

GE1: Introductory Microbiology

Semester 3

HMBGE3032T

THEORY

Total Hours: 52

Module 1

20

Credit 4

Full Marks:

1) Basic microbiology- Landmark achievements in 20th century: Refutation of a biogenesis: discovery of penicillin: discovery of vaccination: proposal of one gene one enzyme hypothesis: discovery of double helix structure of DNA: discovery of recombinant DNA technology.

[8]

2) Major contribution of scientists– Leeuwenhoeck, Edward Jenner, Alexander Flemming, Joshep Lister, Robert Koch, Louis Pasteur, Hargobind Khorana.

[4]

3) Scope of Microbiology

[2]

4) Whittaker's five– kingdom concept of living organism-

[8]

(General characteristics of those five groups), characteristics and importance of yeast, moulds (*Penicillium*, *Aspergillus*), protozoa, *Giardia*, *Plasmodium*, plant diseases (brown spot of rice, stem rot of jute, black stem rust of wheat, apple scab, grey blight of tea, bacterial blight of rice, citrus canker).

- i) Characteristics of pathogenic fungi
- ii) Plant pathogenic toxin and their classification
- iii) Disease expression in a plant, gene for gene concept
- iv) Control of plant disease – physical, chemical, cultural and biological control, IPM

Module 2

Full Marks: 30

5) Microscopy- Principles and applications, dark field, bright field, resolving power, numerical aperture, chromatic aberration, phase contrast microscopy, fluorescent microscopy, inverted

microscopy, stereo microscopy, electron microscopy, TEM and SEM.

[4]

6) Stains and staining- Principles of staining, simple staining, negative staining, differential staining, Gram and acid fast staining, flagella staining, capsule and endospore staining.

[6]

7) Introduction to biomolecules- Outline structure, function and examples of carbohydrate, lipid, protein (primary, secondary, tertiary and quaternary). Amino acids, DNA, RNA.

[10]

8) Control of microbes- Sterilisation, disinfection, antiseptic, tyndallisation, pasteurization: Physical- dry heat, moist heat, UV light, ionizing radiation, filtration, HEPA filter, Chemical- phenol and phenolic compounds, (halogen aliphatic alcohol, formaldehyde, ethylene oxide, heavy metals) anionic and cationic detergents.

[10]

References: 1. Microbiology Pelczar, Chan and Krieg. (Indian edition)
2. Microbiology Vol II Power and Dagainawala.
3. Outlines of Biochemistry Cohn and Stumpf.
4. Microbiology by Dubey & Maheswari
5. Microbiology by Purohit.

PRACTICAL

HMBGE3032P

Credits 2

TOTAL HOURS: 26

- 1) Microscopy– Description and operation of compound microscope, use of oil immersion objective.
- 2) Micrometry and cell measurement- Use of ocular and stage micrometer, cell count (haemocytometer, Bacterial cell- *Bacillus subtilis*), fungal cell (*Saccharomyces*) and human blood cell).
- 3) Staining- Simple and differential staining of bacteria. Simple staining – *Bacillus subtilis*, differential staining – *Bacillus and Ecoli*. Study of bacteria from contaminated water, study of Rhizosphere bacteria, study of bacteria from buccal cavity. Staining of yeast (methylene blue), lactophenol cotton blue, staining of mould (*Penicillium, Aspergillus*), agaricus.
- 4) Study of plant diseases (Brown spot of rice)
- 5) Qualitative tests of glucose, fructose (Benedict's test, Seliwanoff's test), sucrose (acid hydrolysis and benedict's test), proteins (peptone, egg albumin by biuret test, heat coagulation

test), amino acids (glycine by ninhydrin), fats (coconut oil by saponification, emulsification), DNA (by DPA method) and RNA (by orcinol method).

Reference: 1. Microbiological Techniques by Aneja.