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VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227413
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન માઈક્રોબાયોલોજી વિષય ચલાવતી સ્નાતક અને અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓને તથા ડિપાર્ટમેન્ટનાં વડાશ્રીને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૦–૨૧ અમલમાં આવનાર બી.એસસી. એન્ડ એમ.એસસી. (માઈક્રોબાયોલોજી) સેમેસ્ટર–૧ અને ૨ નો અભ્યાસક્રમ અંગે માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા.૦૬/૦૩/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૩૦/૬/૨૦૨૦ ની સભાના **ઠરાવ ક્રમાંકઃ૨૭** અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા.૦૬/૦૩/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૦–૨૧ અમલમાં આવનાર બી.એસસી. એન્ડ એમ.એસસી. (માઈક્રોબાયોલોજી) સેમેસ્ટર–૧ અને ૨ નાં અભ્યાસક્રમ માટે તા.૧૬/૧૨/૨૦૧૯ ની સભામાં નીમેલ પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમમાં પેપર નંબર અને પેપરના શિર્ષક (Title) માં જરૂરી ફેરફારો કરી સર્વાનુમતે મંજૂર કરી તે મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૩૦/૦૬/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૭

:: આથી ઠરાવવામાં આવે છે કે, માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિએ તેની તા.૦૬/૦૩/૨૦૨૦ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે ભલામણ કરેલવિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૦–૨૧ થી અમલમાં આવનાર બી.એસસી. એન્ડ એમ.એસસી. (માઈક્રોબાયોલોજી) સેમેસ્ટર–૧ અને ૨ નાં અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૫૮૦૫/૨૦૨૦
તા. ૧૫–૦૭–૨૦૨૦

ઈ.ચા. કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન માઈક્રોબાયોલોજી વિષય ચલાવતી સ્નાતક અને અનુસ્નાતક કોલેજોનાં આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રી.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

B.Sc. (Microbiology) Syllabus

(Effective from June, 2020)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.Sc. MICROBIOLOGY

Teaching & Evaluation Scheme

Semester – I

Paper No.	Paper Title	Theory	Practical	External	Internal	Total	Credit
		(Hrs/Wk)					
MB 101	History and scope of microbiology	2	-	50	20	140	**4**
MB 102	Fundamentals of microscopy	2	-	50	20		
MBP 103	Practicals	-	4	40	20	60	**2**

F.Y.B.SC. SEMESTER I

MB: 101 HISTORY AND SCOPE OF MICROBIOLOGY

Student Learning Objective: The main aspect of this paper is to study and understand the scope of microbiology with major groups of microorganisms, ancient history and discovery of microbial world. An aim of this paper is to present existing development of the microbiology in diversified area.

	UNIT 1	SCOPE OF MICROBIOLOGY – I
		Teaching Duration: 07 Lectures
1.1	An introduction to Microbiology	
1.2	Microbiology: A multifaceted Science	
1.3	Position of Microorganisms in living world	
1.4	Taxonomic status of Viruses	

	UNIT 2	SCOPE OF MICROBIOLOGY- II
		Teaching Duration: 07 Lectures
2.1	Major groups of Microorganisms	
2.2	Distribution of Microorganisms in nature	
2.3	Applied areas of Microbiology	

	UNIT 3	ANCIENT HISTORY OF MICROBIOLOGY
		Teaching Duration: 08 Lectures
3.1	The discovery of Microbial World and Microscope	
3.2	The spontaneous generation controversy	
3.3	Discovery of microbial effects on organic matter	
3.4	Discovery of the role of Microbes in causation of Disease	
3.5	History of Virology	

	UNIT 4	DEVELOPMENT IN MICROBIOLOGY
		Teaching Duration: 08 Lectures
4.1	Development of pure culture techniques	
4.2	Development of Foundation for immunology	
4.3	Development of Agricultural microbiology	
4.4	Development of Chemotherapy	
4.5	Development of Modern immunology	
4.6	Molecular Biology and Biotechnology	

REFERENCES:

- Modi. H. A. (2014) A Handbook of Elementary Microbiology, Shanti Prakashan, (ISBN: 978-93-5070-1010)

Further Reading:

- Pommerville J.C. (2014) Alcamo's Fundamental of Microbiology, 10th Edition, Jones & Barlett Pvt. Ltd., **(**ISBN: 978-0-07-462320-6)
- Medigan M., et al., (2015) Brock Biology of Microorganisms, 14th Edition, Pearson education Ltd., (ISBN: 978-1-292-01831-7)

MB 102: FUNDAMENTALS OF MICROSCOPY

Student Learning Objective: The main aspect of this paper is to study and understand the Basic principle of microscopy. It focused on different type of fundamental and advanced microscopy techniques. Also provide knowledge related to different types of dyes, staining and staining theories of bacteria.

	UNIT 1	BASIC PRINCIPLE OF MICROSCOPY
		Teaching duration: 08 lectures
1.1 1.2 1.3 1.4 1.5 1.6	General Principles of optics Structure of light Objectives – Numerical Aperture , Resolving power Immersion objectives - Depth of focus, Equivalent focus, Working distance of uncovered objects & covered objects, Chromatic aberrations in objectives. Oculars – Huygens, Compensating, Flat-field. Condenser	

	UNIT 2	LIGHT MICROSCOPY
		Teaching duration: 07 lectures
2.1	Bright field microscope	
2.2	Dark field microscope	
2.3	Phase contrast microscope	
2.4	Differential Interference Contrast Microscope	
2.5	Fluorescence microscope	
2.6	Confocal microscopy	

	UNIT 3	ELECTRON MICROSCOPY
		Teaching duration: 08 lectures
3.1	Transmission Electron microscope	
3.2	Scanning Electron microscope	
3.3	Electron cryotomography	
3.4	Scanning probe microscopy	
	3.4.1 Scanning tunneling microscope	
	3.4.2 Atomic force microscope	

	UNIT 4	DYES & STAINS
		Teaching duration: 07 lectures
4.1	Dyes – Acidic & Basic dyes, Chromophore, Classification of biological stains	
4.2	Staining solution – Intensifier , Mordants	
4.3	Theories of staining	
4.4	Staining of bacteria	

REFERENCES:

- Willey J.M., Sherwood L.M. and Woolverton C.J., (2017) Prescott's Microbiology, 10th Edition McGraw - Hill Education, , (ISBN: 978-981-3151-26-0)
- Salle A. J., (1984) Fundamental Principles of Bacteriology, 7th Edition,Tata McGraw – Hill, (ISBN:0-07-099-562-1)

Further Reading:

- Pelczar, Chan and Krieg, (2001), Microbiology-Concepts and Application, 5th Edition, McGraw-Hill, (ISBN: 9780074623206)

F.Y B.Sc. Microbiology
Semester I Practicals

(Time duration: 04 hours/ week)
MBP-103: Practicals

1. Study of bright field compound microscope: Components, use and care.
2. Microscopic examination of living microorganisms:
   (a) Observation of hay infusion by Wet Mount Technique.
   (b) Observation of bacterial Motility by Hanging Drop technique
3. Measurement of microorganisms (Micrometry) using Ocular and Stage Micrometer.
4. Introduction to common instruments/equipments in microbiology laboratory:
   Autoclave, Incubator, Hot air oven, Laminar air flow, Centrifuge, Bacteriological Filter, pH meter, Colorimeter, Anaerobic jar, Colony counter.
5. Observation of morphological characteristics of Yeast / Fungi / Protozoa by Dark Field and Phase Contrast Microscopy.
6. Preparation of Nutrient broth / agar medium and cultivation of bacteria.
7. pH measurement and adjustment using Lovibond / Hellige's comparator (Phenol red and Bromothymol blue disc).
8. Preparation of standard solutions:
   a) Percent solutions
   b) Part dilutions
   c) Molar solutions
   d) Normal solutions
   e) Molal solutions
   f) PPM and PPB solutions
9. Monochrome staining by Acidic and Basic dye.
10. Gram staining.
11. Acid fast staining.
12. Observation of spirochaete by negative staining.

REFERENCES:

- Patel R.J. and Patel R.K. (2016) Experimental microbiology Volume I, 9th Edition. Aditya,
- Patel R.J. and Patel R.K. (2017) Experimental microbiology Volume II, 9th Edition. Aditya,
- Cappuccino J.G. (2016) Microbiology; A Laboratory Manual, 11th Edition**.** Pearson Edication (Singapore) Pvt. Ltd., (ISBN: 978-9332535190)
- Aneja K.R. (2001) Experiments in Microbiology, Plant Pathology, Tissue culture and Mushroom production technology, 3rd Edition. New Age International Publishers, (ISBN: 978-9386418302)

B.Sc. MICROBIOLOGY

Teaching & Evaluation Scheme

Semester – II

Paper No.	Paper Title	Theory (Hrs/Wk)	Practical (Hrs/Wk)	External	Internal	Total	Credit
MB 201	Procaryotic and archaeal cell structure	2	-	50	20	140	**4**
MB 202	Nutrition and growth of bacteria	2	-	50	20		
MBP 203	Practicals	-	4	40	20	60	**2**

MB 201: PROCARYOTIC AND ARCHAEAL CELL STRUCTURE

Student Learning Objective: The main aspects of this paper are to describe the basic structure of typical procaryotes and archaea. It focuses on important differences in structure between bacteria and Archaea.

	UNIT 1	**CELL MORPHOLOGY & CYTOPLASMIC MEMBRANE**
		Teaching Duration: 07 Lectures
1.1	Cell Morphology	
1.2	Cell Size and the significance of being Small	
1.3	Membrane Structure	
1.4	Membrane Function	

	UNIT 2	**CELL WALL AND GENETIC ELEMENTS OF PROKARYOTES**
		Teaching Duration:08Lectures
2.1	Peptidoglycan	
2.2	LPS: The Outer Membrane	
2.3	Archaeal Cell Wall	
2.4	Nucleoid and Ribosomes	

	UNIT 3	**CELL SURFACE STRUCTURE AND INCLUSIONS**
		Teaching Duration: 07 Lectures
3.1	Cell Surface Structures	
3.2	Cell Inclusions	
3.3	Gas Vesicles	
3.4	Endospore	

	UNIT 4	MICROBIAL LOCOMOTION
		Teaching Duration: 08 Lectures
4.1 4.2 4.3	Flagella and Swimming Motility Gliding Motility Chemotaxis and Other Taxes	

REFERENCE:

- Medigan M., et al., (2015) Brock Biology of Microorganisms, 14th Edition, Pearson education Ltd., (ISBN: 978-1-292-01831-7)
- Willey J.M., Sherwood L.M. and Woolverton C.J., (2017) Prescott's Microbiology, 10th Edition, McGraw - Hill Education, (ISBN: 978-981-3151-26-0)

Further Reading:

- Pommerville J.C. (2014) Alcamo's Fundamental of Microbiology, 10th Edition , Jones & Barlett Pvt. Ltd., (ISBN: 978-0-07-462320-6)

MB 202: NUTRITION AND GROWTH OF BACTERIA

Student Learning Objective: The main objective of this paper is to understand diversified nutritional requirements of microorganisms and their cultivation using various different media. It also focuses on bacterial and archaeal reproduction, cell cycle, growth curve and effect of various environmental factors on growth of microorganisms.

	UNIT 1	BACTERIAL NUTRITION
		Teaching Duration: 07 Lectures
1.1 1.2 1.3 1.4 1.5	Common nutritional requirements Requirements of carbon, hydrogen, oxygen and electrons Nutritional types of microorganisms Requirements of Nitrogen, Phosphorus, sulphur and growth factors Uptake of nutrients	

	UNIT 2	BACTERIAL GROWTH
		Teaching Duration: 08 Lectures
2.1 2.2 2.3 2.4 2.5	Bacterial and Archaeal reproduction by binary fission Bacterial cell cycle Bacterial Growth curve Microbial population size measurement Chemostat and turbidostat for Continuous culture	

	UNIT 3	CULTIVATION OF BACTERIA
		Teaching Duration: 08 Lectures
3.1 3.2 3.3 3.4	Culture media Cultivation of aerobes and anaerobes Enrichment and isolation of pure culture Microbial growth on solid media	

	UNIT 4	ENVIRONMENTAL FACTORS AND GROWTH
		Teaching Duration: 07 Lectures
4.1 4.2 4.3 4.4 4.5 4.6	Solutes and water activity pH Temperature Oxygen concentration Pressure Radiation	

References:

- Willey J.M., Sherwood L.M. and Woolverton C.J., (2017) Prescott's Microbiology, 10th Edition, McGraw - Hill Education, **(**ISBN: 978-981-3151-26-0)
- Willey J.M., Sherwood L.M. and Woolverton C.J., (2008) Prescott, Harley and Klein's Microbiology, 7th Edition, McGraw - Hill Education, (ISBN: 978-007-126727-4)

Further Reading:

- Pelczar, Chan and Krieg, (2001), Microbiology-Concepts and Application, 5th Edition, McGraw-Hill, **(**ISBN: 9780074623206**)**

F.Y B.Sc. Microbiology
Semester II Practicals

(Time duration: 04 hours/ week)

MBP-203: Practicals

1. Cell wall staining – Dyar's method.
2. Flagella staining – Leifson's method.
3. Cytoplasmic membrane staining by victoria blue stain.
4. Endospore staining – Snyder's modification of Dorner's method.
5. Nucleus staining- Feulgen's method.
6. Observation of capsule in bacteria by Maneval's method.
7. Metachromatic granules staining-Albert's method.
8. Techniques for Cultivation of bacteria:
   a) Broth culture
   b) Slant culture
   c) Stab culture.
9. Techniques for Isolation of bacteria:
   a) Streak plate method
   b) Pour plate method
   c) Spread plate method.
10. Influence of oxygen on growth of bacteria and Cultivation of Anaerobic bacteria (Thioglycollate medium).
11. Maintenance and preservation of bacteria.
12. Influence of Environmental factors on microbial growth:
    a) Temperature
    b) pH of media
    c) Osmotic pressure

REFERENCES:

- Patel R.J. and Patel R.K. (2016) Experimental microbiology Volume I, 9th Edition. Aditya,
- Patel R.J. and Patel R.K. (2017) Experimental microbiology Volume II, 9th Edition. Aditya,
- Cappuccino J.G. (2016) Microbiology; A Laboratory Manual, 11th Edition Pearson Edication (Singapore) Pvt. Ltd.(ISBN: 978-9332535190)
- Aneja K.R. (2001) Experiments in Microbiology, Plant Pathology, Tissue culture and Mushroom production technology, 3rd Edition, New Age International Publishers, (ISBN: 978-9386418302)

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