

K.S.Rangasamy College of Arts and Science (Autonomous),

Tiruchengode -637215


Department of Biochemistry

New Courses Introduced

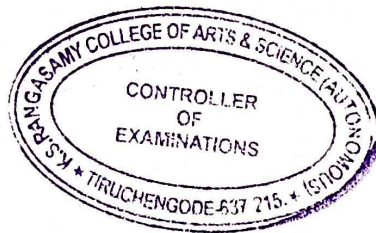
- Food Biochemistry
- Bioprocess technology
- Soil Biochemistry
- Microbial Biochemistry

Enclosures:

1. Copy of Scheme of Examination.
2. Syllabus Copy of Courses highlighting the Newly Introduced Courses

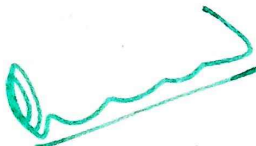

HOD

HEAD
Department of Biochemistry,
K.S.R. College of Arts & Science
TIRUCHENGODE-637 209




COE

Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous),
Tiruchengode - 637 215, Tamil Nadu, India



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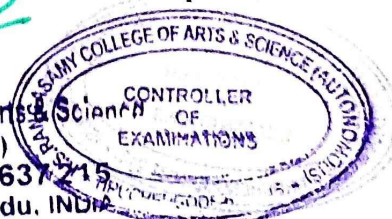
Subject Code	Subject	Hours of Instruction	Exam Duration (Hours)	Maximum Marks			Credit Points
				CA	CE	Total	
First Semester							
Part I							
18UTALA101/ 18UHILA101/ 18UFRLA101	Tamil I/ Hindi I/ French I	5	3	25	75	100	3
Part II							
18UENLA101	Foundation English I	5	3	25	75	100	3
Part III							
18UBCM101	Core I: Biomolecules	6	3	25	75	100	5
18UCHBCA101	Allied I: Chemistry I	4	3	25	75	100	2
18UBCMP101	Core Practical I: Biomolecules	5	6	40	60	100	3
18UCHBCAP101	Allied Practical I: Volumetric and Organic Analysis	3	3	40	60	100	2
Part IV							
18UVE101	Value Education I: Yoga	2	3	25	75	100	2
Total		30				700	20
Second Semester							
Part I							
18UTALA201/ 18UHILA201/ 18UFRLA201	Tamil II/ Hindi II / French II	5	3	25	75	100	3
Part II							
18UENLA201	Foundation English II	5	3	25	75	100	3
Part III							
18UBCM201	Core II: Biochemical Techniques	6	3	25	75	100	5
18UMBBCA201	Allied II: Microbiology	4	3	25	75	100	2
18UBCMP201	Core Practical II: Biochemical Techniques	5	6	40	60	100	3
18UMBBCAP201	Allied Practical II: Microbiology	3	3	40	60	100	2
Part IV							
18UVE201	Value Education II: Environmental Studies	2	3	25	75	100	2

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Department of Biochemistry
K.S. Rangasamy College of Arts & Science (Autonomous)
TIRUCHENGODE - 637 215
Namakkal-Dt. Tamil Nadu, INDIA




Mr. M. MANJAD, M.Sc., M.B.A.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
Tiruchengode - 637 215, Tamil Nadu, India.


B.Sc., Biochemistry (Students admitted from 2018- 2019 onwards)

Total		30		700	20		
Third Semester							
Part I							
18UTALA301/ 18UHILA301/ 18UFRLA301	Tamil III/ Hindi III/ French III	5	3	25	75	100	3
Part II							
18UENLA301	Foundation English III	5	3	25	75	100	3
Part III							
18UBCM301	Core III: Enzymology	4	3	25	75	100	4
18UCSBCA301	Allied III: Computer for Biology	4	3	25	75	100	2
18UBCMP301	Core Practical III: Enzymology	3	6	40	60	100	3
18UCSBCAP301	Allied Practical III: Computer for Biology	2	3	40	60	100	2
Part IV							
18UBCSB301	SBC I: Cell Biology	2	3	25	75	100	2
	NMEC I	2	3	25	75	100	2
Non Credit							
18ULS301	Career Competency Skills I	1	-	-	-	-	-
	Add on Course	2	3	-	-	100	-
Total		30				900	21
Fourth Semester							
Part I							
18UTALA401/ 18UHILA401/ 18UFRLA401	Tamil IV/ Hindi IV/ French IV	5	3	25	75	100	3
Part II							
18UENLA401	Foundation English IV	5	3	25	75	100	3
Part III							
18UBCM401	Core IV: Bioenergetics and Intermediary Metabolism	5	3	25	75	100	5
18UMABCA401	Allied IV: Biostatistics	4	3	25	75	100	2
18UBCMP401	Core Practical IV: Intermediary Metabolism	3	6	40	60	100	3
18UMABCAP401	Allied Practical IV:	2	3	40	60	100	2


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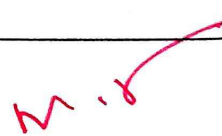



Mr. M. P. S. S. S. S., M.Sc., M.B.A., M.F.P.,
 Controller of Examinations
 K.S. Rangasamy College of Arts & Science (Autonomous)
 Tiruchengode - 637 215, Tamilnadu, India.

	Statistics (Using MS-Excel)						
Part IV							
18UBCSB401	SBC II: Fundamentals of Biochemical Calculations (100 % Internal Evaluation)	2	3	100	-	100	2
	NMEC II	2	3	25	75	100	2
Non - Credit							
18ULS401	Career Competency Skills II	1	-	-	-	-	-
	Add on Course	1	3	-	-	100	-
	Total	30				900	22
ALC*							
Fifth Semester							
Part III							
18UBCM501	Core V: Fundamentals of Immunology	5	3	25	75	100	4
18UBCM502	Core VI: Molecular Biology	5	3	25	75	100	5
18UBCM503	Core VII: Clinical Biochemistry	5	3	25	75	100	5
18UBCM504	Core VIII: Endocrinology	4	3	25	75	100	4
	Elective I	4	3	25	75	100	4
18UBCMP501	Core Practical V: Immunology and Clinical Biochemistry	4	6	40	60	100	3
Part IV							
18UBCSB501	SBC III : Pharmacognosy (100 % Internal Evaluation)	2	3	25	75	100	2
Part V							
18UBCE501	Extension Activity	-	-	-	-	-	2
Non - Credit							
18ULS501	Career Competency Skills III	1	-	-	-	-	-
	Total	30				700	29
ALC*							


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 Namakkal-Dt. Tamil Nadu, INDIA




Mr. M. PRASAD, M.D., M.B.A., M.P.H.
 Controller of Examinations
 K.S. Rangasamy College of Arts & Science (Autonomous)
 Tiruchengode - 637 215, Tamil Nadu, India

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Sixth Semester							
Part III							
18UBCM601	Core IX: Plant Biochemistry	5	3	25	75	100	5
18UBCM602	Core X: Pharmaceutical Biochemistry	5	3	25	75	100	5
18UBCM603	Core XI: Genetic Engineering	5	3	25	75	100	5
	Elective II	4	3	25	75	100	4
18UBCMP601	Core Practical VI: Plant Biochemistry and Genetic Engineering	4	6	40	60	100	3
18UBCPR601	Internship	4	-	40	60	100	4
Part IV							
18UBCSB601	SBC IV : Phytochemistry	2	3	25	75	100	2
Non - Credit							
18ULS601	Career Competency Skills IV	1	-	-	-	-	-
Total		30				700	28
Grand Total						4400	140



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Mr. M. FRAGAD, M.Sc., M.S.A., M.Phil.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
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ELECTIVE SUBJECT

The students shall choose any one of the following elective subjects in fifth and sixth semester.

S.No.	Semester	Subject code	Subject
1.	V	18UBCEL501	Human Physiology
2.		18UBCEL502	Nutritional Biochemistry
3.	VI	18UBCEL601	Computational Biology
4.		18UBCEL602	Biomedical Instrumentation

NON MAJOR ELECTIVE COURSE (NMEC)

Non Major Elective Course is conducted for the Students of other Departments.

S.No.	Semester	Course Code	Subject
1.	III	18UBCNM301	Biochemistry in Health and Diseases
2.	IV	18UBCNM401	Functional Biology

ADD-ON COURSE

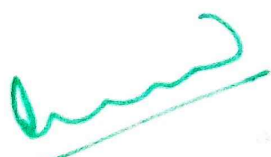
The students shall study the following Add-on Course during their Third and fourth semesters.

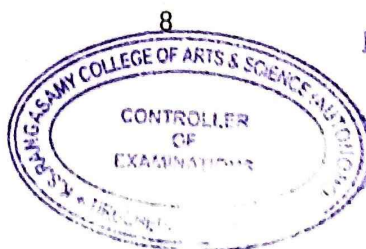
S.No.	Semester	Subject Code	Subject
1.	III	18UBCAC301	Clinical Laboratory Techniques
2.	IV	18UBCAC401	Medical Terminology (For Medical Coding/Medical Transcription)

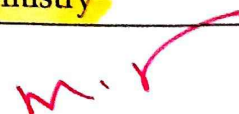
ADVANCED LEARNER COURSE:

The students shall choose any one of the following Advanced Learner Course during their Fourth and Fifth semester.

S.No.	Semester	Subject Code	Subject
1.	IV	18UBCAL401	Food Biochemistry
2.		18UBCAL402	Bioprocess technology
3.	V	18UBCAL501	Soil Biochemistry
4.		18UBCAL502	Microbial Biochemistry


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FOR COURSE COMPLETION

Student shall complete:

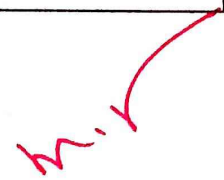
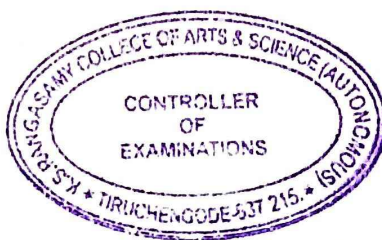
- Language subjects (Tamil/Hindi/French, English) in I, II, III and IV semester.
- Value Education: Yoga and Environmental Studies in I and II semester respectively.
- Allied subjects in I, II, III and IV semester.
- Two Add-on Course in III and IV semesters of their course of study.
- Two Non Major Elective Courses in III and IV semesters.
- Four Skill Based Courses in III, IV, V and VI semesters.
- Extension activity in V semester.
- Elective subjects in the V and VI semesters.
- Internship during the VI semester.
- Career Competency Skill in semester III, IV, V and VI.

TOTAL CREDIT DISTRIBUTION

S.No.	PART	Total Marks	Total Credits
1.	PART I: Language	400	12
2.	PART II: Foundation English	400	12
3.	PART III : Major, Allied, Elective, Internship	2800	98
4.	PART IV: Value Education, SBC, NMEC	800	16
5.	PART V: Extension Activity	-	2
TOTAL		4400	140



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18UBCAL401	ADVANCED LEARNER COURSE I: FOOD BIOCHEMISTRY	SEMESTER - IV
<p>Course Objectives:</p> <p>The Course aims</p> <ul style="list-style-type: none"> To make the students to understand the biochemical processes of food and the role of Food additives and colors in food. On successful completion of the paper the students will get an insight to become an entrepreneur. 		
UNIT	CONTENTS	CO
I	<p>Water - Dietary sources, physical properties, water activity and food spoilage, control of water activity in foods. Carbohydrates - flavor and color production by carbohydrates, texturing characteristics of carbohydrates. Lipids - emulsifying properties of fats, rancidity and reversion of oils. Proteins - proteins of milk, meat, fish, eggs, cereals</p>	CO1
II	<p>Microorganism in Food spoilage- Mold, yeast, bacteria. Factors responsible for spoilage, Spoilage of vegetable, Fruit, Meat, Poultry, Beverage and Other food products.</p> <p>Food poisoning, types of food poisoning - chemicals, microorganism (<i>Clostridium, Staphylococcus, Aspergillus</i>).</p>	CO2
III	<p>Food additives: Definition, Functional characteristics of chemical additives; Intentional food additives - Acids, Bases and their salts; Antioxidants; Desirable and undesirable aspects of additives</p>	CO3
IV	<p>Food colors - chlorophyll, carotenoids, anthocyanins, betalaines, melanins. Natural and artificial food colorants. Flavour - sweetness, saltiness, sourness, bitterness, astringency, pungency, meatiness and fruity flavors, synthetic flavors. Natural flavor development in foods</p>	CO4
V	<p>Food adulterants: Definition, types of adulterants, methods of detection (milk, meat, chilli powder, oil, turmeric powder, coffee,</p>	CO5



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Namakkal-Dt. Tamil Nadu, INDIA



M. S.
Mr. M. PRASAD, M.Sc., M.B.A.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
Tiruchengode - 637 219, Tamilnadu, India.

pepper, salt, sugar) Food Preservation: Importance, principle, methods. Preservation by heat, cold, chemicals	
Text Book	
1. <i>Sivasankar, B.</i> 2005. Food Processing and Preservation. Prentice Hall of India Pvt. Ltd., New Delhi	
Reference Books	
1. <i>ManoranjanKalia and Sangeetha Sood.</i> 1999. Food Preservation and Processing. Kalyani Publishers, New Delhi	
2. <i>Sreelakshmi, B.</i> 1997. Food Science. New Age International Pvt. Ltd., New Delhi	

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO1	Explain the properties and activity of water in foods
CO2	Describe the characteristics and properties of biomolecules
CO3	Elucidate the microorganisms in food spoilage and food poisoning
CO4	Illustrate the functional characteristics of food additives
CO5	Recite about food colours, preservatives and adulterants


MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	H	H
CO2	M	L	M	H	H
CO3	M	L	M	H	H
CO4	M	L	M	H	H
CO5	M	L	M	H	H

H-High; M-Medium; L-Low

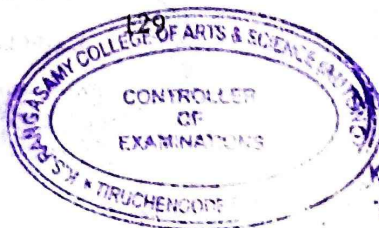

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K.S. Rangasamy College of Arts & Science (Autonomous)
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18UBCAL402	ADVANCED LEARNER COURSE I: BIOPROCESS TECHNOLOGY	SEMESTER - IV
<p>Course Objectives:</p> <p>The Course aims</p> <ul style="list-style-type: none"> To enable the students to gain knowledge about the exploitation of microbes for industrial purpose 		
UNIT	CONTENTS	CO
I	<p>Fermentation: Fermentation - Definition. Isolation of microorganism, strain development and screening of industrially important microbes.</p> <p>Basic design and construction of fermentor - conventional fermentor.</p> <p>Operation of conventional fermentor. Types of fermentor- Stirred tank, Air lift, Bubble column, Packed beds.</p>	CO1
II	<p>Fermentation Processes - Batch, fed batch and continuous fermentation. Types - Solid substrate (SSF) and submerged fermentation. Fermentation process- Inoculum preservation, inoculum build up, prefermentor culture and production fermentation.</p> <p>Measurement and control of bioprocess parameters</p>	CO2
III	<p>Downstream processing- Introduction, stages in downstream processing: solid-liquid separation, release of intracellular process, concentration, purification, formulation</p>	CO3
IV	<p>Industrial Bioprocessing I: Commercial production of enzymes- amylase and protease. Production of organic solvents- alcohol. Alcoholic beverages, wine and beer. Production of organic acids- citric acid and acetic acid</p>	CO4
V	<p>Industrial Bioprocessing II: Production of antibiotic-Penicillin and tetracycline. Production of amino acids- glutamic acid. Production of Vitamins - Vitamin B12. Production of Polysaccharides - Xanthan</p>	CO5

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Dr. M. PRASAD M.Sc., M.B.A., M.Phil.,
 Controller of Examinations
 K.S. Rangasamy College of Arts & Science (Autonomous)
 Tiruchengode - 637 215, Tamil Nadu, India.

Text Books	
1.	Satyanarayana, U. 2008. Biotechnology . Books and Allied Pvt. Ltd., Kolkata.
2.	Patel, A.H. 2005. Industrial Microbiology . [Fifth Edition]. Mac Millan India Ltd., New Delhi
3.	Wulf Crueger and Anneliese Crueger. 2004. A Text Book of Industrial Microbiology . Panima Publishing Corporation, New Delhi
4.	Casida, L. S. 2007. Industrial Microbiology . New Age International, New Delhi

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO1	Recall the types and working of fermentors
CO2	Perform isolation and culturing of microorganism for industrial use
CO3	Illustrate the stages in downstream processing
CO4	Discriminate the commercial production of enzymes, organic acids and organic solvents
CO5	Demonstrate the production of vitamins, antibiotics and polysaccharides

MAPPING

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	H	H
CO2	M	H	M	H	H
CO3	M	H	M	H	H
CO4	M	H	M	H	H
CO5	M	H	M	H	H

H-High; M-Medium; L-Low



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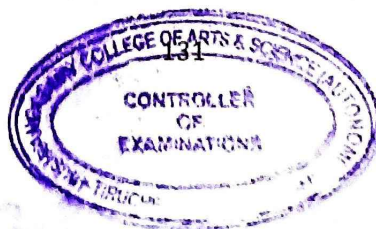



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18UBCAL501	ADVANCED LEARNER COURSE II: SOIL BIOCHEMISTRY	SEMESTER - V
<p>Course Objectives</p> <p>The Course aims</p> <ul style="list-style-type: none"> To enable the learners to understand the concepts of biofertilizers and its role in soil fertility. 		
UNIT	CONTENTS	CO
I	<p>Soil: Soil properties, composition. Factors influencing soil microbial population. Decomposition of organic matter in soil. Elements required in plant nutrition, functions of nutrients in plants- nitrogen, phosphorus, potassium, iron. Soil fertility evaluation: Nutrient deficiency symptoms of plants- hidden hunger, seasonal effects. Plant analysis-tissue test, total analysis.</p>	CO 1
II	<p>Fertilizers-Definition, method of placement- pre planting, at planting, after planting, movement of fertilizer, benefits and hazards. Biofertilizers- Definition and benefits. Biopesticides -Types and advantages. Composting-types, advantages, decomposition stages in composting.</p>	CO 2
III	<p>Biomass and Bioenergy- sources and utilization of biomass, production of alcohol from biomass. Biofuel- Biohydrogen production. Bioleaching- mechanism, advantages. Biosorption, by fungi, algae, moss, bacteria. Mechanism, limitations and factors affecting biosorption.</p>	CO 3
IV	<p>Biogeochemical cycle- Sulphur, nitrogen, hydrogen cycle, carbon cycle, oxygen, phosphorus. Biodegradation - Definition, properties affecting biodegradation, degradation of hydrocarbons. Bioremediation -Definition, types - <i>In situ</i> and <i>Ex situ</i> bioremediation, types of reactions in bioremediation. Bioremediation of contaminated</p>	CO 4

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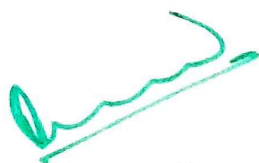
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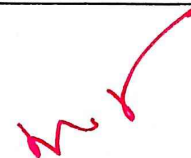
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	soils and waste lands.	
V	Environmental Monitoring - Biosensors. Methods of management - carbondioxide reduction by photosynthesis, calcification. Sewage treatment by bacteria and algae, eutrophication and removal of phosphorus. Metal pollution management, Bioscavengers, role of immobilized cells in pollution management.	CO 5
Text Books		
<ol style="list-style-type: none"> 1. Tisdale, S. L. 1997. Soil fertility and fertilizers [Fifth Edition] Prentice-Hall of India, New Delhi (Unit I, II) 2. <i>Indu Shekhar Thakur</i>. 2011. Environmental Biotechnology: Basic Concepts and Applications. [Second Edition]. I.K. International Publishing House Pvt. Ltd., New Delhi. (Unit II, III) 3. <i>Satyanarayana, U.</i> 2008. Biotechnology. Books and Allied Pvt. Ltd., Kolkata. (UNIT - III, IV & V). 		

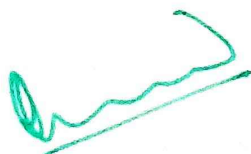


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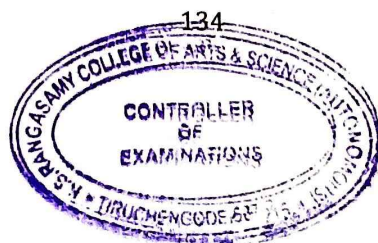



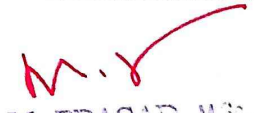
Mr. M. SPASANTH, M.Sc., M.B.A., M.Phil.,
Controller of Examinations
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18UBCAL502	ADVANCED LEARNER COURSE II: MICROBIAL BIOCHEMISTRY	SEMESTER - V
<p>Course Objectives:</p> <p>The Course aims</p> <ul style="list-style-type: none"> To gain knowledge about the biochemical basis of the physiological processes in microbes and exploitation of microbes for industrial purpose 		
UNIT	CONTENTS	CO
I	<p>Cell wall biosynthesis: Organisation of prokaryotic cell surface, structure and synthesis of bacterial peptidoglycan, teichoic acids and lipoteichoic acids, lipopolysaccharides.</p>	CO 1
II	<p>Energy production: Nutritional classification of microorganisms based on source of energy, carbon and electrons. Characteristics and metabolism of autotrophs - photosynthetic bacteria and cyanobacteria. Autotrophic CO₂ fixation and photosynthesis - Photosynthetic pigments, photosynthetic apparatus and mechanism of photosynthesis. Electron transport chain, oxidative phosphorylation and energy yield in bacteria.</p>	CO 2
III	<p>Carbohydrate metabolism: Central pathway - EMP pathway, Alternate pathway - Entner-Doudoroff (ED) pathway, Phosphoketolase pathway. Metabolism of lactose, mannitol, fucose and rhamnose. Degradation of pectin, cellulose and lignin.</p>	CO 3
IV	<p>Fermentation technology: Fermentation - Definition - (Stickland reaction). Isolation of microorganism, strain development and screening of industrially important microbes. Methods - Batch, fed batch and continuous fermentation. Types - Solid substrate (SSF) and submerged fermentation. Fermentation process- Inoculum preservation, inoculum build up, prefermentor culture and production fermentation, Brief account on downstream processing.</p>	CO 4

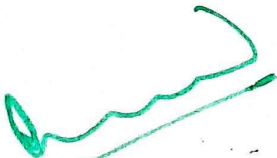


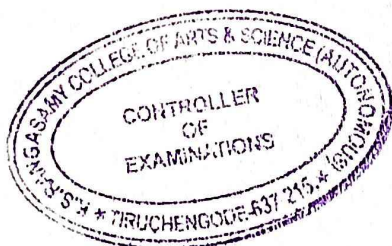
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A. S. Rangasamy College of Arts & Science
(Autonomous)
TIRUCHENGODE - 637 215
Namakkal-Dt. Tamil Nadu. INDIA

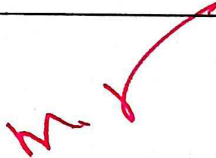



Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.
Coordinator of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
Tiruchengode - 637 215, Tamil Nadu, India.

V	Bioprocessing: Commercial production of enzymes- amylase, organic solvents - alcohol, alcoholic beverages-wine, organic acids- citric acid, antibiotics-penicillin, amino acids- glutamic acid, vitamins - vitamin B12 and polysaccharides -dextran.	CO 5
Text Books		
<ol style="list-style-type: none">1. Albert. G. Moat and John. W. Foster. 1995. Microbial Physiology. [Third Edition]. John Wiley and Sons Publications, New York. (UNIT - I, II & III).2. Satyanarayana, U. 2008. Biotechnology. Books and Allied Pvt. Ltd., Kolkata. (UNIT - IV & V).		
Reference Books		
<ol style="list-style-type: none">1. Doelle, H. W. 2005. Bacterial Metabolism. [Second Edition]. Academic Press. New Delhi.2. Wulf Crueger and Anneliese Crueger. 2004. A Text Book of Industrial Microbiology. Panima Publishing Corporation, New Delhi.3. Casida, L. S. 2007. Industrial Microbiology. New Age International, New Delhi.		


PRINCIPAL
K. S. Rangasamy College of Arts & Science
(Autonomous)
TIRUCHENGODE - 637 215
Namakkal-Dt. Tamil Nadu. INDIA




Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
Tiruchengode - 637 215, Tamilnadu, India,