(A-30 & A-32) SEAT No._____ No. of Printed Pages: 02

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SARDAR PATEL UNIVERSITY

M. Sc. -Integrated Biotechnology – Eighth Semester Examination

Saturday, 11th November 2017

Time: 10:00 am to 01:00 pm

PS08CIGEB1: Applied Environmental Biotechnology

PS08CIGEB1

Total Marks – 70

Q.1 Mark the right answer of following questions. **[08]**

1. In trickling filter, biochemical oxygen demand is reduced to _____.
   a. 30 to 40% **b.** 40 to 60% **c.** 60 to 80% **d.** 80 to 90%
2. C/N ratio of organic materials tends to _____ during composting process.
   a. Increase **b.** Remain constant **c.** Decrease **d.** Fluctuate with cycles
3. In activated sludge process _____.
   a. Aeration is continued till stability
   b. Sludge is activated by constant stirring
   c. Water is removed by centrifugation
   d. Aeration is done with mixing of previously aerated sludge
4. Removal of N & P compounds which promote Eutrophication are removed during which stage of wastewater treatment?
   a. Primary **b.** Secondary **c.** Tertiary **d.** All of these **e.** None of these
5. In tannery industrial ETP, chlorination of water is done for the removal of _____.
   a. Suspended solids **b.** Bacteria **c.** Sediments **d.** Hardness **e.** Colour
6. Primary treatment of sewage consists of removal of _____.
   a. Large suspended organic solids
   b. Oil and grease
   c. Sand and grit
   d. Floating material
7. From the following, which chemical is widely used for chromium oxidation in tannery industry?
   a. H_2O_2 **b.** $KMnO_4$ **c.** $K_2Cr_2O_7$ **d.** ClO_2 **e.** ClO
8. What is the mode of action of un-ionized volatile fatty acids in anaerobic digestion process?
   a. Causes pH variations
   b. Enters in to cell membranes
   c. Decrease metabolic rate of anaerobes
   d. All of these

Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) **[14]**

1. What are the applications of environmental biotechnology?
2. Write advantages of anaerobic treatment process with appropriate reason.
3. Point out advantages of composting process.
4. Explain the impacts of dairy wastewater.
5. Explain components of environment.
6. Write the main stages of tanning process.
7. Draw well labeled diagram of facultative pond treatment process.
8. What are the objectives of solid waste management?
9. Discuss different types of absorption field of septic tank.

(P.T.O.)

Q.3 A. Describe various processes of preliminary and primary wastewater treatment with their major objectives. [06]

B. What is the difference between point and non-point source of pollution? Write a detailed note on water pollution. [06]

OR

B. What is the need of pollutants monitoring? Outline different types of biotechnological methods used for measurement of pollution. [06]

Q.4 A. Describe the role of microorganisms involved in anaerobic wastewater treatment process. [06]

B. What are the advantages of ASP? Discuss various parameters and biology of activated sludge process. [06]

OR

B. What is sloughing? Give an account on trickling filter treatment process. [06]

Q.5 A. Which worms are generally used in vermicomposting process? Write a note on vermicomposting. [06]

B. Note down advantages & disadvantages of bio-fertilizers and bio-fuels. [06]

OR

B. Write a note on factors affecting anaerobic digestion process. [06]

Q.6 A. Write objective and role of chromium tanning process. Give detailed account on tannery industrial wastewater treatment process. [06]

B. Describe different treatment methods commonly used for paper pulp industrial wastewater. [06]

OR

B. Discuss aim and process of different components used in effluent treatment plant of dairy industry. [06]

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SC

SEAT No._____ No. of Printed Pages: 02

[A-16] **SARDAR PATEL UNIVERSITY**

M. Sc. Integrated Biotechnology, Eight Semester Examination

Saturday, 18th November 2017

Time: 10:00 am to 01:00 pm

***PS08CIGEB4*: Biodegradation and Bioremediation**

Total Marks – 70

Q.1 Mark the right answer of following questions. [01 x 08 = 08]

1. The objective of primary treatment is the removal of _____.
   a) Settleable organic solids b) Settleable inorganic solids
   c) Scum d) All of these
2. Bioremediation can clean up polluted soils by _____.
   a) adding nutrients to stimulate the activity of certain soil bacteria
   b) inoculating the certain bacteria that can degrade toxic compounds
   c) using plants to stimulate degradation activity
   d) All of the above
3. Which of the following is not an example of volatile organic compounds
   a) Trichloroethylene b) Trichloroethene
   c) Tetrachloroethylene d) Tetrachloroethane
4. β – oxidation of fatty acids _____.
   a) Involves production of acetyl coA b) Feeds into the TCA cycle
   c) Does not produce ATP d) All of these
5. Which of the following compound(s) can't be degraded by microorganisms?
   a) Polychlorinated biphenyls b) Polyaromatic hydrocarbons
   c) Heterocyclic compounds d) None
6. Which of the following is not a air treatment technology?
   a) Biofilm b) Biofilter c) Bioscrubber d) Biotrickling filters
7. Anionic surfactants contain which functional groups at their head
   a) Sulfate b) Sulfonate c) Phosphate d) All
8. Which of the following bacterium is called as the superbug that could clean up oil spills?
   a) *Bacillus subtilis* b) *Pseudomonas putida*
   c) *Pseudomonas denitrificans* d) *Bacillus denitrificans*

Q.2 Answer the following questions. (Any seven out of nine) [02 x 07 = 14]

1. Give the examples of nitro-reduction.
2. What is the need of bioremediation?
3. Discuss the significance of molecular techniques used for bioremediation.
4. Explain the role of bio-surfactants in bioremediation.
5. What are the applications of chlorinated alkanes?
6. Explain phytoremediation with example.
7. What do you understand by biofilm?
8. What is bio-reactor?
9. Define recalcitrant with suitable example.

(P.T.O.)

Q.3 A. Discuss the process of Aerobic degradation of hydrocarbons with suitable example. [06]

B. Discuss the factors which affect the biodegradation processes. [06]

OR

B. Discuss the pathway for anaerobic bacterial degradation of lipids and S-alkyl. [06]

Q.4 A. Discuss the process of oxidative dehalogenation reaction. [06]

B. Explain the steps involved in the degradation of PCB. [06]

OR

B. Write a note on various degradation pathways of carbon tetrachloride. [06]

Q.5 A. Discuss the process of biosparging, bioventing and bioaugmentation with suitable example. [06]

B. Describe the advantages and disadvantages of bioremediation. [06]

OR

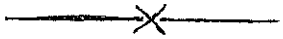
B. Explain the aqueous reactors used in bioremediation with suitable example. [06]

Q.6 A. Explain the degradation of compounds by pathway engineering with suitable example [06]

B. Draw a labeled diagram of bio-scrubber and discuss the mechanism of degradation of contaminants present in air. [06]

OR

B. Write a note on microbial community of bio-filter? [06]



SC

(A-10) SEAT No._____ No. of Printed Pages : 2

SARDAR PATEL UNIVERSITY

M. Sc. Integrated Biotechnology (IG-GBT) 8th Semester
Theory Examination - November 2017
PS08CIGGB2 – Bioprocess Engineering & Technology
14th November 2017 (Tuesday), 10:00 to 1:00 pm

Maximum Marks: 70

Note: (1) All Questions are Compulsory. (2) Figures on the right indicate marks.

Q.1 Select the most appropriate option 1 x 8= 8

(i) Freeze drying is used for
a. Strain improvement b. Sterilization
c. Culture preservation d. None of the above

(ii) Some chemicals, when added to certain fermentation process, are directly incorporated into the desired product are called
a. Buffers b. Precursors
c. Inducers d. By product

(iii) Thermal inactivation of nutrients
a. Increases with temperature rise
b. Decreases with temperature rise
c. Increases with temperature rise but decreases at high temperature
d. It is not affected by temperature

(iv) Del factor is
a. Sterilization criteria b. ln No/Nt
c. Both a & b d. Only b

(v) K_{La} is
a. Mass transfer coefficient b. Volumetric Oxygen transfer coefficient
c. OTR d. Critical Oxygen level

(vi) Dissolved oxygen is measured with _____.
a. Polarographic electrode b. Galvinic electrode
c. pH electrode d. both a & b

(vii) dC_L/dt is _____'

a. mass transfer coefficient
b. change in oxygen concentration over a time period t
c. Driving force
d. None of the above.

(viii) OTR = _____.
a. (C*---CL)
b. K_La . C*
c. dC_L/dt
d. none of these

(P.T.O.)

Q.2. Attempt any seven of the following 2 x 7= 14

1. Explain the significance of Del Factor.
2. Define Turbidostat & Chemostat.
3. Explain the role of growth factors with suitable example in fermentation media.
4. What is fed batch fermentation?
5. Explain Bingham plastic rheology.
6. By which equation rate of oxygen transfer can be determined?
7. Enlist various temperature measure devices utilize in fermentor.
8. Explain the role of orifice sparger in the aeration system of the fementor.
9. What is reverse phase chromatography (RPC)?

Q. 3. a). Discuss various carbon sources used in media preparation at industrial level. 6
b). Explain the ideal characteristics of an antifoam agent and discuss its role in a fermentation process. 6

OR

b). Describe precursor and inhibitors with suitable examples. 6

Q. 4. a). Describe continuous sterilization process. 6
b). Discuss the air sterilization and filter designing. 6

OR

b). Explain a batch sterilization process. 6

Q. 5. a). What is K_{La} ? List and discuss factors that affect the K_{La}. 6
b). Write a note on: PID controller. 6

OR

b). Discuss gassing out method for determination of K_{La}. 6

Q. 6. a). Write a note on : liquid-liquid extraction with suitable example. 6
b). Explain cell recovery process by filtration. 6

OR

b). Discuss Ion exchange chromatography method with suitable example. 6

XXXXX XXXXXX

SC

SEAT No._____ No. of Printed Pages :

[A-22, A-23]

Sardar Patel University

MSc Integrated Biotechnology Examination -Semester 8

PS08CIGG/IB3: Omics

Thursday 16th November, 2017

10:00 am to 1:00 pm

Total Marks: 70

Note:

1. Figures to the right indicate marks.
2. Draw neat and labelled diagram, wherever necessary.

Q.1 Multiple choice questions [08]

1 In automated fluorescent sequencing _____ number of fluorescent tags are used
a) one b) two c) three d) four

2 If instead of three nucleotide for a amino acid, four nucleotides used than total number of possible codes are _____
a) 64 b) 256 c) 512 d) 1024

3 Following _____ is used as a model organism to study development of neurons.
a) Zea maiz b) homo sapience
c) *Caenorhabditis elegance* d) *Haemophilus influenzae*

4 Which of this describes a contig
a) a complete genomic library including overlapping clones
b) a complete mRNA library
c) a chromosome specific library
d) none of these

5 Proteins can be visualized directly in gels by _____
a) staining them with the dye b) using electron microscope only
c) measuring their molecular weight d) none of these

6 Following is NOT true for yeast 2 hybrid assay.
a) based on the reconstitution of a functional transcription factor (TF)
b) use to study two proteins or polypeptides of interest interact.
c) transcription of a reporter gene leads to a specific phenotype,
d) use to study protein DNA interaction

7 Following is not a clustering algorithm used for microarray data.
a) K-mean b) Euclidean c) Hierarchical d) UPMGA

8 _____ is required for preparation of in situ DNA Microarray.
a) Oligomers b) robotic arm for spotting
c) nanoscale needle d) mask

Q.2 Attempt any seven [14]

1 What is bridge PCR?

2 Describe principle of pyro sequencing.

3 Use of RFLP for aligning contigs.

4 Briefly explain radiation hybrid maps.

5 Briefly explain the principle of 2D PAGE separation.

(P.T.O.)

6 What is coulombs explosion in ionization process?

7 What is phage display library?

8 Briefly describe probe immobilization chemistry on microarray chip.

9 What are metabolic networks?

Q.3 A Write a detailed account on automated fluorescent sequencing. [06]

B What is codon bias? Give comparative account on the gene structure in prokaryote and eukaryote. [06]

OR

B What is massively parallel sequencing? Enlist various NGS platforms and Illumina sequencing in detail. [06]

Q.4 A Write goals of human genome project. Explain the vectors used in human genome project. [06]

B What are physical maps? Enlist various physical mapping techniques used in human genome project. Briefly describe the principles of any two. [06]

OR

B Narrate clone by clone sequencing approach used in HGP. [06]

Q.5 A Why study of protein-protein interactions is crucial? Enlist techniques to study protein-protein interactions. Write a short note on yeast two hybrid system. [06]

B What is soft ionization? Describe the principle of ESI QQQ. [06]

OR

B Enlist various protein visualization techniques. Describe types of metal stains used for protein visualization. [06]

Q.6 A What is HPTS platform? Write a note on in situ fabricated microarray. [06]

B What is metabolomics? Write a note on importance of studying metabolomics and give overview of Human metabolome project. [06]

OR

B Define transcriptomics. Enlist techniques use to study transcriptomics. Describe the principle of cDNA library. [06]

—— X ——

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(A-31) SEAT No._____ No. of Printed Pages: 02

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SARDAR PATEL UNIVERSITY

M. Sc. -Integrated Biotechnology – Eighth Semester Examination

Saturday, 11th November 2017

Time: 10:00 am to 01:00 pm

PS08CIGIB1: Applied Environmental Biotechnology

Total Marks – 70

Q.1 Mark the right answer of following questions. [08]

1. _____ sanitizer is widely used in dairy industry.
   a. Sodium hypochlorite **b.** Chlorine dioxide **c.** Phosphoric acid **d.** All of these
2. The pH value of fresh sewage is usually _____.
   a. Equal to 7 **b.** More than 7 **c.** Less than 7 **d.** Equal to zero
3. What is the mode of action of un-ionized volatile fatty acids in anaerobic digestion process?
   a. Causes pH variations **c.** Decrease metabolic rate of anaerobes
   b. Enters in to cell membranes **d.** All of these
4. _____ chemical is widely used for chromium oxidation in tannery industry.
   a. ClO **b.** ClO_2 **c.** H_2O_2 **d.** $KMnO_4$ **e.** $K_2Cr_2O_7$
5. BOD_5 is taken at a temperature of _____.
   a. 0°C **b.** 15°C **c.** 20°C **d.** 25°C **e.** 37°C
6. In a trickling filter treatment process, _____.
   a. Filtration process is used **c.** It is an example of suspended growth system
   b. Biological action is used **d.** Neither (a) nor (b)
7. Concentrations of inorganic micronutrients and metals tend to _____ during composting process.
   a. Increase **b.** Decrease **c.** Remain constant **d.** Fluctuate with cycles
8. In biological waste water treatment process, the temperature affects the _____.
   a. Biological activity of bacteria **c.** Solubility of gases in sewage
   b. Velocity of sewage **d** All of these

Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) **[14]**

1. Define pollution. What are the types of pollution?
2. Draw well labeled diagram of facultative pond treatment process.
3. What are the objectives of solid waste management?
4. What are the advantages of composting process?
5. Explain various types of soil absorption system of septic tank.
6. What are the effects of dairy wastewater?
7. What are the applications of environmental biotechnology?
8. Discuss the main stages of tanning process.
9. Write advantages of attached growth treatment process with specific explanation.

(P.T.O)

Q.3 A. Write examples of different types of water pollutants with their respective sources. Write a brief note on water pollution. [06]

B. Which analytical methods are used to check the load of pollution? Summarize preliminary and primary wastewater treatment processes in detail. [06]

OR

B. Write the role of four different levels of pollution monitoring EPAs. Outline different types of biotechnological methods used for measurement of pollution. [06]

Q.4 A. Explain the biology of anaerobic treatment process. [06]

B. Write short notes on: 1. Parameters of activated sludge process [06]
2. Biology of activated sludge process

OR

B. What are the disadvantages of attached growth system? Write a note on trickling filter treatment process. [06]

Q.5 A. Describe the stages of composting process. Write a note on different methods of composting process. [06]

B. Discuss various factors affecting anaerobic digestion process. [06]

OR

B. Write advantages & disadvantages of bio-fertilizers and bio-fuels. [06]

Q.6 A. What is vegetable tanning process? Write a note on treatment of tannery industrial wastewater. [06]

B. Write the objectives and role various components used in effluent treatment plant of dairy industry. [06]

OR

B. Illustrate different treatment methods commonly used for paper pulp industrial wastewater. [06]

SEAT No._____

SC

No. of Printed Pages: 02

[A-15]

SARDAR PATEL UNIVERSITY

M. Sc. Integrated Biotechnology, Eight Semester Examination

Saturday, 18th November 2017

Time: 10:00 am to 01:00 pm

***PS08CIGIB4*: Biodegradation and Bioremediation**

Total Marks – 70

Q.1 Mark the right answer of following questions. [01 x 08 = 08]

1. The objective of primary treatment is the removal of _____.
   a) Settleable organic solids
   b) Settleable inorganic solids
   c) Scum
   d) All of these

2. Bioremediation can clean up polluted soils by _____.
   a) adding nutrients to stimulate the activity of certain soil bacteria
   b) inoculating the certain bacteria that can degrade toxic compounds
   c) using plants to stimulate degradation activity
   d) All of the above

3. Which of the following is not an example of volatile organic compounds
   a) Trichloroethylene
   b) Trichloroethene
   c) Tetrachloroethylene
   d) Tetrachloroethane

4. β – oxidation of fatty acids _____.
   a) Involves production of acetyl coA
   b) Feeds into the TCA cycle
   c) Does not produce ATP
   d) All of these

5. Which of the following compound(s) can't be degraded by microorganisms?
   a) Polychlorinated biphenyls
   b) Polyaromatic hydrocarbons
   c) Heterocyclic compounds
   d) None

6. Which of the following is not a air treatment technology?
   a) Biofilm b) Biofilter c) Bioscrubber d) Biotrickling filters

7. Anionic surfactants contain which functional groups at their head
   a) Sulfate b) Sulfonate c) Phosphate d) All

8. Which of the following bacterium is called as the superbug that could clean up oil spills?
   a) *Bacillus subtilis*
   b) *Pseudomonas putida*
   c) *Pseudomonas denitrificans*
   d) *Bacillus denitrificans*

Q.2 Answer the following questions. (Any seven out of nine) [02 x 07 = 14]

1. Give the examples of nitro-reduction.
2. What is the need of bioremediation?
3. Discuss the significance of molecular techniques used for bioremediation.
4. Explain the role of bio-surfactants in bioremediation.
5. What are the applications of chlorinated alkanes?
6. Explain phytoremediation with example.
7. What do you understand by biofilm?
8. What is bio-reactor?
9. Define recalcitrant with suitable example.

C.P.T.O.)

Q.3 A. Discuss the process of Aerobic degradation of hydrocarbons with suitable example. [06]

B. Discuss the factors which affect the biodegradation processes. [06]

OR

B. Discuss the pathway for anaerobic bacterial degradation of lipids and S-alkyl. [06]

Q.4 A. Discuss the process of oxidative dehalogenation reaction. [06]

B. Explain the steps involved in the degradation of PCB. [06]

OR

B. Write a note on various degradation pathways of carbon tetrachloride. [06]

Q.5 A. Discuss the process of biosparging, bioventing and bioaugmentation with suitable example. [06]

B. Describe the advantages and disadvantages of bioremediation. [06]

OR

B. Explain the aqueous reactors used in bioremediation with suitable example. [06]

Q.6 A. Explain the degradation of compounds by pathway engineering with suitable example [06]

B. Draw a labeled diagram of bio-scrubber and discuss the mechanism of degradation of contaminants present in air. [06]

OR

B. Write a note on microbial community of bio-filter? [06]

(A-33) SEAT No._____ No. of printed page: [02]

Sardar Patel University
MSc Integrated Biotechnology Examination -Semester 8
PS08CIGMB1: Medical Microbiology
Saturday 11th November, 2017
10:00 am to 1:00 pm

Note: **Total Marks: 70**

1. Figures to the right indicate marks.
2. Draw neat and labeled diagram, wherever necessary.

Q.1 Multiple choice questions [08]

1 The portal of entry for *Trypanosoma cruzi* is
a. Oral cavity b. Skin c. Genital tract d. Mucous membrane

2 The morphological form(s) of Entamoeba observed during life cycle is/are
a. Trophozoite b. precystic stage c. cyst d. all the three

3 Which statement about *Mycobacterium tuberculosis* is FALSE?
a. Desiccation in sputum results in loss of virulence
b. Exposure to UV light is lethal
c. Killed by heating to 62° C for 30 minutes
d. Relatively resistant to disinfectants
e. Unusually resistant to acids and alkalis

4 Following statements are TRUE for natural transformation.
i. The ability to take up DNA from the environment is encoded by chromosomal genes
ii. Transformation genes become active under certain environmental conditions. iii. a cell made permeable to DNA by treatment with agents that damage the cell envelope
iv. competence factor is secreted by natural competent *Haemophilus influenza*
a. i and ii, b. i, ii and iii, c. i, ii, and iv d. i, ii, iii, iv

5 The best method for documentation of acute hepatitis A virus infection is the demonstration of high titers of virus-specific antibody in serum drawn during the acute phase of illness.
a. IgG b. IgM c. IgA d. IgE

6 Infection with _____ is usually "below the waist".
a. HSV-1 b. HSV-2 c. VZV d. EBV

7 _____ is a common and contagious skin disease also known as Athlete's foot.
a. Tinea unguium b. Tinea manuum
c. Tinea corporis d. Tinea pedis

8 The following is not an example of dermatophyte
a. Trichophyton b. Epidermophyton c. Microsporium d. *Fusariun*

Q.2 Attempt any seven [14]

1 Explain the morphological forms of *Leishmania donovani*.

2 What are the infective forms and mode of transmission *of Fasciola hepatica*?

3 Briefly explain the toxins produced by pathogenic strains of *Escherichia coli*.

[P.T.O.]

4 What is rheumatic fever?

5 Briefly explain the mode of action of diphtheria toxin.

6 What are Oncoviruses?

7 Briefly explain association of Hepatitis D and Hepatitis B virus.

8 Explain m-y shift with appropriate example.

9 What is superficial mycosis?

Q.3 A Discuss the life cycle of *Plasmodium* spp. causing malaria in humans. [06]

B nlist the distinguishing features of cestode, trematode and nematode. [06]

OR

B Discuss the life cycle of *Ascaris lumbricoides*. [06]

Q.4 A Briefly explain the modes of genetic exchange prevail in the bacterial kingdom. Compare generalized and specialized transduction process. [06]

B Narrate the pathology, prevention and treatment of toxin mediated disease with the example of diphtheria. [06]

OR

B Enlist and explain the role of toxins and enzymes produced by strains of *Staphylococus aureus* in pathogenesis. Suggest the treatment and preventive measures to halt spread of infection. [06]

Q.5 A Write a detailed note on HIV virus infection and clinical manifestation. [06]

B Write a detailed note on the classification of animal Viruses. [06]

OR

B Give a detailed note on HSV infection. [06]

Q.6 A Discuss pathogenesis, laboratory diagnosis and treatment of sporotrichosis. [06]

B Write a detailed note on different types of Opportunistic Mycoses. [06]

OR

B Discuss various methods used for diagnosis of fungal infection. [06]

— X —