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SARDAR PATEL UNIVERSITY

B. Sc. Examination Semester – 6

Microbiology, Subject Code: US06CMIC05

Subject Title: Agricultural & Environmental Microbiology

Date: 28/6/2022

Time: 10:00 am to 12:00 pm

Tuesday

Total marks: 70

N.B: Figures on the right indicate marks.

Q.1 Multiple Choice Questions. (Attempt Any Six) 10

- 1 Specificity in the *Rhizobium*-legume interaction is due to _____.
 (a) Late nodulins (b) Mo - Fe protein
 (c) Early nodulins (d) (a) & (b) both
- 2 Nod factors are _____.
 (a) Lipoproteins (b) glycoproteins
 (c) Lipooligosaccharides (d) all of these
- 3 _____ spp of fungi used as bioinsecticide, need complex media containing animal materials for their growth
 (a) *Metarhizium* (b) *Verticillium*
 (c) *Entomophthora* (d) *Beauveria*
- 4 Xanthan gum is produced by the bacteria _____.
 (a) *X. campestris* (b) *X. malvacearum*
 (c) *X. citri* (d) *X. oryzae*
- 5 Gasoline contaminates ground water with toxic _____.
 (a) PCB (b) PVC
 (c) BTX (d) ABS
- 6 Biodegradable plastics are made of _____.
 (a) Poly(3-hydroxyalkanoates) (b) Polyvinylchloride
 (c) Poly(3/4- hydroxybutarate) (d) (a) & (c) both
- 8 _____ compounds of crude oil are highly resistant to microbial degradation and left as terry residues in the sea.
 (a) Alicyclic (b) Polynuclear aromatic
 (c) Aliphatic (d) (a) & (c) both
- 9 _____ is considered to be nonbiodegradable under anaerobic condition.
 (a) Cellulose (b) Hemicellulose
 (c) Starch (d) Lignin
- 10 _____ act as inhibitor/inhibitors in biogas production.
 (a) Ammonia (b) Antibiotics
 (c) Sulphates (d) All of these

Q.2 A Fill in the Blanks. 04

- 1 The Mo-Fe-S cluster functions as the site of _____.
- 2 _____ % CuO is required for the control of microbial growth in antifouling paints.
- 3 _____, a Japanese strain of bacteria, produces a co-polyester of polyalkanoates.
- 4 Anaerobic bacteria like *Methanogens* produce _____ gas which is a pollution free fuel.

- B Mention True/False for the following statements. 04**
- 1 Lignin can be used as a carrier material for biofertilizers.
 - 2 *Sulfolobus* are used in the bioleaching of Copper rich ores.
 - 3 Biomagnification is the process of using microbes to remove pollutants.
 - 4 Sugarcane & sugarbeet can be used to produce bioethanol.

Q.3 Short Questions (Attempt any ten) 20

- 1 Give four examples of free living nitrogen fixing bacteria.
- 2 Give reasons- *nodABC* genes are called common *nod* genes
- 3 What is nitrogenase? What are its components?
- 4 Explain the terms -xenobiotic and recalcitrance.
- 5 Define biodeterioration. How wood biodeterioration can be prevented ?
- 6 What is MEOR? Explain the use of xanthan gum in this process.
- 7 What is biodegradation? What changes can make the ABS biodegradable?
- 8 How does ABS remove the dirt or stain from cloths?
- 9 What are the factors affecting biodegradation of oil pollutants?
- 10 Enlist the undesirable features of biofuels.
- 11 Enlist different digesters used in biogas production.
- 12 Explain renewable & nonrenewable energy sources by giving examples.

Q.4 Attempt (any four) from the following long questions. 32
(Each question carries eight marks)

- 1 Write in detail on bacterial insecticide *Bacillus thuringiensis* & fungal insecticides.
- 2 Write in detail on production of *Azotobacter* as biofertilizer .
- 3 What is bioremediation? Discuss bioremediation of PCB &TCE.
- 4 What is bioleaching? Explain mechanism and methods of copper bioleaching
- 5 Explain in detail on biodegradation of oil pollutants.
- 6 Write a note on biodegradation of chlorinated hydrocarbons.
- 7 What are biofuels? How they differ from fossil fuels? Explain advantages and disadvantages of biofuels.
- 8 Define biogas, describe in detail microorganisms used for biogas production, advantages & disadvantages of biogas production.