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THIRUVALLUVAR UNIVERSITY

SERKKADU, VELLORE–632115

B.Sc. MICROBIOLOGY

SEMESTER - II

SYLLABUS

FROM THE ACADEMIC YEAR

2023 – 2024

SECOND SEMESTER

S.No.	Part	Study Components Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-2	6	3	Tamil/Other Languages	25	75	100
2.	II	English	Paper-2	4	3	English	25	75	100
3.	II	NMSDC: Language Proficiency for Employability	Paper-1	2	2	Overview of English Communication	25	75	100
4.	III	Core Course –CC III	Paper-2	5	5	Microbial Physiology and Metabolism	25	75	100
5.	III	Core Course –CC IV	Paper -3	5	5	Microbial Physiology and Metabolism PRACTICAL II	25	75	100
6.	III	Elective II Generic/ Discipline Specific	Elective II	6	3	Bio Instrumentation	25	75	100
7.	IV	Skill Enhancement Course SEC-2	Paper2	2	2	Nutrition & Health Hygiene	25	75	100
8.	IV	Skill Enhancement Course SEC-3 (Discipline Specific)	Paper 1	2	2	Sericulture	25	75	100
		Sem. Total		**32**	**25**		**200**	**600**	**800**

SEMESTER II

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22MBUGCT2	MICROBIAL PHYSIOLOGY AND METABOLISM	Core Course III	Y	-	-	-	5	5	25	75	100

Course Objectives	
CO1	Study the basic principles of microbial growth.
CO2	Understand the basic concepts of aerobic and anaerobic metabolic pathways.
CO3	Analyze the role of individual components in overall cell function.
CO4	Provide information on sources of energy and its utilization by microorganisms.
CO5	Study the different types of metabolic strategies.

Unit	Details	No.of Hours	Course Objectives
I	Physiology of microbial growth: Batch – continuous - synchronous cultures; Growth Curve and measurement method (turbidity, biomass, and cell count). Control of microbial growth.	12	CO1
II	Nutrition requirements - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), Chemoorganotrophs. Nutrition transport mechanisms – Passive diffusion and Active transport. Factors affecting microbial growth.	12	CO2
III	An overview of Metabolism - Embden Meyerhof Pathway, Entner-Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle. Electron Transport Chain and Oxidative Phosphorylation. ATP synthesis. Fermentation-Homolactic Fermentation, Heterolactic Fermentation,.	12	CO3
IV	Photosynthesis - An Overview of chloroplast structure. Photosynthetic Pigments, Light Reaction-Cyclic and non-cyclic Photophosphorylation. Dark Reaction - Calvin Cycle.	12	CO4

V	Bacterial reproduction - Binary fission, Budding, Reproduction through conidia, cyst formation, endospore formation. Fungi asexual and sexual reproduction, Microalgae reproduction.	12	CO5
	Total	60	

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Describe microorganisms based on nutrition.	PO6, PO9
CO2	Know the concept of microbial growth and identify the factors affecting bacterial growth.	PO6, PO7, PO9
CO3	Explain the methods of nutrient uptake.	PO6, PO9
CO4	Describe anaerobic and aerobic energy production.	PO6, PO9
CO5	Elaborate on the process of bacterial photosynthesis and reproduction.	PO6, PO9

Text Books

1	Schlegal, H.G. (1993). General Microbiology.,7th Edition, Press syndicate of the University of Cambridge.
2	RajapandianK.(2010). Microbial Physiology, Chennai: PBS Book Enterprises India.
3	MeenaKumari. S. Microbial Physiology, Chennai 1st Edition MJP Publishers 2006.
4	Dubey R.C. and Maheswari, S. (2003). A textbook of Microbiology, New Delhi: S. Chand & Co.
5	S. Ram Reddy, S.M. Reddy (2008). Microbial Physiology. Anmol Publications Pvt Ltd.

References Books

1	Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
2	Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.

3	Daniel R. Caldwell. (1995). Microbial Physiology & Metabolism Wm.C. Brown Communications, Inc. USA.
4	Moat, A.G and J.W Foaster (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.
5	BhanuShrivastava. (2011). Microbial Physiology and Metabolism: Study of Microbial Physiology and Metabolism. Lambert academic Publication.
Web Resources	
1	https://sites.google.com/site/microbial physiologyoddsem/teaching-contents
2	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition
3	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
4	http://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf
5	https://www..frontiersin.org.microbial-physiology-and-metabolism

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate	Longer essay/ Evaluation essay, Critique or justify with pros and cons	

(K5)	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M			M		
CO2						M	L		M		
CO3						M			M		
CO4						M			M		
CO5						M			M		

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22MBUGCP2	MICROBIAL PHYSIOLOGY AND METABOLISM	CCIV-CORE PRACTICAL II	-	-	Y	-	5	5	25	75	100

Course Objectives	
CO1	Understand the principles of motility test.
CO2	Understand the basic concepts of staining methods.
CO3	Learn the bacterial count using different methods and anaerobic culture.
CO4	Study the morphological demonstration of microorganisms and identification.
CO5	Study the biochemical identification of the bacteria.

UNIT	Details	No.of Hours	Course Objectives
I	Motility demonstration: hanging drop, wet mount preparation, semi-solid agar. Staining techniques: Smear preparation, Capsular, and Acid-fast staining	12	CO1
II	Direct counts – Direct cell count (Petroff-Hausser counting chamber), Turbidometry. Viable count - pour plate, spread plate.	12	CO2
III	Anaerobic culture methods – Candle jar method. Antibiotic sensitivity testing: Disc diffusion test.	12	CO3
IV	Morphological variations in algae, fungi and protozoa. Micrometry.	12	CO4
V	Methods of bacterial identification- morphological, physiological, and biochemical methods - IMViC test, H2S, TSI, Oxidase, catalase, urease test, and Carbohydrate fermentation test.Maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.	12	CO5
	Total	60	

Course Outcomes	
Course	On completion of this course, students will;

Outcomes		
CO1	Describe hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method.	PO6, PO7, PO8, PO9, PO11
CO2	Demonstrate Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining.	PO6, PO7, PO8, PO9, PO11
CO3	Explain antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.	PO6, PO7, PO8, PO9, PO11
CO4	Describe demonstration of the size of yeast, fungal filaments and protozoa.	PO6, PO7, PO8, PO9, PO11
CO5	Elaborate on the bacterial identification- morphological, physiological, and biochemical methods.	PO6, PO7, PO8, PO9, PO11
Text Books		
1	James G Cappucino and N. Sherman MB (1996). A lab manual Benjamin Cummins, New York .	
2	Kannan. N (1996).Laboratory manual in General Microbiology. Palani Publications.	
3	Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.	
4	Gunasekaran. P (2007). Laboratory manual in Microbiology. New age international publisher.	
5	Elsa Cooper (2018). Microbial Physiology: A Practical Approach. Callisto Reference publisher.	
References Books		
1	DavidWhite., James Drummond., Clay Fuqua (2012) Physiology and Biochemistry of Prokaryotes. 4th Ed. Oxford University Press, New York.	
2	Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.	
3	Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.	
4	Dawes, I.W and Sutherland L.W (1992). Microbial Physiology (2nd edition), Oxford Blackwell Scientific Publications.	

5	Moat, A.G and J.W Foaster, (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.
Web Resources	
1	https://sites.google.com/site/microbial physiologyoddsem/teaching-contents
2	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition
3	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
4	https://www.studocu.com/microbial-physiology-practicals
5	https://www.agr.hokudai.ac.jp/microbial-physiology

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M	L	M	L		M
CO2						M	M	L	M		L
CO3						L	M	M	L		M
CO4						L	M	M	M		M
CO5						M	M	M	M		M

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22MBUGDE2	**BIO INSTRUMENTATION**	Elective Generic /Discipline Specific Elective II	**Y**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Course Objectives

CO1	Understand the analytical instruments and study the basic principles in the field of sciences.
CO2	To gain knowledge about principles of spectroscopy
CO3	Understand the analytical techniques of Chromatography and electrophoresis
CO4	To understand the principle of different types of scans used in medical diagnosis
CO5	To gain information about the principles of radioactivity and its measurements

Unit	Details	No.of Hours	Course Objectives
I	Basicinstruments:pH meter, Buffer of biological importance, Centrifuge- Preparative, Analytical and Ultra, Laminar Air Flow, Autoclave**,** Hot Air Oven and Incubator. Biochemical calculations-preparations of Molarity, molality and normality solutions.	12	CO1
II	Spectroscopic Techniques:Spectroscopic Techniques: Colorimeter, Ultraviolet and visible, Infra red and Mass Spectroscopy.	12	CO2
III	Chromatographic and Electrophoresis Techniques: Chromatographic Techniques: Paper, Thin Layer, Column, HPLC and GC. Electrophoresis Techniques: Starch Gel, AGE, PAGE.	12	CO3
IV	Imaging techniques:Principle, Instrumentation and application of ECG, EEG, EMG, MRI, CT and PET scan radioisotopes.	12	CO4
V	Fluorescence and radiation based techniques:Spectrofluorimeter, Flame photometer, Scintillation counter, Geiger Muller counter,	12	CO5

	Autoradiography.		
	Total	60	

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Gain knowledge about the basics of instrumentation.	PO1,PO4,PO11
CO2	Exemplify the structure of atoms and molecules by using the principles of spectroscopy.	PO4,PO10,PO11
CO3	Evaluate by separating and purifying the components.	PO4,PO7,PO11
CO4	Understand the need and applications of imaging techniques.	PO7,PO8,PO11
CO5	Categorize the working principle and applications of fluorescence and radiation.	PO10,PO11

Text Books

1.	Jayaraman J (2011). Laboratory Manual in Biochemistry, 2nd Edition. Wiley Eastern Ltd., New Delhi .
2.	Ponmurugan. P and Gangathara PB (2012). Biotechniques.1stEdition. MJP publishers.
3	Veerakumari, L (2009).Bioinstrumentation- 5 thEdition -.MJP publishers.
4	Upadhyay, Upadhyay and Nath (2002). Biophysical chemistry – Principles and techniques 3rd Edition. Himalaya publishing home.
5	Chatwal G and Anand (1989). Instrumental Methods of Chemical Analysis. S.Himalaya Publishing House, Mumbai.

References Books

1	Rodney.F.Boyer (2000). Modern Experimental Biochemistry, 3rd Edition. Pearson Publication.
2	SkoogA.,WestM (2014). Principles of Instrumental Analysis – 14th Edition W.B.SaundersCo.,Philadephia.
3	N.Gurumani. (2006). Research Methodology for biological sciences- 1st Edition – MJP Publishers .
4	Wilson K, and Walker J (2010). Principles and Techniques of Biochemistry and Molecular Biology.7thEdition. Cambridge University Press .
5	Webster, J.G. (2004). Bioinstrumentation- 4th Edition - John Wiley & Sons (Asia) Pvt.Ltd,Singapore.

Web Resources

1	http://www.biologydiscussion.com/biochemistry/centrifugation/centrifugeintroduction-types- uses-and-other-details-with-diagram/12489

2	https://www.watelectrical.com/biosensors-types-its-working-andapplications/
3	http://www.wikiscales.com/articles/electronic-analytical-balance/ Page 24 of 75
4	https://study.com/academy/lesson/what-is-chromatography-definition-typesuses.html
5	http://www.rsc.org/learn-chemistry/collections/spectroscopy/introduction

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	L			M							S
CO2				L						M	S
CO3				L			M				S

CO4							S	S			S
CO5										M	S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22MBUGSEC2	Nutrition & Health Hygiene	Skill Enhancement Course - SEC-2 (NME)	Y	-	-	-	2	2	25	75	100

Course Objectives	
CO1	Learn about nutrition and their importance
CO2	Make student understand thenutritional facts fora better life.
CO3	Learn information to optimize our diet
CO4	Impart knowledge on different health care programs taken up by India
CO5	Learn knowledge on different health indicators and types of hygiene methods

Unit	Details	No.of Hours	Course Objectives
I	Nutrition – definition, importance, Good nutrition, and mal nutrition; Balanced Diet: Basics of Meal Planning. Carbohydrates, Lipids, Proteins and Vitamins –functions, dietary sources, effects of deficiency. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium, and Sodium; food sources of Iron, Iodine, and Zinc. Importance of water– functions, sources, requirements and effects of deficiency	5	CO1
II	Nutrition for Life Cycle: Balanced diet - Normal, Pregnant, lactating women, Infancy, young children Adolescents, Adults, and the Elderly; Diet Chart; Nutritive value of Indian foods.	5	CO2
III	Improper diets: Definition, Identification, Signs and Symptoms - malnutrition, under-nutrition, over-nutrition, Protein Energy	5	CO3

	Malnutrition, obesity; Nutritional Disease and Disorder - hypertension, diabetes, anemia.		
IV	Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India.	5	CO4
V	Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme. Rural Community Health: Village health sanitation & Nutritional committee. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places.	5	CO5
	Total	25	

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn the importance of nutrition for a healthy life	PO5, PO6, PO7, PO8, PO10
CO2	Study the nutrition for life cycle	PO5, PO6, PO7, PO8, PO10
CO3	Know the health care programmes of India	PO5, PO6, PO7, PO8, PO10
CO4	Learn the importance of community and personal health & hygiene measures	PO5, PO6, PO7, PO10
CO5	Create awareness on community health and hygiene	PO5, PO6, PO7, PO10

Text Books	
1.	Bamji, M.S., K. Krishnaswamy& G.N.V. Brahmam (2009) Textbook of Human Nutrition(3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2.	Swaminathan (1995)Food &Nutrition(Vol I, Second Edition) The Bangalore Printing &Publishing Co Ltd., , Bangalore
3	SK. Haldar(2022). Occupational Health and Hygiene in Industry. CBS Publishers.
4	Acharya, Sankar Kr, Rama Das, Minati Sen (2021). Health Hygiene and Nutrition Perception and Practices.Satish Serial Publishing House
5	Dass (2021).Public Health and Hygiene, Notion Press

References Books	
1	VijayaKhader (2000)Food, nutrition & health, Kalyan Publishers, New Delhi
2	Srilakshmi, B., (2010)Food Science, (5th Edition) New Age International Ltd., New Delhi
3	Arvind Kumar Goel (2005). A College Textbook of Health & Hygiene,ABD Publishers
4	Sharma D. (2015).Textbook on Food Science and Human Nutrition.Daya Publishing House.
5	Revilla M. K. F., Titchenal A. and Draper J. (2020).Human Nutrition. University of Hawaii, Mānoa.

Web Resources	
1	National Rural Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49
2	National Urban Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137
3	Village health sanitation & Nutritional committee https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225
4	Health Impact Assessment - https://www.who.int/hia/about/faq/en/
5	Healthy Living https://www.nhp.gov.in/healthylivingViewall

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External	End Semester Examination	75 Marks

Evaluation		
	Total	100 Marks

Methods of Assessment

Recall (KI)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					S	M	M	M		S	
CO2					S	M	M	M		S	
CO3					S	M	M	M		S	
CO4					S	S	L			S	
CO5					S	S	M			S	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22MBUGSEC3	SERICULTURE	Skill Enhancement Course - SEC-3	Y	-	-	-	2	2	25	75	100

Course Objectives	
CO1	Acquire knowledge on the concepts of origin, growth and study of Sericulture as science and scientific approach of mulberry plant.
CO2	Describe the morphology and physiology of silkworm.
CO3	Discuss effective management of silkworm diseases.
CO4	Demonstrate field skills in mulberry cultivation and silkworm rearing with an emphasis on technological aspects.
CO5	Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up small-scale enterprises.

Unit	Details	No.of Hours	Course Objectives
I	General introduction to Sericulture, its distribution in India. Botanical distribution and taxonomical characters of mulberry varieties and species.Biology of Mulberry plant and Mulberry crop cultivation and protection.	5	CO1
II	Silkworm- biology-morphology of silkworm. Life cycle of silkworm- egg, larva, pupa, and moth.	5	CO2
III	Silkworm pathology: Introduction to Parasitism, Commensalism, Symbiosis and Parasite relationship - Mulberry Silkworm Diseases: Introduction, types, Pebrine, Grasserie, Muscardine, Flacherie, Symptoms and Pathogens, Mode of Infection, Prevention and Control -Non – mulberry silkworm diseases: Pebrine, Bacterial and viral diseases. Brief Account of Pests and Predators of Silkworms, Nature of damage and control measures.	5	CO3

IV	Rearing of silkworm. Cocoon assessment and processing technologies. Value added products of mulberry and silkworms.	5	CO4
V	Entrepreneurship and rural development in sericulture:Planning for EDP, Project formulation, Marketing, Insectary facilities and equipments: Location, building specification, air conditioning and environmental control, furnishings and equipment, sanitation and equipment, subsidiary facilities.	5	CO5
	Total	25	
Course Outcomes			
Course Outcomes	On completion of this course, students will;		
CO1	Discuss the overall aspects of Sericulture and the biology and varieties of mulberry plant.Creates awareness among students about the economic importance and suitability of Sericulture in Indian conditions.	PO1,PO5,PO7	
CO2	Familiarize with the lifecycle of silk worm.	PO1, PO2	
CO3	Explain common diseases of silkworm encountered during rearing, sources of infection, disease symptoms, pre-disposing factors and their management practices.	PO1, PO5	
CO4	Attain thorough knowledge about the cultivation of mulberry, maintenance of the farm, seed technology, silkworm rearing, post cocoon techniques like stifling, reeling, and utilization of by-products.	PO7, PO8, PO10	
CO5	Plan the facilities required for establishment of insectary. Competent to transfer the knowledge and technical skills to the Seri-farmers.Analyze the importance of sericulture in entrepreneurship development and emerge as potential entrepreneur.	PO5, PO7, PO8	
Text Books			
1	Ganga, G. and Sulochana Chetty (2010). Introduction to Sericulture,, J., Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.		
2	Dr. R. K. Rajan&Dr. M. T. Himantharaj(2005). Silkworm Rearing Technology, Central Silk Board, Bangalore.		
3	Dandin S B, Jayant Jayaswal and Giridhar K (2010). Handbook of Sericulture technologies,Central Silk Board, Bangalore.		

4	M. C. Devaiah, K. C. Narayanaswamy and V. G. Maribashetty(2010). Advances in Mulberry Sericulture,,CVG Publications, Bangalore
5	T.V.SatheandJadhav.A.D.(2021). Sericulture and Pest Management, Daya Publishing House.
References Books	
1	S. Morohoshi (2001). Development Physiology of Silkworms 2nd Edition, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
2	Hamamura, Y (2001). Silkworm rearing on Artificial Diet. Oxford & IBH publishing Co., Pvt. Ltd. NewDelhi.
3	M.Johnson, M.Kesary (2019).Sericulture, 5th.Edition.Saras Publications.
4	Manisha Bhattacharyya (2019).Economics of Sericulture, Rajesh Publications.
5	Muzafar Ahmad Bhat, Suraksha Chanotra, Zafar Iqbal Buhroo, Abdul Aziz and Mohd.Azam (2020).A Textbook on Entrepreneurship Development Programme in Sericulture, IP Innovative Publication.
Web Resources	
1	https://egyankosh.ac.in › bitstream
2	https://archive.org › details › SericultureHandbook
3	https://www.academic.oup.com
4	https://www.sericulture.karnataka.gov.in
5	https://www.silks.csb.gov.in

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
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Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate	

	between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S		S				
CO2	M				S						
CO3	S				S						
CO4							S	S		S	
CO5					S		S	S			