubation at 200 C, the D.O was zero. The BOD of waste water is: *
(0.5 Points)

- 700 mg/l

- 100 mg/l
- Cannot be determined
- 7 mg/l

20. Activated sludge is the: *

- (0.5 Points)
- Sludge settled in the humus tank
 - Sludge in the secondary tank after aeration and rich in nutrients
 - Sludge in the secondary tank after aeration and rich in microbial mass
 - Aerated sludge in the aeration unit

21. The atmosphere *

(0.5 Points)

- become thinner and thinner with increasing altitude
- sometimes thinner sometimes thicker
- none of the above
- becomes thicker and thicker with increasing altitude

22. Ergonomics is about_____

(0.5 Points)

- fitting the worker to the job
- lifting injuries
- safety and health
- designing the job to fit the worker

23. Environmental Impact Assessment is prepared for *
(0.5 Points)

- Every natural disaster to pre-assess its adverse impacts on humanity and environment
- Every specified polluting developmental project
- None of the above
- Both the above

24. The hard hat used to for protection from electrical hazards is classified as
(0.5 Points)

- Class A
- Class C
- Class E
- Class G

25. Match the following

P. Accident
and

- I. 50 kg carton falls off the top shelf of a 12 ft high rack
lands near the worker
- II. worker fighting with his supervisor and injures him
- III. tree falling on a parked car
- IV. a drunk driver runs his car into a group of people
- V. a drunk driver bumps into another car but it leaves

Q. Incident

no damage
(0.5 Points)

- P- IV, V; Q- I, II, III
- P-II, IV; Q-I, III, V
- P- III, IV, V; Q- I, II
- P-II, III, IV; Q- I, V

26. Identify the physical hazards among the following

- I. handling Vibrating equipment
- II. Working in cold environment
- III. Working in shifts
- IV. Handling microwaves

(0.5 Points)

- I and II
- I, II and III
- I, III and IV
- All the above

27. Recirculation in "Activated Sludge Process" is done to *

(0.5 Points)

- Operate the plant continuously
- Dilute the incoming sewage
- Dampen the effect of flow variation
- Supply seed materials to the aeration tank

28. Identify the risks among the following

- I. Stair case
- II. using mobile while driving
- III. Petrol
- IV. Smoking
- V. Shift work
- VI. Not wearing mask
- VII. Sanitizer

(0.5 Points)

- II, IV
- II, IV, VI

I, II, IV, VI I, II, IV, VI, V

29. Ecosystem is smallest unit of *

(0.5 Points)

 Lithosphere Hydrosphere Biosphere Ionosphere

30. Which of the following are the advantages of HAZOP

- (I) Participants gain valuable knowledge of process
- (ii) Systematic and thorough the procedure
- (iii) Very focused on solution
- (iv) Doesn't consume much time

(0.5 Points)

 only (I) and (II) only (i) and (iii) only (ii) and (iii) all the above

31. Which of the following is an unsafe condition

(0.5 Points)

 Taking and improper working position Failure to wear PPE Excessive noise Using defective equipment

32. Match the following workplace or occupational stressors

- P. Classification-A I. High turnover of workers
Q. Classification-B II. Disability in workers
R. Classification-C III. Alcoholism
S. Classification-D IV. Quality deficiencies

(0.5 Points)

- P-III, Q-II, R-IV, S- I
- P-III, Q-I, R-II, S- IV
- P-III, Q-IV, R-II, S- I
- P-II, Q-IV, R-III, S- I

33. Which of the following contains most of the satellites orbiting Earth * *

(0.5 Points)

- Stratosphere
- Thermosphere
- Exosphere
- Troposphere

34. Which of the following impurities are removed in trickling filter process? *

(0.5 Points)

- Large floating matter
- Dissolved organic
- Suspended inorganic
- Suspended organic

35. A particle can be collected in a settling chamber when (select one)
(0.5 Points)

- the centrifugal force pushes the particle against the wall of the chamber
- the gravitational force is less than the drag and buoyant force causing particle collection
- the buoyant force causes the particle to be collected in the chamber
- the particle is moving at the terminal or setting velocity

36. Chemical oxygen demand (COD) of sewage is the: *
(0.5 Points)

- Oxygen required to oxidise biologically inactive organic matter
- None
- Oxygen required to oxidise biologically both active and inactive organic matter
- Oxygen required to oxidise biologically active organic matter

37. An electrostatic precipitator could be utilized by which of the following industries:
(multiple choice may be correct)
(0.5 Points)

- Power
- Paper and Pulp
- Metallurgy
- Chemical
- Municipal waste
- Petroleum

38. Tick all of the air pollutants as per national pollution control board of India:
(Multiple options could be correct)
(0.5 Points)

SO₂

NO₂

CO₂

O₂

O₃

CO

H₂S

NH₃

39. Between BOD and COD, the greater of the two, is: *
(0.5 Points)

BOD

both are equal

COD

depends on the sewage characteristics

40. Fabric filtration is a process may operate in a batch or semi continuous mode, with periodic removal of the retained solids from the filter medium. Filtration systems may also be designed to operate in a continuous manner. The fabric filtration could be utilized for : (multiple choices may be correct)
(0.5 Points)

solid

liquid

gases all of them

41. Biodegradable organics enter wastewaters, from *
(0.5 Points)

- Domestic wastes
- Both industrial as well as domestic wastes
- Industrial wastes
- Infiltration in sewers from the surrounding soils

42. Identify the hazards among the following

- I Stair case
 - II using mobile while driving
 - III Petrol
 - IV Smoking
 - V Shift work
 - VI Not wearing mask
 - VII Sanitizer
- (0.5 Points)

- I , III, V, VII
- I, III, IV, VII
- II, III, IV, VI
- II, III, IV, VI, VII

43. The treatment in a grit chamber is: *
(0.5 Points)

- Preliminary treatment



- Primary treatment
- Secondary treatment
- Tertiary treatment

44. Air binding in rapid sand filter is encountered when *
(0.5 Points)

- Filter bed comprises largely of coarse sand
- Filter bed comprises largely of fine sand
- The water is subjected to prolonged aeration
- There is excessive negative head

45. Which of the following phenomenon could be utilized for particulate removal/recovery: (multiple choices could be correct)
(0.5 Points)

- gravity settling
- centrifugal action
- inertial energy
- electrostatic attraction
- Brownian motion

46. The detention period adopted for grit chamber is of the order of: *
(0.5 Points)

- 12 min
- 2-4 min
- 5 minutes

 1 minute

47. Which of the following safety analysis method is based on Logic and Boolean algebra ?

(0.5 Points)

- FMEA Failure Modes and Effect Analysis (FMEA)
- Fault Tress analysis (FTA)
- Markov Method
- Hazard and Operability Analysis (HAZOP)
- Job Hazard analysis (JHA)

48. Which of the following allows pollutants to reach the ground surface from chimney opening: (multiple options could be correct)

(0.5 Points)

- looping
- coning
- fanning
- lofting
- fumigation
- trapping

49. The efficiency of sedimentation tank does not depend on *

(0.5 Points)

- Depth of the tank
- Width of the tank
- Detention period

Length of the tank

50. The minimum dissolved oxygen required in water to save the aquatic life is *
(0.5 Points)

4 ppm

1 ppm

8 ppm

2 ppm

51. An electrostatic precipitator (ESP) removes particles from a gas stream by using electrical energy to charge particles either positively or negatively. The charged particles are then attracted to collector plates carrying the opposite charge. An ESP could be categorized as:

(0.5 Points)

perforated

dry

solid plate

wet

52. The three E's in the safety programme stand for
(0.5 Points)

Engineering, Education, Enforcement

Elimination, Engineering, Education

Engineering, Elimination, Enforcement

Elimination, Education, Enforcement

53. An Environmental Impact Statement should include *

(0.5 Points)

- None of the above
- Description of its significant effects on environment and society
- Description of the project with location, design, etc
- All of the above

54. Assume that in an organization during a 6-month period a total of 120 accidents occurred. What is the standard deviation for the passion distribution in control charts ?

(0.5 Points)

- 3.56
- 4.47
- 10.95
- 20

55. Identify the ergonomic hazard

- I. Keyboard work
- II. Shift work
- III. Discrimination
- IV. Handling poorly designed tools
- V. Workstation handling
- VI. Handling heavy machinery

(0.5 Points)

- I, IV, V
- II, III, VI
- I, IV, VI
- II, III, VI

56. A gravity settler will collect a hydrochloric acid mist in air at 25 degrees Celsius.

You must compute the smallest mist droplet (spherical in shape and size is micrometer) that the settler will undoubtedly capture. Assume that the acid concentration is uniform over the unit's inlet cross section, and Stokes' law applies. Operating data and information on the gravity settler are given below:

Dimensions of gravity settler = 30 m wide, 20 m high, 50 m long

Actual volumetric flowrate of acidic gas = 50 m³/s

Specific gravity of acid = 1.6

Viscosity of air = 1.243×10^{-5} g/m . s

Density of air = 0.076 g/m³

(0.5 Points)

12.6

13.3

14.8

15.9

57. A town produces sewage of 50×10^6 l/d with BOD of 180 mg/l. Taking permissible volumetric organic loading as 550 gm of BOD per 1 cu. m of volume, the volume of aeration tank required is: *

(0.5 Points)

14360 m³

16363 m³

2800 m³

8423 m³

58. Trickling filter plants are preferred for sewage treatment for: *

(0.5 Points)

Mega cities

Large sized cities

Medium sized cities

Towns and smaller cities

59. A city supply of 15000 cubic metre of water per day is treated with a chlorine dose of 0.5 ppm. For this purpose, requirement of 25% bleaching powder per day would be *

(0.5 Points)

- 3000 kg
- 30 kg
- 3 kg
- 300 kg

60. A source emitting 80 dB and other emitting 60 dB if put in the same location will produce a noise of: *

(0.5 Points)

- 140 dB
- 60 dB
- 80 dB
- 70 dB

61. The method of sludge disposal involving burial in trenches *

(0.5 Points)

- Incineration
- Composting
- Pulverization
- Purification

62. The study of Earth's atmosphere and its processes is called *

(0.5 Points)

meteorology

aerology

aerosol

astronomy

63. Which layer of atmosphere has the highest density of gas molecule? *

(0.5 Points)

Troposphere

Mesosphere

Exosphere

Stratosphere

64. Temperature inversion is a phenomenon that normally occurs in:

(0.5 Points)

exosphere

thermosphere

stratosphere

troposphere

65. The cyclones are well known device used for separations. What are the forces that

acts on particles in a cyclone separator? (multiple choice may be correct)

(0.5 Points)

buoyancy

gravity

centrifugal frictional

66. The BOD of sewage entering a Trickling Filter is 200 mg/l. If the effluent of the sewage of Trickling Filter is 40 mg/l, then efficiency of trickling filter is: *
(0.5 Points)

 85% 40% 0% 80%

67. If present in water, chlorination of water does not reduce the: *
(0.5 Points)

 D.O. pH B.O.D. Ammonia

68. HAZOP is a
I. Risk identifying technique
II. Risk eliminating technique
III. Risk assessing technique
(0.5 Points)

 I and II I and III II and III All the above

69. The following cause alkalinity in natural water * (0.5 Points)

- None of the above
- Potassium carbonate
- All of the above
- Sodium carbonate

70. Which of the following will not help in abating noise pollution: * (0.5 Points)

- Implementing noise quality standards
- None of the above
- Imposing ban on public against blaring of loudspeaker
- Raising of thick and high vegetation and trees

71. Which one is not a factor of the abiotic environment? *

(0.5 Points)

- Heat
- Decomposer
- Sunlight
- Water

72. PM2.5 means diameter:

(0.5 Points)

- equal to 2.5 nanometer

- equal to 2.5 micrometer
- less than or equal to 2.5 micrometer
- greater than or equal to 2.5 micrometer

73. Welding shields are used as PPE against...

- I. Suspended particles in the air
- II. Metal splatter
- III. Fog
- IV. flying sparks

(0.5 Points)

- I and II
- II and IV
- II and III
- III and IV

74. The term used to describe the size of a particle that is removed with 50% efficiency in a gravity settler is the:

(0.5 Points)

- Mean size
- Critical size
- Cut size
- Mode

75. A Trickling Filter is designed with a unit organic loading of 0.175 Kg/ m³ / day. If the influ-ent BOD of the sewage is 150 mg/l, then the effluent BOD is *

(0.5 Points)

- None of these
- 23.3 mg/l

126.7 mg/l 43.35 mg/l

76. The atmosphere of earth is retained by *
(0.5 Points)

 earth's core both the above none of the above earth's gravity

77. Temporary hardness is caused due to *
(0.5 Points)

 Calcium sulphate Calcium chloride Magnesium carbonate Magnesium sulphate

78. The particles are charged in an ESP by utilizing:
(0.5 Points)

 attrition ionization heat all of above

79. The set of ecosystems is called a *
(0.5 Points)

- Climate
- Lagoon
- Subsystem
- Biome

80. As per the pollution level of air, the attainment areas are:
(0.5 Points)

- desirable
- undesirable
- depends
- can't say

81. In a water treatment plant, dissolved iron and manganese can be removed from water by *
(0.5 Points)

- aeration and coagulation
- aeration and sedimentation
- aeration and disinfection
- aeration and flocculation

82. Which year is 50th anniversary of US clean air act:
(0.5 Points)

- 2018

2019 2020 2021

83. Risk Priority number is estimated using

- I. severity
 - II. occurrence
 - III. detection
- (0.5 Points)

 only (I) and (II) only (II) and (III) all the three none of the above

84. Consider the following statements with respect to slow sand filters:

- i) Qualitywise they are more efficient than rapid sand filter
- ii) Need periodic backwashing
- iii) Flow rate is lower than rapid sand filter *

(0.5 Points)

 1,2 and 3 are correct 2 and 3 are correct 1 and 2 are correct 1 and 3 are correct

85. Which of the following has lowest energy consumption for air pollutants separation:

(0.5 Points)

 scrubbing

fabric filtration ESP all have same

86. HAZOP can be performed

- I. during project definition, design and construction
- II. only during shutdown
- III. only during the operation of the plant

(0.5 Points)

 Only I is correct Both II and III are correct II and III are wrong both (a) and (c) are correct

87. Hearing protection is required when noise levels exceed __ dBA

(0.5 Points)

 80 90 100 110

88. Grit chambers are designed to remove: *

(0.5 Points)

 Particles equivalent to fine sand 0.2 mm diameter and specific gravity of 2.7 with a minimum of organic material Fine sand particles Organic particles

- Particle with 0.2 cm diameter and specific gravity 3.5 with maximum of organic matter

89. Floating substance like oil, fat and grease are separated and removed by *
(0.5 Points)

- trickling filter
- Bar screens
- Primary sedimentation
- Skimming tank

90. Match List – 1 (terminology) with List – 2 (Definition/Brief Description) and select the correct answer using the codes given below the lists:

List 1

- P. Primary treatment
- Q. Secondary treatment
- R. Unit operation
- S. Unit process

List 2

- 1. Containment removal by physical force
- 2. Involving biological and/or chemical reaction
- 3. Conversion of soluble organic matter to biomass
- 4 . Removal of solid materials from incoming wastewater

	P	Q	R	S
(a)	4	3	1	2
(b)	4	3	2	1
(c)	3	4	2	1
(d)	1	2	3	4 *

(0.5 Points)

- (c)
- (d)
- (a)

(b)

91. According to Domino's Accident theory, which sequence of events results in injury
(0.5 Points)

- Fault of person -->social factors--> unsafe act--->accident ---->injury
- Fault of person ---> unsafe act --->social factors --> accident --->injury
- Social factors --> Fault of person ---> unsafe act ---> accident ---> injury
- Social factors ---> unsafe act ---> Fault of person ---> accident ---> injury

92. Safety management is that branch of management that is concerned with _____ hazards from the industries.
(0.5 Points)

- reducing
- controlling
- eliminating
- all the above

93. For conduction a preliminary HAZOP study, which of the following is required
(i). Process flow diagram
(ii) Piping and instrumentation diagram
(iii). description of the process
(iv). hazardous area classification
(0.5 Points)

- I and III
- II and III
- I, II, and III
- I, II, III, and IV

94. Consider activated sludge process:

- i) It is obtained by setting of sewage in presence of plenty of oxygen
 - ii) The aeration period is 3-6 hours
 - iii) The bulking of sludge is remedied by chlorination *
- (0.5 Points)

ii and iii

i only

i, ii, and iii

i and ii

95. The plume behavior is affected by which of the following factors: (multiple choice may be correct)
(0.5 Points)

Wind speed

Wind direction

Temperature

solar radiation

96. Calculate the mass concentration (in g/m³) of PM10 and TSP for air, when given with the following data:

Initial weight of filter paper = 1.462 g

Final weight of filter paper = 1.627 g

Initial weight of filter paper = 5.238 g

Initial weight of filter paper = 6.179 g

24 hours of rate at 1.1 m³/min.

(0.5 Points)

7.11

6.76

8.65 5.90

97. Temperature variations affect the: *

(0.5 Points)

- viscosity of sewage
- Biological activity of bacteria in sewage
- solubility of gases in sewage
- all of these

98. Water is a _____ type of hazard

(0.5 Points)

- Physical
- chemical
- Mechanical
- Ergonomic

99. What is the full form of BOD? *

(0.5 Points)

- Biogeological oxygen demand
- Biometric oxygen deep
- Biochemical oxygen demand
- None of these

100. In the design of grit chambers in sewage treatment ***(0.5 Points)**

- Baffles are essential
- The maximum flow velocity should be of the order of 0.3 m/sec
- The detention period should be at least be 10 minutes
- Temperature control is an important factor

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