GOVERNMENT DEGREE & P.G.COLLEGE, SIDDIPET

(Re-Accredited with 'A' Grade by NAAC)

DISTRICT: MEDAK, TELANGANA

PIN CODE: 502103, Ph: 08457-222110

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Department of Microbiology

GOVERNMENT DEGREE COLLEGE, SIDDIPET

Medak Road, Siddipet, Medak -502103

Reaccredited with 'A' grade (3.02 CGPA) by NAAC

Government Degree College Siddipet (Autonomous)

(Re-Accredited with 'A' Grade by NAAC)

Affiliated to the Osmania University- Hyderabad

COMPOSITION OF ACADEMIC COUNCIL

Sl.No	Name of the Member	Designation in the College/ Representing Institution	Designation in The BOS
1	**Sri. A.Srinivas Reddy M. Sc; (Ph.D)**	**Principal, Government Degree College- Siddipet**	**Chairman**
2	Dean, Faculty of Arts Osmania University	Dean, Faculty of Arts Osmania University	Member
3	Dean, Faculty of Science Osmania University	Dean, Faculty of Science Osmania University	Member
4	Dean, Faculty of Humanities Osmania University	Dean, Faculty of Humanities Osmania University	Member
5	Sri. A. V. Sharma M.A;MSc;M.Ed; NET;SET(Ph.D).	Chairman, BOS Department. of English-GDC, Siddipet	Member
6	Dr. S. B.Ramani M.A; M.Phil;Ph.D;SLET	Chairman, BOS Department. of Telugu GDC, Siddipet	Member
7	Sri. N. Venu M.A; NET	Chairman, BOS Department. of Hindi GDC, Siddipet	Member
8	Dr. M. Ramachary M.A; M.Phil;Ph.D	Chairman, BOS Department. of Urdu GDC, Siddipet	Member
9	Sri. M. Ravi Kumar M.A; M.Phil;M.Ed;(Ph.D)	Chairman, BOS Department. of History GDC, Siddipet	Member
10	Dr. K. Hussain M.A; M.Phil; NET; Ph.D;	Chairman, BOS Department. of Political Science GDC, Siddipet	Member
11	Dr. K. Bhavani M.A; M.Phil;Ph.D	Chairman, BOS Department. of Economics GDC, Siddipet	Member
12	Sri. Shaik Peer shahab M.A; B.Ed; NET	Chairman, BOS Department. of Public Administration GDC, Siddipet	Member
13	Sri. P. Ramachandram M.Com; M.Phil.	Chairman, BOS Department. of Commerce GDC, Siddipet	Member
14	Dr. Gopala Sudarshanam M.Com;M.B.A; M.Phil;Ph.D; SLET;PGDCA;D.Ed.	Chairman, BOS Department. of Computer Science & Applications	Member
15	Smt. K. Anuradha M.Sc;SET;B.Ed.(Ph.D)	Chairman, BOS Department. of Botany GDC, Siddipet	Member
16	Sri. A. Srinivas Reddy M.Sc;.(Ph.D)	Chairman, BOS Department. of Zoology GDC, Siddipet	Member
17	Sri. Gundu. Mallikarjun M.Sc;NET (Ph.D)	Chairman, BOS Department. of Chemistry GDC, Siddipet	Member
18	Sri. N. Vijayabhasker Reddy	Chairman, BOS	Member

	M.Sc; B.Ed;NET (Ph.D)	Department. of Mathematics GDC, Siddipet	
19	Sri. B. Ramesh M.Sc;NET (Ph.D)	Chairman, BOS Department. of Physics GDC, Siddipet	Member
20	Dr. A. Rachana M.Sc; B. Ed; Ph.D	Chairman, BOS Department. of Biotechnology GDC, Siddipet	Member
21	Sri. N. Harikrishna M.Sc;NET (Ph.D)	Chairman, BOS Department. of Microbiology GDC, Siddipet	Member
22	Sri. K. Prabhu M.PEd;M.Sc;SLET (Ph.D)	Chairman, BOS Department. of Physical Education GDC, Siddipet	Member
23	Sri. A. Durgaprasad M.Li.Sc; NET;SET;(Ph.D)	Chairman, BOS Department. of Library Science GDC, Siddipet	Member
24	Sri. R.Srinivas Rao M.A;B.Ed	Nominated as a senior Faculty Member from Arts Group, GDC, Siddipet	Member
25	Sri. J. Sangameshwar M.Com; M.Phil; LLB	Nominated as a senior Faculty Member from Commerce Group, GDC, Siddipet	Member
26	Dr. P. Ayodhya Reddy M.Sc; M.Ed;NET; Ph.D	Nominated as a senior Faculty Member from Science Group, GDC, Siddipet	Member
27	Smt. Jhansi Laximi M.Sc;	Nominated as a senior Faculty Member from Science Group, GDC, Siddipet	Member
28	**Dr. N. Raj Kumar** M.Sc; B.Ed; SET ; Ph.D.	**Nominated by the Principal As a Member Secretary**	**Member**
29	Dr. G. Papaiah-**Educationist** M.Sc; Ph.D	Nominated by the Governing Body as an Outside Expert	Member
30	Dr. Rammohan- **Doctor** MBBS; M.D	Nominated by the Governing Body as an Outside Expert	Member
31	Sri. Ramesh **- Industrialist** M.A.	Nominated by the Governing Body as an Outside Expert	Member
32	Sri. Rama Rao **- Advocate** M.A; LLM	Nominated by the Governing Body as an Outside Expert	Member

GOVERNMENT DEGREE COLLEGE, SIDDIPET, MEDAK
(AUTONOMOUS)
RE-ACCREDITED WITH "A" GRADE BY NAAC
DEPARTMENT OF MICROBIOLOGY
BOARD OF STUDIES

Sri. N. Harikrishna I/C, Department of Microbiology, Government Degree College, SiddipetPh.No. 9966222110	**Chairman Board of Studies**
Dr.P. Acharya Nagarjun, Associate Professor, Chairman, BOS, Dept. of Microbiology, Osmania University, Hyderabad.Ph. No.8106892737	**Member** **(From University)**
Dr. Y. Harish Kumar Reddy Manager, R&D Vaccine Technology Development, Biological E limited, Hyderabad. Ph.No.9848860658	**Member** **(From Industry)**
Sri. R.V. Ramchandar, Assistant Professor, Department of Microbiology, Govt.DegreeCollege,Gajwel, Medak. Ph. No. 9959513920	**Member** **(Subject Expert)**
Smt. A. Madhuri Assistant Professor, Department of Microbiology, Hussainialam Govt.Degree College for Women, Hyderabad. Ph. No.: 9581208104	**Member** **(Subject Expert)**
Sri. Md. KhajaMohinuddin Student, M.Sc, Microbiology, Osmania University, Hyderabad. Ph. No. 9000527440	**Member** **(Alumni Student)**

WORKLOAD (HOURS PER WEEK)

AND

ASSIGNMENT OF CREDITS

GOVERNMENT DEGREE COLLEGE, SIDDIPET, MEDAK
(AUTONOMOUS)
RE-ACCREDITED WITH "A" GRADE BY NAAC

DEPARTMENT OF MICROBIOLOGY

Choice Based Credit System (CBCS) 2016-17

Department: Microbiology **Total Credits:38**

Semester	Module	Module title	Hour/ Week	Max. Marks	Credits
I	I	Introductory Microbiology-I	4	100	4
	Practical -I	Based on module I	2	50	1
II	II	Introductory Microbiology-I	4	100	4
	Practical -II	Based on Module II	2	50	1
III	III	Microbial Physiology	4	100	4
	Practical -I	Based on module III	2	50	1
IV	IV	Microbial Genetics	4	100	4
	Practical-II	Based on module IV	2	50	1
V	V	Immunology	3	100	3
	Practical -V	Based on module V	2	50	1
	VI (Elective)	Environmental and agricultural Microbiology	3	100	3
	VI (Elective)	Microbial Ecology	3		
	Practical -VI	Based on module VI	2	50	1
VI	VII	Medical Microbiology	3	100	3
	Practical -V	Based on module VII	2	50	1
	VIII (Elective)	Food and Industrial Microbiology	3	100	3
	VIII (Elective)	Pharmaceutical Microbiology	3		
	Practical VIII	Based on Module V III	2	50	1
General	Inter Disciplinary Elective	Microbiology for human welfare	2	50	1
Project			2	50	1

Scheme of examination valuation:

Maximum marks for theory (Module I,II,III,IV,V,VI) = 100 marks (4 credit)

Maximum marks for external exam = 70 (Time $2_{1/2}$hrs)

Maximum marks for internal exam = 20 (Sum 10+10)

Maximum marks for assignment and seminar = 10

GOVERNMENT DEGREE COLLEGE, SIDDIPET, MEDAK
(AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY
B.SC.I, II &III YEAR

SYLLABUS/COURSE PATTERN AND SCHEME OF EXAMINATION.

Semester-I	Theory Paper-I	General Microbiology-I	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Paper -I		Total Marks-50
Semester-II	TheoryPaper-II	General Microbiology-II	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper II		Practical exam-50
Semester-III	TheoryPaper-III	Microbial Physiology	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper III		Practical exam-50
Semester-IV	TheoryPaper-IV	Microbial Genetics	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper IV		Practical exam-50
Semester-V	TheoryPaper-V	Microbial Genetics	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper V		Practical exam-50
Semester- VI	TheoryPaper-V	Microbial Genetics	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper VI		Practical exam-50
Semester-VII	TheoryPaper-VII	Microbial Genetics	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	Practical Paper VII		Practical exam-50
Semester-VIII	TheoryPaper-VIII	Microbial Genetics	Internal exams-30 M Semester exam-70 M Total-100 M
Practical	PracticalPaper VIII		Practical exam-50

NOTE: Practical exams will be conducted at the end of each semester

GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.SC. I YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-60@ 4Hrs/week)

I SEMESTER

(GENERAL MICROBIOLOGY-I) (Paper-I)

UNIT-I – History of Microbiology **15 Hrs**

1. Meaning, definition and history of Microbiology. 3Hrs
2. Contributions of Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch,Iwanowsky, Beijerinck, Winogradsky and Alexander Fleming. 9Hrs
3. Importance and applications of Microbiology. 3Hrs

UNIT-II- Microscopy **15 Hrs**

1. Principles of microscopy. bright field, dark field, phase-contrast, fluorescent and electron microscopy (SEM and TEM). Ocular and stage micrometers. 8 Hrs
2. Size determination of microorganisms. 2 Hr
3. Principles and types of stains - Simple stain, differential stain, negative stain, structural stains - spore, capsule, flagella. Hanging-drop method. 5 Hrs

UNIT-III – Microbiological Techniques **15 Hrs**

1. Sterilization and Disinfection techniques. Principles & methods of sterilization. 4 Hrs
2. Physical methods – autoclave, hot-air oven, pressure cooker, laminar air flow, filter sterilization. 7 Hrs
3. Radiation methods – UV rays, gamma rays, Ultra sonic methods. 4 Hrs
4. Chemical methods-use of Alcohols, Aldehydes, Fumigants, Phenol, Halogens and Hypochlorides, Phenol coefficient.

UNIT-IV - Pureculture techniques-II **15 Hrs**

1. Isolation of pure culture techniques – Enrichment culturing, dilution-plating, streak-plate, spread-plate and micromanipulator. 5 Hrs
2. Preservation of microbial cultures – subculturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature. 5 Hrs

PAPER: I: PRACTICALS: INTRODUCTORY MICROBIOLOGY- Paper I)

1. Light compound microscope and its handling.
2. Calibrations of microscopic measurements (Ocular, stage micrometers).
3. Measuring dimensions of fungal spores
4. Simple and differential staining (Gram staining), Spore staining, capsule staining and negative staining.
5. Preparation of culture media: Solid / Liquid.
6. Sterilization techniques: Autoclaving, hot-air oven and filtration.
7. Enumeration of bacterial numbers by serial dilution and plating.
8. Microscopic observation of bacteria (Gram +ve bacilli and cocci, Gram –ve bacilli), cyanobacteria (*Nostoc*, *Spirulina*).

TEXT AND REFERENCE BOOKS:

- Ram Reddy, S. and Reddy, S.M. (2007). **Essentials of Virology**. Scientific Publishers India, Jodhpur.
- Dubey, R.C. and Maheswari, D.K. (2000) **General Microbiology**. S Chand ,New Delhi.
- Prescott, M.J., Harley, J.P. and Klein, D.A. (2002). **Microbiology.** 5th Edition, WCB Mc GrawHill, New York.
- Madigan, M.T., Martinkl, J.M. and Parker, J. (2000). **Brock Biology of Microorganisms**, 9th Edition, MacMillan Press, England.
- Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). **General Microbiology**, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.
- Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). **Microbiology**. 5th Edition, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi.
- Rao, A.S. (1997). **Introduction to Microbiology**. Prentice-Hall of India Pvt Ltd., Nerw Delhi.
- Black, J.G. (2005). **Microbiology: Principles and Explorations**, John Wiley, USA.
- Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1996). **Introductory Mycology**, Wiley, NY.
- Atlas, R.A. and Bartha, R. (2000). **Microbial Ecology – Fundamentals and Application**, Benjamin Cummings, New York.
- Frobisher, H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. (2005). **Fundamentals of Microbiology**, Saunder and Company, London.
- Power, C.B. and Daginawala, H.F. (1986). **General Microbiology** Vol I & II (2nd
- Edition), Himalaya Publishing House, Mumbai.
- Sullia, S.B. and Shantaram, S. (1998). **General Microbiology**, Oxford & IBH Publishing Pvt. Ltd., New Delhi.
- Webster, J. (1980). **Introduction to Fungi**, Cambridge University Press, Cambridge, England.
- Singh, R.P. (2007). **General Microbiology**. Kalyani Publishers, New Delhi.
- Talaro, K. and Talaro, A. (1996). **Foundations in Microbiology**. 2nd Edition. UMC Brown Publications.

- Tortora, G.J., Funke, B.R. and Case, C.L. (2004). **Microbiology: An Intoduction**.Pearson Education, Singapore.

GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.SC. I YEAR SYLLABUS
SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-60 @ 4Hrs/week)

II SEMESTER

(GENERALMICROBIOLOGY-II) (Paper-II)

UNIT-I - Biology of Microorganisms 15 Hrs

1. Classification of living organisms; Heckel, Whittaker and carlwoese systems. 4Hrs
2. Place of microorganisms in the living world. Differentiation of prokaryotes and eukaryotes. 1 Hr
3. Prokaryotes - General characteristics of bacteria, archaebacteria, rickettsias, mycoplasmas, cyanobacteria and actinomycetes. 7 Hrs
4. Outline classification for bacteria as per the second edition of Bergey.s Manual of Systematic Bacteriology (up to section level). 3Hrs

UNIT- IV- General characters of Microorganisms 15 Hrs

1. Ultrastructure of a bacterial cell: Invariant components - cell wall, cellmembrane, ribosomes, nucleoid. Variant components - Capsule, flagella, fimbriae, endospore and storage granules. 3Hrs
2. General characteristics and classification of viruses. 2Hrs
3. Morphology and structure of TMV and HIV 2 Hrs
4. Structure and multiplication of lambda bacteriophage. 2 Hrs
5. Eukaryotes – General characteristics and classification (upto order level) 2 Hrs
6. Eukaryotic microorganisms – Protozoa, microalgae, molds and yeast. 4Hrs

UNIT-III - Biomolecules-I 15 Hrs

1. Outline classification and general characteristics of carbohydrates (Monosaccharides, Disaccharides and Polysaccharides). 6 Hrs
2. General characters of amino acids and proteins. 5Hrs
3. General characteristics Fatty acids(saturated and unsaturated) and lipids (sphingolipids,sterols and phospholipids) 4 Hrs

UNIT-IV - Biomolecules -II 15 Hrs

1. Structure of nitrogenous bases, nucleotides, nucleic acids. 3Hrs
2. Hydrogen ion concentration in biological fluids, pH measurement. 3Hrs
3. Types of buffers and their use in biological reactions. 3Hrs
4. Principle and application of colorimetry 2Hrs
5. chromatography - paper and thin layer chromatography 4Hrs

PAPER –II: PRACTICALS: INTRODUCTROY MICROBIOOGY-II

1. Paper chromatography-separation of sugars/amino acids
2. Determination of pH
3. Preparation of Buffers
4. Colorimetry- Principles, laws, determination of absorption maximum.
5. Microscopic observation of algae (*Scenedesmus*sp., diatoms),
6. Microscopic observation of fungi (*Saccharomyces, Rhizopus, Aspergillus, Penicillium, Fusarium*).

TEXT AND REFERENCE BOOKS:

- Reddy, S.M. (2003). **University Microbiology –I** .Galgotia Publications New Delhi.
- Dubey, R.C. and Maheswari, D.K. (2000) **General Microbiology**. S Chand ,New Delhi.
- Prescott, M.J., Harley, J.P. and Klein, D.A. (2002). **Microbiology.** 5th Edition, WCB Mc GrawHill, New York.
- Madigan, M.T., Martinkl, J.M. and Parker, J. (2000). **Brock Biology of Microorganisms**, 9th Edition, MacMillan Press, England.
- Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). **General Microbiology**, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.
- Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). **Microbiology**. 5th Edition, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi.
- Rao, A.S. (1997). **Introduction to Microbiology**. Prentice-Hall of India Pvt Ltd., Nerw Delhi.
- Black, J.G. (2005). **Microbiology: Principles and Explorations**, John Wiley, USA.
- Voet, D. and Voet, J.G. (1995) **Biochemistry**, Wiley, New York.
- Zubay, G. (1998). **Biochemistry** WCB. Mc GrawHill, Iowa.
- Atlas, R.A. and Bartha, R. (2000). **Microbial Ecology – Fundamentals and Application**, Benjamin Cummings, New York.
- Frobisher, H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. (2005). **Fundamentals of Microbiology**, Saunder and Company, London.
- Power, C.B. and Daginawala, H.F. (1986). **General Microbiology** Vol I & II (2nd
- Edition), Himalaya Publishing House, Mumbai.
- Sullia, S.B. and Shantaram, S. (1998). **General Microbiology**, Oxford & IBH Publishing Pvt. Ltd., New Delhi.
- Singh, R.P. (2007). **General Microbiology**. Kalyani Publishers, New Delhi.
- Talaro, K. and Talaro, A. (1996). **Foundations in Microbiology**. 2nd Edition. UMC Brown Publications.
- Tortora, G.J., Funke, B.R. and Case, C.L. (2004). **Microbiology: An Introduction**.Pearson Education, Singapore.

GOVERNMENT DEGREE COLLEGE SIDDIPET

B.SC. II YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-60@ 4hrs/week)

III SEMESTER

(MIROBIAL PHYSIOLOGY) (Paper III)

UNIT-I – Nutrition and Growth 15 hrs

1.Microbial nutrition - nutritional requirements and uptake of nutrients by cells.
2.Nutritional groups of microorganisms - autotrophs, heterotrophs, mixotrophs, methylotrophs. 4 Hrs
3.Growth media - synthetic, nonsynthetic, selective, enrichment and differential media. 2 Hrs
4.Microbial growth - different phases of growth in batch cultures. 2 Hrs
5. Factors influencing microbial growth. 2 Hrs
6.Synchronous, continuous, biphasic growth. 2Hrs
7.Methods for measuring microbial growth – Direct microscopy, viable count estimates, turbiodometry, biomass. 3 Hrs

UNIT-II- Enzymes15 hrs

1.Enzymes - properties and classification, enzyme unit. 5 Hrs
2.Biocatalysis - induced fit, and lock and key model, coenzymes, cofactors, factors affecting catalytic activity of enzymes. 5 Hrs
3.Inhibition of enzyme activity - competitive, noncompetitive, uncompetitive and allosteric. 5 Hrs

UNIT-III– Microbial Metabolism 1 15 hrs

1.Aerobic respiration - Glycolysis, HMP pathway, ED pathway, TCA cycle, electron transport, oxidative and substrate-level phosphorylation. Anaplerotic reactions. β-
2.Oxidation of fatty acids. 12 Hrs
3.Glyoxylate cycle. Anaerobic respiration (nitrate, sulphate respiration). 3 Hrs

UNIT- IV - Microbial Metabolism 2 15 hrs

1.Fermentation - Common microbial fermentations with special reference to alcohol and lactic acid fermentations. 7 Hrs
2.Photosynthetic apparatus in prokaryotes. Outlines of oxygenic and anoxygenic photosynthesis in bacteria. 8 Hrs

PAPER –III: PRACTICLES: MICROBIAL PHYSIOLOGY –(45 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.

TEXT AND REFERENCE BOOKS:

- Gottschalk, G. (1986). **Bacterial Metabolism**, Springer-Verlag, New-York.
- Caldwell, D.R. (1995). **Microbial Physiology and Metabolism**, W.C. Brown Publications, Iowa, USA.
- Moat, A.G. and Foster, J.W. (1995). **Microbial Physiology**, John-Wiley, New York.
- White, D. (1995). **The Physiology and Biochemistry of Prokaryotes**, Oxford University Press, New York.
- Reddy, S.R. and Reddy, S.M. (2004). **Microbial Physiology**, Scientific Publishers, Jodhpur, India.
- Reddy, S.M. and Reddy, S.R. (2005). **A Text Book of Microbiology Vol-II. Microbial Metabolism and Molecular Biology**. Himalaya Publishing House, Mumbai.
- Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). **Principles of Biochemistry**, 2nd Edition, CBS Publishers and Distributors, New Delhi.
- Elliot, W.H. and Elliot, D.C. (2001). **Biochemistry and Molecular Biology**, 2nd Edition, Oxford University Press, U.S.A.
- Kannan, N. (2003). **Hand Book of Laboratory Culture Medias, Reagents, Stains and Buffers**. Panima Publishing Co., New Delhi.

GOVERNMENT DEGREE COLLEGE SIDDIPET
B.SC. II YEAR SYLLABUS
SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-60@ 4hrs/week)

IV SEMESTER

(MIROBIAL GENETICS) (Paper- IV)

UNIT-I - Microbial Genetics 1 15 hrs

1.Fundamentals of genetics - Mendelian laws, alleles, crossing over, and linkage.
2.DNA and RNA as genetic materials. 5 Hrs
3.Structure of DNA – Watson and Crick model. 2 Hrs
4.Replication of DNA – Semiconservative mechanism. 2 Hrs
5. Outlines of DNA damage and repair mechanisms. 3 Hrs
6. Mutations – spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions. Various physical and chemical mutagens. 2 Hrs

UNIT-II - MicrobialGene Expression-I15 hrs

1. Extrachromosomal genetic elements – Plasmids and transposons. 3 Hrs
2. Brief account on horizontal gene transfer among bacteria – transformation, transduction and conjugation. 5 Hrs
2.Concept of gene – Muton, recon and cistron. 3 Hrs
3.Theories on gene expression-One gene-one enzyme, one gene-one polypeptide, one gene-one product hypotheses. 4 Hrs

UNIT-III - MicrobialGene Expression-II15 hrs

1.Types of RNA and their functions. 3 Hrs
2.Outlines of RNA biosynthesis in prokaryotes. 3 Hrs
3.Genetic code. Structure of ribosomes and a brief account of protein synthesis. 5 Hrs
4.Operon concept. Regulation of gene expression in bacteria – lac operon. 4 Hrs

UNIT-IV - Recombinant DNA Technology 15 hrs

1.Basic principles of genetic engineering - restriction endonucleases, DNA polymerases and ligases, 6 Hrs
2.Outlines of gene cloning methods. 3 Hrs
3.Genomic and c DNA libraries. 3 Hrs
4.General account on application of genetic engineering in industry, agriculture and medicine. 3 Hrs

PAPER –IV PRACTICALS:MICROBIAL GENETICS (45 Hrs)

1. Colorimetric estimation DNA by diphenylamine method.
2. Colorimetric estimation of proteins by Biuret/Lowry method
3. Paper chromatographic separation of sugars and amino acids
4. Starch hydrolysis, catalase test and sugar fermentation test.
5. Verification of Beer's law.
6. Problems related to DNA and RNA characteristics, Transcription and Translation.

TEXT AND REFERENCE BOOKS:

- White, D. (1995). **The Physiology and Biochemistry of Prokaryotes**, Oxford University Press, New York.
- Reddy, S.M. and Reddy, S.R. (2005). **A Text Book of Microbiology Vol-II. Microbial Metabolism and Molecular Biology**. Himalaya Publishing House, Mumbai.
- Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). **Principles of Biochemistry**, 2nd Edition, CBS Publishers and Distributors, New Delhi.
- Elliot, W.H. and Elliot, D.C. (2001). **Biochemistry and Molecular Biology**, 2nd Edition, Oxford University Press, U.S.A.
- Verma, P.S. and Agarwal, V.K. (2004). **Cell Biology, Genetics, Molecular Biology, Evolution and Ecology.** S. Chand & Co. Ltd., New Delhi.
- Freifelder, D. (1997). **Essentials of Molecular Biology**. Narosa Publishing House, New Delhi.
- Glick, B.P. and Pasternack, J. (1998). **Molecular Biotechnology**, ASM Press, Washington D.C., USA.
- Freifelder, D. (1990). **Microbial Genetics**. Narosa Publishing House, New Delhi.
- Strickberger, M.W. (1967). **Genetics**. Oxford & IBH, New Delhi.
- Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). **Principles of Genetics**. 5th Edition. McGraw Hill, New York.
- Glazer, A.N. and Nikaido, H. (1995). **Microbial Biotechnology – Fundamentals of Applied Microbiology**, W.H. Freeman and company, New York.
- Old, R.W. and Primrose, S.B. (1994) **Principles of Gene Manipulation**, Blackwell Science Publication, New York.
- Smith, J.E. (1996). **Biotechnology**, Cambridge University Press.
- Snyder, L. and Champness, W. (1997). **Molecular Genetics of Bacteria**. ASM press, Washington, D.C., USA.
- Twynan, R.M. (2003). **Advanced Molecular Biology**. Viva books Pvt. Ltd. New Delhi.
- Nicholl, D.S.T. (2004). **An Introduction to Genetic Engineering.** 2nd Edition. Cambridge University Press, London.

- Ram Reddy, S., Venkateshwarlu, K. and Krishna Reddy, V. (2007) **A text Book of Molecular Biotechnology**. Himalaya Publishers, Hyderabad.

GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.Sc. III YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-45@ 3hrs/week)

V SEMESTER, PAPER-V

(Immunology)

UNIT-I – History of Immunology and Immune System11 hrs

1.Development of immunology. 3 Hrs
2. Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity. 4 Hrs
3.Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes. 4 Hrs

UNIT-II – Cells of Immune System 11Hrs

1. Cells of immune system. 5Hrs
2.Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils. 6Hrs

UNIT – III Basics of Immunology 13Hrs

1.Antigens – types, chemical nature, antigenic determinants, haptens. Factors affecting antigenicity. 4 Hrs
2.Antibodies – basic structure, types, properties and functions of immunoglobulins. 2Hrs
3.Types of antigen-antibody reactions – agglutination, blood groups, precipitation, neutralization, complement fixation. 3 Hrs
4. Labeled antibody based techniques – ELISA, RIA and Immunofluroscence. 2 Hrs
5.Components of complement and activation of complement. 2 Hrs

UNIT – IV Applications of Immunology 10Hrs

1.Polyclonal and monoclonal antibodies – production and applications. 2Hrs
2.Types of hypersensitivity – immediate and delayed. 3Hrs
3.Autoimmunity and its significance. 3 Hrs

PAPER –V : PRACTICLES: IMMUNOLOGY (45 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).

TEXT AND REFERENCE BOOKS:

- Reddy, S.R. and Reddy, K.R. (2006). **A Text Book of Microbiology - Immunology and Medical Microbiology**, Himalaya Publishing House, Mumbai.
- Tizard, I.R. (1995). **Immunology : An Introduction**, WB Saunders, Philadelphia, USA.
- Riott, I.M. (1998). **Essentials of Immunology**, ELBS and Black Well Scientific Publishers, England.
- Goldsby, Kindt, T.J. and Osborne, B.A. (2004). **Kuby Immunology**, 6th Edition, W.H.Freeman and Company, New York.
- Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). **Instant Notes in Immunology**, Viva Books Pvt. Ltd., New Delhi.
- Chakraborty, B. (1998). **A Text Book of Microbiology**, New Central Book Agency (P) Ltd, Calcutta, India.12
- Ananthanarayana, R. and Panicker, C.K.S. (2000). **Text Book of Microbiology**, 6th Edition, Oriental Longman Publications, USA.
- Gupta, S. (1995). **Short Text Book of Medical Microbiology**, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
- Annadurai, B. (2008). **A Textbook of Immunology and Immunotechnology**. S. Chand & Co. Ltd., New Delhi.
- Dey, N., T.K. and Sinha, D. (1999). **Medical Bacteriology Including Medical Mycology and AIDS.** New Central Book Agency (P) Ltd. Calcutta, India.
- Shetty, N. (1994). **Imuunology – Introductory Textbook**. New Age International Pvt. Ltd., New Delhi.
- Singh, R.P. (2007). **Immunology and Medical Microbiology**. Kalyani Publishers, New Delhi.

GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.SC. III YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-45@ 3hrs/week)

V SEMESTER, PAPER-VI

(Agricultural and Environmental Microbiology)

UNIT - I Agricultural Microbiology 11 Hrs

1.Physical and chemical characteristics of soil. 2 Hrs
2.Rhizosphere and phyllosphere. 2 Hr
3.Plant growth-promoting microorganisms -mycorrhizae, rhizobia, *Azospirillum, Azotobacter,* cyanobacteria, *Frankia*and phosphate-solubilizing microorganisms. 3 Hrs
4. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). 4 Hrs

UNIT – II Plant Diseases 12 Hrs
1.Concept of disease in plants. 1 Hr
2.Symptoms of plant diseases caused by fungi, bacteria, and viruses. 3 Hrs
3.Plant diseases caused by fungi (groundnut rust), bacteria (angular leaf spot of cotton) and viruses (tomato leaf curl). 4 Hrs
2.Biological control of plant diseases. Biopesticides – *Bacillus thuringiensis,* Nuclear polyhedrosis virus (NPV), *Trichoderma*. 3 Hrs
3.Biofertilisers – Rhizobium 1Hr

UNIT – III Environmental Microbiology -I 11 Hrs
1.Microorganisms of environment (soil, water and air). 2 Hrs
2.Role of microorganisms in nutrient cycling (carbon, nitrogen, sulphur). 4 Hrs
3.Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism, predation. 5 Hrs
4. Microbiology of potable and polluted waters. *E. coli* and *Streptococcus faecalis*as indicators of water pollution.

UNIT – IV Environmental Microbiology-II11 Hrs

1. Sanitation of potable water. 3 Hrs
2.Sewage treatment (primary, secondary and tertiary). 2 Hrs
3.Outlines of biodegradation of environmental pollutants – pesticides. 2 Hrs
4.Solid waste disposal – sanitary land fills, composting. 2 Hrs
5.Microbiology of air and air sampling methods. 2 Hrs

PAPER VI: PRACTICLES: AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (45 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-arbuscularmycorrhizal (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.

TEXT AND REFERENCE BOOKS:

- Subba Rao, N.S. (1993). **Biofertilizers in Agriculture and Forestry**, 3rd Edition Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Rangaswami, G. and Bhagyaraj, D.J. (2001). **Agricultural Microbiology**, 2nd Edition, Prentice Hall of India, New Delhi.
- Atlas, R.M. and Bartha, R. (1998). **Microbial Ecology - Fundamentals and Applications**, Addison Wesley Longman, Inc., USA
- Paul, E.A. and Clark, F.E. (1989). **Soil Microbiology and Biochemistry,** Academic Press, USA.
- Lynch, J.M. and Poole, N.J. (1979). **Microbial Ecology – A Conceptual Approach**, Blackwell Scientific Publications, USA
- Alexander, M. (1985). **Introduction to Soil Microbiology**, 3rd Edition. Wiley Eastern Ltd., New Delhi.
- Subba Rao, N.S. (1999). **Soil Microorganisms and Plant Growth**. Oxford & IBHPublishing Co. Pvt. Ltd., New Delhi.
- Reddy, S.R. and SingaraCharya, M.A. (2007). **A Text Book of Microbiology – AppliedMicrobiology**. Himalaya Publishing House, Mumbai.
- Singh, R.P. (2007). **Applied Microbiology**. Kalyani Publishers, New Delhi.

GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.SC. III YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-45@ 3hrs/week)

VI SEMESTER, PAPER-VII

(Medical Microbiology)

UNIT – I History of Medical Microbiology & Host defense mechanisms. 10 Hrs

1.History of medial microbiology. 1 Hr
2.Normal flora of human body. 2 Hrs
3.Definition of infection, non-specific defense mechanisms, mechanical barriers, antagonism of indigenous flora. 3 Hrs
4.Anti-bacterial substances – lysozyme, complement, properdin, antiviral substances, phagocytosis. 4 Hrs

UNIT – II Diagnostic Microbiology & Host Pathogen Interactions 13 Hrs

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

UNIT – III Chemotherapy and microbial diseases 11 Hrs

1.Elements of chemotherapy – therapeutic drugs. Drug resistance. 2 Hrs
2.Mode of action of penicillin and sulpha drugs, and their clinical use. 2 Hrs
3.Preventive control of diseases – active and passive immunization. 2Hrs
4.Vaccines – natural and recombinant. 1Hr
5. General account of the following diseases – causal organisms, pathogenesis, epidemiology, diagnosis, prevention and control of:
Food and water-borne diseases - Cholera, Typhoid, Hepatitis- A, Poliomyelitis, Amoebiasis 5Hrs

UNIT – IV Microorganisms and Diseases 11 Hrs

1.Insect-borne diseases - Malaria, Dengue fever 3 Hrs
2.Contact diseases - Syphilis, Gonorrhoea 2Hrs
3.Zoonotic diseases – Rabies 1Hr
4.Blood-borne diseases - Serum hepatitis, AIDS 2Hrs
5.Air-borne diseases - Tuberculosis, Influenza 2Hrs
6.General account of nosocomial infections. 1 Hr

PAPER VII:PRACTICLES: MEDICAL MICROBIOLOGY (45 hrs)

1. Isolation and identification of medically important bacteria (*E. coli*, *Klebsiella*, *Pseudomonas*, *Staphylococcus* and *Streptococcus*) by cultural, microscopic andbiochemical tests.
2. Antibiotic sensitivity testing – disc diffusion method.
3. Parasites – Malarial parasite, *Entamoeba*(study of permanent slides).
4. Observation of fungal pathogen *(Candida*).
5. Tests for disinfectant (Phenol coefficient).

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- Reddy, S.R. and Reddy, K.R. (2006). **A Text Book of Microbiology - Immunology and Medical Microbiology**, Himalaya Publishing House, Mumbai.
- Tizard, I.R. (1995). **Immunology : An Introduction**, WB Saunders, Philadelphia, USA.
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- Goldsby, Kindt, T.J. and Osborne, B.A. (2004). **Kuby Immunology**, 6th Edition, W.H.Freeman and Company, New York.
- Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). **Instant Notes in Immunology**, Viva Books Pvt. Ltd., New Delhi.
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- Dey, N., T.K. and Sinha, D. (1999). **Medical Bacteriology Including Medical Mycology and AIDS.** New Central Book Agency (P) Ltd. Calcutta, India.
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GOVENRMENT DEGREE COLLEGE, SIDDIPET

B.SC. III YEAR SYLLABUS

SUBJECT -MICROBIOLOGY (TOTAL HRS OF TEACHING-45@ 3hrs/week)

VI SEMESTER, PAPER-VIII

(Food and Industrial Microbiology)

UNIT – I Food Microbiology **12 Hrs**

1.Microorganisms of food spoilage and their sources. 2 Hrs
2.Spoilage of different food materials - fruits, vegetables, meat, fish. Canned foods. 3 Hrs
3.Food intoxication (botulism and staph poisioning), foodborne diseases (salmonellosis and shigellosis) and their detection. 4 Hrs
4.General account of food preservation. 3 Hrs

UNIT- II Applied Food Microbiology **10 Hrs**

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

UNIT – III Industrial Microbiology-I **12 Hrs**

1.Microorganisms of industrial importance – yeasts, moulds, bacteria, actinomycetes. 2 Hrs
2.Screening and isolation of industrially-important microorganisms. 4Hrs
3.Outlines of strain improvement. 1Hrs
4.Types of fermentation – aerobic, anaerobic, batch, continuous, submerged, surface, solid state. 3Hrs
5.Design of a stirred tank reactor fermentor and Fermentation media. 2Hrs

UNIT – IV Microbial Biotechnology **12 Hrs**

1.Industrial production of alcohols (ethyl alcohol), beverages (beer). 02
2.Industrial production of enzymes (amylases), 01
3. Industrial production of antibiotics (penicillin) 02
4. Industrial production of amino acids (glutamic acid), 02
5. Industrial production of organic acids-(citric acid), 02
6. Industrial production of vitamins (B12), biofuels (biogas - methane). 03

PAPER –VIII : PRACTICLES: FOOD AND INDUSTRIAL MICROBIOLOGY (45 Hrs)

1. Determination of biological oxygen demand (BOD) of polluted water.
2. Microbial testing of water by coliform test (multiple tube fermentation method)
3. Determination of microbiological quality of milk – MBRT.
4. Observation of different spoiled foods.
5. Isolation of fungi and bacteria from spoiled fruits and vegetables.
6. Alcohol production and estimation; Calculation of fermentation efficiency.
7. Isolation of amylase-producing organisms.
8. Citric acid production and estimation.

TEXT AND REFERENCE BOOKS:

- Atlas, R.M. and Bartha, R. (1998). **Microbial Ecology - Fundamentals and Applications**, Addison Wesley Longman, Inc., USA
- Lynch, J.M. and Poole, N.J. (1979). **Microbial Ecology – A Conceptual Approach**, Blackwell Scientific Publications, USA
- Adams, M.R. and Moss, M.O. (1996). **Food Microbiology**, New Age International (P) Ltd, New Delhi.
- Banwart, G.J. (1987). **Basic Food Microbiology**, CBS Publishers and Distributors, New Delhi.
- Patel, A.H. (1984). **Industrial Microbiology**, Mac Milan India Ltd., Hyderabad.
- Cassida, L.E. (1968). **Industrial Microbilogy**, Wiley Eastern Ltd. & New Age International Ltd., New Delhi.
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- Singh, R.P. (2007). **Applied Microbiology**. Kalyani Publishers, New Delhi.
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- Stanbury, P.F., Whitaker, A. and Hall, S.J. (1997). **Principles of Fermentation Technology**, Aditya Books (P) Ltd. New Delhi.
- Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). **Food Microbiology**: **Fundamentals and Frontiers**. ASM Press, Washington D.C., USA.
- Frazier, W.C. and Westhoff, D.C. (1988). **Food Microbiology**, Mc Graw-Hill, New York.
- Jay, J.M. (1996). **Modern Food Microbiology**, Chapman and Hall, New York. 15
- Ray, B. (1996). **Fundamentals of Food Microbiology**, CRC Press, USA.

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DEPARTMENT OF MICROBIOLOGY
Internal examinations
(Semester-I Paper –I)

Time : 30 min Max. Marks: 10

I. Multiple choice questions **5X1/2=21/5**

1.
a. b.
c. d.
2.
a. b.
c. d.
3.
a. b.
c. d.
4.
a. b.
c. d.
5.
a. b.
c. d.

II. Fill in the blanks **5X1/2=21/5**

1.
2.
3.
4.
5.

III. Match the following **5X1/2=21/5**

1. ( ) a.
2. ( ) b.
3. ( ) c.
4. ( ) d.
5. ( ) e.

II. One word answer questions **5X1/2=21/5**

1.
2.
3.
4.
5.

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DEPARTMENT OF MICROBIOLOGY
Theory examinations
(Semester-I Paper –I)

Time : 2 h 30 min Max. Marks: 70

Section -A

I. Answer all the questions **4X2 ½ = 10**

1.
2.
3.
4.

Section -B

II. **Answer all the questions** **4X5 = 20**

5.
6.
7.
8.
9.

Section -C

III. **Answer all the questions** **4X10=40**

10. a or b
11. a or b
12. a or b
13. a or b

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FACULTY OF SCIENCE
SUBJECT: MICROBIOLOGY
Practical examinations
(Paper –I)

Time : 3 h Max. Marks:50

Answer all the questions

1. Major practical question 1X20=20
2. Minor practical question 1X10=10
3. Specimen for Spotters 5X3=15
   a.
   b.
   c.
   d.
   e.
4. Record 5

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FACULTY OF SCIENCE
SUBJECT: MICROBIOLOGY
Practical examination
(Paper –I&II)

Time : 3 h Max. Marks: 50

Answer all the questions

1.Major practical **1X20=20**

Bacterial culture is provided to you. Prepare the smear of the same and stain by differential staining(Gram stainig) method. Observe the microscopic characteristics of stained culture and report the microscopic morphology, arrangement and staining nature. Demonstrate your observation.

2. Minor practical question **1X10=10**

Demonstrate the spread plate technique for isolation of bacterial culture

3. Specimen for Spotters **5X3=15**

a. Microscope
b. Nutrient agar plate
c. Autoclave
d. Colorimeter
e. Inoculating loop

4. Record **5**

Signatures of B.O.S :

1.
2.
3.
4.
5.
6.

GOVERNMENT DEGREE COLLEGE, SIDDIPET,
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Academic Year 2016-17

DEPARTMENT OF MICROBIOLOGY