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VEER NARMAD SOUTH GUJARAT UNIVERSITY

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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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--: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની માઈક્રોબાયોલોજી વિષયનો અભ્યાસક્રમ ચલાવતી સંલગ્ન આચાર્યશ્રીઓને જણાવવાનું કે, માઈક્રોબાયોલોજી વિષયનો એમ.ફીલ. અને પીએચ.ડી. માટેનો અભ્યાસક્રમ અને તેના મૂલ્યાંકન અંગે માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિએ તેની તા. ૧૨-૦૭-૨૦૧૨ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે કરેલી નીચેની ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાવતી સ્વીકારેલ છે, જે એકેડેમિક કાઉન્સિલ વતી માનનીય કુલપતિશ્રીએ મંજૂર કરેલ હોય તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવા વિનંતી.

માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા. ૧૨-૦૭-૨૦૧૨ ની સભાની ભલામણ

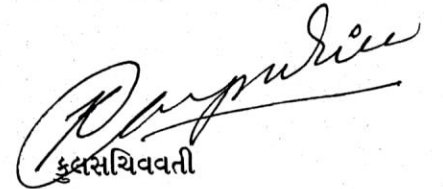
ક્રમાંક : ૨

:: આથી ઠરાવવામાં આવે છે કે, માઈક્રોબાયોલોજી વિષયનો એમ.ફીલ. અને પીએચ.ડી. નો કોર્ષ અને તેનું મૂલ્યાંકન આ સાથે સામેલ પરિશિષ્ટ મુજબ શૈક્ષણિક વર્ષ ૨૦૧૨-૧૩ થી અમલ થાય તે રીતે સ્વીકારવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

બિડાણ : ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૮૦૮૪/૧૨

તા. ૦૭-૦૮-૨૦૧૨


કુલસચિવવતી

પ્રતિ,

- (૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની માઈક્રોબાયોલોજી વિષયનો અભ્યાસક્રમ ચલાવતી સંલગ્ન આચાર્યશ્રીઓ.
- (૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા
- (૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

...તરફ જાણ તેમજ ઘટતી કાર્યવાહી સારૂ.

2012-13

M.PHIL. & PH.D. COURSE WORK
IN
MICROBIOLOGY

[DRSC-MICROBIOLOGY]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

EVALUATION SCHEME FOR M.PHIL. AND PH.D. IN MICROBIOLOGY

Sr. No	Subject/ papers (H/course)			Examination scheme		
	L	P	Total	T	P	Total
Paper-1	60	10	70	80	20	100
Paper-2	60	30	90	80	20	100
Paper-3	80	-	80	80	-	100
Team work/ field work/ seminar		10			20	
Total	200	50	250	240	60	300

M.PHIL. PROGRAMME	
PAPER-I	RESEARCH METHODOLOGY IN MICROBIOLOGY
PAPER-II	ANALYTICAL METHODS IN MICROBIOLOGY
PAPER-III	GENERAL MICROBIOLOGY (M.PHIL.)
PH. D. PROGRAMME	
PAPER-I	RESEARCH METHODOLOGY IN MICROBIOLOGY
PAPER-II	ADVANCE ANALYTICAL TECHNIQUES IN MICROBIOLOGY
PAPER-III	ADVANCES IN MICROBIOLOGY (PH.D.)

PAPER-I

RESEARCH METHODOLOGY IN MICROBIOLOGY (M.PHIL. /PH.D.)

1. Research: General (15L)

Meaning, need, process

Types of Research: Application perspective, objective perspective, mode of inquiry perspective

Kinds of Research: Diagnostic, Descriptive, Exploratory, Explanatory

2. Reviewing the Literature (15L+10P)

Purpose of literature review

Literature resources

How to reviewing the literature

Writing about the literature review

3. Formulating a research problem and constructing hypothesis (15L)

Steps in formulating research problem

Formulation of research problems and research objectives

Definition of hypothesis

Type of hypothesis

Hypothesis in qualitative research

4. Presentation of research (15L)

Write up the research proposal

Conference paper presentations/ Posters presentations

Presenting yourself for viva-voce

1. Sundar Rao, P. S. S. (2006). *Introduction to Biostatistics and Research Methods*. 4th Edition. Prentice-Hall of India Private Limited, New Delhi.
2. Gurumani, N. (2005). *An Introduction to Biostatistics*. 2nd Edition. MJP Publishers, Chennai.
3. Kumar, R. (2005). *A Step-by-step Guide for Beginners*. Sage Publications.

Paper – II:

ANALYTICAL METHODS IN MICROBIOLOGY

1. Basic Concepts of Computer & Computer applications in microbiology (15 L+10 P)

History of Computer, Concept of Computer hardware, Concept of Computer languages, Concept of Computer Softwares

Spreadsheet tools : Microsoft Excel or similar.

Presentation tools :- Microsoft Power Point or Similar.

Web Search: Introduction to Internet, Use of Internet and WWW, Use of search engines, Biological data bases

2. Biostatistics (15L+10 P)

Measures of Central tendency, measure of dispersion, regression and correlation, chi-square test. Probability, Confidence Interval, Errors. Levels of significance

3. Analytical methods (15L+05 P)

Principle, instrumentation and application of GC, TLC, HPLC, HPTLC, UV-VIS, IR, NMR, Spectrofluorimetry

4. Techniques in Molecular Biology: (15L+05 P)

Identification and characterization of DNA, RNA, Protein and plasmids: Agarose gel electrophoresis, ethidium bromide staining. FAME, Southern, Northern, Western Blotting, RAPD, RFLP, DGGE, TGGE, PCR.

Reference:

1. Tools in Biochemistry David Cooper
2. Practical Biochemistry, 5th edition, Keith Wilson and Walker.
3. Biostatistics by Zar
4. Biostatistics : A foundation for Analysis in the Health Sciences 7/E Wayne W. Daniel, Wiley Series in Probability and Statistics.
5. Introductory Statistics. Fifth Edition. (2004) Prem S. Mann. John Wiley and Sons (ASIA) Pvt. Ltd.

Paper-III

GENERAL MICROBIOLOGY (M.PHIL.)

UNIT-1 MICROBIAL DIVERSITY IN NORMAL AND EXTREME ENVIRONMENT: (20L)

Diversity of microbes in terrestrial (agricultural and desertsoils), aquatic (fresh water and marine), atmospheric (stratosphere) and animal (cattle, termites, pests such as cockroach and nematodes, and human being) and their potential applications , Occurrence, diversity, adaptations and potential applications of oligotrophs, thermophiles, psychrophiles, barophiles, organic solvent and radiation tolerants, metallophiles, acidophiles, alkaliphiles and halophiles

UNIT-2 MICROBIAL TECHNOLOGY (20L)

Various methods for isolation of pure culture methods for measurement of microbial growth, manipulation of environment, nutritional and genetic parameters for over production of metabolites, maintenance and preservation of microbes (pure culture). Design of production nutrient media, preparation of inoculum, alternative carbon and nitrogen sources, pretreatment of carbon, growth kinetics.

UNIT-3 DIAGNOSTIC MICROBIOLOGY (20L)

Adult/Prenatal/Newborn screening; Pre-implantation screening (Assisted reproductive technology- *in vitro* fertilization and Embryo transfer), Cytogenetics/ Molecular cytogenetics/Biochemical/Molecular methods of identification ; Screening for mutation/ chromosomal anomaly -; Forensic testing - DNA fingerprinting, paternity testing, individual identification.

UNIT-4 EMERGING AND RE-EMERGING PATHOGENS (20L)

Illustrate emerging and re-emerging pathogens using *V. cholerae* O: 139, X-MDR *M.tuberculosis*, *Helicobacter pylori*, Enterohaemorrhagic *E. coli* (EHEC), *Cryptosporidium parvum*, Lyme disease, SARS virus, Bird flu, prions, AIDS, Dengue Hemorrhagic Fever, and *Chlamydiae*, opportunistic fungal pathogens. Mechanisms of emergence of new pathogens: microbial change and adaptation, horizontal gene transfer (HGT), pathogenicity islands (PAI), role of integrons.

Reference:

1. Bergey's Manual of Systematic Bacteriology (2nd Ed.), Volumes 1 to 4 Springer
2. Molecular Biotechnology, 2nd Ed. S. B. Primrose, Blackwell Scientific publishers, Oxford, 1994
3. Kuby : Immunology; RA Goldsby, Thomas J. Kindt, Barbara A. Osborne.
4. Immunology by Roitt I. M., Brostoff J. and Male D. Gower medical publishing London.
5. Fundamentals of immunology 4th ed., Paul 1999, Lippencott Raven.

Paper-II

ADVANCED ANALYTICAL TECHNIQUES IN MICROBIOLOGY

1. Molecular techniques: (15L+05P)

PCR, DGGE, PFGE, Southern blots, Northern blots, Western blots, RFLPs, SNPs, AFLPs.

2. Analytical methods: (15L+05P)

Principle, instrumentation and application of AAS, GC-MS, LC-MS, ICP-MS, ESR spectroscopy, XRD, BioLog, Nucleic acid Sequencer.

3. Analytical softwares: (15L+10P)

Microsoft Excel statistical tools, SPSS/PSPP, Winpepi, An introduction to bioinorganic softwares: bioperl, biojava, bioXML, bioORACLE, etc. Introduction to Harvard graphics and coral draw.

4. Tools for Bioinformatics: (15L+10P)

ClustalW, BioEDIT, BLASTp, FASTA, Phylogenetic analysis tools- Phylip, , Online phylogenetic analysis.

Reference:

1. Protein Purification by Robert Scopes, Springer Verlag Publication, 1982
2. Tools in Biochemistry David Cooper.
3. Methods of Protein and Nucleic acid Research, Osterman Vol I – III

PAPER-III ADVANCES IN MICROBIOLOGY (PH.D.)

UNIT-1 INDUSTRIAL MICROBIOLOGY (20L)

Microbial strains, substrates, strain improvement, flow diagrams, product optimization and applications of industrial alcohol (ethanol and butanol), amino acids (lysine, phenylalanine, tryptophan), antibiotics (cephalosporins, tetracyclines, polyenes), enzymes and immobilized enzymes, SCP, microbial polyesters, biosurfactants, and recombinant products (insulin, somatostatin, thaumatin).

UNIT-2 MICROBIAL PATHOGENECITY(20L)

Mechanisms of variability in pathogens, pathogenicity genes and mechanisms in pathogenic bacteria, biotrophic and necrotrophic fungi, Virus and Viroid genes involved in pathogenicity

UNIT-3 RECENT ADVANCES IN MICROBIOLOGICAL WASTE TREATMENT METHODS (20L)

Activated Sludge Process, Anaerobic sludge digestion, Root zone technology, Microbial biosorption technology, Mass scale production of Effective Microorganisms (EM) for waste treatment., Economics of waste treatment

Unit-4 CONTEMPORARY DEVELOPMENTS IN MICROBIOLOGY (20L)

Recent advances in microbial identification, Recent advances in analytical techniques, Quality control and Quality assurance and Research and development for Microbiology.

Reference:

1. Bruce Rittman, Perry L. McCarty. Environmental Biotechnology: Principles and Applications. McGraw-Hill 2nd edition (July 25, 2000) ISBN: 0072345535.
2. Raina M. Maier , Ian L. Pepper, Charles P. Gerba. Environmental Microbiology. Publisher: Academic Press; (February 23, 2000).
3. M.N.V. Prasad, Kazimierz Strzalka. Physiology and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers, Dordrecht Hardbound, ISBN 1-4020-0468-0. February 2002, 460 pp.
4. T. Palzkill. 2002. Proteomics, Kluwer Academic Publishers, New York, USA.
5. E.D. Hoffmann, V. Stroobant. 2007. Mass Spectrometry: Principles and Applications, John Wiley & Sons Ltd. The Atrium,
6. Southern Gate, Chichester, West Sussex PO19 8SQ, England.

7. D. Kambhampati. 2004. Protein Microarray Technology, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
8. E. Fung. Methods in Molecular Biology, Volume 264: Protein Arrays, Humana Press Inc., Totowa, NJ.
9. Molecular Biotechnology, 2nd Ed. S. B. Primrose, Blackwell Scientific publishers, Oxford, 1994
10. Kuby : Immunology; RA Goldsby, Thomas J. Kindt, Barbara A. Osborne.
11. Immunology by Roitt I. M., Brostoff J. and Male D. Gower medical publishing London.
Fundamentals of immunology 4th ed., Paul 1999, Lippencott Raven.