



UNIVERSITY OF JAMMU

NOTIFICATION (10/July/ ADP/32)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation to the approval of the Academic Council, has been pleased to authorize adoption of the revised Syllabi and Courses of Study in the subject of Bio-technology for B.Sc. II of Three Year (General) Degree Course and M.Sc. Microbiology 1st semester for the examination to be held in the years as under alongwith %age of change:-

Adoption of the revised Syllabi of B.Sc. II alongwith %age of Change in each Paper and M.Sc. Microbiology

Bio-technology

<u>Class</u>	<u>Part</u>	<u>For the Examinations to be held in the year</u>	<u>Paper</u>	<u>%age of Change</u>
B.Sc	II	2011, 2012 & 2013	Paper- A Paper- B	about 50% change about 25% change

Microbiology

M.Sc	I- Semester	Dec. 2010	for BMB-404	10% change
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The alternative question papers are required to be set as per the University regulation given as under:-

- If the change in the Syllabi and Courses of Study is less than 25%, no alternative Question paper will be set.
- If the change is 25% and above but below 50% alternative Question Paper be set for one year.
- If the change is 50% and above on whole scheme is changed, alternative Question Paper are set for two years.

Sd/-
(DR. P.S. PATHANIA)
REGISTRAR

F.Acd./XXVI/10/ 5318-43
Dated: 17-8-2010

BIOTECHNOLOGY
(For the year 2011, 2012 & 2013)

There shall be two theory papers and one practical paper of 50 marks each. Each theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in each theory paper and 50% in practical paper. Each theory paper will be set for 40 marks and practical paper for 25 marks. The theory paper will have a total of 10 questions two from each unit and the candidate will be required to answer any five questions, selecting one from each unit. In case of regular students, internal assessment received from the college will be added to the marks obtained by them in the University examination and in case of private candidates, marks obtained by them in the University examination shall be increased proportionately in accordance with the Statutes/Regulations.

B.Sc. part – II (Biotechnology)

Paper A

Cell and Molecular Biology

Unit – I

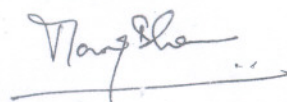
Cell theory, Structure of pro-and eukaryotic cells; cell wall in plants and microbes; structure and function, Plasma membrane; transport through membrane, Cell organelles; Mitochondria, Chloroplast and endoplasmic reticulum. Basic concept of cell signaling. Chromosome structure and function.

Unit – II

Mendelian Genetics, interaction of genes, Recombination, Bacterial genetic system; transformation, transduction and conjugation, Mutations; molecular basis, Overview of transposable elements in bacteria and plants. Structural and numerical alterations of chromosomes.

Unit – III

DNA structure: factors determining structure of DNA, Hydrogen bonding in DNA, Hydrophobic interactions in DNA, base stacking, DNA denaturation and renaturation, different forms of DNA: A, B, Z, Satellite DNA, Circular DNA.



Unit – IV

DNA replication, modes of DNA replication, enzymology of DNA replication, Okazaki fragments, Replication of circular DNA molecule; Rolling circle replication. Transcription: structure and function of RNA polymerase, basal transcriptional apparatus and transcription factors, promoters, enhancers and silencers, reverse transcription.

Unit – V

Regulation of gene expression, inducible and repressible, Operon concept, Post transcriptional and Post translational regulations, Antisense RNA. Translation: structure and function of ribosomes, mRNA, tRNA, rRNA; Protein synthesis, detailed account of factors involved in initiation and translation.

Books recommended

1. Alberts, B. Bray, D. Lewis, J. Raff, M., Roberts K. and Watson J.D (2002). Molecular Biology of Cell (2nd edition), Garland Publishing Inc., New York.
2. Dranell, J. Lodish, H and Baltimore D (1999). Molecular Cell Biology (4th edition), WH Freeman and Co. New York, NY.
3. Das, H.K (2005). Textbook of Biotechnology (2nd edition), Wiley Dreamteck India Pvt. Ltd, India.
4. Wilson, K. and Walker, J. (2004) Practical Biochemistry, John Wiley.
5. Singh, B. D. (1999) Biotechnology, Kalyani Publishers, India.

Practicals

1. Genomic DNA isolation from *E.coli*.
2. Spectrophotometer analysis of DNA.
3. Agarose gel electrophoresis of DNA.
4. Plasmid DNA isolation.
5. Restriction digestion of DNA.
6. Preparing competent cells.
7. Transformation of competent cells.
8. Native and SDS PAGE.
9. Paper Chromatography.
10. Spectrophotometry.

Books recommended

1. Sambrook J, Fritsch, E.F. and Maniatis, T. (2001). Molecular cloning. A Laboratory Manual 3rd ed., Cold Spring Harbor Laboratory Press.
2. Dabre P.D. (1998) Introduction to Practical Molecular Biology, John Wiley & Sons Ltd., New York.
3. Plummer D.T. (1990) An Introduction of Practical Biochemistry. 3rd Ed. Tata McGraw Hill Publishers Co. Ltd., New Delhi.
4. Singh R. and Sawhney, S.K. (2002) Introduction to Practical Biochemistry. Narosa Publications, New Delhi.

B.Sc. part – II (Biotechnology)

Paper B

Enzymology and Bioprocess Technology

Unit – I

Biophysical and biochemical techniques: Principle, theory and applications of centrifugation, chromatography, types of chromatography; column, paper, TLC, ion exchange chromatography and affinity chromatography. Theory, principle and applications of Spectrophotometry (UV - VIS) and electrophoresis.

Unit – II

History of Enzymology, Enzyme vs chemical catalysts, Nomenclature and classification of enzymes, Holoenzyme, apoenzyme, coenzymes, prosthetic group; Enzyme activity, enzyme action, Nature of active sites, Enzyme substrate complex, Types of enzymes.

Unit – III

Enzyme kinetics, Michaelis-Menten equation, K_m , V_{max} , different forms of inhibitions, Competitive, non-competitive, uncompetitive and mixed inhibition; Isolation and purification of enzymes, Industrial applications of enzymes.

Unit – IV

Bioprocess technology, Concept of Fermentation, Microbial growth kinetics; Substrate and product inhibition of product biosynthesis, Effect of pH, temperature and inducers on product synthesis. Fermentation medium; air and medium sterilization. Bioreactors, design and types of bioreactors; Agitation and aeration, impeller and sparger.

Unit – V

Bioprocess based products-antibiotics, ethanol, organic acids, single cell protein; bioprocess monitoring and control. Down stream processing, steps involved in down stream processing, separation of cells and broth, filtration, centrifugation, chromatography, solvent extraction, effluent treatment.

Books recommended

1. Shuler, M.L. and Kargi, G. (2003). Bioprocess Engineering: Basic Concepts, Prentice Hall, Englewood Cliffs.
2. Stanbury, P.F. and Whitaker, A. (1997). Principles of Fermentation Technology, Pergamon Press, Oxford.
3. Doran, P.M. (1999). Bioprocess Engineering Principles. Academic Press, New York.
4. Tripathi, G. (1999). Enzyme Biotechnology. Technoscience Publications, Jaipur, India.
5. Palmer, T. (2001). Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Horwood Publishing Chichester, England.
6. Nicholas, P, Stevans, L. Fundamental of Enzymology (1999). Oxford University Press, New York.

Practicals

1. Estimation of α -amylase activity from saliva.
2. Effect of temperature and pH on enzyme activity.
3. Study of enzyme kinetics.
4. Enzyme purification by salt precipitation.
5. Enzyme purification by chromatography.
6. Enzyme purification by electrophoresis.
7. Isolation of yeast from fruits.
8. Study of microbial growth kinetics.
9. Determination of thermal death point and thermal death time.
10. Ethanol production by fermentation in shake flask.

Books recommended

1. Plummer D.T. (1990) An Introduction of Practical Biochemistry. 3rd Ed. Tata McGraw Hill Publishers Co. Ltd., New Delhi.
2. Singh R. and Sawhney, S.K. (2002) Introduction to Practical Biochemistry. Narosa Publications, New Delhi.
3. Wilson, K. and Walker, J. (2004), Practical Biochemistry, Principles and techniques (4th edition), Cambridge University Press.

M. Sc. MICROBIOLOGY SEMESTER - I

COURSE TITLE: MYCOLOGY AND PHYCOLOGY

Course No. BMB - 404

Duration of Examination: 3 hrs

Contact hours :	48
Credits :	4
Max Marks :	100
Semester Exam :	80
Internal Assessment :	20
Total :	100

Syllabi for the examinations to be held in the years Dec. 2010

Objectives: The course on Mycology and Phycology has been designed for the students who need an orderly presentation of certain fundamental facts on the structure and classification of fungi and algae. With the recent studies in the genetics and the biochemistry of fungi, and with the realization of the role which fungi play in the causation of allergies and parasitic diseases of man, the need for such a course is envisaged.

UNIT-I: LOWER FUNGI

Historical: introduction to mycology, structure and cell differentiation. Division myxomycota; Acrasiomycetes, Hydromycomycetes, Plasmodiophoromycetes. Zoosporic fungi; Chytridiomycetes, Hypochytridiomycetes, Oomycetes, Zygomycotina; Zygomycetes, Trichomycetes. Evolutionary tendencies in lower fungi.

UNIT-II: HIGHER FUNGI

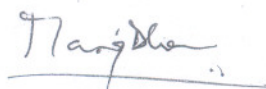
Ascomycotina; Hemiascomycetes, Plectomycete, Pyrenomycetes, Discomycetes, Laboulbeniomycetes, Oculascomycetes. Basidiomycotina; Telcomycetes, Hymenomycetes. Deuteromycotina; Hyphomycetes, Coelomycetes, Blastomycetes. Heterothalms, Sex hormones in fungi, Physiological specialization, Lichens-ascolichens, basidiolichens, deuterolichens.

UNIT-III: FUNGI AND ECOSYSTEM

Fungi and bioremediation. Mycorrhiza, ectomycorrhiza, endomycorrhiza, vesicular arbuscular mycorrhiza. Fungal diseases; mycoses; systemic and subcutaneous, candidiasis, Pneumocystis, blastomycoses, dermatophytosis.

UNIT-IV: ALGAE

Distribution of algae, classification of algae, algal nutrition, algal thallus, algal reproduction. Green algae, diatoms, euglenoids. Brown Rhodophyta, Pyrrophyta. Algal ecology and algal biotechnology.



NOTE FOR PAPER SETTING

The question paper will have 9 questions in all. Question 1, based on material from all 4 units will be compulsory and will have minimum of 4 parts. Besides, there will be 8 other questions, two from each unit. The students will be required to attempt the compulsory question and 4 others, one from each unit.

BOOKS RECOMMENDED

1. Mehrotra, R.S. and K.R. Aneja (1990), An introduction to Mycology, New Age International publishers.
2. Alexopoulos, C.J. and C.W. Mims (2001), Introduction to Mycology. Wiley Eastern Ltd. New Delhi. (3rd ed.).
3. Subbalis, G.(2004) The Fungi. Narosa Publishing House, N.Delhi.
4. Stainer, R.Y., Ingrahm, J.L., Wheelis, M.L. and Painter, P.R.(1991) General Microbiology. The MacMillian Press.
5. Pelczar, M.J., Chan E.C.S., Kraig N.R., (1998). Microbiology, Mc Graw Hills.
6. Balows, A.G. Thuper, M. Dworkin. W. Harder, K. Springer Verlag (1991). The Prokaryotes.
7. Madigan, M.T., Martinko, J.M. and Parker, J. (2008) Brock Biology of microorganisms (14 th ed.)
8. Cappuccino, J.G. and Shreman, N. (2005) Microbiology:- A Laboratory Manual. Addison Wiley.
9. Tortora, G.J., Funke, B.R. and Case (2008) Microbiology: An introduction 9th ed. Ed., Benjamin Cummings.

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