शासकीय कमला राजा कन्या स्नातकोत्तर स्वशासी महाविद्यालय, ग्वालियर (मध्य प्रदेश)

आनो भद्राः क्रतवो यन्तु विश्वतः

माइक्रोबायोलॉजी विषय के अध्ययनमंडल
द्वारा अनुमोदित सूक्ष्म जैविकी विषय के

स्नातक पाठ्यक्रम

अनुमोदन अकादमिक सत्र

2019–2020

प्रस्तुतकर्ता

स्नातक अध्ययन केन्द्र

माइक्रोबायोलॉजी विभाग

प्राप्तकर्ता

अकादमिक प्रकोष्ठ

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दूरभाष : 0751 – 2625495, 0751 – 2438173, फैक्स : 0751 – 2625495

कार्यालय प्राचार्य, शासकीय कमलाराजा कन्या स्नातकोत्तर स्वशासी महाविद्यालय, ग्वालियर
GOVT. KAMLA RAJA GIRLS P.G. AUTO. COLLEGE, GWALIOR (M.P.) INDIA
(Affiliated to Jiwaji University, Gwalior under 2(f) & 12(b) NAAC – 'A' Grade Accredited Institute)
www.krgcgwalior.org krgc@rediffmail.com Phone : 0751- 2625495, 0751-2438173

ग्वालियर, दिनांक 29 जून, 2019

माइक्रोबायोलॉजी विभाग

अध्ययन मंडल की बैठक का कार्यवाही विवरण

नवीन सत्र 2019–20 हेतु माइक्रोबायोलॉजी ------विषय से सम्बंधित अध्ययन मण्डल की बैठक आज दिनांक 29 जून, 2019 को प्रातः 11:00 बजे माइक्रोबायोलॉजीविभाग में आयोजित की गई, जिसमें निम्नानुसार उपस्थिति रही –

1. डॉ. साधना पाण्डेय श्रेणी-1
2. डॉ. मधुलक्ष्मी शर्मा श्रेणी-2 अनुपस्थित
3. डॉ. प्रीति कुलश्रेष्ठ श्रेणी-2 29/6/19
4. डॉ. सुरभि श्रीवास्तव श्रेणी-3 अनुपस्थित
5. डॉ. सुशील कुमार शर्मा श्रेणी-3
6. डॉ. महेन्द्र गुप्ता श्रेणी-4 29/6/19
7. डॉ. श्रीमती चरनजीत मेहता श्रेणी-6 29/6/19
8. डॉ. श्री अविनाश मिश्रा श्रेणी-6 अनुपस्थित
9. डॉ. —
10. डॉ. —
11. डॉ. —
12. डॉ. —

अध्ययनमंडल की बैठक की कार्यवाही निम्नानुसार रही –

1. माइक्रोबायोलॉजी ---विषय के स्नातक स्तर के प्रथम, द्वितीय एवं अंतिम वर्ष का पाठ्यक्रम अंक योजना सहित सत्र 2019–2020 हेतु अध्ययनमंडल द्वारा मान्य किया जाता है।

2. माइक्रोबायोलॉजी --विषय की सत्र 2019–2020 में होने वाली परीक्षाओं हेतु संलग्न परीक्षकों की सूची को अध्ययनमंडल द्वारा मान्य किया जाता है।

3. विभाग में सत्र 2019–2020 में यदि कोई शोध संगोष्ठी / कार्यशाला / अधिवेशन / अध्ययन भ्रमण आदि के आयोजन का प्रस्ताव है तो उसका विवरण एवं अनुमोदन----------

~~विषय संबधित अंमंत्रित व्यख्यान (अनुमानित व्यय- Rs 30000/-~~
~~शैक्षणिक भ्रमण - NBPGR (1) National Bureau of Plant Genetic Resources. N. Delhi~~
2. DRDE, Gwalior.
3. CIF. Jiwaji uni.
अनुमानित व्यय - Rs 10,000/-

4. यदि अन्य कोई विषय हो तो उसका विवरण एवं अनुमोदन।

हस्ताक्षर अध्ययन मंडल अध्यक्ष एवं समस्त सदस्य

P. Kulkarni 29/6/19

29/6/19

29/6/19

Department of Higher Education, Madhya Pradesh Bhopal
Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)

B.Sc. Microbiology: Scheme

Year	Course title		Distribution of marks			
		CCE	Theory Exam	Total Theory	Practical Exam	Total (Theory + Practical)
B.Sc.- I year	Paper –I General Microbiology & Cell Biology	10	40	50	50	150
	Paper –II Tools & Techniques in Microbiology	10	40	50		
B.Sc.- II year	Paper –I Biochemistry & Microbial Physiology	10	40	50	50	150
	Paper –II Microbial Genetics & Molecular Biology	10	40	50		
B.Sc.- III year	Paper –I Applied & Environmental Microbiology	10	40	50	50	150
	Paper –II Immunology & Medical Microbiology	10	40	50		
	Grand Total					450

Scheme of practical examination for each Year		
1. Major exercise	14 Marks	**Total marks- 50**
2. Minor exercise-1	8 Marks	
3. Minor exercise-2	8 Marks	
4. Spotting (5)	10 Marks	
5. Viva-voce	05 Marks	
6. Practical record	05 Marks	

List of practicals are given for each year, separately (after syllabus)

P. Kulkarni
29/6/19
29/06/19

Department of Higher Education, Madhya Pradesh Bhopal
Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.Sc. FIRST YEAR - MICROBIOLOGY
Paper-I General Microbiology and Cell Biology

MM - 40

UNIT I

Introduction to Microbiology, History, Scope and Development of Microbiology, Branches of Microbiology, Concept of diseases, Contributions of eminent microbiologist of India and Abroad, Applications of Microbiology in human welfare.

UNIT II

Classification, general characteristics and structure of bacteria (Eubacteria and Archaebacteria), Ultrastructure of bacterial cell, Surface appendages- flagella, pilli, prostheceae and stalk, Surface layers of bacteria- sheath, glycocalyx and cell wall, Internal cell structures- cell membrane, Internal membrane system, Mesosomes and Gas vacuoles, Cytoplasmic matrix- Ribosomes, Nucleoid and cytoplasmic inclusions, Dormant structures- Exospores, Cysts and Endospores, Structure of Cyanobacteria, Actinomycetes, Mycoplasma, Rickettsia and Chlamydia with emphasis on function of each part components.

UNIT III

Classification, brief introduction to classes of fungi, general characteristics, thallus, mycelia modification, nutrition, heterokaryosis, structure with emphasis on function of each part and components of cell, Sexual and asexual reproduction, Economic importance of fungi.

Classification, general characteristics, morphology and structure of phages, phage nucleic acids, Virus host, General features of virus reproduction, Lytic and lysogenic cycle and their mechanism, DNA and RNA viruses, T4, TMV, Pox virus, Prions, Virions, Virusoid and Viriod

UNIT IV

Structural organization and function of cell organelles, Cell cycle, cell division, Membrane structure and intercellular transport, cell locomotion, cellular interaction, cell differentiation and senescence.

UNIT V

Isolation and maintenance of Microorganisms, Pure, axenic, mixed culture, strain, isolate, clone- Definitions. Pure culture techniques, Dilution, Plating- pour plate method, spread plate method, streak plate method, Enrichment culture and micromanipulator, Maintenance and preservation of pure cultures, subculturing, overlaying, cultures with mineral oils, lyophilization, sand cultures, storage at low temperature, Major Microbial Culture Collection Centers in India.

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SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.Sc. FIRST YEAR -MICROBIOLOGY
Paper-II Tools and techniques in Microbiology

MM - 40

UNIT I

Principle and working of Bright field Microscopy, Dark Field Microscopy, Phase Contrast Microscopy, UV and Fluorescent Microscopy, Electron Microscopy, Types of Electron Microscope (TEM & SEM). Preparation of Specimen, Advantages, limitations and applications of microscopy, Use of Software in Microscopy.

UNIT II

Instrumentation techniques, basic principle, function and applications of Autoclave, Oven, BOD Incubator, Laminar Air Flow, Colorimeter, Spectrophotometer, Centrifugation, Basic principles of sedimentation, methods and applications, Chromatography, types of chromatography and applications of Chromatography.

UNIT III

Occular and stage micrometry, Cell count, Haemocytometry, Use of Camera Lucida, Stains and staining techniques- Chemistry of dyes and stains, Fixation, Smears, Types of staining- Monochrome, negative staining, Differential staining - Gram staning and Acid Fast staining, Cell wall staining, Metachromatic granule staining, Capsule staining.

UNIT IV

Types of media, Preparation of media, Characteristics of growth medium, Sterilization, Mode of action of antimicrobial agents, Physical agents, Applications of high temperatures for destruction of Microorganisms- Moist heat, boiling water, Pasteurization, dry-heat, incineration, low temperatures, desiccation, lyophilization, Osmotic pressure, plasmolysis and plasmoptysis, Radiation- Ultraviolet light, X- rays, Gamma rays, Cathode rays.

Chemical Agents, Characteristics of an ideal antimicrobial chemical agent, disinfectant, antiseptic, sanitizer, germicide, bactericide, bacteriostatic, antimicrobial agent, Criteria for selection of chemical agent for practical applications, Major groups of chemical antimicrobial agents and their mode of action.

29/6/19

29/06/19

UNIT V

Principle of Biostatistics, Classification of Data, Tabulation and graphical representation, Measure of Central tendency, Mean, Mode, Median- merits and demerits, Measure of Dispersion Range, Mean Deviation Variance and Standard Deviation, x^2 (Chi square), t-test and F-test.

Bioinformatics, Basic Organization of Computer, Computer Hardware, Software, Bit, Byte, Computer Memory, Binary Code, Binary System, Introduction to Bioinformatics, Database and applications of bioinformatics. Online databases and online softwares for bioinformatic analysis.

List of suggested books:

- Microbiology-Pelczar MJ, Chan ECS & Kreig NR, 5th edition (Tata McGraw-Hill, NewDelhi).
- Fundamentals of Microbiology-Frobisher M, Hinsdill RD, Crabtree KT & Goodheart CR, 9th edition (W.B. Saunders Co.).
- Fundamental Principles of Bacteriology -Salle AJ, 7th edition (Tata McGraw-Hill, NewDelhi).
- Microbiology- Prescott LM, Harley JP & Klein DA, 7th edition (Wm. C. Brown Publishers,USA) Elementary Microbiology-Modi, HA (Vol.I), 1st edition (Ekta Pakashan, Nadiad).
- A Handbook of Elementary Microbiology-Modi, HA, 1st edition (Shanti Pakashan, Rohtak).
- A Textbook of Microbiology- Dubey RC & Maheshwari DK, 2nd edition(S Chand & Co. N. Delhi).
- General Microbiology (Vol I, II, III)- Powar CB & Daginawala HF, 2nd edition (Himalaya Publication, Bombay).
- Biostatistics – Arora PN, Malhan PK, 1st edition (Himalaya Publishing House, Mumbai). How computers work-White R, 10th edition (Que Publishing).
- How the Internet works-Gralla P, 8th edition (Que Publishing).
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (Methods of Biochemical Analysis -Baxevanis AD,Ouellette BFF, 1st edition (John Wiley & Sons).
- Bioinformatics: Sequence, Structure, and Databanks: A Practical Approach-Higgins D, Taylor W, 1st edition (Oxford University Press).

List of Practicals based on paper I and II for B.Sc. I Year (MM, 50):

Teachers should give instruction to the students to take necessary precautions while working in Microbiology laboratory.

1. Demonstration and briefing about principles and working of basic instruments, autoclave, incubator, hot air oven, pH meter, laminar air flow, spectrophotometer and centrifuge.
2. Basic media preparation, autoclaving, cleaning and sterilization of glass wares.
3. Media preparation Liquid media – Peptone water, Nutrient broth. Solid media – Nutrient agar (Agar slant, Agar plate) Enriched Medium – Blood agar, Differential medium – Mac Conkey agar, Enrichment Medium – Selenite F broth, Selective medium – EMB
4. Culture characteristics of Microorganisms on different media.
5. Demonstration of selective and differential media.
6. Isolation of bacteria from water and soil by serial dilution agar plating method.
7. Isolation of fungi from water and soil by serial dilution agar plating method.
8. Estimation of air microflora.

29/6/19 29-06 29/6/19 29/06/19

9. Isolation of bacteria by pour plate method.
10. Isolation of bacteria by streak plate method.
11. Isolation of bacteria by spread plate method.
12. Preparation of smear and microscopic examinations of Fungi – Mucor spp., Aspergillus spp., Penicillium spp. & Alternaria spp. Bacteria – *Staphylococcus* spp. *Lactobacillus* spp. *Escherichia* spp. *Vibrio* spp. & *Leptospira* spp.
13. Staining techniques – Simple staining, Differential staining (Gram's, Ziehl-Neelsen), Spore and Capsular staining methods.
14. Designing of at least two innovative experiments based on the available facility in the college/ University related to subject.

29/6/19

29/6/19

29/6/19

29/6/19

29/6/19

Department of Higher Education, Madhya Pradesh Bhopal
Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.Sc. SECOND YEAR - MICROBIOLOGY
Paper-I Biochemistry and Microbial Physiology

MM - 40

Unit I

General properties, classification and function of carbohydrates, lipids, proteins and amino acids. General properties, classification and nomenclature of enzymes. Factors affecting enzyme activity, mechanism of enzyme action, regulations of enzyme activity, applications of enzymes.

Unit II

Growth and measurement of growth, mathematical expression of growth, growth curve, growth yield, factors affecting growth, effect of nutrients, temperature, oxygen, pH, osmotic pressure. Cell count, direct and indirect method, dry weight and wet weight method, synchronous cultures. continuous culture, and batch cultures.

Unit III

Energy production in anaerobic and aerobic process, glycolysis, Pentose phosphate pathway, Entner Duodoroff pathway, fermentation, glucose fermentation by *E. coli*, TCA cycle, heterotrophic carbon dioxide fixation, Glyoxylate cycle, catabolism of lipids, α and β-oxidation, catabolism of proteins, aerobic respiration. Principles of Bioenergetics, oxidation-reduction reaction, Redox-potential, oxidative phosphorylation hypothesis.

Unit IV

Utilization of Energy, Methods of studying Microbial biosynthesis, assimilation of Ammonia, Nitrogen and Sulphate Utilization of energy in non-biosynthetic and biosynthetic process, Diffusion, gaseous exchange, osmosis, plasmolysis, transport of nutrients in bacteria- active transport, passive diffusion, facilitated diffusion, group translocation.

Unit V

Energy production by photosynthesis, photochemical reaction, cyclic and non cyclic photophosphorylation, role of ATP in metabolism, role of reducing power in metabolism, role of precursors of metabolism, component of electron transport chain and arrangement of ETC in cell membrane.

29/6/19

P. Kulkarni

29/6/19

29/08/19

Department of Higher Education, Madhya Pradesh Bhopal
Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.Sc. SECOND YEAR - MICROBIOLOGY
Paper-II Microbial Genetics and Molecular Biology

MM - 40

UNIT I

Structure and genetic material of microbes; Nucleic acid as genetic material, Physical and chemical structure and different forms of DNA. Melting curve of DNA and Tm value determination, Buoyant density of DNA and its relationship with mole (G+C) content in DNA, Types of RNA, mRNA, rRNA, tRNA. Gene structure and functions.

UNIT II

Types of DNA replication, Replication of DNA in prokaryotes and eukaryotes, Conservative, Semi-conservative and Dispersive mode of replication, mechanism of replication, Messelson and Stahl experiment, DNA topology, Supercoiling of DNA and linking number, Enzymes involved in replication of DNA.

Molecular Mechanism of chromosomal replication, Models of chromosomal replication, Cairns model, Rolling Circle model. Translation and transcription in prokaryotes and eukaryotes.

UNIT III

Basic features of genetic code, Biological significance of degeneracy, Wobble hypothesis, Poly cistronic RNA, Overlapping genes, deciphering of genetic code, gene translocation, Ribosomes, and role in protein synthesis, tRNAs, initiation, elongation and termination of protein synthesis in prokaryotes, post translational modification of polypeptides, Regulation of protein synthesis, Lac operon, Repressible operon.

UNIT IV

Genetic recombination in bacteria, transformation, conjugation, F factor, Hfr strains, transduction in microbes, plasmids and binary vectors, transposons, transformation techniques, use of bacteria and viruses in genetic engineering.

UNIT V

DNA mutation and repair, types of mutation, evidence of spontaneous nature of mutation, fluctuation test, new comb's experiment and replica testing, mode of action of physical, chemical and biological mutagens-UV rays, nitrous acid, 5-bromouracil, 2-aminopurin, EMS, Reversion in mutation, true reversion, suppression and types of suppressor mutation, DNA repair mechanism, Photo reactivation, excision, mismatch, SOS repair and dealkylation repair.

29/6/19 29/6/19 29/6/19 29/08/19

List of recommended books:

- Microbiology-Pelczar MJ, Chan ECS & Kreig NR, 5th edition (Tata McGraw-Hill, New Delhi).
- Fundamentals of Microbiology-Frobisher M, Hinsdill RD, Crabtree KT & Goodheart CR, 9th edition (W.B. Saunders Co.).
- Fundamental Principles of Bacteriology -Salle AJ, 7th edition (Tata McGraw-Hill, New Delhi).
- Microbiology- Prescott LM, Harley JP &Klein DA, 7th edition (Wm. C. Brown Publishers, USA).
- Elementary Microbiology-Modi, HA (Vol.I), 1st edition (Ekta Pakashan, Nadiad).
- A Handbook of Elementary Microbiology-Modi, HA, 1st edition (Shanti Pakashan, Rohtak).
- A Textbook of Microbiology- Dubey RC & Maheshwari DK, 2nd edition (S Chand & Co. N. Delhi.
- General Microbiology (Vol I, II, III)- Powar CB& Daginawala HF, 2nd edition (Himalaya Publication, Bombay) Lehniger-Principles of Biochemistry- Nelson DL & Cox MM, 4th edition (CBS Publishers, New Delhi).
- Microbial Physiology- Moat AG, Foster JW &Spector MP, 4th edition (John Wiley & Sons).
- Fundamentals of Biochemistry-Jain JL, Jain S & Jain N, 8th edition (SChand & Co. New Delhi).
- Biochemistry- Satyanarayana U, 4th edition (Elsevier, India).
- Genetics- Russel JP, 2nd edition (Scott, Foresman & Company, USA).
- Principles of Genetics- Gardner JE, Simmons JM & Snustad PD, 8th edition (John Wiley & Sons, Canada)..
- Concepts of Genetics- Klug WS&Cummings MR, 10th edition (Bejamin Cummings, USA).
- Microbial Genetics- Freifelder D, 2nd edition (Jones & Bartlett, Boston).
- Molecular Biology & Genetic Engineering- Singh BD, 1st edition (Kalyani Publishers).
- Essentials of Practical Microbiology- Patel B &Phanse N, 1st edition (Print Care, Indore).
- Experiments in Biotechnology- Nighojkar S& Nighojkar A, 1st edition (Satprachar Press, Indore).
- Recombinant DNA Technology- Sardul Singh Sandhu (2008). IK International publisher, New Delhi.

List of Practicals based on paper I and II for B.Sc. II Year (MM, 50)

1. To determine the pH of a given solution.
2. To prepare a buffer solution.
3. Identification of biological compound, Carbohydrates – Molisch's test, Protein - Biuret test, Lipid - Saponification test
4. Qualitative analysis for amino acid- Color reaction for amino acid, Biuret test, Ninhydrine test.
5. Quantitative analysis of fat- Test for oil, Solubility test, Emulsion test, Absorption test.
6. Estimation of glucose by Cole's method

29/6/19 29/6/19 29/6/19 29/6/19 29/06/19

7. Estimation of protein by Folin Lowry method.
8. Estimation of total lipid by dichromate method.
9. Study of enzyme activity and effect of different factors on enzyme activity.
10. Demonstration on isolation of DNA.
11. Quantitative estimation of DNA by DPA method.
12. Quantitative estimation of RNA by Orcinol method.
13. To study conjugation in bacteria.
14. To transfer bacterial colonies by replica plating method.
15. Effect of UV light on growth of bacteria.
16. Effect of mutagen on the growth of bacteria.
17. To study antibiotic resistance in bacteria.
18. Primary screening of amylase/ protease producers.
19. Designing of at least two innovative experiments based on the available facility in the college/ University related to subject

29/6/19

P. Kathuria

29/6/19

29/06/19

Department of Higher Education, Madhya Pradesh Bhopal

Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.SC THIRD YEAR - MICROBIOLOGY
Paper-I Applied and Environmental Microbiology

(MM Theory 40)

UNIT I

Design and types of Fermentor, factors affecting fermentation process, Industrial production of alcohol, organic acid economically important enzymes, amino acids, antibiotics, vitamins. Method of immobilization and applications. Strategy for improvement of industrially important microbial strain.

UNIT II

Physical and microbial spoilage of food and food products, spoilage of stored products, fruits and vegetables, spoilage of milk, milk products and meat. Food born diseases. Food preservation methods; asepsis, pasteurization, canning, desiccation, low temperature, anaerobiosis, filtration, chemical preservation of food- salt and sugar, organic acids, use of sulphur dioxide, ethylene and propylene oxides, wood smoke. Applications and production of SCP.

UNIT III

Physical and chemical characteristics of soil, soil microflora, soil fertility and management of agricultural soil, rhizosphere and phyllosphere. Microbial diseases of crop plants with special reference to wheat, rice. VAM and its importance. Nitrogen fixation by symbiotic and non- symbiotic microbes. Use of microbes as biofertilizers, mass cultivation of Rhizobium and Azotobacter, use of blue green algae as biofertilizer.

UNIT IV

Concept of environment in relation to microbes, physiological adaptation in microbes, nature of microbial population in soil, water and air. Microbial interactions - neutralism, commensalism, synergism.

UNIT V

Bioremediation, biomagnification, bioleaching, biopesticides, Microbial H_2 production. Impact of genetically modified organisms. Biodegradation of plastics. Liquid waste disposal, characteristics of solid and liquid waste, sewage treatment - primary, secondary and tertiary treatment.

bioaugmentation,

Methods / Technologies for waste to best.

29/6/19

29/6/19

29/06/19

Department of Higher Education, Madhya Pradesh Bhopal
Syllabus approved by Central Board of Studies in Microbiology
SYLLABUS FOR THE DEGREE OF THE BACHELOR OF SCIENCE
(From 2017-18 onwards)
B.SC THIRD YEAR - MICROBIOLOGY
Paper-II Immunology and Medical Microbiology

(MM Theory 40)

Unit I

Structure, composition and types of cells and organs involved in immune system. Innate and acquired immunity. Types, structure and functions of MHC molecules, antigen processing and presentation. Humoral and cell mediated immune responses.

UNIT-II

Antigens – structure, properties and types. Haptens and adjuvants. Immunoglobulins- structure, heterogeneity, types and subtypes, physico-chemical and biological properties. Theories of antibody production. generation of antibody diversity. Antigen-Antibody interactions - agglutination, precipitation, immunofluorescence, ELISA, Radioimmunoassays. Hybridoma technology - Production and applications of monoclonal antibodies.

UNIT-III

Tumor immunology –Cancer, origin, oncogenes, tumor antigens, immune response to tumors, tumor evasion of the immune system, immune diagnosis of tumors.

UNIT-IV Active and passive immunization,

Immunization – Modern methods of vaccine production, autoimmunity, hypersesitivity. Immunohematology, antigens of ABO and Rh blood group systems. Medical importance of blood groups- ABO and Rh incompatibility.

UNIT-V

Host microbe interaction, mechanism of pathogenecity. Laboratory strategies in diagnosis of infective syndrome. Bacterial and viral diseases of human - Syphilis, pox, Hepatitis. Fungal diseases of human- Cryptococcus, Candidiasis, Dermatomycosis, sexually transmitted diseases (STDs).

Cholera

29/6/19

P. Kulkarni 29/6/19

29/6/19

29/6/19

List of recommended books:

- Introduction to soil microbiology-Alexander M, 2nd edition (John Wiley and Sons NewYork).
- Soil Microbiology- Subba Rao NS, 4th edition (Oxford and IBH, Publishing Co. New Delhi).
- Fundamental Principles of Bacteriology -Salle AJ, 7th edition (Tata McGrawhill,NewDelhi).
- Microbiology-Pelczar MJ, Chan ECS & Kreig NR, 5th edition (Tata McGraw-Hill, New Delhi).
- A Textbook of Microbiology- Dubey RC & Maheshwari DK, 2nd edition (S Chand & Co. NewDelhi.
- Food Microbiology- Frazier CW and Westhoff CD, 4th edition (Tata McGrawhill,NewDelhi).
- Food Microbiology- Adams RM and Moss OM, 3rd edition (RSC publisher).
- Introductory Food Microbiology-Modi HA, 1st edition, (Aavishkar Publishers, Jaipur).
- Modern Food Microbiology- Jay JM, 5th edition (Aspen Publishers, Maryland).
- Introduction to Environmental Microbiology-Michael R, 1st edition (Prentice Hall).
- Bioremediation-Baker KH and Herson DS (Mc Graw Hill, New York).
- Textbook of Industrial Microbiology -Patel AH, 1st edition (Macmillan India Ltd, Madras).
- Industrial Microbiology-Cassida LE, 4th edition (Wiley Eastern Ltd, New Delhi).
- Principles of Fermentation Technology-Stanbary FP, Whitaker A and Hall JS, 2nd edition,
- (Elsevier, Delhi).
- Fermentation Technology- Modi HA, 1st edition (Pointer Publisher, Jaipur).
- Biotechnology -Industrial Microbiology- Crueger W & Crueger A, 2nd edition (Panima Publisher, Delhi).
- Industrial Microbiology- Prescott SC & Dunn CG, 4th edition (Agrobios India, Jodhpur).
- Industrial Microbiology: Fundamentals and Applications- Agarwal AK & Parihar P, 1st edition (Agrobios India, Jodhpur).
- Kuby Immunology- Kindt TJ, Goldsby RA, Osborne BA, 6thedition (WH Freeman & Co. NewYork).
- Text book of Microbiology -Ananthnarayan R and Panikar CKJ, 8th edition, (Univ Press Pvt Ltd, Hyderabad).
- Text book of Microbiology-Chakraborty P, 1st edition (New Central book agency Pvt Ltd).
- Fundamental Immunology- Paul WE, 7th edition (Lippincott Williams & Wilkins, USA).
- Fundamentals of Immunology-Coleman RM, Lombord MF and Sicard RE, 2nd edition (WMC Brown, USA).
- Immunology-Weir DM and Steward J, 8th edition (Topley & Wilson, UK).
- Immunology-Rao CV, 2nd edition (Narosa Publishing House, New Delhi).
- Essentials of Immunology- Roitt IM, 11th edition, (Blackwell Pub, USA).
- Immunology- Elgert KD, 2nd edition (Wiley Blackwell).

29/6/19

P. Kulkarni

29/6/19

29/06/19

List of Practicals based on paper I and II for B.Sc. III Year (MM, 50)

1. Isolation and enumeration of microorganisms from air.
2. Isolation and enumeration of microorganisms from water.
3. Isolation and enumeration of microorganisms from soil.
4. Total count of bacteria from water.
5. Measurement and confirmation of *E.coli* in water sample.
6. Isolation and identification of bacteria from spoiled food.
7. Heavy metal sensitivity in microbes.
8. Study of *Rhizobium* bacteria from root nodules.
9. Study of symbiotic and non-symbiotic blue green algae.
10. Determination of milk quality by resazurin test through MBRT.
11. Determination of Blood Groups.
12. Estimation of hemoglobin by Sahli's method.
13. Estimation of hemoglobin by Cynamethaemoglobin mehod.
14. Total count of W.B.C.
15. Total count of R.B.C.
16. Differential W.B.C. count.
17. Flocculation reaction- VDRL.
18. Agglutination reaction- Widal test.
19. Examination of urine- chemical, physical, microscopic and bacteriological.
20. Demonstration of ELISA test.
21. Designing of at least two innovative experiments based on the available facility in the college/ University related to subject.

Important Note:

(Visit to any industry / Research industry/ Research laboratory related to Microbial product during III year)

29/6/19

P. Kulkarni 29/6/19

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P. Kulkarni
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MICROBIOLOGY

(UG Self Finance Course) 2019-20

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S.No.	Name	Address	Mobile No.
1	Prof Shashi Chauhan	Retd Prof SOS in Botany Gwl	
2	Prof. Rekha Bhadoriya	Retd Prof SOS in Botany Gwl	
3	Prof. R M Agrawal	Retd Prof SOS in Botany Gwl	
4	Prof. Avinash Tiwari	Prof SOS in Botany Gwl	
5	Prof. M K Gupta	Prof SOS in Botany Gwl	
6	Dr. Susheel Manderiya	SOS in Botany Gwl	
7	Dr. Sapan Patel	SOS in Botany Gwl	
8	DR Archana Shrivastava	CHRI Gwalior	
9	Dr RAS Chauhan	PG College Ambah	
10	Dr. B M Kulshrestha	Retd, KRG College Gwalior	
11	Prof Madhu L Sharma	KRG College Gwalior	
12	Prof Sadhna Pandey	KRG College Gwalior	
13	Mrs. Charanjit Mehta	VRG College Gwalior	
14	Dr. Preeti Kulshrestha	KRG College Gwalior	
15	Dr. S H Qureshi	JhalkariBai College Gwl	
16	Dr Rakesh Kushwaha	Bhagwat Sahai College Gwl	
17	Dr AC Raghuvanshi	Science College Gwalior	
18	Dr. Hariom Sharma	Science College Gwalior	
19	Dr R K Khare	Science College Gwalior	
20	Dr VK Sewaria	Science College Gwalior	
21	Dr DP Sharma	Science College Gwalior	
22	Dr PP Deo	Science College Gwalior	
23	Prof. Deep Azad	SLP College Gwalior	
24	Dr BB Gupta	SLP College Gwalior	
25	Dr JK Mishra	PG College Morena	
26	Dr RP Singh	PG College Morena	
27	Dr SK Raina	Retd Prof PGV College Gwl	
28	Dr Rajbeer Singh	KK College Etawah	
29	Dr Reena Jain	Boston College Gwl	
30	Dr Madhu Gupta	CHRI Gwalior	
31	Dr Usha Duseja	CHRI Gwalior	
32	Dr Kusum Kashyap	Govt Girls College Chhatarpur	
33	Dr KK Dubey	Retd. Prof	
34	Dr Shushil Kumar Sharma	Scientist, DRDO Gwalior	8989844441
35	Prof Ragini Gothwal	Barkatullah Uni, Bhopal	
36	Dr Surnahi Shrivastava	Gargi College Delhi	
37	Dr Sangeeta Shrivastava	Pri. Sci. Indian Institute of Sugarcane research Lucknow	
38	Dr Sanjeev Kumar	Pri. Sci. Indian Institute of Sugarcane research Lucknow	
39	Dr. Alka Pandey	Govt. PG College, Betul	
40	K N Bhardwaj		

29/6/19 29/6/19 29/6/19 29/6/19

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अधिसूचना

स्वशासी महाविद्यालय हेतु विश्वविद्यालय अनुदान आयोग दिल्ली द्वारा जारी दिशा निर्देश की कंडिका 8 परिशिष्ट 5 में वर्णित प्रावधान अनुसार गठित **माइक्रोबायोलॉजी** विषय के अध्ययन मंडल की बैठक दिनांक **29 जून, 2019, शनिवार को प्रातः 11 बजे** माइक्रोबायोलॉजी विभाग में आयोजित की गई है। अतः आप अध्ययनमंडल की बैठक में उपस्थित होकर पाठ्यक्रम एवं अन्य अकादमिक–शोध संबंधी विकास के प्रस्तावों को तैयार करने में अपना सुझाव एवं सहयोग प्रदान करें।

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(इ)	श्रेणी–5	–	सदस्य :	निरंक
(य)	श्रेणी–6	–	सदस्य :	श्रीमती चरनजीत मेहता, शा. वी.आर.जी. महा., मुरार, ग्वालियर श्री अविनाश मिश्रा, इंडस्ट्रियलिस्ट, गोदरेज, ग्वालियर

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प्रतिलिपि :

1. अध्यक्ष, अध्ययन मंडल,. माइक्रोबायोलॉजी विषय की ओर सूचनार्थ एवं निर्देश कि समस्त सदस्यों को दूरभाष अथवा ईमेल अथवा व्हाट्सएप के माध्यम से बैठक की सूचना यथासमय उपलब्ध करायें।
2. समस्त सदस्य, अध्ययन मंडल, माइक्रोबायोलॉजी विषय की ओर सूचनार्थ।

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