BABA GHULAM SHAH BADSHAH UNIVERSITY, RAJOURI-185 234, J&K

Syllabus for Entrance Test to M.Sc. Programme in MICROBIOLOGY- 2020

General Microbiology:

- Different types of microscopes, their construction and working principles, Simple and Compound microscope, Stereomicroscope, Principles, construction and mode of operation of Scanning and transmission electron microscope, limitations.
- Principles and methods of sterilization. Theory of spontaneous generation and biogenesis.
- Groups of microorganisms: Viruses, Prokaryotes, and Eukaryotes, Study of ultra-structure of typical prokaryotic cell and eukaryotic cell, comparative account.
- Distribution, structure of typical algal cell.General thallus structure and reproduction in algae and fungi.

Microbial Growth and Metabolism:

- Major nutritional types of microorganisms. Nutritional requirements of microorganisms. Uptake of nutrients – passive and active transport.
- Photosynthetic microorganisms: photosynthetic pigments and apparatus in prokaryotes and eukaryotes. Mechanism of photosynthesis in bacteria.
- Anaerobic Respiration: breakdown of glucose to pyruvate – EMP, HMP and ED pathways, Fermentation- conversion of pyruvate to ethanol and lactic acid.
- Aerobic respiration: formation of acetyl CoA from pyruvate, TCA Cycle, Electron transport and oxidative phosphorylation, efficiency of aerobic and anaerobic respiration as energy yielding processes.

Microbial Genetics:

- Chromosomes: Prokaryotic and eukaryotic organization. Recombination in Bacteria: Transformation, Transduction and Conjugation process – F – factor, Sexduction, transposons.
- Extrachromosomal genetic elements and their importance.
- Structure and types of DNA and RNA, Replication – mode and mechanism, replication in prokaryotic DNA.
- Protein synthesis – transcription and translation, genetic code – features, triplet code, Wobble hypothesis, nonsense codon, evolution of genetic code, regulation of gene expression in prokaryotes.

Microorganisms in agriculture:

- Biofertilizers: Nitrogen fixing, Phosphate solubilizing and cellulolytic microbes.
- Symbiotic and asymbiotic nitrogen fixation, nodule formation, bacteroids, leghaemoglobin,mechanism and biochemistry of N2 fixation.
- Biological control: mechanism of antagonism, amensalism, competition predation and parasitism. Application of biological control on field.
- Biopesticides: types – bacterial, viral and fungal, mode of action, target pests, use of transgenic plants.

Immunology and Medical microbiology:

- Introduction to immune system: Types of immunity-Innate and Adaptive Immunity.
- Antibody mediated immunity and Cell mediated immunity.

- Cells and tissues of immune system – Structure and role of primary lymphoid organs (bone marrow, thymus), secondary lymphoid organs (spleen, lymph nodes and tonsils) B&T lymphocytes, phagocytes, killer cells, NK cells.
- Antigens – nature and types.
- Antibodies – Structure of lgG. Classes of antibodies and their functional diversity, Human blood types and Rh factors, Antigen-antibody reactions, Immunoprophylaxis, Vaccine types: Killed, Live attenuated (bacterial and viral) and Toxoid.

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Model Question Paper for Entrance Test to Masters Programme in Microbiology- 2020

1. What pigments occur in blue green algae?

    a. Phycocyanin and phycoerythrin
    b. Lycopene and rhodopin
    c. Spirilloxanthin and rhodopin
    d. Spheroidene and Okeonone

2. How much energy is released when one of the high energy bonds in ATP is broken?

    a. 7.3 kcal/mol
    b. 7.3 cal/mol
    c. 730 kcal/mol
    d. 730 cal/mol

3. Select the false matching:

    a. Sugarcane virus I - Virus
    b. Meloidogne - Nematode
    c. Xanthomonas - Bacterium
    d. Leptosphaeria - Myxomycete

4. Prokaryotic ribosomes are:

    a. 70S
    b. 80S
    c. 40S
    d. 58S

5. Initiation codon for translation is:

    a. AGG
    b. AUG
    c. AGU
    d. GAU

6. In a microbial culture the order of various phases is:

    a. Log, Lag, Stationary, Death
    b. Stationary, Log, Lag, Death
    c. Lag, Log, Stationary, Death
    d. Death, Log, Lag, Stationary

7. _____ is not an amino acid:

    a. Histidine
    b. Aspartic acid
    c. Alanine
    d. Oleic acid

8. Cell theory was put forward by:

    a. Sutton and Boveri
    b. Watson and Crick
    c. Darwin
    d. Schleiden and Schwann