॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'B++' grade

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Academic-1 (BOS) Section

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E-mail: bos@srtmun.ac.

विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० नुसार पदव्यूत्तर द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, या विद्यापीठा अंतर्गत येणा–या सर्व संलग्नित महाविद्यालयामध्ये शैक्षणिक वर्ष २०२४–२५ पासून राष्ट्रीय शैक्षणिक धोरणानुसार पदव्यूत्तर द्वितीय वर्षाचे अभ्यासक्रम लागू करण्याच्या दृष्टीकोनातून विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत येणा–या अभ्यासमंडळांनी तयार केलेल्या पदव्यूत्तर द्वितीय वर्षाच्या अभ्यासक्रमांना मा. विद्यापरिषदेने दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या बैठकीतील विषय क्रमांक १५/५९–२०२४ च्या ठरावाअन्वये मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील खालील एम. एस्सी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) लागू करण्यात येत आहेत.

1) M. Sc. II year Biotechnology (Affiliated College)
2) M. Sc. II year Biotechnology (Campus)
3) M. Sc. II year Bioinformatics (Sub Campus Latur)
4) M. Sc. II year Bioinformatics (Affiliated College)
5) M. Sc. II year Clinical Research (Affiliated College)
6) M. Sc. II year Botany (Campus)
7) M. Sc. II year Herbal Medicine
8) M. Sc. II year Boany (Affiliated College)
9) M. Sc. II year Geology (Campus)
10) M. Sc. II year Dairy Science
11) M. Sc. II year Electronics
12) M. Sc. II year Environmental Science
13) M. Sc. II year Environmental Science (Campus)
14) M. Sc. II year Geography (Campus)
15) M. Sc. II year Applied Mathematics
16) M. Sc. II year Mathematics
17) M. Sc. II year Mathematics (Campus)
18) M. Sc. II year Microbiology
19) M. Sc. II year Microbiology (Campus)
20) M. Sc. II year Statistics
21) M. Sc. II year Statistics (Campus)

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/एनइपी/विवत्रंविपदवी/२०२४–२५/१०९
दिनांक १२.०६.२०२४

डॉ. सरिता लोसरवार
सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : १) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मुंल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
३) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ
५) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर प्रसिध्द करण्यात यावे.

M. Sc. Second Year Semester III *(Level 6.0)*

SMICC- 501
FERMENTATION TECHNOLOGY

Credit 4 **Period 60**

MODULE - I

An introduction to fermentation processes:
Microbial biomass, microbial enzymes, microbial metabolites, recombinant products.
The isolation of industrially important microorganisms:
Isolation methods utilizing selection of the desired characteristics: Enrichment liquid culture, Enrichment cultures using solidified media.

MODULE II

The preservation and improvement of industrially important
Microorganism: Storage on agar slopes, Storage under liquid nitrogen, Lyophilization. The improvement of industrial microorganisms
Mutant resistant to the feedback effects of the secondary metabolite.
The application of the parasexual cycle, protoplast fusion techniques, Recombinant DNA techniques.
The improvement of industrial strains by modifying properties other than the yield of products: The selection of stable strains, strains resistant to infection, non- foaming strains, morphologically favorable strains.

MODULE III

Media for industrial fermentation: Typical media, medium formulation, carbon sources, Nitrogen chelators, Buffers, precursors, Inhibitors, Inducers, Oxygen requirements, Antifoams.
Sterilization: Medium sterilization, Methods of batch sterilization, sterilization of the fermenter, filter sterilization of air.
The development of inocula for industrial fermentation: The Development of inoculum for yeast processes, Brewing, Baker's yeast, bacterial processes, Mycelial processes.

MODULE IV

Design of a fermenter: Basic function of a fermenter for microbial or animal cell culture, Body construction, The agitator (impeller), The aeration system (Sparger): porous sparger, Orifice sparger, Nozzle sparger, Combined sparger- agitator, Valves and steam traps: Gate valve, Globe valves, Piston valves, Needle valves, Safety valves.

Other fermentation vessels: The tower fermenter, Air- lift fermenters, Method of measuring process variables: Temperature, pressure measurement.

The recovery and purification of fermentation products: Filtration, Centrifugation, Cell disruption, Chromatography.

Reference Books

1. Principles of Fermentation Technology by Stanbury, P.F., Whitekar A. and Hall. 1995., Pergaman. McNeul and Harvey.
2. Fermentations - A practical approach. IRL.
3. Bioprocess Technology: Fundamentals and Applications. Stockholm KTH.
4. Biochemical Reactors by Atkinson B., Pion, Ltd. London.
5. Biotechnology - A Text Book of Industrial Microbiology by Cruger.
6. Fermentation Biotechnology: Industrial Perspectives by Chand.
7. Biochemical Engineering Fundamentals by Bailey and Ollis, Tata McGraw Hill, N.Y.
8. Biotechnology. Volume 3.Edited by H. J. Rehm and G. Reed.VerlagChemie. 1983.
9. Advances in Biochemical Engineering by T.K. Bhosh, A.Fiechter and N. Blakebrough. Springer Verlag Publications, New York.
10. Bioprocess Engineering Kinetics, Mass Transport, Reactors, and Gene expressions by Veith, W.F., John Wiley and Sons.
11. Industrial Microbiology by L.E. Casida, Wiley Eastern

SMICC-502
Medical Microbiology

Credit 4 Period 60

Course objectives

The aim of this course is to introduce basic principle & application relevance of clinical disease for students acquire working knowledge in basic medical science & research.

Learning outcome

Upon successful completion f this course the student will be able to Understand basic principles of medical microbiology & infectious diseases. Learn mechanisms of transmission of infectious diseases & role of normal flora of human body. Understand importance of pathogens in disease formation. Explain the methods of prevention & control of microbial diseases.

MODULE I

History of infectious disease: Koch's postulates, molecular postulates, types of pathogens, sub cellular infectious entities, prokaryotic and eukaryotic microorganisms, normal micro flora in healthy human body.

Host-Parasite interactions: Basic terminology of infectiology, determinants of bacterial pathogenicity and virulence, adhesion, invasion and spread and damage, action of toxins, regulation of bacterial virulence.

MODULE II

Bacterial Diseases: Transmission, mechanism of pathogenesis and laboratory diagnosis of the diseases caused by Pneumococcus, Neisseria, Clostridium, Mycobacterium, and Helicobacter pylori.

Biology of obligate parasites: Transmission, mechanism of pathogenesis and laboratory diagnosis of the diseases caused by Rickettsia, Chlamydia.

Viral Diseases: Orthomyxo virus – Influenza, Swine-flu, Arbo virus - Chikungunya, Dengue, Ebola Virus, Retro viruses - Hepatitis, Corona virus.

MODULE III

Mycotic infections in humans: Superficial, subcutaneous, cutaneous and systemic mycoses, source of infection, symptomatology & diagnosis of Aspergillosis, Candidiasis, Microsporum, Trichophyton & Epidermatophyton, Blastomycosis and Histoplasmosis.

Protozoal infections in humans: Pathogenesis, life cycles, diagnosis & prophylaxis of Plasmodium, Entamoeba, Toxoplasma, Trypanosome, Leishmania, Roundworm & Tapeworm.

MODULE IV

Hospital infections and methods of disease diagnosis - Types, sources, factors affecting and control measures of nosocomial and iatrogenic infections, collection, transport and preliminary processing of clinical pathogens. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.

Chemotherapeutic Agents: Mechanism of action of cell wall inhibitors (penicillin, bacitracin), inhibitors of membrane function (polyenes, tunicamycin, ionophores), inhibitors of ribosomal function (amino glycoside, tetracycline, chloramphenicol, puromycin), inhibitors of nucleic acid metabolism (Actinomycin D, mitomycin C) examples and sites of action of some commonly used antifungal agents. Viral vaccines, antiviral agents.

Reference Books

1. Mechanism of Microbial Diseases 2nd edition. Chaechter M. Medoff G. and Eisenstein BC.(1993), Williams and Wilkins, Baltimore.

2 Practical Medical Microbiology, Collee, JG. Duguid JP, Fraser AG, Marimon BP. (1989) Mackie and McCartney 13th Edition. Churchill Livingstone.

3. Medical Microbiology. David Greenwood, Richard CD, Slack, John Forrest Peutherer. (1992) 14th edition. ELBS with Churchill Livingstone.

4. Pharmaceutical Microbiology, Hugo WB and Russell AD, (1989) IV edition. Blackwell Scientific Publication, Oxford.

5. Clinical Microbiology, Joan Stokes E, Ridgway GL and Wren MWD (1993). 7th edition. Edward Arnold. A division of Hodder and Stoughton.

6. Microbiology. Fundamentals and Applications, Ronald M. Atlas.(1989), II edition, international editions.

7. Principles of Bacteriology, Virology and Immunity, Topley& Wilsons's. (1990), VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London. Maxwell Macmillan

8. Handbook of Microbiological Media, Atlas RM (1993) (ed) Parks L.C, CRC Press, London.

9. Manual of Clinical Microbiology, Balows A, HanslerJr K.L, Isenberg H.D, Shalomy H.J (1991).American Society for Microbiology, Washington DC.

10. Modern Experimental Biochemistry, Boyer R (2001) 3rd edition: Benjamin/Cummings Publishing Company Inc.

11. Laboratory Immunology, Brawshaw L.J. (1988). Sandders College Publishing.

12. Experimental Biochemistry, Clark J.M Jr and Switzer RI (1977) 2nd Edition. W.H. Freeman, San Francisco.

13. Methods for General and Molecular Bacteriology Gerhardt P, Murray R.G, Wood W.A and Kreig N.R. (ed) (1994), American Society for Microbiology, Washington D.C.

14. Laboratory manual in Biochemistry, Jayaraman J (1981). New Age Int. Publishers, New Delhi.

15. Antibiotics in Laboratory Medicine, Lorian V (1991), 3rd edition, Williams and Wilkins, Baltimore. 16. Diagnostic procedures in medical microbiology, Myers R.M, Koshi G (1982) IELC Combodia Press.

SMICC-503

DIAGNOSTIC MICROBIOLOGY AND BIOINFORMATICS

Credit 4 **Period 60**

Course objective

This course has been developed to develop basic principle and application of bioinformatics and new diagnostic techniques

Learning outcome

Student will be able to understand the diagnostic techniques used in the diagnosis of various diseases and disordersuse bioinformatics based analytical tools

MODULE I

Staining techniques in disease diagnosis (AFB), immunofluorescence, direct fluorescence, PCR in clinical microbiology, Real-time PCR, advanced PCR techniques next generation sequencing, radiology and hematology based diagnostic methods, serodiagnosis (agglutination, ELISA, radio immunoassay, T cell based tests skin tests, interferon gamma assays,) VITEK-2 system, anti microbial susceptibility testing (disc diffusion, inhibition zones E test , MIC) detection of viral infection (e- microscopy, ag&ab detection, virus culture).

MODULE II

Detection of blood glucose level, oral glucose tolerance test, gestational diabetes & HB, AC, detection of serum bilirubin, uric acid &cholesterapy LFT, KFT, alkaline phosphatase, Lipid profile.

MODULE III

Computers and peripherals like mouse, printer, wireless routers, scanners etc. Windows operating system and its features like MS-Paint, Internet Explorer OR Browser like Chrome or Firefox, Zipping & Unzipping, Fonts etc. General software used for DTP like MS-Word, MS-Excel, MS-Power Point etc.Connecting to Internet by Wired Connection (LAN) as well as Wireless Connection (WIFI). Use of popular search engines like Google, Yahoo etc, Study of sources of information like Wikipedia, TED, Youtubeetc, Use of Pen Drives for collecting and browsing information. Using Internet for communications as mailing, Skype or like software for Voice Communication, Video Communication, General knowledge about social networking sites like Tweeter, Facebook, Blogs, YouTube, Instagram etc.

MODULE IV

Introduction to Bioinformatics: Various definitions of bioinformatics, history of bioinformatics, applications of bioinformatics, scope of bioinformatics, bioinformatics in business. Introduction to central dogma of molecular biology . Internet and Bioinformatics: General purpose search engine: Google, Biological search engine: Entrez, SRS. What is Database? Types of Databases Biological databases: Primary databases – GenBank, DDBJ, EMBL. Protein sequence databases – Swissprot, Uniprot, TrEMBL, Structural databases – PDB,PubChem, ChemBank,. Bibliographic databases:-Pubmed, PMC, PloS.

Reference Books

1. Blair, J.E.e., Lennette, E.H.e., and Truant, J.P.e. (1970). Manual of clinical microbiology, American Society for Microbiology, Bethesda, Md.

2. Gradwohl, R.B.H., Sonnenwirth, A.C., and Jarett, L. (1980). Gradwohl's clinical laboratory methods and diagnosis. Mosby, London.8th ed 53

3. Lennette, E.H., Balows, A., Hausler, W.J., and Shadomy, H.J. (1985). Manual of clinical microbiology. American Society for Microbiology, Washington, D.C. 4th ed.

4. Topley, W.W.C., Wilson, G.S.S., Parker, T., and Collier, L.H. (1990b). Topley and principles of bacteriology, virology and immunology. Edward Arnold,8thed

5. Mukherjee, K.L. (2010) Medical Laboratory Technology .Tata McGraw-Hill Education.2nd ed. M.Sc. Microbiology Syllabus - Kerala University 2013 Admission Onwards

6. Sood, R. 1999. Medical Laboratory Technology - Methods and Interpretations.Jaypee Brothers Medical Publishers (P) Ltd. New Delhi. 5th ed.

7. Cheesbrough, M. (2006). District Laboratory Practice in Tropical Countries. Cambridge University Press.2nd ed.

8. Mackie, T.J., McCartney, J.E., and Collee, J.G. (1989). Mackie & McCartney practical medical microbiology. Churchill Livingstone, 13th ed

9. Black, J.G. (1999). Microbiology : principles and explorations. Prentice Hall International, London. 4th ed.

10. Kindt, T.J., Goldsby, R.A., Osborne, B.A., and Kuby, J. (2006). Kuby immunology.W.H. Freeman, New York. 6th ed.

11. Forbes, B.A., Sahm, D.F., Weissfeld, A.S., and Bailey, W.R.D. m. (2007). Bailey & Scott's diagnostic microbiologyt. Elsevier, Mosby, London. 12th ed.

12. Fundamentals of Computer by V. Rajaraman- PHI

13. Computer Fundamentals- P.K. Sinha- BPB Publication 14. MS DOS- Russel- BPB

SMICE-501

Food and Dairy Microbiology

Credit 3 **Period 45**

MODULE I

Role and significance of microorganisms in food, Primary sources of microorganisms in food, Common foodborne bacteria, yeast, Intrinsic & Extrinsic parameters of food affects microbial growth, Spoilage of poultry, Spoilage of milk & milk products, Spoilage of fruits & vegetables, Spoilage of fish, Food poisoning by Mycotoxin.

MODULE II

Common foodborne diseases: (1) Staphylococcal gastroenteritis (2) Clostridium botulism
Food preservation with chemicals:
(1) Benzoic acid & sorbic acid (2) Nacl & sugar (3) Acetic acid & lactic acid
(4) Antibiotics (5) Ethylene & propylene oxide
Principle underlying destruction of microorganisms by radiation in food preservation.
Food preservation by low temperature.

MODULE III

Production of cheddar cheese, Production of yoghurt, Production of kefir, Study of food safety standard act 2006, HACCP and its Application, International food laws. Milk and milk product order 2006**.**

Reference books

1. Food Microbiology. 2nd Edition By Adams. Basic Food Microbiology by Banwart George J. Food Microbiology: Fundamentals and Frontiers by Dolle.

2. Essentials of Food Microbiology. Edited by John Garbult. Arnold International Students Edition.

3. Microbiology of Fermented Foods. Volume I and II. By Brian J. Wood. Elsiever Applied Science Publication.

4. Microbiology of Foods by John C. Ayres. J. Orwin Mundt. William E. Sandinee.

5. W.H. Freeman and Co. Dairy Microbiology by Robinson. Volume II and I.

6. Food Microbiology: Fundamentals and Frontiers. 2nd Edition by Michaell P. Doyle, Larry R. Beuchat and Thomas I. Montville (Eds.), ASM Publications.

7. Bacterial Pathogenesis A Molecular Approach. 2nd Edition.2001 by Abigail A. Salyers and Dixie D. Whitt.ASM Publications.

8. Advances in Applied Microbiology by D. Pearlman, Academic Press.

9. Microbial biotechnology- principles and applications- by Lee Yuan Kun Biotechnology Vol. III and V edited by H J Rehman and G Reed Industrial and

10. food microbiology by James M Jay

SMICP-2501 Lab 1

1. Screening of industrially important enzymes producer (amylase) using soil sample.

2. Screening of industrially important organic acid producer using soil sample.

3. Screening of industrially important antibiotic producer using soil sample.

4.Preservation of industrially important microbes by low temperature and oil overlay method.

5. Inoculum built up using *S. cerevisiae* and *Bacillus species*.

SMICP-502 Lab 2

1. Isolation and observation of air microflora.

2. Biodegradation of phenol compounds.

3. Synder test

4. Isolation of normal flora.

5. Isolation of hospital microflora

SMIEP-501 Elective Lab

1.Microbiological analysis of milk using MBRT.

2. Microbiological analysis of dairy effluents- BOD.

3.Microbiological analysis of water using MPN.

4. Microbiological analysis of milk product: ice-cream, paneer, butter using SMP.

5.Testing for microbial quality of water: Coliform using SPC method.

M. Sc. Second Year Semester IV *(Level 6.0)*

SMICC-551

MICROBIAL TECHNOLOGY

4 Credits **60 periods**

Course objective

The aim of this course is to impart knowledge about biological & biochemical technologies with focus on biological products & design & operation of industrial practices.

Learning outcome
Upon successful completion of this course, the student will able to

1. Understand the basic concepts in a microbial production of different solvents, antibiotics, plants growth promoters, biofertilizers& other industrially important products.

2. Learn the process of patents filing, types of products to be patented & basic principles of IPR

MODULE I:

Microbial production of therapeutic agents

Antibiotics; Griseofulvin, Rifamycin

Antiviral & anticancer agents

Vaccines, insulin and siderophores

Biotransformation of steroids and antibiotics.

MODULE II:

Microbial production of solvents, beverages and biofuels

Solvents : Ethanol, acetone-butanol.

Beverages: Wine and beer.

Biofuels- H2 gas and bio-diesel.

MODULE III:

Modern trends in Microbial Production
Biopolymers &Bioplastics: Dextran, Alginate, Xanthan, Pullulan, PHA & PHB.

Biofertilizers: Nitrogen's fixers, Phosphate solubilizers.
Biomass: Mushroom and probiotics

Biosurfactants & Bio pigments: Glycolipids, beta-carotene.
Bio – insecticides &Bio weedicides.

MODULE IV:

IPR and IPR Practices

Introduction to IPR & patents: composition of patents, patent practices and problems, patent, Trademarks and copyrights.

Patenting of biological materials: Microbial products, transgenic organisms and isolated genes.

Patent regulation bodies at national and international level.

Reference books

1. Biotechnological innovations in Chemical Synthesis. BITOL.Publishers / Butterworth-Heinemann.
2. Industrial Microbiology by G.Reed (Ed,) CBS publishers (AVI publishingCo.)
3. Biology of industrial Microorganisms by A.L.Demain
4. Genetics and Biotechnology of Industrial Microorganism by C.I. Hershnergy, S.W. Queener and Q. Hegeman.
5. Publisher.ASM Ewesis ET.AL 1998 Bioremediation Principles, Mac GrawHill.
6. Biotechnology, A textbook of industrial Microbiology by Creuger and Creugersinaeurassociates.
7. Manual of industrial microbiology and Biotechnology 2ndedition by Davis J.E. and Demain A.L. ASMpublications.
8. Mukhopadhayay, S.N. (2004) Process Biotechnology Fundamentals , 2ndedn., Viva Books Pvt. Ltd, Mumbai(ISBN:81-7649-496-8)
9. Rehm, H.J. and Reed, G, (1983) Biotechnology, Vol. 3 Dellweg, H. (ed.), VerlagChemie, Basel(ISBN:3-527- 25765-9)
10. Martin, A.M. (1998) Bioconversion of Waste Materials to industrial products, 2ndedn,.BlackieAcademicandprofessional,London((ISBN:0-7514-0423-4)

10. Chincholkar, S.B. and Mukherji ,K. G.(2007)Biological Control of Plant Diseases, Hawarth Food and Agricultural Products Press, Oxford, UK(ISBN:1-56022-328-6)
11. The Indian Environmental Protection Act(EPA) ,1986
12. Rules for manufacture, use/ import / export and storage of hazardous microorganisms or cells Act ,1989

SMICC-552

Pharmaceutical Microbiology

4 Credits **Periods 60**

Course objective

Aim of course is to provide knowledge of Antibiotics and Pharmaceutical product policies in pharmaceutical industries and validation of product.

Learning Outcome

After completing the course student will have idea of Pharmaceutical products their mode of action spoilage and validation policies of pharmaceutical industries

MODULE I

Antibiotics and Synthetic antimicrobial agents

Concept of bioassay, therapeutic index, MIC andLD50

Mechanism of action, microbial resistance, therapeutic, prophylactic usage and adverse Reactions of,

Antibiotic and synthetic antimicrobial agents: β-lactam, aminoglycosides, tetracyclines, ansamycins, macrolides, peptide antibiotics, synthetic antibiotics: Sulphonamides, Chloramphenicol, Quinolone.

Antifungal antibiotics: Amphotericin B, Griseofulvin and Fluconazole.
Antiviral drugs: Acyclovir, Zidovudine, Amantidines.
Antitumor drugs: Bleomycin, Ductinomycin.

MODULE II:

Microbial production and spoilage of Pharmaceutical products (14)

Microbial contamination, spoilage and sterilization of pharmaceutical products: Injectables, non-injectables, ophthalmic preparations and implants.

Manufacturing procedures and in process control of pharmaceuticals.

Microbial fermentation of other pharmaceutical products: Streptokinase, streptodornase.

New vaccine technology: DNA Vaccines, synthetic peptide vaccines, multivalent subunit vaccines, vaccines in clinical trials.

Drug targeting and drug delivery systems.

MODULE III :

Regulatory practices and policies in pharmaceutical industries (14)
Financing R& D capital and market outlook.
FDA, Govt. regulatory practices and policies.
Significance of IP, BP and USP.
Reimbursement of drugs- biological and legislative aspects.
Rational of drug designing
Patenting of drugs

MODULE IV

Quality assurance and validation (16)
Regulatory aspects of QC, QA and QM.
GMP, GLP and CMP in pharma industries.
ISO, WHO, US, FDA and US certification.
Sterilization control and sterility testing: heat sterilization, D value, Z value, survival curve, radiation, gaseous and filter sterilization, Microbial limit test.

Pyrogen testing and LAL test.

Chemical and biological indicators of sterilization.
Design and layout for Microbiology laboratory.

Reference books

1. Pharmaceutical Microbiology- Edited by W. B. Hugo & A.R. Russel Sixth Edition. Blackwell ScientificPublications.
2. Lippincott's illustrative Reviews: Pharmacology Edition: 02 Maryjnycck by Lippincott's review Publisher Pheladelphia1997.

3. Principles of medicinal chemistry Vol. 1 by Kadam S.S., Mahadik K.R., Bothra K.G. Edition: 18, NiraliPublication.

11. PharmacognosybyGokhleS.D.,KoKateC.K..Edition:18, NiraliPublicationtion.
12. Biotechnology – Expanding Horizon by B.D. Singh., First Edition, Kalyani Publication, Delhi.
13. Analytical Microbiology- Edited by Fredrick Kavanagh volume I &II. Academic Press, NewYork.
14. Pharmaceutical Biotechnology by S. P. Vyas& V.K. Dixit. CBS publishers & distributors, NewDelhi.
15. Quniolinone antimicrobial agents- Edited by David C. Hooper, John S. Wolfson. ASM Washington DC.
16. Quality control in the Pharmaceutical industry - Edited by Murray S. Cooper Vol. 2, Academic Press New York.
17. Biotechnology- Edited by H.J. Rhem& Reed, vol 4 VCH publications, Federal Republic of Germany.
18. Good manufacturing practices for Pharmaceuticals. By Sydney H. Willing, Murray M. Tuckerman, Willam S.
19. Hitchings IV.Second edition Mercel Dekker NC New York.

12. Advances in Applied Biotechnology series Vol.10, Biopharmaceutical in transition., Industrial Biotechnology Association by Paine Webber,. Gulf Publishing Company Houston.

20. Drug carriers in biology & medicine Edited by Gregory Gregoriadis. Acedemic Press New York.
21. Quality Assurance in Microbiology by Rajesh Bhatia, Rattan LalIhhpunjani. CBS publishers & distributors, New
22. Delhi.
20.

SMICE-2551

GENETIC ENGINEERING

Credit 3 **Period 45**

MODULE I

Transgenic construct preparation.
Transgenic technology in India.
Restriction Endonuclease
Procedure of gene/molecular cloning.
Construction of DNA library.
Restriction mapping RFLP (restriction fragment length polymorphism)
Modification on restriction fragments.
Alkaline phosphatase.

MODULE II

vecors :

(1) Plasmid
(2) Cosmid
(3) M13 vectors
super vectors:
(1) YAC
(2) BAC
C-DNA synthesis
PCR primers /probes
PCR and RT- pcr based DNA cloning
Importance of DNA cloning
Nucleic acid hybridization

MODULE III

Gene transfer in bacteria by _
(1) Conjugation
(2) Transformation
(3) Transduction
Gene transfer in plant by _
(1) Conjugation
(2) Transformation
(3) Transduction
Gene transfer in plant by _
(1) Agrobacterium Tumefaciens
(2) Shot gun method
(3) Electroporation
Gene transfer in animal by _Microinjection
Production of chimeric protein.
Gene scuffling

Reference books

1. Molecular cell biology by Harvey Lodish, Published by W.H.Freemanand company.

2. MolecularbiologyofthegenebyJames.D.Watson,PublishedbyPearsoneducation.

3. Cell and molecular biology by E.D.P. De Roberties, Published by Lippincutt William and wilkins.

4. Molecular Biotechnology : Principles and applications 3rded by R BernadGlick, Published by ASM press,Washington

SMICP-551 Lab course I

1. Production of ethanol using S. Cerevisiae.

2. Microbial production of biosurfactants.

3.production of siderophores using Pseudomonas aeruginosa.

4.Production of biofertilizers and testing of efficacy.

5.Testing for antibiotic/ drug sensitivity/ resistance.

SMICP-552 Lab course II

1 sterility testing of pharmaceutical products.

2 Test for disinfectant (phenol coefficient /RWC method)

3 Determination of antimicrobial spectrum for drugs /Antibiotics

4 Determination of MIC value for antimicrobial chemicals.

3. Isolation and culturing of antibiotic resistant strains.

SMIEP-551 Elective Lab

1 Restriction mapping.

2 ligation studies.

3 Demonstration of RAPD/RFLP southern transfer.

4 Isolation of DNA checking its impurity.

5 Determination of Tm value.