SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) Microbiology-I Year

Semester-I – Paper-I

BS104-DSC-1A: INTRODUCTORY MICROBIOLOGY

Theory Syllabus

4HPW-Credits-4

1st Credit: Introduction

Microbiology: Definition and scope. History of microbiology: Contribution of Antony van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanoswky, Beijernik, Winogardsky and Alexander flemming.

Microbiological Techniques: Sterilization and Disinfection- Physical methods (dry and moist heat), Filtration, radiation. Chemical methods (alcohols, phenols, aldehydes, fumigants)

2nd Credit: Microscopy and Staining methods

Principles and applications of Microscopy-Bright field, Dark field, Phase- contrast, Fluorescent and Electron Microscopy (SEM and TEM). Ocular and Stage micrometry.

Principles and types of stains- Simple stain, Differential stain, Negative stain.

Structural stain: spore, capsule, flagella.

3rd Credit: Classification, Isolation and Identification of Micro organisms

Classification of living organisms: Haeckel, Whittaker and Carl Woese systems.

Differentiation of prokaryotes and eukaryotes. Classification and identification of bacteria as per the second edition of Bergey's manual of systematic bacteriology. Classification of protozoa, microalgae and fungi.

Growth media- synthetic, semi-synthetic, selective, enrichment and differential media.

Isolation of Pure culture techniques- Enrichment culturing, Dilution planting, streak plate, spread plate, Micromanipulator. Preservation of Microbial cultures- Sub culturing, overlaying cultures with minerals oils, sand cultures, lyophilization, storage at low temperature.

4th Credit: Structure and General Characteristics of Microorganisms

General Characteristics of prokaryotes: Bacteria, Archaea bacteria. Rickettsia, Mycoplasma, Cyanobacteria and Actinomycetes. Ultra structure of bacterial cell: cell wall, cell membrane, ribosomes, nucleoid, capsule, flagella, fimbriae, endospores & storage granules.

General characteristics of eukaryotes: protozoa, microalgae and fungi.

General characteristics and classification of virus. Morphology and structure of lambda bacteriophage (lytic and lysogeny), TMV and HIV.

References:

1. Michael J. Pelezar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw-Hill publisher.
2. Prescott, M.J. Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T. Martinkl, J.M and Parker, J. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube,R.C. and Maheswari, D.K. General Microbiology S Chand, New Delhi.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – I Year
Semester-I – Paper-I
DSC-1A: INTRODUCTORY MICROBIOLOGY
Practical Syllabus

3HPW-

Credits-1

1. Compound microscope and its handling.
2. Sterilization techniques: Autoclave, Hot air oven and filtration
3. Calibration of microscope by ocular, stage micro meter and measurement of bacterial and fungal spores.
4. Simple and differential staining (Gram staining), Spore staining, capsule staining and flagellar staining.
5. Microscopic observation of bacteria (Gram positive bacilli and cocci, Gram negative bacilli), cyanobacteria (Nostoc, Spirulina), fungi (Saccharomyces, Rhizopus, Aspergillus, Penicillium)
6. Bacterial motility: hanging drop method
7. Preparation of culture media: Solid/liquid.
8. Isolation of bacteria by serial dilution and pure cultures methods (streak, spread and pour plate techniques)
9. Preparation of microbial cultures- Slant, Stab, mineral oil overlay and glycerol stocks
10. Bacterial biochemical identification – IMViC test, carbohydrate fermentation test

References:

1. Experiments in Micro biology by K.R. Aneja
2. Gopal Reddy. M. Reddy. M.N. Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheswari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.

SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) Microbiology-I Year

Semester-II – Paper-II

BS204-DSC: Microbial Physiology and Biochemistry

Theory Syllabus

4HPW-Credits-4

1st Credit: Microbial nutrition and growth

Microbial Nutrition, uptake of nutrients by cell. Nutritional groups of micro organisms- Autotrophs, Heterotrophs, Mixotrophs, Methylotrophs. Photosynthetic apparatus in prokaryotes. Bacterial growth – Different phases of growth, factors influencing bacterial growth. Synchronous, Continuous, Biphasic Growth. Methods for measuring microbial growth – Direct Microscopic, Viable count, Turbidometry.

2st Credit: Microbial metabolism

Bacterial photosynthesis: Outline of oxygenic and anoxygenic photosynthesis in bacteria. Microbial Respiration – Aerobic: Glycolysis, HMP Pathway, ED Pathway, TCA Cycle and Anaplerotic reactions, Electron transport, Oxidative and Substrate level phosphorylation. Glyoxylate cycle, Anaerobic representation (Nitrate and Sulphate).

3rd Credit: Biomolecules

Classification and characteristics of carbohydrates (Monosaccharides, disaccharides and polysaccharides). General characteristics of amino acids and proteins, fatty acids (saturated and unsaturated) and lipids (sphingo lipids, sterols and phospholipids). Structure of nitrogenous bases, nucleotides and nucleic acids.

Properties and Classification of enzymes. Biocatalysis- Induced fit and Lock and Key Model, Coenzymes, Co-factors. Factors effecting enzyme activity.

4th Credit: Biochemical techniques

Hydrogen ion concentration in biological fluids. pH measurement. Types of buffers and their uses in biological reactions. Principles and applications of colorimetry and chromatography (paper and thin layer).Principles and applications of Electrophoretic techniques- Agarose gel electrophoresis and SDS PAGE

References:

1. Michael J. Pelczar, Jr.E.C.S. Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J. Harly, J.P. and Klein Microbiology 5th edition, WCB Mc GrawHill, New York.
3. Madigan, M.T. Martinkl, J.M and Parker, j. Bat broch biology of Microorganism, 9th edition, MacMillan Press, England.
4. Dube, R.C. and Maheswari, D.K. General Microbiology S Chand, New Delhi.
5. Vote, D Biochemistry WCB. Mc GrawHill, Iowa.
6. N.J. Dimmock, A.J Easton, and K.N. Leppard. Introduction to Modern Virology. Blackwell Publishing.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – I Year
Semester-II – Paper-II

DSC-1A: Microbial Physiology and Biochemistry

Practical Syllabus

2HPW-Credits-1

1. Setting up of Winogradsky's column
2. Cultivation of photosynthetic bacteria
3. Determination of Viable count of bacteria
4. Turbidometric measurement of bacterial growth curve
5. Factors affecting bacterial growth – pH, temperature, salts
6. Qualitative tests for carbohydrates and amino acids
7. Determination of pH
8. Preparation of buffers
9. Colorimetry- Principles, laws, determination of absorption maxima
10. Paper chromatography- separation of sugars/amino acids

References:

1. Experiments in Microbiology by K.R.Aneja.
2. Gopal Reddy.M, Reddy. M.N. Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology
3. Dubey, R.C. and Maheswari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.
5. Mahy, B.W.J. and Kangro, H.O. Virology- Methods Manual Academic Press, USA.
6. Burleson et al Virology- A Laboratory Manual. Academic Press, USA.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Examiners panel

Course: B.Sc Industrial Microbiology &

B.Sc Microbiology

The following members were appointed as panel of Examinations by board of studies in Microbiology

1. Dr.G.Pallavi

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5. Dr.T. Ragasudha

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6. Dr.K.Jyothi

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SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Course: B.Sc Microbiology
Model question paper for Semester end Examinations

Time: 3 hrs

Max.marks:80+20=100.
Semester end examinations=80.
Internal examination=20.
Total=100

Section-A

1. Answer all the following **FOUR ESSAY** type questions
(4x12=48)

I. a (Or) b
II. a (Or) b
III. a (Or) b
IV. a (Or) b

Section-B

2. Answer any **TWO** from each of the following questions.
(8x4=32)

A) 1.
2.
3.

C) 1.
2.
3.

B) 1.
2.
3.

D) 1.
2.
3.

(Note: Each Question of section A & B should carry equal weightage of four units of the syllabus).

SR & BGNR Govt Arts and Science College (Autonomous) Khammam.
Department of Microbiology
Course: B.Sc Industrial Microbiology
Model Question paper for Year End Practical Examinations(CBCS)

Time: 3 Hrs Max.Marks: 25

I.	Major Experiment	Marks: 1X10= 10M
II	Minor Experiment	Marks: 1X5= 5M
III	Spotters & Identification	Marks: 2X4= 8M
IV	Record	Marks: 1X2=2M

Total : 25M

SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) Microbiology-II Year

Semester-III – Paper-III

BS204-DSC: MEDICAL MICROBIOLOGY & BASICS OF IMMUNOLOGY

Theory Syllabus

Theory: 4 Hours/Week; **Credits:** 4 **Marks:** 100 (Internal: 20: External: 80)

Practical: 3 Hours/Week **Credits:** 1 **Marks:** 25

UNIT-I: MEDICAL BACTERIOLOGY

1. History of Medical Microbiology. Normal flora of human body
2. Host pathogen interactions. Bacterial toxins, virulence and attenuation. Antimicrobial resistance. Air- borne diseases- Tuberculosis. Food and Water- borne diseases- cholera, Typhoid.
3. Contact diseases- Syphilis, Gonorrhoea. General account of nosocomial infections.

UNIT-II: MEDICAL VIROLOGY AND PARASITOLOGY

1. Air borne diseases – Influenza. Food and water- borne diseases- poliomyelitis, Amoebiasis.
2. Insect- borne diseases- Malaria, Dengue fever. Zoonotic diseases- Rabies
3. Viral diseases – Hepatitis B, HIV, SARS, MERS.

UNIT-III: INTRODUCTION OF IMMUNOLOGY

1. History of Immunology, Cells and Organs of the immune system- Primary and Secondary Lymphoid organs. Function of B and T Lymphocytes. Natural Killer cells, Polymorphonuclear cells.
2. Structure and Classification of Antigens, Factors affecting antigenicity. Antibodies: Basic structure, Types of properties and functions of immunoglobulins
3. Types of Immunity: Innate and Acquired Immunity, Humoral and cell- mediated immune response.
4. **UNIT-IV: IMMUNOLOGICAL DISORDERS AND AG-AB REACTIONS**

1. Types of hyper sensitivity reactions- Immediate and delayed. Systemic and Localized autoimmune disorders. Complement pathways- Classical and Alternative pathways.
2. Types of antigen-antibody reactions- Agglutinations, Precipitation, Neutralization, Blood groups.
3. Complement fixation Test. Labeled antibody based techniques- ELISA, RIA and immunofluorescence; polyclonal and monoclonal antibodies production and application.

References:

1. Ananthanarayan R. and paniker C.K.J.(2009) Text book of Microbiology. 8th edition, University press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition . Mc Graw Hill publication
3. Goering R., Dockrell H., Zuckerman M. and Wakelin D.(2007) Mims' Medical Microbiology 4th edition. Elsevier
4. Willy JM, Sherwood LM, and Woolverton CJ.(2013) Prescott, Harley and Klein's Microbiology .9th edition. Mc Graw Hill Higher Education
5. Madigan MT, Martinko JM, Dunlap PV and Clark DP.(2014). Brock Biology of Microorganisms. 14th edition Pearson International Edition.
6. Abbas AK, Lichtman AH,Pillai S. (2007). Cellular and Molecular Immunology. 6th edition. Saunders Publication, Philadelphia.
7. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitee's Essential Immunology. 11TH edition W Wiley- Blackwell Scientific Publication, oxford.
8. Goldsby RA, Kindt TJ, Osborne BA. (2007), Kuby's Immunology, 6th edition W.H. Freeman and Company, New York.
9. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7TH edition Garland Science Publishers, New York.
10. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg

SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) *Microbiolog II* Year

MEDICAL MICROBIOLOGY & BASICS OF IMMUNOLOGY

(SEM III , PAPER – III: Discipline Specific Course)

Practical syllabus

Practical: 3 Hours/Week Credits:1 Marks: 25

1. Enumeration of RBC and WBC
2. Estimation of blood haemoglobin.
3. Determination of blood groups and Rh typing.
4. Isolation and identification of medically important bacteria by cultural, microscopic and bio chemical tests.
5. Antibiotic sensitivity testing- disc diffusion method.
6. Parasites- Malarial parasite, Entamoeba (study of permanent slides).
7. Test for disinfectant (phenol coefficient).
8. Typing of human blood groups – slide agglutination
9. Estimation of haemoglobin content of human blood
10. Preparation of blood smear and different blood cell count
11. RBC count
12. WBC count
13. Differential staining of WBC by Leishman's stain
14. Widal- slide agglutination test
15. RPR card test for syphilis
16. Tridot test
17. Tube flocculation test.

SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) Microbiology-II Year

Semester-IV– Paper-IV

BS204-DSC: MOLECULARBIOLOGY AND MICROBIAL GENETICS

Theory Syllabus

Theory: 4 Hours/Week; Credits: 4 Marks: 100 (Internal: 20: External: 80)
Practical: 3 Hours/Week Credits:1 Marks: 25

Unit-I

1. Overview of prokaryotic and eukaryotic cells, cell size and shape, Eukaryotic and Prokaryotic Cell organelles, Cell division (mitosis and meiosis)
2. Fundamentals of genetics – Mendelian laws, alleles, crossing over, and linkage. DNA and RNA as genetic materials.
3. Structure of DNA – Watson and Crick model. Extrachromosomal genetic elements – Plasmids and Transposons. Replication of DNA – Semiconservative mechanism

Unit-II

1. Brief account on horizontal gene transfer among bacteria – transformation, transduction and conjugation.
2. Mutations – Spontaneous and induced, base pair changes, frameshifts, deletions, inversions, tandem duplications, insertions. Physical and chemical mutagens.
3. Outline of DNA damage and repair mechanisms.

Unit-III

1. Concept of gene – Muton, recon and cistron. One gene-one enzyme, one gene-one polypeptide, one gene-one product hypotheses.
2. Type of RNA and their functions, outlines of RNA biosynthesis in prokaryotes.
3. Genetic code. Structure of ribosomes and a brief account of protein synthesis.

Unit-IV

1. Type of genes – structural, constitutive, regulatory. Operon concept. Regulation of gene expressions in bacteria – lac operon.
2. Basic principles of genetic engineering- restriction endonucleases, DNA polymerases and ligases, vectors. Outlines of gene cloning methods. Genomic and cDNA libraries.
3. General account on application of genetic engineering in industry, agriculture and medicine.

References:

1. Genes XI, Author- B.Lewin.
2. Principles of Genetics, Authors- Gardener, Simmons and Snustad.
3. Concepts of Genetics, Authors- Klug and Cummings.
4. Microbial Genetics, Authors- Freifelder.
5. Genetics, Authors- Arora and Sandhu.
6. Text of Microbiology, Authors- Ananthanarayanan and Paniker.
7. S R Maloy, D Freifelder and J E Cronan. Microbial Genetics. Jones and Barlett Publishers.

SR&BGNR Govt Arts and Science College (A) Khammam

Department of Microbiology

B.Sc (CBCS) *Microbiolog II* Year, SEM-IV

MOLECULARBIOLOGY AND MICROBIAL GENETICS (DSC)

Practical Syllabus

Practical: 3 Hours/Week Credits:1 Marks: 25

1. Estimation DNA by diphenylamine (DPA) method.
2. Estimation of RNA by orcinol method
3. Study of cell division in onion root tip (mitotic divisions)
4. Isolation of DNA from bacteria.
5. Isolation of mutants of bacteria by UV exposure.
6. Problems related to Mendilian laws mono and dihybrid cross (problems)
7. Problems related to gene interactions
8. Problems related to DNA and RNA characteristics, Transcription and Translation.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Examiners panel

Course: B.Sc Industrial Microbiology &

B.Sc Microbiology

The following members were appointed as panel of Examinations by board of studies in Microbiology

1. Dr.G.Pallavi

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SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Course: B.Sc Microbiology
Model question paper for Semester end Examinations

Time: 3 hrs

Max.marks:80+20=100.
Semester end examinations=80.
Internal examination=20.
Total=100

Section-A

1. Answer all the following **FOUR ESSAY** type questions (4x12=48)

V. a (Or) b
VI. a (Or) b
VII. a (Or) b
VIII. a (Or) b

Section-B

2. Answer any **TWO** from each of the following questions. (8x4=32)

A) 1.
2.
3.

C) 1.
2.
3.

B) 1.
2.
3.

D) 1.
2.
3.

(Note: Each Question of section A & B should carry equal weightage of four units of the syllabus).

SR & BGNR Govt Arts and Science College (Autonomous) Khammam.

Department of Microbiology

Course: B.Sc Industrial Microbiology

Model Question paper for Year End Practical Examinations(CBCS)

Time: 3 Hrs **Max.Marks: 25**

II.	Major Experiment	Marks: 1X10= 10M
II	Minor Experiment	Marks: 1X5= 5M
III	Spotters & Identification	Marks: 2X4= 8M
IV	Record	Marks: 1X2=2M

Total : 25M

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – III Year
Semester-V – Paper-V
BS503-DSC-1E: BASICS OF IMMUNOLOGY
Theory Syllabus

Credits:4

UNIT – I

1. History of Immunology: Contributions of Edward Jenner, Louis Pasteur, Emil Von Behring, Early theories of Immunity.
2. Types of Immunity: Innate and Acquired Immunity, Humoral and cell-mediated immunity, Active and passive immunity.
3. Structure and function of the immune system primary lymphoid organs: Thymus, bone marrow and bursa fabricius. Secondary lymphoid organs: spleen and lymphnodes.

UNIT – II

1. Cells of the immune system: B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils, eosinophils.
2. Antigens - types of antigens, chemical nature of antigens, antigenic determinants, haptens, factors affecting antigenicity.
3. Anibodies: Basic structure of immunoglobulins, types of immunoglobulin (IgG, lgM, lgA, lgE, IgD), Properties and functions of Immunoglobulins.

UNIT – III

1. Types of antigen-antibody reactions - Agglutinations; Hemagglutinations, Bacterial agglutnations, Passive agglutuinations Precipitations: Preipitation reactions in fuids, precipitation reactions in Gels, Radial immunodiffusion, Double immunodiffusion (Ouchterlony method). Neutralization and Compliment fixation.
2. Anibody labeled immune reactions-ELISA (Enzyme linked immunosorbent assay), RIA (Radio immunoassay) and immunoflourescence.
3. Components of complement and activation of complement pathways, Classical pathway, Alternative pathway. Properdin palhway.

UNIT – IV

1. Monoclonal antibodies: Production of monoclonal antibodies and their applications.
2. Hyper sensitivity reactions- Immediate hyper sensitivity: Systemic anaphylaxis, Localized anaphylaxis (Allergic rhinitis, asthama), Delayed hyper sensitivity: Contact dermatitis.
3. Auto immunity :Factors responsible for auto immunity, autoimmune disorders systemic disorders: Multiple sclerosis, Rheumatoid arthritis, Organ specific auto immune disorders: hasimoto's thyroiditis, Good's Pasteur's syndrome.

SR & BGNR Govt Arts and Science College (Autonomous) Khammam

B. Sc (CBCS) MICROBIOLOGY – III Year

Semester-V – Paper-V (Discipline Specific Course)

DSC-1E-BASICS OF IMMUNOLOGY

Practical syllabus

Credits:4

1. Determination of blood groups and Rh typing.
2. Estimation of hemoglobin content of human blood
3. Preparation of blood smear and different blood cell count

   i)RBC count
   ii) WBC count
4. Differential staining of WBC by Leishman's stain
5. Widal-slide agglutination test
6. RPR card test for syphilis
7. Tridot test

References:

1. Abbas AK. Lichtman AH. Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication. Philadelphia.
2. Delves P. Martin S. Burton D. Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication. Oxford.
3. Goldsby RA. Kindt TJ. Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company. New York.
4. Murphy K. Travers P. Walport M. (2008). Janeway'sImmunobiology. 7th edition Garland Science Publishers. New York.
5. PeakmanM. and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers. Edinberg.
6. Richard C and Geiffrey S. (2009) Immunology 6th Edition. Wiley Blackwell Publication.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – III Year
Semester-V – Paper-V
BS506-DSE-1E/A: INSTRUMENTATIONS AND BIOTECHNIQUES
Theory Syllabus

Credits:4

UNIT – I

1. Microscopy: Brightfield and darkfield microscopy, Fluorescence Microscopy, Phase contrast Microscopy.
2. Electron Microscopy (Scanning and Transmission Electron Microscopy).
3. Biophysical Principles: Osmosis, osmotic pressure, Donan equilibrium, diffusion potential, diffusion coefficient, endocytosis & exocytosis, gradient of chemical potential as driving force in transport, membrane potential & ionophores.

UNIT – II

1. Chromatography: Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography. Column packing and fraction collection.
2. Gel filtration chromatography, ion-exchange chromatography and affinity chromatography, GLC, HPLC.
3. Sedimentation and filtration.

UNIT – III

1. Electrophoresis: Principle and applications of native polyacrylamide gel electrophoresis.
2. SDS- polyacrylamide gel electrophoresis, 2D gel electrophoresis. Isoelectric focusing, Zymogram preparation and Agarose gel electrophoresis.
3. Spectrophotometry: Principle and use of study of absorption spectra of biomolecules. Analysis of biomolecules using UV and visible range. Colorimetry and turbidometry.

UNIT – IV

1. Centrifugation: Principle, working and applications of centifuge Preparative and analytical centrifugation, fixed angle and swinging bucket rotors.
2. RCF and sedimentation coefficient, differential centrifugation, density gradient centrifugation and ultracentrifugation.
3. Fundamental of Radioactivity: Radioactive & non-radioactive isotopes, Laws of Radioactivity. Half-life & Average life, types of radiation (α, β, γ, radiations) application of radioactive isotopes in biology.

SR & BGNR Govt Arts and Science College (Autonomous) Khammam

B. Sc (CBCS) Microbiology – III Year

Semester-V – Paper-VI/A (Discipline Specific Elective)

DSE-1E/AINSTRUMENTATION AND BIOTECHNIQUES

Practical syllabus

Credits:4

1. Study of fluorescent micrographs to visualize bacterial cells.
2. Ray diagrams of phase contrast microscopy and Electron microscopy.
3. Separation of mixtures by paper / thin layer chromatography.
4. To demonstrate column packing in any form of column chromatography.
5. Separation of protein mixtures by Polyacrylamide Gel Electrophoresis (PAGE).
6. Determination of λmax for an unknown sample and calculation of extinction coefficient.
7. Separation of components of a given mixture using a laboratory scale centrifuge.
8. Understanding density gradient centrifugation with the help of pictures.

References:

1. A.Upadhyay, K.Upadhyay and N. Nath 2006 Biophysical Chemistry, Principles and Techniques Himalaya Pub. House.
2. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
3. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.
4. . Willey MJ, Sherwood LM &Woolverton C J. (2013). Prescott, Harley and Klein's Microbiology. 9thEd., McGraw Hill.
5. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons. Inc.
6. De Robertis EDP and De Robertis EMF. (2006). Cell and Molecular Biology. 8th edition. Lipincott Williams and Wilkins, Philadelphia.
7. Cooper G.M. and Hausman R.E. (2009). The Cell: A Molecular Approach. 5th Edition. ASM Press & Sunderland, Washington D.C., Sinauer Associates, MA.
8. Nigam A and Ayyagari A. 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – III Year
Semester-VI – Paper-VI
BS603-DSC-1F: MEDICAL MICROBIOLOGY
Theory Syllabus

Credits:4

UNIT – I

1. Important mile stones in medial microbiology. Normal flora of human body and their importance.
2. Definition of infection, non-specific defense mechanisms, mechanical barriers, antagonism of indigenous flora. Collection, transport and processing of clinical samples
3. Vaccines: Conventional and modern vaccines (Killed vaccines, attenuated vaccines, subunit vaccines, synthetic peptide vaccines, recombinant vaccines)

UNIT – II

1. General methods of laboratory diagnosis - Cultural, biochemical, serological and molecular methods
2. Chemotherapy and antimicrobial Agents used to control of pathogens - therapeutic drugs (Sulfanilamide Penicillin) Drug resistance.
3. Tests for Antimicrobial susceptibility (Disc diffusion)

UNIT – III

1. Air- borne diseases- tuberculosis, influenza.
2. Food and water borne diseases - Cholera, Typhoid. Hepatitis - A. Amoebiasis.
3. Zoonotic diseases- Rabies, Anthrax

UNIT – IV

1. Insect-borne diseases- Malaria, Filariasis, Dengue fever.
2. Contact diseases- syphilis, gonorrhoea
3. Blood bore diseases - Serum hepatitis. AIDS.

SR & BGNR Govt Arts and Science College (Autonomous) Khammam

B. Sc (CBCS) Microbiology – III Year

Semester-VI – Paper-VII (Discipline Specific Course)

DSC-1F- MEDICAL MICROBIOLOGY

Practical syllabus

Credits:4

1. Enumeration of RBC and WBC
2. Estimation of bloodhemoglobin
3. Determination of blood groups and Rh typing.
4. Isolation and identification of medically important bacteria by cultural, Microscopic and Biochemical tests.
5. Antibiotic sensitivity testing – disc diffusion method.
6. Parasites – Malarial parasite, Entamoeba (study of permanent slides).
7. Observation of fungal pathogen (Candida).
8. Tests for disinfectant (Phenol coefficient).

References:

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
3. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
4. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education
5. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
B. Sc (CBCS) Microbiology – III Year
Semester-VI – Paper-VI
BS606-DSE-1F/B: INDUSTRIAL MICROBIOLOGY
Theory Syllabus

Credits:4

UNIT – I

1. Introduction to industrial microbiology and fermentation processes, Brief history and developments in industrial microbiology.
2. Types of fermentation processes- Solid-state and liquid-state (stationary and submerged) fermentations; batch, fed-batch (eg. baker's yeast) and continuous fermentations.
3. Components of a typical bio-reactor, types of bioreactors-Laboratory. Pilot- scale and production fermenters, constantly stirred tank and air-lift fermenters.

UNIT – II

1. Design of typical batch fermentor. Factors affecting fermentor design, Fermentation media control of agitation, aeration, pH, temperature and dissolved oxygen.
2. Measurement and control of fermentation parameters - pH, temperature, dissolved oxygen, foaming and aeration.
3. Microbial fermentation process: downstream processing- filtration, centrifugation, cell disruption, solvent extraction.

UNIT – III

1. Microorganisms of industrial importance- yeasts, moulds, bacteria, actinomycetes.
2. Screening and isolation of industrially important microorganisms, strain improvement.
3. Types of fermentations- -aerobic, anaerobic, batch, continuous, submerged, surface, solid state.

UNIT – IV

1. Industrial production of alcohols (ethyl alcohol), beverages (beer), enzymes (amylases), antibiotics (penicillin).
2. Industrial production of amino acids (glutamic acid), organic acids (citric acid), vitamins (B12),biofuels(biogas-methane).
3. Methods of immobilization. advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).

SR & BGNR Govt Arts and Science College (Autonomous) Khammam

B. Sc (CBCS) Microbiology – III Year

Semester-VI – Paper-VIII/B (Discipline Specific Elective)

DSE-1F/B:INDUSTRIAL MICROBIOLOGY

Practical syllabus

Credits:4

1. Measurement and production of citric acid by A. niger.
2. Measurement and production of ethanol by Saccharomyces.
3. Demonstration for the cultivation of mushroom.
4. Measurement of in vitro production of IAA by soil fungi.
5. Isolation of Antibiotic producer from soil smaple
6. Estimation of streptomycin.
7. Isolation of Amylase producers from soil sample.
8. Immobilization of enzymes

References: .

1. Patel A.H. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.
2. Okafor N. (2007). Modern Industrial Microbiology and Biotechnology. 1st edition. Bios Scientific Publishers Limited. USA.
3. Waites M.J., Morgan N.L., Rockey J.S. and Higton G. (2001). Industrial Microbiology: An Introduction. 1st edition, Wiley – Blackwell.
4. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
6. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.
7. Glaze A.N. and Nikaido H. (1995) Microbial Biotechnology : Fundamentals of Applied Microbiology . 1st Edition W.H.Freeman and company

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Examiners panel

Course: B.Sc Industrial Microbiology

1. J.Sridevi
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2. Dr.P.Pallavi
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3. Dr.G.Renuka
   Assistant professor
   KDC Warangal
   Phone No: 9849263336

4. Dr.B.Naga Raju
   Assistant professor
   Nagarjuna Govt Degreee College (A)
   Nalgonda

5. Dr.P.Muthenna
   Assistant professor
   SRR Govt Degree College
   Karimnagar

SR&BGNR Govt Arts and Science College (A) Khammam
Department of Microbiology
Course: B.Sc Microbiology
Model question paper for Semester end Examinations

Time: 3 hrs

Max.marks:80+20=100.
Semester end examinations=80.
Internal examination=20.
Total=100

Section-A

1. Answer all the following **FOUR ESSAY** type questions
(4x12=48)

I. a (Or) . b
II. a (Or) b
III. a (Or) b
IV. a (Or) b

Section-B

2. Answer any **TWO** from each of the following questions.
(8x4=32)

A) 1.
2.
3.

C) 1.
2.
3.

B) 1.
2.
3.

D) 1.
2.
3.

(Note: Each Question of section A & B should carry equal weightage of four units of the syllabus).

SR & BGNR Govt Arts and Science College (Autonomous) Khammam.

Department of Microbiology

Course: B.Sc Industrial Microbiology

Model Question paper for Year End Practical Examinations(CBCS)

Time: 3 Hrs

Max.Marks: 100

I.	Major Experiment	Marks: 1X40= 40M
II	Minor Experiment	Marks: 1X20= 20M
III	Spotters & Identification	Marks: 5X5= 25M
IV	Record	Marks: 1X10=10
V	Viva Voice	Marks: 1X10=10

Total : 100