Faculty of Pharmacy
Program: B. Pharm.

Syllabus | Semester: 5
Course code with name: 13PH0504 Pharmaceutical Microbiology

Scope: Study of all categories of microorganisms especially for the production of alcohol, antibiotics, vaccines, vitamins, enzymes etc.

Objectives: Upon completion of the course the student shall be able to
1. Understand methods of identification, cultivation and preservation of various microorganisms.
2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry.
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Teaching and examination scheme:

<table>
<thead>
<tr>
<th>Teaching scheme (Hours/week)</th>
<th>Total credits</th>
<th>Examination scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>Tutorial</td>
<td>Practical</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Theory syllabus:

**Unit-1**
Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes: Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

**Unit-2**

**Unit-3**
Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses. Classification and mode of action of disinfectants. Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions. Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

**Unit-4**

w.e.f. academic year (AY) 2020-21 and onwards

**Unit-5**

7 Hours

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research.

**Tutorials will be based on above syllabus.**

**Teaching hours: 15 Hours**

**Practical syllabus:**

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods.
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.

**Recommended Books (Latest edition):**

3. Pelczar, Chan Kreig, Microbiology, Tata Mcgray Hill edn.
5. Rose: Industrial Microbiology.
7. Cooper and Gunn’s: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.