BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

**FIRST SEMESTER 2017-2018**

**BIO G525, ENVIRONMENTAL BIOTECHNOLOGY AND WASTE MANAGEMENT**

# Comprehensive examination (Closed Book)

# Duration: 90 Min. Date: 07/12/2017 Total marks: 30

1. What are the postulates of Robert Koch that describe parasite and disease relationship? Are the postulates valid in present day scenario? Justify quoting examples.[4M]
2. What are the pollutants of paper and pulp industry? How can you use biotechnology to eliminate them?[2M]
3. Describe the MALDI-TOF process only pictorially. (In three steps) [no marks for writing].[3M]
4. What is dextran? Where is it used in analytical biochemistry?[2M]
5. Give overall reaction of anmmoxidation and characteristics of the bacteria involved.[3M]
6. Give the pathway for biodegradation of TNT. [give enzymes. Structure not necessary].[4M]
7. Write two techniques for studying engineered nanomaterials. Give their drawbacks.[3M]
8. Give the thermal methods of enhanced oil recovery.[3M]
9. What is Cartagena protocol? What are its key features?[3M]
10. How is nanotechnology used for waste water purification?[3M]

Good Luck

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1. Discuss the importance of hydraulic residence time in the different selector chambers/bioreactors with respect to biological phosphorous removal.[3M]
2. Using the figure given below, answer the following questions:



1. i) What is the percentage increase in total discarded paper waste production in united states from 1960 to 1980?

ii) What percent of the total paper discarded in 1990 was recycled?

1. Other than recycling identify and describe a possible reason why solid waste production of paper declined in 2005.
2. Discuss why it is beneficial to produce paper products from recycled materials rather than from wood.
3. Explain two environmental consequences to conventional landfill or incineration practices for solid waste materials. [1+1+2+1]
4. A) Briefly explain how reverse transcription PCR can be used in bioremediation studies.

B) You would like to improve the ability of plants to remove arsenate from contaminated soil. Describe how you could genetically modify plants to achieve this goal.[2+2]

1. **With something like nanosilver, is it possible to design out the hazard while keeping the “benefits”? Explain.[3]**
2. What happens when GM foods are traded internationally?[4]
3. Differentiate between environmental hazard and occupational hazard with regard to biomedical waste disposal.[2]
4. How do the filamentous bacteria that cause sludge foaming differ from floc forming bacteria during activated sludge process? Which are generally preferred? How do you ensure it?[5]
5. Using your biotechnology skills and knowledge on biofuels, design an organism to produce best biofuel at a very economical cost and also high yield. Justify your model. [4]