SEMESTER-V

COURSE 15: NANOTECHNOLOGY & PHARMACEUTICAL

Theory Credits: 3 3 hrs/week

I. LEARNING OUTCOMES

On successful completion of the course, the students will be able to

1. Learn about concept and types of nanoparticles
2. Learn about methods of nanobiotechnology
3. Learn about bio nanoelectronics and applications of nanobiotechnology
4. Learn about Pharmacology and drugs &its types
5. Learn about tissue engineering and production of biological substances

II. Syllabus

UNIT I

1. Nanobiology – concepts, definitions, prospects; nanoparticles – size, shape, properties.
2. Bio nanoparticles – nano starch, nano composites – dendrimers.
3. Hot – Dot nanoparticles. Types of biomaterials. Biodegradable polymers.

UNIT II

1. Methods of nanobiotechnology – Analysis of bimolecular nanostructures by Atomic Force Microscopy, Scanning Probe Electron Microscopy.
2. Nanofabrication - lithography. Drug nanoparticles - structure and preparation ,Liposomes, Cubosomes and hexosomes.
3. Lipid based nanoparticles-liquid nano dispersion, solid liquid nanoparticles

UNIT III:

1. Nanotubes, Nanorods, Nanofibers and Fullerenes for nanoscale drug .
2. Bio nanoelectronics. Applications of nanobiotechnology in medicine, drug designing and cancer treatment.
3. Medical, social and ethical considerations of nanobiotechnology.

UNIT-IV

1. History & principle of pharmacology. Drug names & classification systems.
2. General principle of drug action – Pharmacokinetics, Pharmacodynamics. Measurement of drug action.
3. Chemotherapeutic drugs – Protein Synthesis Inhibitors, Anti-Inflammatory, Antibacterial, Antifungal, Antiviral, Antihelminthic, Anticancer Drugs.

UNIT-V

1. Production of biological – Human insulin, HGH, Erythropoietin's, IFN, TNF, IL, Clotting factor VIII
2. Synthetic therapy: Synthetic DNA, therapeutic ribozymes, synthetic drugs.
3. Tissue Engineering: Skin, Liver, Pancreas. Recombinant vaccines, Cell adhesion based therapy: Integrins, Inflammation

III . Skills Outcome

On Successful Completion of this Course, Student shall be able to

1. Learn about biological assays of antibiotics
2. Learn about Minimum Inhibitory Concentration (MIC) of Antibiotic
3. Learn about Sterility testing of commercial pharmaceuticals

SEMESTER-V

COURSE 15: NANOTECHNOLOGY & PHARMACEUTICAL

Practical Credits: 1 2 hrs/week

1. Estimation of penicillin/streptomycin by biological assay.
2. Estimation of penicillin/streptomycin by chemical assay.
3. Assay of antimicrobial activity of Penicillin, Chloramphenicol, streptomycin
4. Determination of Minimum Inhibitory Concentration (MIC) of Antibiotic
5. Determination of shelf life of antibiotics (Expired drugs)
6. Sterility testing of commercial pharmaceuticals.
7. Study of microbial spoilage of pharmaceuticals.
8. Sterility testing of injectable as per IP.
9. Effect of chemical disinfectant on growth of bacteria

V. REFERENCES

1. Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen and Jack E.Lemons. Biomaterials Sciences: An Introduction to Materials in Medicine 2nd Edition.

2. David L. Nelson and Michael M. Cox, 2006 Lehninger's Principles of Biochemis try, 4th Edition.

3. M.Niemayer, Chad A. Mirkin, 2004. Nanobiotechnology: Concepts, applications and perspectives, Wiley VCH publishers.

4. David. S. Goodsell., 2006. Bionanotechnology: Lessons from Nature, Jhonwiley.

5. K.K. Jain, Naobiotechnology: Molecular Diagnosis, Tailor L. Francis Group.

VI. CO-Curricular Activities

a) **Suggested C0-Curricular Activities**

1 Assignments
2. Seminars, Group Discussions on related topics
3. Charts on drug action, chemotherapeutic drugs