



ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

GULBARGA UNIVERSITY Jnana Ganga, KALABURAGI-585 106

Phone: 08472-263202, Fax: 08472-263206, E-mail: registrargug@rediffmail.com

ವಿದ್ಯಾಮಂಡಲ ವಿಭಾಗ



ಕ್ರ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿಟಎಸ್/2020-21/ ೩೨

ದಿನಾಂಕ: ೨/೧/೨೦೨೧

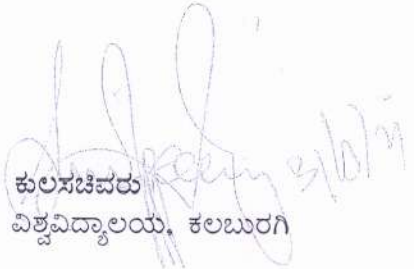
ಅಧಿಸೂಚನೆ

ವಿಷಯ : ಎಂ.ಎಸ್ಸಿ ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಕೋರ್ಸಿನ I ರಿಂದ IVನೇ ಸೆಮಿಸ್ಟರ್‌ನ ಪಠ್ಯಕ್ರಮ ತಿದ್ದುಪಡಿ ಮಾಡಿ ಪರಿಷ್ಕರಿಸಿದ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸ್ನಾತಕೋತ್ತರ ಅಧ್ಯಯನ ಮಂಡಳಿ ಸಭೆ ದಿನಾಂಕ 23.11.2020
2. ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಗೊತ್ತುವಳಿ ಸಂಖ್ಯೆ 18 ದಿನಾಂಕ 23.02.2021
3. ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ 20.03.2021

ಉಲ್ಲೇಖ (2) ರಲ್ಲಿನ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್‌ನ ಸಭೆಯ ಗೊತ್ತುವಳಿ ಸಂಖ್ಯೆ 18 ನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸುತ್ತ; ಎಂ.ಎಸ್ಸಿ ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಕೋರ್ಸಿನ ವಿಷಯದ I ರಿಂದ IVನೇ ಸೆಮಿಸ್ಟರ್‌ವರೆಗಿನ ಪಠ್ಯಕ್ರಮದಲ್ಲಿ ತಿದ್ದುಪಡಿ ಮಾಡಿ, ಸ್ನಾತಕೋತ್ತರ ಅಧ್ಯಯನ ಮಂಡಳಿ ಸಭೆಯ ಅನುಮೋದನೆ ನೀಡಿದ್ದು ಹಾಗೂ 2020-21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಪೂರ್ವಾನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳಿಸಿದೆ.

ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಬಂಧಪಟ್ಟ ಶಿಕ್ಷಕರ ಹಾಗೂ ವಿದ್ಯಾರ್ಥಿಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ. ಪಠ್ಯಕ್ರಮದ ವಿವರವನ್ನು ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ www.gug.ac.in ದಿಂದ ಪಡೆಯಬಹುದು.


ಕುಲಸಚಿವರು
ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

ಗೆ,

1. ಮುಖ್ಯಸ್ಥರು, ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ, ಗು.ವಿ. ಕಲಬುರಗಿ

ಪ್ರತಿಗಳು:

1. ಡೀನ್‌ರು, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ನಿಕಾಯ, ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
2. ಕುಲಸಚಿವರು, (ಮೌಲ್ಯಮಾಪನ) ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
3. ನಿರ್ದೇಶಕರು, ಪಿಎಂಇಬಿ, ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
4. ವಿಶೇಷಾಧಿಕಾರಿಗಳು, ವಿದ್ಯಾಮಂಡಲ ವಿಭಾಗ, ಗುವಿಕ ರವರ ಮಾಹಿತಿಗಾಗಿ.
5. ಮುಖ್ಯಸ್ಥರು, ಗಣಕಕೇಂದ್ರ ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿ ಹಾಗೂ ವೆಬ್‌ಸೈಟ್‌ನಲ್ಲಿ ಪ್ರಕಟಿಸಲು ತಿಳಿಸಿದೆ.
6. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ/ಕುಲಸಚಿವರ ಆಪ್ತ ಸಹಾಯಕರು ಗು.ವಿ. ಕಲಬುರಗಿ ಮಾಹಿತಿಗಾಗಿ



GULBARGA UNIVERSITY
DEPARTMENT OF MICROBIOLOGY
M.Sc. DEGREE (SEMESTER) COURSE UNDER CBCS SCHEME
SCHEME OF TEACHING AND EXAMINATION
 (Effective from the academic year 2020-21 and onwards)

PAPER	Teaching	Examination	Marks	IA	Credits
	Hours/week	Hours			
I SEMESTER:					
1.1 HC Fundamentals of Microbiology	4	3	80	20	4
1.2 HC Biochemistry and Microbial Enzymology	4	3	80	20	4
1.3 HC Bacteriology	4	3	80	20	4
1.4 SC Virology and Mycology	4	3	80	20	4
1.5 Practical Based on paper 1.1	4	3	40	10	2
1.6 Practical Based on paper 1.2	4	3	40	10	2
1.7 Practical Based on paper 1.3	4	3	40	10	2
1.8 Practical Based on paper 1.4	4	3	40	10	2
II SEMESTER:					
2.1 HC Microbial Physiology and Metabolism	4	3	80	20	4
2.2 HC Microbial Genetics and Molecular Biology	4	3	80	20	4
2.3 SC Environmental Microbiology	4	3	80	20	4
2.4 OE Microbes in Human Welfare	4	3	80	20	4
2.5 Practical Based on paper 2.1	4	3	40	10	2
2.6 Practical Based on paper 2.2	4	3	40	10	2
2.7 Practical Based on paper 2.3	4	3	40	10	2
2.8 Practical Based on paper 2.4	4	3	40	10	2
III SEMESTER:					
3.1 HC Recombinant DNA Technology	4	3	80	20	4
3.2 HC Immunology and Immunotechnology	4	3	80	20	4
3.3 SC Food and Dairy Microbiology	4	3	80	20	4
3.4 OE Microbes and Environment	4	3	80	20	4
3.5 Practical Based on paper 3.1	4	3	40	10	2
3.6 Practical Based on paper 3.2	4	3	40	10	2
3.7 Practical Based on paper 3.3	4	3	40	10	2
3.8 Practical Based on paper 3.4	4	3	40	10	2
IV SEMESTER:					
4.1 HC Fermentation Technology and Bioprocess Engineering	4	3	80	20	4
4.2 HC Medical Microbiology and Diagnostics	4	3	80	20	4
4.3 HC Project - Dissertation	4	3	90	20	4
4.4 SC Agricultural Microbiology	4	3	80	20	4
4.5 Practical Based on paper 4.1	4	3	40	10	2
4.6 Practical Based on paper 4.2	4	3	40	10	2
4.7 Project colloquium and Viva	4	3	30	10	2
4.8 Practical Based on paper 4.4	4	3	40	10	2
TOTAL MARKS (I TO IV SEMESTERS)			1920	480	96
HC – Hard core, SC – Soft core, OE – Open Elective					

1
1

(Signature)
CHAIRMAN
 Department of Microbiology
 Gulbarga University, Kalaburagi-587101

Paper-4.1 IIC: Fermentation Technology and Bioprocess Engineering

- | | | |
|-----|---|------|
| 1. | Fermentation: Origin, concept and historical development of fermentation. Types of Fermentations- Surface, Submerged, Solid -State, Batch, Continuous, Dual and Fed batch fermentations | 3 h |
| 2. | Industrially important Microorganisms: Isolation, Screening of metabolites (Primary and Secondary metabolites) and Preservation. Strain development- Mutation, Recombination and Protoplast fusion technique. Inoculum development for industrial fermentation. | 4 h |
| 3. | Media for industrial fermentations: Criteria, Media formulation, Media ingredients - Water, Carbon sources, Nitrogen sources, Minerals and Vitamin sources, Buffers, Precursors and Growth factors, Oxygen requirement, Chelaters and Antifoaming agents, Nutrients recycling. | 3 h |
| 4. | Fermentor: Construction and Design of a typical fermentor. Parts and functions of a fermentor. Manual and automatic control systems. Types of fermentors- Tower, Jet, Loop, Airlift, Bubble, Column, Packed bed, Fluidized bed. | 3 h |
| 5. | Sterilization of media and fermentors - Design of sterilization process for batch and continuous fermentation. Sterilization of Fermentor and Media, Air and Exhaust air, Filter sterilization. | 2 h |
| 6. | Kinetics of microbial growth: Phases of cell growth in batch culture. Simple unstructured kinetic models for microbial growth-Monod model. Growth of filamentous organisms. Growth associated (primary) and non - growth associated (secondary) product formation Kinetics. | 3 h |
| 7. | Bioprocess Engineering: Origin, Concept and Principles of Bioprocess Engineering. Basic components of bioprocess engineering. | 1 h |
| 8. | Upstream bioprocess: Major process variables, Optimization of process variables. Strategies for the enhanced production - Immobilization and Response surface methodology. | 2 h |
| 9. | Downstream bioprocess: Filtration-Micro, Cross-flow and Ultra, Centrifugation-High speed, Continuous and Ultra, Cell disruption, Precipitation, Coagulation and Flocculation, Solvent /Aqueous 2-phase extractions, Dialysis and Electro-dialysis, Reverse osmosis, SDS-PAGE, Ion Exchange chromatography and HPLC, Gel Filtration, Drying, Crystallization. | 5 h |
| 10. | Production and purification of microbial products: Enzymes-(Amylase, Proteases), Organic acids (Lactic acid, Citric acid and Vinegar), Amino acids (L-lysine and L-glutamic acid), Antibiotics (Penicillin and Streptomycin), Solvents-(Ethyl alcohol, Acetone- and butanol) Alcoholic beverages-(Beer, Wine, Brandy and Rum), Vitamins B12, Antitumours and Anticholesterol agent, An overview of bioenergy. | 20 h |
| 11. | Single cell protein and Single cell oil - Concept, production and uses. | 2 h |
| 12. | Intellectual property rights and patents | 2 h |

Reference Books:

1. Ali Cinar, S.J. Parulekar, et al., (2003) Batch Fermentation: Modeling, Monitoring, and Control, Marcel Dekker
2. Arnold D & J E. Davies, Atlas, RM 1999 Manual of Industrial Microbiology & Biotechnology 2nd Ed. Berry, D.R. (Ed) 1998 Physiology of Industrial fungi BSP, Oxford University.
3. Crueger & Crueger Biotechnology: A Text Book of Industrial microbiology 2nd edition
4. Casida, Industrial Microbiology
5. Demain, A.L Biology of Industrial Microorganisms
6. Diliello Methods in Food and Dairy Microbiology
7. Harold B. Reisman 1988 Economic Analysis of Fermentation Processes CRC Pr I Llc
8. Vogel A & L. Celeste Todaro 2005 Fermented and Biochemical Engineering Hand Book 2nd Standard Publishers Distribution New Delhi
9. Harvey, W., Blanch, S. Clark, 2007 Biochemical Engineering, Marcel Dekker

Paper-4.2 HC: Medical Microbiology and Diagnostics

1. Introduction: Historical developments - Major milestones and significant contributions. 2 h
2. Human Anatomy and physiology: An overview of human anatomy and physiology. Important terms/concepts of human anatomy and physiology with special reference to microbial infections. 2 h
3. Diseases caused by microorganisms: Concept and illustrations; Communicable diseases; normal flora of human body; opportunistic pathogens. 2 h
4. Microbial pathogenicity and pathogenesis: Attributes of pathogenicity and pathogenesis. Mechanism of disease process and prognosis. Host and microbial factors influencing susceptibility. Microbial infections: Concept and types of microbial infections; Modes of transmission of pathogens. Portal of entry and exit; Types of infections; Nosocomial infections. 5 h
5. Chemotherapy: Antimicrobial agents and antibiotics; Classification of antibiotics based on chemical structure, mode of action and range of effectiveness; Drug resistance - recent trends and its consequences; Antibiogram and Antibiotic policy; NCCLS (CLSI) guidelines and standards; WHO Guidelines. 4 h
6. Systematic study of important pathogenic bacteria with reference to etiology, symptoms, diagnosis, treatment and epidemiology: Enterobacteriaceae (*Salmonella*, *Shigella*, *E.coli*, *Klebsiella*); *Mycobacterium tuberculosis*, *M. Leprae*, Staphylococci, Streptococci, *Vibrio cholerae*, *Brucella pertussis*, *Clostridium welchii*, *C. tetani* and *Treponema pallidum* 10 h
7. Etiology, epidemiology, symptoms, diagnosis and treatment of diseases caused by Chlamydia, Mycoplasma and Rickettsia. 2 h
8. Pathogenicity, symptoms, diagnosis, treatment and preventive measures of viral diseases caused by important viruses - Pox, Herpes, Adeno, Papov, Picarno, myxo, retro, arbo, hepatitis, Rabies, SARS, Chikungunya, Ebola and H₁N₁ viruses. 8 h
9. Advances in Molecular Diagnosis of infections: RT-PCR (HCV, Corona, Mycobacteria), RAT (Rapid Antigen Test), TrueNat (TB and Covid-19), Feluda test Based on CRISPR (Clustered Regularly Interspaced Short Palindromic), Cartridge Based Nucleic Acid Amplification Test (CBNAAT), for TB, MDR-TB. 5h
10. Fungal diseases: Types of diseases - superficial and deep mycosis; Causative agents; Diagnosis and Treatment of diseases. 2h
11. Protozoan diseases: Causative agents, symptoms, diagnosis and treatment of Amoebiasis, Giardiasis, Filariasis, Leishmaniasis, Toxoplasmosis and Malaria 5h
12. Diagnostics: Collection and transport of clinical samples; Processing of clinical samples for direct and indirect diagnostics tests. Conventional, Serological and Molecular methods and techniques for the diagnosis of Urinary tract infections, Sexually transmitted diseases, Acute diarrheal and gastrointestinal infections, Cholera, Dysentery, Tuberculosis, Leprosy, Pyogenic infections, Dental caries and Central nervous system infections. 6h

Reference Books:

1. Topley and Wilson: Principles of bacteriology, Virology and Immunity, Edward Arnold.
2. David Greenwood, Richard C and Slack B. Medical Microbiology. ELBS Churchill Livingstone.
3. Rajesh Bhatia R. Essentials of Medical Microbiology. Jayjee Brothers.
4. Kenneth jR. Medical Microbiology – Introduction to Infectious Disease. Prentice Hall Int.
5. Joanstokes, Ridewaywren and Sir ashleymiles. Clinica Microbiology, Edward Arnold.
6. Dougias J and Slekh. Medical Bacteriology. Churchill Livingstone.
7. Bailey and Scotts. Diagnosite Microbiology. C.V. Mosry Company
8. Hoghl and Moffet. Clinical Microbiology. JB Lippincott Company

Paper-4.4 SC: Agricultural Microbiology

- | | | |
|-----|--|-----|
| 1. | Introduction: Origin, Concept and Development of Agricultural Microbiology. | 2 h |
| 2. | Role of microorganisms in soil formation and soil fertility. Factors affecting soil microorganisms. | 2 h |
| 3. | Microbes and biogeochemical cycles - Nitrogen, Carbon, Sulfur and Phosphorous cycles. | 4 h |
| 4. | Plant - Microbe Interactions: Types - Mutualism, Commensalism, parasitism, amensalism and synergism. Concepts of Rhizosphere, Phyllosphere and Spermosphere. Rhizosphere effect and R/S ratio. Factors influencing rhizosphere microorganisms. Plant growth promoting rhizobacteria, Mycorrhizae. | 4 h |
| 5. | Biological nitrogen fixation: General chemistry, mechanism and genetics of biological nitrogen fixation. Nitrogen fixation by diazotrophs-Rhizobium, Azotobacter, Azospirillum, Frankia and Blue Green Algae. | 6 h |
| 6. | Phosphate solubilizing microorganisms and Mycorrhizae: Types of phosphate solubilizing microorganisms - Bacteria and Fungi, Mechanism of phosphate solubilization. Types, significance and role of mycorrhizae. | 3 h |
| 7. | Biofertilizers: Concept and types of microbial biofertilizers - Bacterial (Rhizobium, Azotobacter and Azospirillum), Fungal and Algal. Screening and selection of potential strains for biofertilizer. Production and quality control of biofertilizers. Phosphate solubilising microbial biofertilizers. Methods of application and evaluation of biofertilizers. | 8 h |
| 8. | Green manure, Organic matter, Compost and Composting | 2 h |
| 9. | Plant diseases: Etiology, pathogenesis, Symptoms and control measures of plant diseases. Bacterial diseases - Wilt and Citrus canker; Fungal diseases - Wilt, Downy mildew, Rust and Smuts); Viral diseases -Tobacco mosaic and Bunchy top of Banana; Mycoplasmal diseases - Grassy shoot of sugar cane and Coconut yellowing disease | 8 h |
| 10. | Biological control: Origin and concept. Various microorganisms as biocontrol agents. Isolation, screening, cultivation and mode of action of microbial biocontrol agents. Merits and demerits of biological control | 4 h |
| 11. | Biopesticides: Origin and concept. Types, mass production and applications of microbial biopesticides. Bacterial - <i>Bacillus thuringiensis</i> and <i>Pseudomonas fluorescens</i> ; Fungal - <i>Trichoderma viridae</i> and Coelomomyces; Viral - NPV and CPV. Integrated pest and plant diseases management | 4 h |
| 12. | Genetically modified crops: Origin and concept. Role and significance of microbial genes. Construction, evaluation and field application of BT cotton, Flavr Savr tomato and Golden Rice. Advantages and disadvantages of GM crop plants. | 3 h |

Reference Books:

1. Subba Rao, 2000. Soil Microbiology, 4th Ed. Oxford & IBH
2. Subba Rao. Biofertilizers in Agriculture. Oxford & IBH
3. Subba Rao. Recent Advances in Biological Nitrogen Fixation. Oxford & IBH.
4. Rangaswamy and Bagyraj. Agricultural Microbiology.
5. Swaminathan M.S. Biotechnology in Agriculture. McMillan.
6. Steinhaus, 1963. Insect Pathology. Vol I & II. Academic Press, New York.
7. Burges H D. 1970-1980. Microbial Control of Pests and Plant Diseases.
8. Plant pathology. By George Agrios; Academic Press. New York.
9. Microbial Ecology: Fundamentals and Applications by Rinald Atlas and Richard Bartha; Benjamin/Cummings Science Publis., 2725 Sand Hill Road, Menlo Park, California 94025.
10. Plant pathology. By George Agrios; Academic Press. New York.