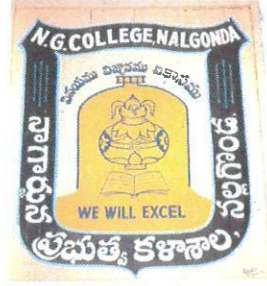


**NAGARJUNA GOVERNMENT COLLEGE,  
(AUTONOMOUS)  
NALGONDA**



**SYLLABUS  
CHOICE BASED CREDIT SYSTEM  
SEMESTER PATTERN  
B.Sc. Microbiology  
(Students admitted from 2016-2017 onwards)**

**NAGARJUNA GOVERNMENT DEGREE COLLEGE, NALGONDA**  
**(Autonomous),**  
**Reaccredited by NAAC with "A" GRADE**  
**DEPARTMENT OF MICROBIOLOGY**  
**BOARD OF STUDIES MEETING -2016**

The Board of Studies in the Department of Microbiology has been constituted with the following members for the Academic year **2016-2017**

S.No.	Catagory	Name and Designation
1.	Chairman ,board of studies	<b>Sri.B. Nagaraju,</b> Assistant prof. Head,Dept.of microbiology N.G. Government College Nalgonda. <i>B. Nagaraju</i> <b>Chairman</b> <b>Board of Studies</b> <b>Dept. of Microbiology,</b> <b>N.G. College, NALGONDA.</b>
2.	University Nominee	<b>Dr.P. Acharya Nagarjun</b> Associate Prof.& Head Department of Microbiology Osmania university Hyderabad. <i>[Signature]</i> Dept. Of Microbiology Osmania University Hyderabad-500 007.
3.	Subject Experts- from outside the College	<b>1.Dr.B.Bhima,</b> Chairman ,Board Of Studies Department of microbiology Osmania university Hyderabad <b>2.Dr. P.PALLAVI</b> Assistant prof. Dept. of microbiology GDC women, nalgonda <i>[Signature]</i> <b>Dr. P. PALLAVI</b> M.Sc., Ph.D Assistant Professor Department of Microbiology, U.C. OSMANIA UNIVERSITY, HYD.
4.	Members: All the faculty members of the Department	<b>1. kum.B.Rupa,</b> Guest faculty in Microbiology N.G.College,Nalgonda <i>[Signature]</i> <b>Dr. P. PALLAVI</b> M.Sc., Ph.D Assistant Professor DEPARTMENT OF MICROBIOLOGY Govt. Degree College for Women NALGONDA-508 001.

*[Signature]*  
**Principal,**  
**Nagarjuna Government College**  
**NALGONDA -508 001 (T.S.)**

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**DEPARTMENT OF MICROBIOLOGY**  
**BOARD OF STUDIES MEETING -2016**

The Board of Studies Meeting of Microbiology department is being held Today i.e on **8.11** .2016 in the Department of Microbiology under the Chairmanship of Sri . B . Nagaraju, Head Department Of Microbiology to discuss the following Agenda and to formulate certain Resolutions.


**Agenda:**

- 1.To continue CBCS(Choice based credit system),introduced during the academic year 2014 -15.
2. To Aprove the syllabus of B.Sc. I,II,and III year( All papers) .
3. To conduct two (2)internal assessments for 30 marks twice in a semester ,each in the form of (20 marks for written examination, 5 marks for assignment and 5 marks for student seminar )for the students admitted during 2016-17& after.
4. To approve the **pass percentage** for CBCS (**40%**).
5. To approve the **Model Question Papers** for cbcs I, II, III, IV and VI
- 6.To approve the semester end examinations - **70 marks for (CBCS)**, and to conduct **practical examinations at the end of the year for 50 marks**(forII and III year CBCS)
- 7.To approve the semester-end practical exams for I year students admitted in 2016-17&after.
- 8.To continue **Diagnostic microbiology, certificate course**(4 months duration)
9. To approve the list of **Paper Setters and Panel of Examiners** for evaluation of papers .


**Members Present**

1. Sri B. Nagaraju, Chairman , Board of Studies,Department Of Microbiology, N.G College , Nalgonda
2.  P. Acharya Nagarjun , Assoc. Prof. &H.O.D, Dept. Of Microbiology, O.U , Hyderabad
3. Dr. B.Bhima Asst. prof. , Chairman , Board of Studies Microbiology , O.U , Hyderabad.
4. Dr.P. Pallavi ,Assistant professor, GDCW , Nalgonda
5. Kum.B.Rupa , Guest Faculty N.G college , Nalgonda

  
**Dr. B. BHIMA**, M.Sc., Ph.D.  
Assistant Professor  
Department of Microbiology, U.C.S.  
OSMANIA UNIVERSITY, HYD-7.

  
**Chairman**  
**Bord of Studies**  
**Dept. of Microbiology,**  
**N.G. College, NALGONDA.**

  
**Dr. P. PALLAVI**  
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Department of Microbiology  
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## NAGARJUNA GOVERNMENT DEGREE COLLEGE, NALGONDA

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BOARD OF STUDIES MEETING -2016

The Board of Studies Meeting of Microbiology department is being held Today i.e on 8.11.2016 in the Department of Microbiology under the Chairmanship of Sri . B . Nagaraju, Head Department Of Microbiology to discussed th Agenda and to formulated the following Resolutions.

- 1.The committee approved to continue **CBCS(Choice based credit system)**,introduced during the academic year 2014 -15.
2. Approved the **syllabus of B.Sc. I,II,and III year( all papers) .**
3. Approved to conduct two (2)**internal assessments for 30 marks** twice in a Semester,each in the form of (20 marks for written Examination,5 marks for Assignment and 5 marks for student seminar)for the students admitted during 2016-17 & after.
4. Approved the **pass percentage (40%)for CBCS** students.
5. Approved the **Model Question Papers** for CBCS I, II, III, IV, Vand VI Semesters ,
6. Approved the semester end examinations - **70 marks for (CBCS)**, and to conduct **practical examinations at the end of the year for 50 marks**(for Iyr and IIyr)
- 7.Approved the Semester end Practical Examinations for**50** marks to students admitted in 2016-17&after.
8. Approved to continue **Diagnostic microbiology, certificate course**(4 months duration)
9. Approved the list of **Paper Setters and Examiners** for evaluation of papers .

### Members Present :

1. Sri B. Nagaraju, Chairman , Board of Studies,  
Department Of Microbiology,  
N.G College , Nalgonda.
2. Dr.P. Acharya Nagarjun , Assoc.Prof& Head  
Department Of Microbiology, O.U , Hyderabad .
3. Dr. B.Bhima Assistant prof. & chairman  
Board of Studies Microbiology, O.U , Hyderabad
4. Dr.P.Pallavi Assistant prof.  
Dept. of microbiology ,GDC Women,Nalgonda.
5. Kum.B.Rupa , Guest Faculty N.G college , Nalgonda.

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*P. Acharya Nagarjun*  
Dr. P. Acharya Nagarjun  
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*B. Bhima*  
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*K. B. Rupa*  
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## B.Sc. Microbiology I Year Syllabus

(Applicable to the students admitted in 2016-17&After)

I Year B.Sc. (Microbiology)CBCS

SEMESTER-I

Paper I: INTRODUCTORY MICROBIOLOGY-I

### UNIT - I:

Meaning, definition and history of Microbiology. 2 Hrs

Contributions of Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur,

Robert Koch, Iwanowsky, Beijerinck, Winogradsky and Alexander Fleming. 10 Hrs

Importance and applications of Microbiology. 2 Hrs

### UNIT -II:

Principles of microscopy - . Principles of Bright field, dark field, phase-contrast, fluorescent and electron microscopy (SEM and TEM). Ocular and stage micrometers. 10 Hrs

Size determination of microorganisms. 2 Hrs

Principles and types of stains - Simple stain, differential stain, negative stain,

structural stains - spore, capsule, flagella. Hanging-drop method. 4 Hrs

### UNIT - III :

sterilization. 2 Hrs

Physical methods - autoclave, hot-air oven, pressure cooker, laminar air flow, filter sterilization. 5 Hrs

Radiation methods - UV rays, gamma rays, ultrasonic methods. 4 Hrs

Chemical methods - Use of alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites. Phenol coefficient. 5 Hrs

### UNIT-IV:

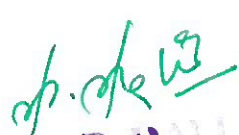
Isolation of pure culture techniques - Enrichment culturing, dilution-plating, streak-plate, spread-plate and micromanipulator. 8 Hrs

Preservation of microbial cultures - subculturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature. 6 Hrs

  
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B. Nagaraj  
Chairman

Bord of Studies  
Dept. of Microbiology,  
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## LAB – I: (B.Sc. I Yr) INTRODUCTORY MICROBIOLOGY (Practicals) 45 Hrs

1. Precautions to work in Microbiology laboratory.
2. Preparation of culture media: Solid / Liquid.
3. Sterilization techniques: Autoclaving, hot-air oven and filtration.
4. Isolation of single colonies on solid media.
5. Enumeration of bacterial numbers by serial dilution and plating.
6. Light compound microscope and its handling.
7. Microscopic observation of bacteria (Gram +ve bacilli and cocci, Gram –ve bacilli), cyanobacteria (*Nostoc*, *Spirulina*), algae (*Scenedesmus* sp., diatoms), and fungi (*Saccharomyces*, *Rhizopus*, *Aspergillus*, *Penicillium*, *Fusarium*).

### REFERENCE BOOKS FOR LAB:


- Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). **Laboratory Experiments in Microbiology**, Himalaya Publishing House, Mumbai.
- Reddy, S.M. and Reddy S.R. (1998). **Microbiology – Practical Manual**, 3rd Edition, Sri Padmavathi Publications, Hyderabad.
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- Burleson *et al.* (1992). **Virology – A Laboratory Manual**. Academic Press, USA
- Alcarno, I.E. (2001). **Laboratory Fundamentals of Microbiology**. Jones and Bartlett Publishers, USA.
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**B.Sc. Microbiology I Year Syllabus**  
(Applicable to the students admitted in 2016-17)  
**I Year B.Sc. (Microbiology)**  
**SEMESTER-II**  
**Paper II: INTRODUCTORY MICROBIOLOGY-II**

**UNIT – I**

Outline classification of living organisms: Heckeel, Whittaker and Carl Woese systems. 6 Hrs  
Place of microorganisms in the living world. 2 Hrs  
Differentiation of prokaryotes and eukaryotes. 1 Hr  
Prokaryotes - General characteristics of bacteria, archaeobacteria, rickettsias, mycoplasmas, cyanobacteria and actinomycetes. 6 Hrs  
Outline classification for bacteria as per the second edition of Bergey's Manual of Systematic Bacteriology (up to section level). 2 Hrs

**UNIT-II**

Ultrastructure of a bacterial cell: Invariant components - cell wall, cell membrane, ribosomes, nucleoid. Variant components - Capsule, flagella, fimbriae, endospore and storage granules. 6 Hrs  
General characteristics and classification of viruses. Morphology and structure of TMV and HIV. 2 Hrs  
Structure and multiplication of lambda bacteriophage. 2 Hrs  
Eukaryotes - General characteristics and classification (up to the order level) of eukaryotic microorganisms - Protozoa, microalgae, molds and yeasts. 3 Hrs

**UNIT – III**

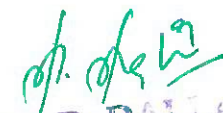
Biomolecules of microorganisms. 1 Hr  
Outline classification and general characteristics of carbohydrates(monosaccharides, disaccharides and polysaccharides). 5 Hrs  
General characteristics of amino acids and proteins. 5 Hrs  
Structure of nitrogenous bases, nucleotides, nucleic acids. 5 Hrs

**UNIT IV**

Fatty acids (saturated and unsaturated) and lipids (spingolipds, sterols and phospholipids). 5 Hrs  
Hydrogen ion concentration in biological fluids, pH measurement. 3 Hrs  
Types of buffers and their use in biological reactions. 3 Hrs  
Principle and application of colorimerty and chromatography (paper and thin-layer). 3 Hrs

  
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- Reddy, S.M. (2003). **University Microbiology –I**. Galgotia Publications New Delhi.
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- Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). **Microbiology**. 5<sup>th</sup> Edition, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi.
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- Dimmock, N.J., Easton, A.J. and Leppard, K.N. (2001). **Introduction to Modern Virology**, Blackwell Science Ltd, U.K.
- Webster, J. (1980). **Introduction to Fungi**, Cambridge University Press, Cambridge, England.
- Singh, R.P. (2007). **General Microbiology**. Kalyani Publishers, New Delhi.
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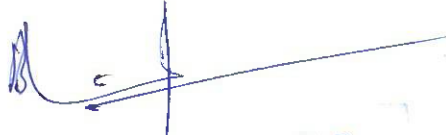


## LAB –II: (B.Sc. I Yr) INTRODUCTORY MICROBIOLOGY (Practicals) 45 Hrs

1. Calibrations of microscopic measurements (Ocular, stage micrometers).
2. Measuring dimensions of fungal spores
3. Simple and differential staining (Gram staining).
4. Spore staining, capsule staining and negative staining.
5. Diagrammatic or Electron photomicrographic observation of TMV, HIV, T4 phage and adenovirus
6. Qualitative tests for sugars and amino acids.
7. Qualitative test and estimation of glucose.

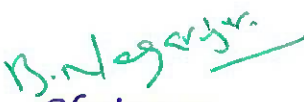
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**B.Sc. Microbiology II Year Syllabus**  
(Applicable to the students admitted in 2015-16)

**SEMISTER-III**

**Paper III: MICROBIAL PHYSIOLOGY (Theory)**

**UNIT – I**

Microbial nutrition - nutritional requirements and uptake of nutrients by cells.  
Nutritional groups of microorganisms - autotrophs, heterotrophs, mixotrophs, methylotrophs. 5 Hrs  
Growth media - synthetic, nonsynthetic, selective, enrichment and differential media.

**UNIT-II**

Microbial growth - different phases of growth in batch cultures. 6 Hrs  
Factors influencing microbial growth. 2 Hrs  
Synchronous, continuous, biphasic growth. 3 Hrs  
Methods for measuring microbial growth – Direct microscopy, viable count estimates, turbidometry, biomass. 4 Hrs


**UNIT-III**

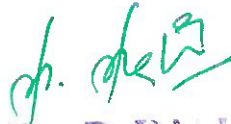
Enzymes - properties and classification, enzyme unit. 3 Hrs  
Biocatalysis - induced fit, and lock and key model, coenzymes, cofactors, factors affecting catalytic activity of enzymes. 4 Hrs  
Inhibition of enzyme activity - competitive, noncompetitive, uncompetitive and allosteric. 3 Hrs


**UNIT – IV**

Aerobic respiration - Glycolysis, HMP pathway, ED pathway, TCA cycle, electron transport, oxidative and substrate-level phosphorylation. Anaplerotic reactions.  $\beta$ -Oxidation of fatty acids. Glyoxylate cycle. 13 Hrs  
Anaerobic respiration (nitrate, sulphate respiration). 7 Hrs  
Fermentation - Common microbial fermentations with special reference to alcohol and lactic acid fermentations. 5 Hrs  
Photosynthetic apparatus in prokaryotes. Outlines of oxygenic and anoxygenic photosynthesis in bacteria. 5 Hrs

  
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**B.Sc. Microbiology II Year Syllabus**  
(Applicable to the students admitted in 2015-16)  
**II Year B.Sc. (Microbiology)**  
**SEMESTER-IV**

**Paper IV : MICROBIAL GENETICS**

**UNIT – I**

DNA and RNA as genetic materials. 8 Hrs  
Structure of DNA – Watson and Crick model. 2 Hrs  
Extrachromosomal genetic elements – Plasmids and transposons. 2 Hrs  
Replication of DNA – Semiconservative mechanism. 3 Hrs  
Outlines of DNA damage and repair mechanisms. 4 Hrs

**UNIT-II**

Mutations – spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions. 4 Hrs  
Various physical and chemical mutagens. 2 Hrs  
Brief account on horizontal gene transfer among bacteria – transformation, transduction and conjugation. 5 Hrs


**UNIT – III**


Concept of gene – Muton, recon and cistron. One gene-one enzyme, one gene-one polypeptide, one gene-one product hypotheses. 4 Hrs  
Types of RNA and their functions. 2 Hrs  
Outlines of RNA biosynthesis in prokaryotes. 3 Hrs  
Genetic code. Structure of ribosomes and a brief account of protein synthesis. 4 Hrs  
Types of genes – structural, constitutive, regulatory. 2 Hrs  
Operon concept. Regulation of gene expression in bacteria – *lac* operon. 3 Hrs

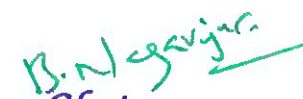
**UNIT-IV**

Basic principles of genetic engineering - restriction endonucleases, DNA polymerases and ligases, vectors. 3 Hrs  
Outlines of gene cloning methods. 2 Hrs  
Genomic and cDNA libraries. 3 Hrs  
General account on application of genetic engineering in industry, agriculture and medicine. 4 Hrs

  
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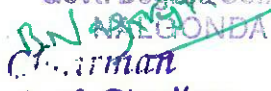
  
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## LAB – II: MICROBIAL PHYSIOLOGY AND GENETICS (Practicals) 90 Hrs

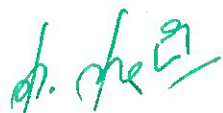
1. Preparation of media for culturing autotrophic and heterotrophic microorganisms - Algal medium, mineral salts medium, nutrient agar medium, McConkey agar, and blood agar.
2. Enrichment culturing and isolation of phototrophs and chemoautotrophs.
3. Setting and observation of Winogradsky column.
4. Determination of viable count of bacteria.
5. Turbidometric measurement of bacterial growth.
6. Bacterial growth curve.
7. Factors affecting bacterial growth – pH, temperature, salts.
8. Colorimetric estimation DNA by diphenylamine method.
9. Colorimetric estimation of proteins by Biuret/Lowry method
10. Paper chromatographic separation of sugars and amino acids
11. Starch hydrolysis, catalase test and sugar fermentation test.
12. Verification of Beer's law.
13. Problems related to DNA and RNA characteristics, Transcription and Translation.

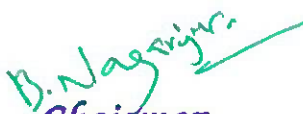
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**III Year B.Sc. (Microbiology)**

**SEMISTER-V**  
**Paper V: IMMUNOLOGY**

**UNIT – I**

Development of immunology. 2 Hrs

Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity. 6 Hrs

Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes. 6 Hrs

Cells of immune system- B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils. 6 Hrs

**UNIT – II Basics of Immunology 22 Hrs**

Antigens – types, chemical nature, antigenic determinants, haptens. 2 Hrs

Factors affecting antigenicity. 1 Hr

Antibodies – basic structure, types, properties and functions of immunoglobulins. 2 Hrs

Components of complement and activation of complement. 2 Hrs

**UNIT-III**

Types of antigen-antibody reactions – agglutination, blood groups, precipitation, neutralization, complement fixation. 4 Hrs

Labeled antibody based techniques – ELISA, RIA and Immunofluorescence. 3 Hrs

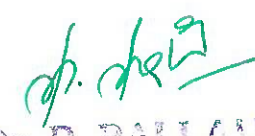
**UNIT-IV**

Polyclonal and monoclonal antibodies – production and applications. 3 Hrs

Autoimmunity and its significance. 2 Hrs

  
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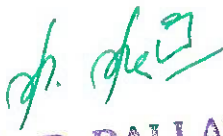
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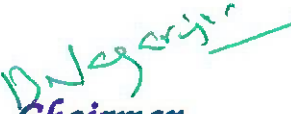
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**SEMESTER-V**

**Paper VI: AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY**

**UNIT - I Agricultural Microbiology**

Physical and chemical characteristics of soil. 2 Hrs

Rhizosphere and phyllosphere. 1 Hr

Plant growth-promoting microorganisms -mycorrhizae, rhizobia, *Azospirillum*,  
*Azotobacter*, cyanobacteria, *Frankia* and phosphate-solubilizing microorganisms.

Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). 8 Hrs

Biofertilizers - *Rhizobium*. 1 Hr

**UNIT:II**

Concept of disease in plants. 1 Hr

Symptoms of plant diseases caused by fungi, bacteria, and viruses. 3 Hrs

Plant diseases caused by fungi (groundnut rust), bacteria (angular leaf spot of  
cotton) and viruses (tomato leaf curl). 3 Hrs

Principles of plant disease control. 2 Hrs

Biological control of plant diseases. Biopesticides – *Bacillus thuringiensis*,

Nuclear polyhedrosis virus (NPV), *Trichoderma*. 2 Hrs

**UNIT : III Environmental Microbiology**

Microorganisms of environment (soil, water and air). 2 Hrs

Role of microorganisms in nutrient cycling (carbon, nitrogen, sulphur). 4 Hrs

Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism,  
predation. 4 Hrs

**UNIT-IV**


Microbiology of potable and polluted waters. *E. coli* and *Streptococcus faecalis* as  
indicators of water pollution. Sanitation of potable water. 5 Hrs

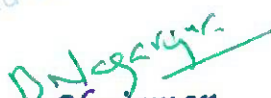
Sewage treatment (primary, secondary and tertiary). 2 Hrs

Outlines of biodegradation of environmental pollutants – pesticides. 2 Hrs

Solid waste disposal – sanitary land fills, composting. 2 Hrs

  
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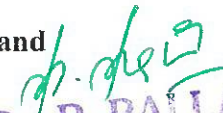


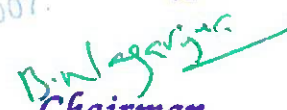
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**SEMESTER-VI**  
**Paper VII: CLINICAL MICROBIOLOGY**

**UNIT – III Clinical Microbiology 23 Hrs**

History of medical microbiology. 1 Hr  
Normal flora of human body. 2 Hrs  
Definition of infection and types of infections,  
antagonism of indigenous flora. 3 Hrs  
Anti-bacterial substances – lysozyme, complement, antiviral substances,  
phagocytosis. 2 Hrs

**UNIT-II**

General principles of diagnostic microbiology. 1 Hr  
Collection, transport and processing of clinical samples. 3 Hrs  
General methods of laboratory diagnosis – cultural, biochemical, serological  
and molecular methods. 5 Hrs  
Tests for antimicrobial susceptibility. 2 Hrs  
Antiviral agents – interferon and base analogues. 2 Hrs  
Host-pathogen interactions. Bacterial toxins, virulence and attenuation. 2 Hrs


**UNIT – III**

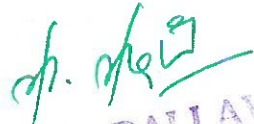
Elements of chemotherapy – therapeutic drugs.. 2 Hrs  
Mode of action of penicillin and sulpha drugs, and their clinical use.  
Drug resistance 3 Hrs  
Preventive control of diseases – active and passive immunization. 3 Hrs  
Vaccines – natural and recombinant. 2 Hrs


**UNIT-IV:**

General account of the following diseases – causal organisms, pathogenesis,  
epidemiology, diagnosis, prevention and control of:  
Air-borne diseases - Tuberculosis, Influenza  
Food and water-borne diseases - Cholera, Typhoid, Hepatitis- A  
Poliomyelitis, Amoebiasis  
Insect-borne diseases - Malaria, Filariasis, Dengue fever  
Contact diseases - Syphilis, Gonorrhoea  
Zoonotic diseases - Rabies, Anthrax  
Blood-borne diseases - Serum hepatitis, AIDS 12 Hrs  
General account of nosocomial infections. 1 Hr

  
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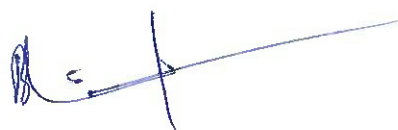
  
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### LAB-III:IMMUNOLOGY AND MEDICAL MICROBIOLOGY (Practicals) 90 Hrs

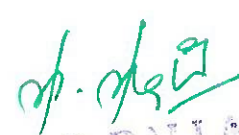
1. Blood tests – TC, DC and ESR.
2. Estimation of blood haemoglobin.
3. Determination of blood groups and Rh typing.
4. Antigen-antibody interactions in Widal test, VDRL test, and Precipitation – Ouchterlony double diffusion test.
5. Acid-fast staining of mycobacteria (stained/permanent slides).
6. Isolation and identification of medically important bacteria (*E. coli*, *Klebsiella*, *Pseudomonas*, *Staphylococcus* and *Streptococcus*) by cultural, microscopic and biochemical tests.
7. Antibiotic sensitivity testing – disc diffusion method.
8. Parasites – Malarial parasite, *Entamoeba* (study of permanent slides).
9. Observation of fungal pathogen (*Candida*).
10. Tests for disinfectant (Phenol coefficient).


#### REFERENCE BOOKS FOR LAB:

- Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). **Laboratory Experiments in Microbiology**, 2<sup>nd</sup> edition. Himalaya Publishing House, Mumbai.
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**SEMISTER-VI**  
**Paper VIII: FOOD AND INDUSTRIAL MICROBIOLOGY**

**UNIT – I Food Microbiology 22 Hrs**

Microorganisms of food spoilage and their sources. 3 Hrs  
Spoilage of different food materials - fruits, vegetables, meat, fish. 3 Hrs  
Canned foods. Food intoxication (botulism and staph poisoning), foodborne diseases (salmonellosis and shigellosis) and their detection. 5 Hrs  
General account of food preservation. 2 Hrs

**UNIT-II**

Microbiological production of fermented foods – bread, cheese, yogurt. 3 Hrs  
Biochemical activities of microbes in milk. 2 Hrs  
Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). 2 Hrs  
Concept of probiotics. 2 Hrs


**UNIT – III Industrial Microbiology 22 Hrs**

Microorganisms of industrial importance -yeasts, moulds, bacteria, actinomycetes. 2 Hrs  
Screening and isolation of industrially-important microorganisms. 3 Hrs  
Outlines of strain improvement. 2 Hrs  
Types of fermentation – aerobic, anaerobic, batch, continuous, submerged, surface, solid state. 4 Hrs  
Design of a stirred tank reactor fermentor. Fermentation media. 3 Hrs

**UNIT-IV**

Industrial production of alcohols (ethyl alcohol), beverages (beer), enzymes (amylases), antibiotics (penicillin), amino acids (glutamic acid), organic acids (citric acid), vitamins (B12), biofuels (biogas - methane). 8 Hrs

  
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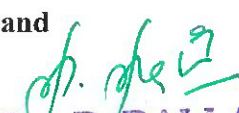
  
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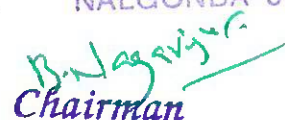
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#### LAB - IV: APPLIED MICROBIOLOGY (Practicals) 90 Hrs


1. Isolation and enumeration of major groups of microorganisms from rhizosphere and nonrhizosphere.
2. Study of root nodules and isolation of *Rhizobium* from legume root nodules.
3. Isolation of *Azospirillum / Azotobacter*.
4. Staining and observation of vesicular-arbuscular mycorrhizal (VAM) fungi.
5. Observation of plant diseases of local importance – Rusts, smuts, powdery mildews, tikka disease of groundnut, citrus canker, bhendi yellow vein mosaic, tomato leaf curl, little leaf of brinjal.
6. Isolation of antagonistic microorganisms by crowded plate technique.
7. Isolation of microorganisms of air by Petri plate exposure method.
8. Determination of biological oxygen demand (BOD) of polluted water.
9. Microbial testing of water by coliform test (multiple tube fermentation method).
10. Determination of microbiological quality of milk – MBRT.
11. Observation of different spoiled foods.
12. Isolation of fungi and bacteria from spoiled fruits and vegetables.
13. Alcohol production and estimation; Calculation of fermentation efficiency.
14. Isolation of amylase-producing organisms.
15. Citric acid production and estimation.
16. Estimation of ascorbic acid from fruit juices.

#### REFERENCE BOOKS FOR LAB:

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**Model question paper B.Sc.I YEAR CBCS**

**SEMESTER-I**

**INTRODUCTORY MICROBIOLOGY-I**

**70MARKS 3HRS**

**SECTION-I**

**5X2=10M**

**VERY SHORT ANSWER TYPE QUESTIONS**

**ANSWER ALL FIVE OF THE FOLLOWING**

- 1.Simple staining
- 2.Robert koch
- 3.Filter sterilization.
- 4.Micromanipulator
- 5.Spontaneous generation

**SECTION-II**

**4X5=20**

**SHORT ANSWER TYPE QUESTIONS**

**ANSWER ANY FOUR OF THE FOLLOWING**

6. Dark field Microscopy
- 7 Acid fast staining
8. Edward Jenner
9. Tyndelization
10. Streak plate method.
11. Lyophilization.

**SECTION III**

**4X10=40**

**(ESAY TYPE QUESTIONS)**

**ANSWER ANY FOUR OF THE FOLLOWING**

12.(a) Write about the history of Microbiology.

**OR**

(b) write the contributions of the following scientists - **Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanowsky, Beijerinck, Winogradsky and Alexander Fleming.**

13.(a) write a brief note on staining techniques.

**OR**

(b) write a Essay on Electron Microscopy.

14.(a) define Sterilization and write about the Physical Sterilization methods.

**OR**

(b) what are chemosterillants and write about the chemical sterilization agents.

15.(a) define pure culture and write about the pure culture isolation methods.

**OR**

(b) write a general account on pure culture preservation methods

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**SEMESTER-II**

**INTRODUCTORY MICROBIOLOGY-II**

**70MARKS 3HRS**

**SECTION-I**

**5X2=10M**

**VERYSHORT ANSWER TYPE QUESTIONS**  
**ANSWER ANY FIVE OF THE FOLLOWING**

- 1.Mycoplasmas
- 2.Flagella.
- 3.Actinomycetes
- 4.poly sacharides.
- 5.Sterols.

**SECTION-II**

**4X5=20**

**SHORT ANSWER TYPE QUESTIONS**  
**ANSWER ANY FOUR OF THE FOLLOWING**

6. Cyanobacteria.
7. TMV(Tobacco Mosaic Virus)
8. Nucleotides.
9. Phospholipids.
10. Storage Granules.
- 11.Archeabacteria

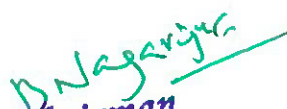
**SECTION-III**

**4X10=40**


**(ESAY TYPE QUESTIONS)**

**ANSWER ANY FOUR OF THE FOLLOWING**

- 1.(a) Write about the Diffentioation of Procaryotes and Eucaryotes .  
OR  
(b) write the CARL WOOSE System of Classification.
- 2.(a)write a brief note on Ultra Structure of Bacteria.  
OR  
(b)write a Essay on General characteristics of Viruses.
- 3.(a) write about the Classification of carbohydrates.  
OR  
(b) Give general account of Amino acida and Proteins.
- 4.(a)discuss about the fatty acids and lipids.  
OR  
(b)write about the Buffers And their Biological Significance

  
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SEMESTER-III

MICROBIAL PHYSIOLOGY-III

70MARKS 3HRS

SECTION-III  
VERYSHORT ANSWER TYPE QUESTIONS  
ANSWER ALL OF THE FOLLOWING

5X2=10M

1. Autotrophs
2. Enriched media.
3. Effect of temperature on Enzyme activity.
4. Glyoxalate Cycle.
5. Anaerobic Respiration.

SECTION-II  
SHORT ANSWER TYPE QUESTIONS  
ANSWER ANY FOUR OF THE FOLLOWING

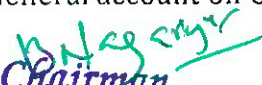
4X5=20


6. Active transport
7. Effect of temperature on microbes
8. Lock and key model
9. Cofactors.
10. Alcohol fermentation.
11.  $\beta$ -Oxidation of fatty acids.

SECTION-I  
(ESAY TYPE QUESTIONS)  
ANSWER ANY FOUR OF THE FOLLOWING

4X10=40

- 1.(a) Write about the Nutritional Groups of Microorganisms.  
OR  
(b) Define media and write about the types of Media.
- 2.(a) what are Biocatalysts and write about the properties and classification of them .  
OR  
(b) Define Enzyme Inhibition and write about the types of Enzyme Inhibition .
- 3.(a) Write about the GLYCOLYSIS.  
OR  
(b) What is Oxidative phosphorylation and write about ETS(Electron Transport System).
- 4.(a) write about Fermentation.  
OR  
(b) write a General account on Oxygenic and Non-Oxygenic Photosynthesis in Bacteria.

  
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Model question paper B.Sc.II YEAR CBCS  
SEMESTER-IV

MICROBIAL GENETICS-IV

70MARKS 3HRS

SECTION-I  
VERYSHORT ANSWER TYPE QUESTIONS  
ANSWER ALL OF THE FOLLOWING

5X2=10M

1. Conjugation
2. Semi-conservative Replication
3. Muton
4. Structural Genes
5. Ligases

SECTION-II  
SHORT ANSWER TYPE QUESTIONS  
ANSWER ANY FOUR OF THE FOLLOWING

4X5=20

6. chemical mutagens
7. t-RNA
8. Ribosomes
9. lac-Operon
10. Restriction enzymes
11. c-DNA Libraries.

SECTION-III  
(ESAY TYPE QUESTIONS)  
ANSWER ANY FOUR OF THE FOLLOWING

4X10=40

- 1.(a) Write about the Structure of DNA.  
OR  
(b) Define plasmid and write about the types of Plasmids.
- 2.(a) what are Mutagens and write about the physical and chemical mutagens .  
OR  
(b) write a brief note on Induced Mutations.
- 3.(a) Write about the RNA Biosynthesis(Transcription)in prokaryotes.  
OR  
(b) write a brief note on Genetic Code.
- 4.(a) Discuss the Enzymes involved in Genetic Engineering.  
OR  
(b) write a general account on Cloning methods.

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Model question paper B.Sc.III YEAR  
SEMESTER-V

CBCS

IMMUNOLOGY-V

70MARKS 3HRS

SECTION-I

5X2=10M

VERYSHORT ANSWER TYPE QUESTIONS  
ANSWER ALL FIVE OF THE FOLLOWING

1. Macrophages
2. Antibodies
3. Agglutination
4. Blood Groups
5. HAT Medium

SECTION-II

4X5= 20

SHORT ANSWER TYPE QUESTIONS  
ANSWER ANY FOUR OF THE FOLLOWING

6. Louis Pasteur
7. Humoral immunity
8. Ig E
9. Poly clonal Antibodies
10. Autoimmunity.
11. ELISA

SECTION-I

4X10=40

(ESAY TYPE QUESTIONS)  
ANSWER ANY FOUR OF THE FOLLOWING

12.(a) Write about the History of Immunology.

OR

(b) Define Immunity and write about the types of Immunity.

13.(a). what are Antigens and Write about the types of Antigens

OR

(b) write a brief note on Basic Structure of Immunoglobullins

14.(a) Discuss about RIA (Radio Immuno Assay).

OR

(b) Write about ELISA.

15.(a) Discuss about Autoimmunity.

OR

(b)write a general account on Hybridoma Technology

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Model question paper B.Sc.III YEAR

**CBCS**

**SEMESTER-V;Agri&Environmental Microbiology -VI**

**70MARKS 3HRS**

**SECTION-I**

**5X2=10M**

**(SHORT ANSWER TYPE QUESTIONS)**

**ANSWER ALL OF THE FOLLOWING**

- 1.Cyanobacteria.
- 2.Nuclear Poly Hedrosis Virus.
- 3.Sulphur Cycle.
- 4.Trickling filters.
- 5.Commensalism.

**SECTION-II**

**4X5=20**

**SHORT ANSWER TYPE QUESTIONS**

**ANSWER ANY FOUR OF THE FOLLOWING**

- 6.Write a note on PGPR.
- 7.Discuss Nitrogen cycle.
- 8.Explain about Mycorrhizae.
- 9.Mutualism.
- 10.Write about Bacillus Thuringensis.
- 11.Degradation of pesticides.

**SECTION-III**

**4X10=40**

**(ESAY TYPE QUESTIONS)**

**ANSWER ANY FOUR OF THE FOLLOWING**

1. (a) Write about the Biological Nitrogen fixation.  
OR  
(b) Discuss about Biofertilizers.
2. (a) write about the Biological Control of Diseases .  
OR  
(b)write a brief note on Biopesticides.
3. (a) what are Bio-Geo-Chemical Cycles and write about N<sub>2</sub> Cycle.  
OR  
(b) write a brief note on Microbial Interactions.
- 4 .(a) Discuss about the sewage treatment methods.  
OR  
(b)write a general account on Biodegradation of Environmental Pollutants.

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**Model question paper B.Sc.III YEAR**  
**SEMESTER-VI**

**CBCS**

**Medical microbiology-VII**

**70MARKS 3HRS**

**SECTION-I**

**5X2=10**

**(VERY SHORT ANSWER TYPE QUESTIONS)**

**ANSWER ALLOF THE FOLLOWING**

- 1.Infection
- 2.ELISA
- 3.Antibiotics
- 4.AIDS
- 5.Paul Ehrlich

**SECTION-II**

**4X5=20**

**SHORT ANSWER TYPE QUESTIONS**

**ANSWER ANY FOUR OF THE FOLLOWING**

5. Phagocytosis
6. Lysozyme
7. ELISA
8. Drug resistance
9. Vaccines
10. Bacterial toxins.
11. Nosocomial infections

**SECTION-III**

**4X10=40**

**(ESAY TYPE QUESTIONS)**

**ANSWER ANY FOUR OF THE FOLLOWING**

- 1.(a) Write about the History of Medical microbiology.  
OR  
(b) write about the Normal flora of Human body.
- 2.(a) write about the Different types of Laboratory diagnosis methods .  
OR  
(b)write a brief note on Sample collection,transport and processing of clinical samples.
- 3.(a) what are Antibiotics and Write about the mode of action and clinical uses of Penicillins.  
OR  
(b) write a brief note on sulfa Drugs.
- 4.(a) Discuss the Pathogenicity and treatment for Tuberculosis.  
OR  
(b)write a general account on Zoonotic infections.

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Model question paper B.Sc.III YEAR  
SEMESTER-VI

CBCS

FOOD&INDUSTRIAL MICROBIOLOGY-VIII

70MARKS 3HRS

SECTION-I

5X2=10

(VERY SHORT ANSWER TYPE QUESTIONS)  
ANSWER ALLOF THE FOLLOWING

- 1.Food Spoilage
- 2.SCP
- 3.Submerged Fermentation
- 4.Citric Acid Uses
- 5.Fermentor

SECTION-II

4X5=20

SHORT ANSWER TYPE QUESTIONS  
ANSWER ANY FOUR OF THE FOLLOWING

5. Botulism
6. Appertization(canning)
7. Edible mushrooms
8. Bioreactor
9. Fermentation media
10. Amylases
11. Citric acid production.

SECTION-III

4X10=40

(ESAY TYPE QUESTIONS)  
ANSWER ANY FOUR OF THE FOLLOWING

- 1.(a) Write about the Food Spoilage.  
OR  
(b) Discuss about the Food intoxication.
- 2.(a) write about the Food Preservation methods .  
OR  
(b)write a brief note on Single Cell Proteins.(SCP)
- 3.(a) Write about the types of Screening methods for the isolation of industrially important microorganisms.  
OR  
(b) write a brief note on types of Fermentation.
- 4.(a) write about the industrial production of Alcohol by fermentation.  
OR  
(b)write a General account on the industrial production of Penicillin.

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**MODEL PRACTICAL QUASTION PAPER FOR B.Sc.I,II AND III YEAR CBCS**

50MARKS

3HRS

SECTION-I

1X20=20

1.MAJOR QUESTION

SECTION-II

1X10=10

2.MINOR QUESTION

SECTIONIII  
(SPOTTINGS)

5X2=10

3.

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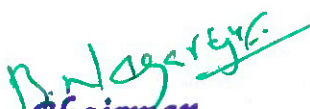
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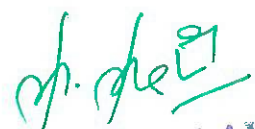
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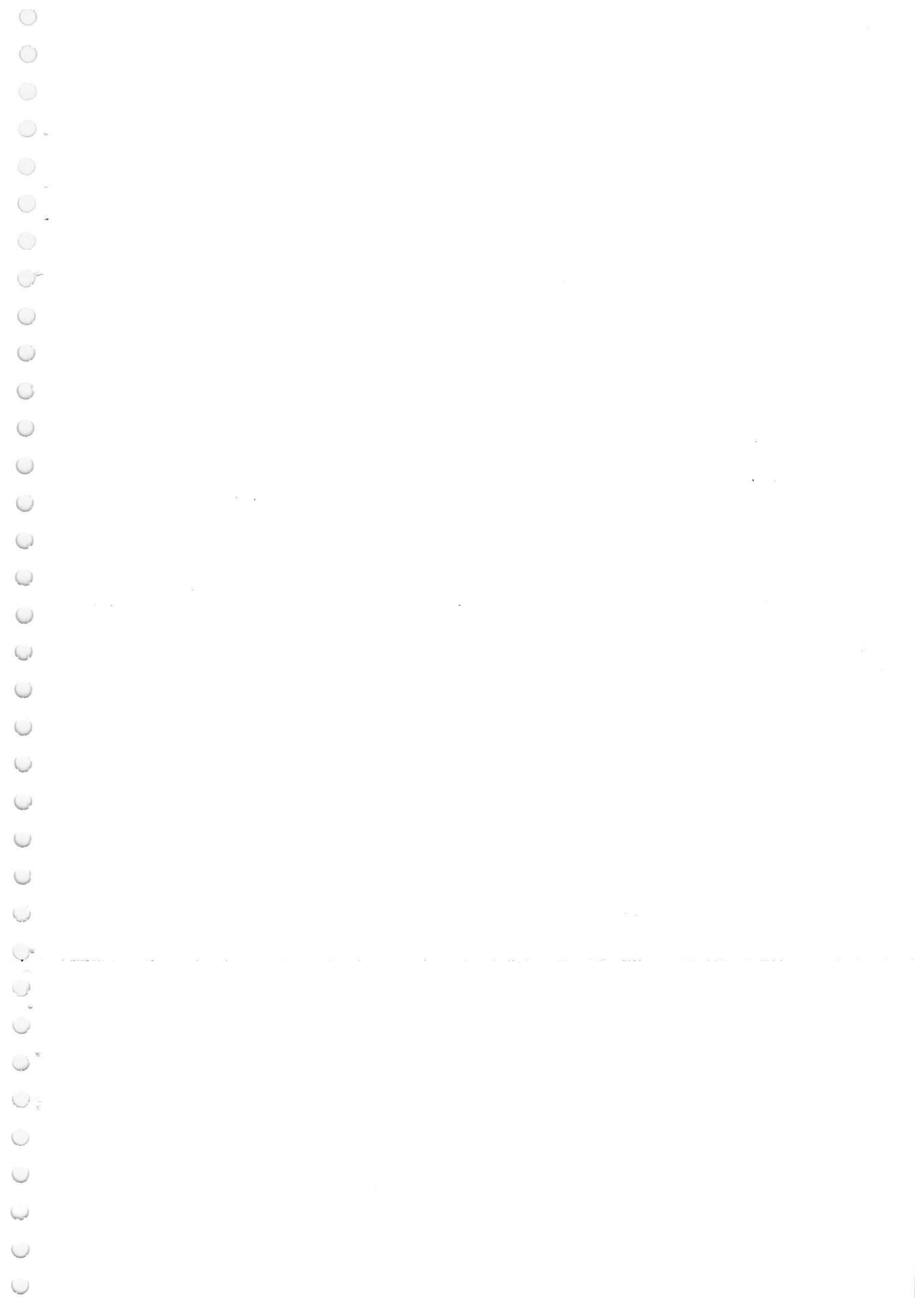
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**PANNEL OF QUESTION PAPER SETTERS AND EXAMINERS FOR BS.c. MICROBIOLOGY**  
**I,II AND III YEAR 2016-2017**


SEMESTER-I,  
 INTRODUCTORY MICROBIOLOGY-I

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**I,II AND III YEAR 2016-2017**

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 INTRODUCTORY MICROBIOLOGY-II

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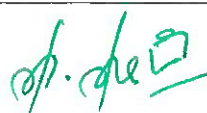
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SEMESTER-III,  
MICROBIAL PHYSIOLOGY-I

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SEMESTER-IV,  
MICROBIOAL GENETICS-IV

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IMMUNOLOGY -V

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SEMESTER-V,  
 AGRICULTURE & ENVIRONMENTAL MICROBIOLOGY-VI

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SEMESTER-VI,  
 MEDICAL MICROBIOLOGY-VII

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**I,II AND III YEAR 2016-2017**

SEMESTER-VI,  
 FOOD & INDUSTRIAL MICROBIOLOGY-VIII

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