

**PROGRAMME: B.Sc. BIOCHEMISTRY
CURRICULUM**

SEMESTER I									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA1101 SFR1101 SHN1101	Tamil - I French - I Hindi – I	3	0	0	3	50	50	1 3 5
2.	SHS1109	General English – I	3	0	0	3	50	50	5
3.	SBC1001	Biomolecules	4	0	0	4	50	50	7
4.	SBB1102	Fundamentals of Microbiology	4	0	0	4	50	50	8
5.	SBT1001	Environmental Science	3	0	0	3	50	50	9
6.	SBC4101	Fundaments of Biochemistry Lab	0	0	2	2	50	50	11
7.	SBB4102	Fundaments of Microbiology Lab	0	0	2	2	50	50	11
Total Credits for Semester 1 – 21									
Total Marks for Semester 1 – 700									

SEMESTER II									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA 1102 SFR 1102 SHN1102	Tamil – II French – II Hindi – II	3	0	0	3	50	50	12 14 15
2	SHS 110	General English – II	3	0	0	3	50	50	16
3.	SBB1101	Cell Biology	4	0	0	4	50	50	18
4.	SBB1201	Zoology	4	0	0	4	50	50	19
5.	SBC1202	Basics of Computers	3	0	0	3	50	50	20
6.	SBB4202	Cell Biology Lab	0	0	4	2	50	50	21
7.	SBC4201	Zoology Lab	0	0	4	2	50	50	21
Total Credits for Semester 2 – 21									
Total Marks for Semester 2 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
CAE – CONTINUOUS ASSESSMENT EXAMINATION,
ESE – END SEMESTER EXAMINATION

SEMESTER III									
S. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC2101	Molecular Biology I	4	0	0	4	50	50	22
2.	SCY1213	Chemistry I	3	0	0	3	50	50	23
3.	SBC2102	Enzymes	4	0	0	4	50	50	24
4.	SBC2103	Biophysical chemistry	3	0	0	3	50	50	25
5.		Elective I	3	0	0	3	50	50	
6.	SBB4301	Molecular Biology Lab	0	0	3	2	50	50	26
7.		Chemistry Lab	0	0	3	2	50	50	26
Total Credits for Semester 3 – 21									
Total Marks for Semester 3 – 700									

SEMESTER IV									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC2201	Intermediary Metabolism I	4	0	0	4	50	50	27
2.	SCY1214	Chemistry II	3	0	0	3	50	50	28
3.	SBC2202	Molecular Biology II	3	0	0	3	50	50	29
4.	SBB1201	Immunology	4	0	0	4	50	50	30
5.		Elective II	3	0	0	3	50	50	
6.	SBB4201	Immunology Lab	0	0	3	2	50	50	31
7.	SBC4401	Enzymology Lab	0	0	3	2	50	50	31
Total Credits for Semester 4 – 21									
Total Marks for Semester 4 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
 CAE – CONTINUOUS ASSESSMENT EXAMINATION,
 ESE – END SEMESTER EXAMINATION

SEMESTER V									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC3101	Intermediary Metabolism II	4	0	0	4	50	50	32
2.	SBC3102	Genetics	3	0	0	3	50	50	33
3.	SBC3103	Endocrinology	3	0	0	3	50	50	34
4.	SBC3104	Clinical Biochemistry	4	0	0	4	50	50	35
5.		Elective III	3	0	0	3	50	50	
6.	SBC4501	Clinical Biochemistry Lab	0	0	3	2	50	50	36
7.	SBC4502	Genetics Lab	0	0	3	2	50	50	36
Total Credits for Semester 5 – 21									
Total Marks for Semester 5 – 700									

SEMESTER VI									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBT1002	Research Methodology	3	0	0	3	50	50	37
2.	SBC3201	Plant Biochemistry	3	0	0	3	50	50	38
3.	S30PROJ	Project	0	0	30	15	50	50	
Total Credits for Semester 6 – 21									
Total Marks for Semester 6 – 300									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
 CAE – CONTINUOUS ASSESSMENT EXAMINATION,
 ESE – END SEMESTER EXAMINATION,

Semester	Theory courses (including elective courses)			Practical Courses (including Project)		
	Total No.	Total Credits	Total Marks	Total No.	Total Credits	Total Marks
1	5	17	500	2	4	200
2	5	17	500	2	4	200
3	5	17	500	2	4	200
4	5	17	500	2	4	200
5	5	17	500	2	4	200
6	2	6	500	1	15	100
Overall Total	27	91	3000	11	35	1100

Overall total credits for B.Sc.(Biochemistry) Programme	126
Overall total marks for B.Sc.(Biochemistry) Programme	4100

LIST OF ELECTIVES

ELECTIVE COURSES									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1	SBB2103	Concepts in Biotechnology	3	0	0	3	50	50	39
2	SMB1602	Biofertilizers and Biopesticides	3	0	0	3	50	50	40
3	SMB1603	Food Fermentation Techniques	3	0	0	3	50	50	41
4	SBB1601	Nutritional Biochemistry	3	0	0	3	50	50	42
5	SMB1605	Advanced instrumentation Techniques	3	0	0	3	50	50	43
6	SBB1609	Introduction to Bioinformatics	3	0	0	3	50	50	44
7	SMB1607	Medical Laboratory techniques	3	0	0	3	50	50	45
8	SMB1611	Biostatistics and probability	3	0	0	3	50	50	46
9	SMB1612	Human Physiology	3	0	0	3	50	50	47
10	SBB1615	Bioethics, Biosafety and IPR	3	0	0	3	50	50	48
11	SBB1607	Genomics and Proteomics	3	0	0	3	50	50	49
12	SBB1605	Cancer biology	3	0	0	3	50	50	50
13	SBB1602	Biopharmaceutical Technology	3	0	0	3	50	50	51
14	SBB1604	Protein engineering	3	0	0	3	50	50	52
15	SBB1608	Metabolic Engineering	3	0	0	3	50	50	53
16	SBB1616	Nanobiotechnology	3	0	0	3	50	50	54

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STA 1101	தமிழ்-முதல் தாள்	L	T	P	Credits	Total Marks
		3	0	0	3	100

நோக்கம்:

- மாணவர்களுக்குத் தமிழ் இலக்கியப்பரப்பை எடுத்துரைத்து சிற்றிலக்கியம், உரைநடை, புதினம், சிறுகதை, புதுக்கவிதை ஆகிய இலக்கியவகைமைகளை அறிமுகப்படுத்துதல்.

பயன்

- நெடிய தமிழ் இலக்கிய வரலாற்றில் சிற்றிலக்கியம், உரைநடை, புதினம், சிறுகதை, புதுக்கவிதை ஆகிய இலக்கியவகைமைகளை அறிதல்.
- பல்வேறு இலக்கிய ஆளுமைகளையும் அவர்தம் படைப்பு, மொழி நடை, மொழிப்பற்று ஆகியவற்றை உணர்ந்து கொள்ளுதல்.
- நவீன சிந்தனைகளோடு மாணவர்தம் கருத்தாக்கங்கள் உருப்பெறல்.
- படைப்பாக்க உத்திகளையும் திறன்களையும் அறிதல்.
- மாணவர்கள் இலக்கியப்படைப்புகளை உருவாக்க அறிந்து கொள்ளுதல்.

அலகு - ஒன்று: தமிழ்இலக்கியவரலாறு

1. சிற்றிலக்கியம்-தோற்றமும் வளர்ச்சியும்
2. உரைநடை-தோற்றமும் வளர்ச்சியும்
3. புதினம்-தோற்றமும் வளர்ச்சியும்
4. சிறுகதை-தோற்றமும் வளர்ச்சியும்
5. புதுக்கவிதை-தோற்றமும் வளர்ச்சியும்

அலகு - இரண்டு: சிற்றிலக்கியம்

1. கலிங்கத்துப்பரணி-போர்பாடியது : 404 --- 408 பாடல்கள்
2. குற்றாலக்குறவஞ்சி - மலைவளம்
i.வானரங்கள்கனிகொடுத்து...எனத்தொடங்கும்பாடல்
ii.முழங்குதிரைப்புனலருவிகழங்கெழுத்தாடும்...எனத்தொடங்கும்பாடல்

அலகு - மூன்று: புதுக்கவிதைகள்

1. பாரதியார் - நெஞ்சுபொறுக்குதிலையே...என்றுதொடங்கும் கவிதை.
2. பாரதிதாசன் - உலகஒற்றுமை-தன்பெண்டுதன்பிள்ளை...என்று தொடங்கும் கவிதை.
3. நா.காமராசன் - கருப்புமலர்கள் -காகிதப்பூக்கள் -காலமழைத்தாறலிலே...என்று தொடங்கும் கவிதை
4. இன்குலாப்-மரங்களின்சுற்றம்
5. பாரதிபுத்திரன்-மாரிக்கால இரவுகள் - சிவகாசிச்சிசுக்கள்-மகனே அன்றொருநாள்.... என்று தொடங்கும் கவிதை

அலகு - நான்கு : சிறுகதை மற்றும் புதினம்

1. புதுமைப்பித்தன் சிறுகதைகள்
சாபவிமோசனம்
கடவுளும் கந்தசாமிப்பிள்ளையும்
அன்று இரவு
வாடாமல்லி
ஒரு நாள் கழிந்தது
2. புதினம்
வாடிவாசல்-சி.சு. செல்லப்பா

அலகு - ஐந்து : உரைநடைப்பகுதி

பண்டைத்தமிழர் வாழ்வும் வழிபாடும்-கலாநிதிக . கைலாசபதி

பார்வையாளர்கள்

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும் - வல்லிக்கண்ணன்
2. தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும் - சிட்டி, சிவபாதசுந்தரம்
3. தமிழ்நாவல் (புதினம்) தோற்றமும் வளர்ச்சியும் - சிட்டி, சிவபாதசுந்தரம்,
4. தமிழ்உரைநடைவரலாறு - வி.செல்வநாயகம்
5. நூற்றாண்டுதமிழ்உரைநடை - சு.சுத்திவேல்
6. கலிங்கத்துப்பரணி - புலியூர்க்கேசிகன்உரை
7. குற்றாலக்குறவஞ்சி - புலியூர்க்கேசிகன்உரை

8. பாரதியார்கவிதைகள்
9. பாரதிதாசன்கவிதைகள்
10. மரங்களின்சுற்றம் - இன்குலாப்
11. கருப்புமலர்கள் - நா.காமராசன்
12. மாரிக்காலஇரவுகள் - பாரதிபுத்திரன்
13. புதுமைப்பித்தன் சிறுகதைகள்
14. வாடிவாசல்-சி.சு. செல்லப்பா
15. பண்டைத்தமிழர்வாழ்வும்வழிபாடும்-கலாநிதிக. கைலாசபதி

பருவத் தேர்வு வினாத்தாள் அமைப்பு

மொத்தமதிப்பெண்கள்: 100

பகுதி அ: 10 வினாக்களுக்குத்தலா 2 மதிப்பெண்கள்

பகுதி ஆ: 7 வினாக்களில் 5 வினாக்களுக்குத்தலா 7 மதிப்பெண்கள்

பகுதி இ: 3 வினாக்களுக்குத்தலா 15 மதிப்பெண்கள்

காலம் : 3 மணி நேரம்.

- 20 மதிப்பெண்கள்

- 35 மதிப்பெண்கள்

- 45மதிப்பெண்கள்

SFR1101	FRENCH- I	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To teach basic skills in written and spoken French.
- To encourage students' oral and written mastery of the language.

UNIT- I**9Hrs**

Se présenter à des publics différents et saluer - Saluer et Prendre congé - La presentation. Pronoms, objets et sujets. Articles définis /indéfinis. Des cartes d'identité. Présenter quelqu'un. Les chiffres 1 à 50. Épreuves.

UNIT- II**12Hrs**

Exprimer ses goûts, ses preferences. La negation. Les mois et les jours / le calendrier - Les verbes - L'interrogation avec intonation - Décrire un lieu, les noms des différentes salles - Les adjectifs - Les articles. Épreuves.

UNIT- III**12Hrs**

Donner des directions / localiser un lieu/ trouver un lieu-Les verbes aller et mettre.-L'article contracté et les prépositions de lieu - L'impératif- Les mots de caractérisation d'un lieu et les lieux urbains - Les transports. Épreuves.

UNIT- IV**12Hrs**

Discuter et acheter des produits - Les expressions de quantité-Les fruits, les légumes, les produits alimentaires-les produits propres aux pays différents.-La negation-le COD-Le conditionnel et les verbes-irréguliers - Épreuves.

UNIT- V**15Hrs**

Fixer un rendez-vous avec le médecin-L'heure et Les nombres de 51 à 100-L'interrogation avec est-ce que- Les parties du corps, avoir + les expressions et les-maladies communes-Les adjectifs possessifs – Le COI - L'entraînement DELF et épreuves.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Panorama De La Langue Francaise: Level 1 by Jacky Girardet, Jean-Marie Cridlig, CLE International, 2004.
2. Krishnan, C & Albert Adeline, Le Tramway Volant - I, Saraswathi House Pvt Ltd, India, 2011.
3. CAPELLE Guy; MENAND, Robert Taxi-1, Hachette, Paris, 2008.
4. MERIEUX , Régine; LOISEAU, Yves, Connexions-1, Didier, Paris , 2004.
5. MIQUEL, Claire,Vite et Bien-1, CLE International, Paris, 2009.
6. POISSON QUINTON, Sylvie, SIREJOLS, Evelyne, Amical -1, CLE International, Paris, 20011

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** :6 Questions to be answered out of 8 questions and each question carries 5 Marks**30 Marks****PART B**: 4 questions to be answered out of 8 questions and each question carries 10 Marks**40 Marks****PART C**: 2 questions/Problems to be answered out of 4 questions each carries 15 marks**30 Marks**

SHN1101	HINIDI - I	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I ALPHABETS, VOWELS**10 hrs.**

स्वर अ से अः तक - व्यंजन क से झ तक,
बारह खड़ी अनुस्वार - अनुनासिक व विसर्ग ,संयुक्ताक्षर

UNIT II WHO, WHERE, HERE, THERE**10 hrs.**

क्या ,कौन ,कहाँ ,वहाँ ,यहाँ । मैं हूँ । तुम हो । पढ़ते हो ।

UNIT III ITS, HER, HIS, MINE**10 hrs.**

का, के, की, बड़ा, बड़े, बड़ी ,मेरा, तुम्हारा, हमारा ,आउँगा ,आएगा, आओगे आँगे ,किससे , किसपर ,किसको ,
था ,थे ,थी ,थीं ,आया ,आये, आयी, आयीं , खाया , खायी , खयीं आया है ,आया था ,रहा ,रहे ,रही

UNIT IV**10 hrs.**

प्रार्थना 2 पर्यटन 3 पालतु पशु 4 महाकवी तिरुवल्लुवर

UNIT V**10 hrs.**

Grammar प्रयोग काल Tense कारक विभक्तियों Case Endings का के की -
Possessive Case गिनती - Numbers(1-50)

TEXT BOOK:

1. Hindi Parichaya Publisher: Dakshin Bharat Hindi Prachar Sabha
2. Central Hindi directorate – Certificate course material, MHRD.

EVALUATION PATTERN**1. Exercises for written test**

- Fill In The Blanks With Suitable Word
- Write The Number Names
- Write The Hindi Meanings
- Write The English Meanings
- Write The Opposites
- Write The Correct Word

SHS1109	GENERAL ENGLISH- I	L	T	P	Credits	Total Marks
		3	0	0	3	100

OBJECTIVES OF THE COURSE:

- The paper provides opportunities for students to read and respond to representations of current issues through texts that present themes and topics that are familiar, insightful and informative. The thrust is on preparing students to effectively communicate by applying reflective thinking practices.
- Students will have an opportunity to improve their vocabulary related to immediate environment, practice speaking skills by discussing about issues based on reading texts, read texts that include everyday problems that provide opportunities to develop problem solving skills in cooperative learning situations, develop writing skills through writing paragraphs and letters based on prompts, of a poem, email and letters and composition of dialogues/paragraphs.

UNIT 1 DRESS IN COMMUNICATION**12 Hrs.**

Speaking - Rhetorical analysis and Group Discussion. Reading for details and Global Comprehension - Dress in communication, I have a Dream Speech by Martin Luther King and The Justice Peace by Hilaire Belloc. Critical Thinking: Asking Questions, Analyzing Assumptions and Biases. Vocabulary: Expressions and markers. Collocations – Identifying collocations by reading prose passages mentioned in the UNIT one. Language Focus: Determiners, Parts of Speech Writing: Paragraph writing based on hints given on topics like 'My dream for my family/ country', 'importance of clothing for communication, 'social inequality in society', 'Judge the Book by its Cover- Can we judge people by their appearance?

UNIT II: AN INCONVENIENT TRUTH**12 Hrs.**

Speaking: Debate on the topics related to Environmental issues and Discrimination in Society, Reading for details and Global Comprehension on An Inconvenient Truth, A Different History by Kamala Das and Sujata Bhatt. Critical Thinking: Identifying Facts and Opinions, Distinguish a main idea in text from a subordinate idea. Examine views on a controversial issue and consider one's own biases and personal interest. 'Vocabulary: Collocations, Useful words to express point of view. Language focus- Tenses, Conjunctions and discourse markers Writing- Responding to Slogans, Campaign Leaflet and Writing Film Review , Letter writing

UNIT 3 A SPEECH BY N R NARAYANA MURTHY**12 Hrs.**

Speaking: Giving Impromptu speeches- Welcome address and Vote of Thanks. Reading for details and Global Comprehension- A Speech by NR Narayana Murthy and Digging by Seamus Heaney Critical Thinking: Asking 'wh' questions Questions, Making informed decisions based on evidence, Examining Evidence by citing evidence from the textbook or lecture to support a position. Vocabulary - Word association, onomatopoeic words. Language focus: Sentence Function and Sentence Kinds Writing: Writing email , Writing Diary Entry

UNIT 4 AFTER TWENTY YEARS**12 Hrs.**

Listening: For details and Overall Idea , Speaking: Informal Speech, Reading for details and Global Comprehension- After Twenty Years by Jamila and After Twenty Years by O Henry Writing: Problem solving paragraph writing. Letter to the editor with solutions to current problems related to areas covered in the course Critical Thinking: Problem Solving selecting effective solutions for overcoming obstacles or constraints by explaining why it is the most effective of the possible solutions. Vocabulary : Phrasal Verbs Language Focus Types of sentences -simple, compound and complex. Language Focus: Subject verb Agreement

UNIT 5 I LOVE YOU MOM**12 Hrs.**

Listening for details Speaking- Greeting , thanking , apologising, offering condolences by doing Role plays Reading for details and Global Comprehension- I Love you Mom by Joanna Fuchs and Prose passage on 'I Love You Mom'. Writing: Writing restaurant review, argumentative writing. Vocabulary: Phrasal Verbs , Synonyms and Antonyms Critical Thinking : Argumentation provides a well-articulated and detailed argument

Max Hours.60

TEXT / REFERENCE BOOKS

1. P Bhaskaran Nair, C Radha Krishna Pillai, Geetha Rajeevan, CLN Prakash, Nadhini Nayar Reflections - An Anthology of Prose, Poetry and Fiction (2015) Foundation Books, Chennai . Foundation Books. ISBN 978-93-85386-008
2. Sen S , Mahendra etal. (2015) Communication and Language Skills . Foundation books. Chennai

Reference Links for teachers on Critical Thinking

<https://designteachengage.wisc.edu/course-activities-learner-interaction/sdc-activity-types-active-learning/>

<https://www.uen.org/rubric/previewRubric.html?id=1219>

<https://www.diigo.com/profile/Teachonlineuw?query=%22Critical+Thinking%22+rubric>

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each - No choice

20 Marks

PART B : 2 questions from each UNIT of internal choice; each carrying 16 marks

80 Marks

SBC1101	BIOMOLECULES	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- To ensure students to gain knowledge about the structure, properties and functions of biomolecules.

Unit 1 CARBOHYDRATES**12 Hrs..**

Carbohydrates – Definition, classification. Structure and chemical properties of glucose. Structure, properties and biological functions of monosaccharides (glucose, fructose), disaccharides (maltose, lactose, sucrose), oligosaccharides and polysaccharides.

UNIT 2 AMINO ACIDS**12 Hrs..**

Amino acids – Structure, classification and chemical properties. pKa and titration curve of amino acids. Peptides, peptide bond, biologically important peptides.

Proteins – classification and biological importance. Primary, secondary, tertiary and quaternary structure of proteins. Denaturation and precipitation by salts, isoelectric pH.

UNIT 3 LIPIDS**12 Hrs..**

Lipids – definition, nomenclature of fatty acids. Biological significance and classification of lipids. Simple lipids: triglycerides, waxes, steroids, prostaglandins, Compound lipids: Phospholipids, sphingolipids, glycolipids and lipoproteins. Properties of lipids (Reichert-Meisel value, Iodine number, saponification value, acid number).

UNIT 4 NUCLEIC ACIDS**12 Hrs..**

Nucleic acids – purines and pyrimidines. Nucleosides and nucleotides. Polynucleotides: DNA and RNA, biological significance. Structure and forms of DNA. Types of RNA. Denaturation and Renaturation.

UNIT 5 VITAMINS**12 Hrs..**

Vitamins – Source, biological function, daily requirement and deficiency symptoms of fat soluble vitamins (A, D, E and K) and water soluble vitamins (Ascorbic acid, thiamine, riboflavin, pyridoxine, niacin, pantothenic acid, lipoic acid, biotin, folic acid and vitamin B12).

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2. Harper —s Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai-5.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBB1102	FUNDAMENTALS OF MICROBIOLOGY	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- This course is aimed give an understanding about the basics of microbiology dealing types of microbes, classification & characterization

UNIT 1 INTRODUCTION TO MICROBIOLOGY**12 Hrs..**

History and scope of Microbiology, Spontaneous generation - Biogenesis theory - Contribution of Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Paul Ehrlich and Flemming.

UNIT 2 MICROSCOPE**12 Hrs..**

Microscope- Principles, working mechanism and application - Simple and compound microscope - Dark field -Phase contrast, Fluorescence ,SEM and TEM.

UNIT 3 STRUCTURAL ORGANIZATION OF CELL**12 Hrs..**

Structure and organization of bacterial cell, Gram positive and Gram negative bacterial cell wall. Types of Staining - Simple, Differential (Gram's, AFB), Special - Capsular staining (negative), Spore. LPCB, KOH mount.

UNIT 4 STERILIZATION METHODS**12 Hrs..**

Sterilization and Disinfection- principles -methods of sterilization- physical methods - Dry heat- Moist heat- Radiation. Filtration (Membrane and HEPA). Chemical sterilization- Chemical agents- mode of action- phenol coefficient test- sterility testing.

UNIT 5 MEDIA AND ITS TYPES**12 Hrs..**

Culture and media preparation - solid and liquid . Types of media- Semi synthetic ,Synthetic, Enriched, Enrichment, Selective and Differential media. Pure culture techniques – Tube dilution, Pour, Spread, Streak plate. Anaerobic culture technique Wright's Tube, Roll tube method, Anaerobic Jar.

Max Hours.60**TEXT / REFERENCE BOOK**

1. Prescott, Harley, Klein. 2003. Microbiology. 5th Edition. McGraw Hill Publ.
2. Bernard R. Glick & Jack J. Pasternak. 2002. Molecular Biotechnology. Indian edition. Panima Publishing Corporation.
3. Pelzer, Chan and Kreig. 1986. Microbiology. 5th Edition. McGraw-Hill.
4. Tortora, G.J., Funke, B.R. and Case, C.L. 2012. Microbiology - An Introduction. 11th Edition. Pearson Education.
5. Stainer, Ingharam, Wheelis and Painter. 1987. General Microbiology. 5th Edition. Macmillan Education, London.
6. A.J. Salle. 1974. Fundamental Principles of Bacteriology. Tata McGraw – Hill Edition.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBT1001	ENVIRONMENTAL SCIENCE	L	T	P	Credits	Total Marks
		3	0	3	3	100

Course objectives

- To impart knowledge on the issues related to environment and to emphasize the importance of a clean environment

UNIT 1 ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**12 Hrs.**

Definition, scope and importance- Need for public awareness. Natural Resources : Renewable and non-renewable resources : Natural resources and associated problems. Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT 2 ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION**12 Hrs.**

Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem :- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Definition-genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as mega- diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity.

UNIT 3 ENVIRONMENTAL POLLUTION**9Hrs**

Definition -Cause, effects and control measures of :- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management : floods, earthquake, cyclone and landslides.

UNIT 4 SOCIAL ISSUES AND THE ENVIRONMENT**12 Hrs.**

Idea of Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case Studies. Environmental ethics : Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

UNIT 5 HUMAN POPULATION AND THE ENVIRONMENT**12 Hrs.**

Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain

- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Max Hours.60**TEXT / REFERENCE BOOK**

1. Erach Bharucha, Text Book of Environmental Studies, 2nd Edition, University Press, Chennai, 2006
2. Meenakshi. P, Elements of Environmental Science and Engineering, 1st Edition, Prentice Hall of India, New Delhi, 2009.
3. Ravikrishnan. A, Environmental Science & Engineering, 3rd Edition, Sri Krishna Publications, Chennai, 2008.
4. Wrigh. R. T & Nebel B.J, Environmental science-towards a sustainable future by Richard 8th edition, Prentice Hall of India, New Delhi, 2006

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBC4101	FUNDAMENTALS OF BIOCHEMISTRY LAB	L	T	P	Credits	Total marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Properties of water, Concept of pH and buffers, preparation of buffers and Numerical problems to explain the concepts
2. Estimation of Ascorbic acid.
3. Carbohydrates: Glucose, fructose, galactose, mannose, maltose, lactose and arabinose and xylulose.
4. Amino acids: Arginine, cysteine, tryptophan and tyrosine.
5. Colorimetric analysis (only for demonstration)
6. Estimation of protein by Biuret method.
7. Estimation of DNA using diphenyl amine.
8. Estimation of glucose by O -Toluidine.

SBB4102	FUNDAMENTALS OF MICROBIOLOGY LAB	L	T	P	Credits	Total Marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Handling of Instruments and Laboratory safety measures
2. Handling and Maintenance of compound microscope
3. Cleaning of Glassware and preparation of cleaning solutions
4. Staining procedures
5. Sterilization procedures and preparation of solid and liquid media
6. Streak plate method
7. Decimal dilution method
8. Spread plate method
9. Pour plate method
10. Antibiotic sensitivity test

STA1102	தமிழ் -இரண்டாம் தாள்	L	T	P	Credits	Total Marks
		3	0	0	3	100

நோக்கம்

மாணவர்களுக்குத்தமிழின்செவ்விலக்கியங்கள்மற்றும்காப்பியங்களைஅறிமுகப்படுத்துதல்.

பயன்

- ஈராயிரம்ஆண்டுகளுக்குமுந்தையதமிழின்செவ்விலக்கியங்களின்சிறப்பினைஉணர்தல்.
- பண்டையகாலத்தமிழ்மக்களின்அகமற்றும்புறவாழ்வியலையும்பண்பாட்டையும்அறிதல்.
- தமிழர்தம்அறச்சிந்தனைகளையும்அறவாழ்வியலையவர்கள்பேணியமுறையினையும்உணர்தல்.
- தமிழர்களுடையமெய்யியல்த்தத்துவங்களையும்கடவுள்பற்றியகோட்பாடுகளையும்உணர்தல்.
- நெடுங்கதைகளாகத்திகழ்காப்பியங்களின்வழிபலபண்பாட்டுச்செய்திகளைஅறிதல்.

அலகு-ஒன்று : தமிழிலக்கியவரலாறு

1. சங்க இலக்கியங்கள்
2. அற இலக்கியங்கள்
3. பக்தி இலக்கியம்
4. காப்பியங்கள்

அலகு-இரண்டு : சங்கஇலக்கியம்

1. 'முளியதிர்பிசைந்த' என்று தொடங்கும்சூறுந் தொகைப்பாடல் (167)
2. 'நின்றசொல்லர்' என்று தொடங்கும் நற்றிணைப்பாடல் (1)
3. 'மனைநடுவயலை வேழம் சுற்றும்' என்று தொடங்கும் ஐங்குறுநூற்றுப்பாடல் (11)
4. 'எம்வெங்காமம்இயைவதுஆயின்' என்று தொடங்கும் அகநானூற்றுப்பாடல் (15)
5. 'சுடர்தொடிகேளாய்' என்று தொடங்கும் கலித்தொகைப்பாடல் (51)
6. 'மண்டுஅமர்அட்ட' என்று தொடங்கும் புறநானூற்றுப்பாடல் (213)
7. 'நறவுவாய்உறைக்கும்நாகுமுதிர்'என்று தொடங்கும் சிறுபாணாற்றுப்படை பாடல் (51 - 67)

அலகு-மூன்று : அறஇலக்கியங்கள்

1. திருக்குறள்-நட்பாராய்தல், புலவிநுணுக்கம் (2 அதிகாரம்).
2. நாலடியார்-பொருட்பால்-மேன்மக்கள்-(5) பாடல்கள்

அலகு-நான்கு : பக்திஇலக்கியங்கள்**சைவம்-பன்னிருதிருமுறைகள்**

1. திருஞானசம்பந்தர்தேவாரம்-முதலாந்திருமுறை
'காதல்ஆகி, கசிந்து'என்றுதொடங்கும்பாடல்.
2. திருநாவுக்கரசர்தேவாரம்-ஐந்தாந்திருமுறை
'மாசில்வீணையும்மாலை'என்றுதொடங்கும்பாடல்.
3. சுந்தரர்தேவாரம்-ஏழாந்திருமுறை
'பொன்னார்மேனியனே' என்று தொடங்கும்பாடல்.

வைணவம்-நாலாயிரத்திவ்யப்பிரபந்தம்

1. பூதத்தாழ்வார்
'பெருகுமதவேழம்மாப்பிடிக்கு'என்றுதொடங்கும்பாடல்.
2. குலசேகராழ்வார்
'ஆனாதசெல்வத்துஅரம்பையர்கள்தற்குழ்'என்றுதொடங்கும்பாடல்.

அலகு-ஐந்து : காப்பியஇலக்கியங்கள்

1. சிலப்பதிகாரம்
மங்கலவாழ்த்துப்பாடல் முழுவதும்
2. சீவகசிந்தாமணி
கோவிந்தையார்இலம்பகம் முழுவதும்
3. கம்பராமாயணம்
திருவடித்தொழுதபடலம் (பாடல்எண் : 25 - 48)

பார்வைநூல்கள்

1. தமிழ்இலக்கியவரலாறு-மு.வ.
2. தமிழ்இலக்கியவரலாறு-மது. ச. விமலானந்தம்
3. சங்கஇலக்கியம்-ஒளவைச. துரைசாமிப்பிள்ளை
4. சங்கஇலக்கியம் - புலியூர்கேசிகன்
5. திருக்குறள் - பரிமேலழகர்உரை
6. திருக்குறள் - மு.வ. உரை
7. நாலடியார் - கு. மதுரைமுதலியார்
8. சைவத்திருமுறைகள் - வர்த்தமானப்பதிப்பகம்
9. நாலாயிரதிவ்வியப்பிரபந்தம் - வர்த்தமானப்பதிப்பகம்
10. சிலக்கதிகாரம்-ஞா.மாணிக்கவாசகன்
11. சீவகசிந்தாமணி-துரைராசாராம்
12. கம்பராமாயணம்-கழகவெளியீடு.

பருவத்தேர்வுவினாத்தாள்அமைப்பு**மொத்தமதிப்பெண்கள்: 100****காலம் : 3 மணிநேரம்.****பகுதிஅ:** 10 வினாக்களுக்குத்தலா 2 மதிப்பெண்கள்**- 20 மதிப்பெண்கள்****பகுதிஆ:** 7 வினாக்களில் 5 வினாக்களுக்குத்தலா 7 மதிப்பெண்கள்**- 35 மதிப்பெண்கள்****பகுதிஇ:** 3 வினாக்களுக்குத்தலா 15 மதிப்பெண்கள்**- 45 மதிப்பெண்கள்**

SFR1102	FRENCH- II	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To teach basic skills in written and spoken French.
- To encourage students' oral and written mastery of the language.

UNIT I

Acheter un billet - Les nombres au-delà de 100 - Les différents types de places (fumeur, non fumeur, aller-retour) - Les adjectifs démonstratifs - L'interrogation avec inversion - Les vêtements - L'entraînement DELF - Compréhension/Production écrite- Épreuves

UNIT II

Discuter les plats au restaurant - Les recettes, des plats et boissons différents, - les formules de cuisine, des recettes simples - des différents pays - Le passé récent - Les pronoms toniques - Il faut + infinitif, Le pronom - Faire des projets pour les vacances, décrire le temps - les lieux touristiques et le climat des différents pays - Le futur proche et les adverbes, le il - m personnel, le pronom y - Épreuves et entraînement DELF

UNIT III

Le passé composé - Les pronoms relatifs (qui, que) - Québec et son histoire - Parler du passé et de soi - Compréhension/ production écrite - Entraînement DELF - Épreuves

UNIT IV

Les verbes réfléchis - Les pronoms relatifs (dont, où) - L'impératif négatif - Compréhension/ production écrite - Entraînement DELF - Épreuves

UNIT V

L'imparfait - La place des pronoms doubles - Décrire les mœurs et les pays - La Réunion - Compréhension/ production écrite - Entraînement DELF - Épreuves

Max Hours.60**TEXT / REFERENCE BOOKS**

- Panorama De La Langue Française: Level 1 by Jacky Girardet, Jean-Marie Cridlig, CLE International, 2004.
- Krishnan, C & Albert Adeline, Le Tramway Volant - I, Saraswathi House Pvt Ltd, India, 2011.
- CAPELLE Guy; MENAND, Robert Taxi-1, Hachette, Paris, 2008.
- MERIEUX, Régine; LOISEAU, Yves, Connexions-1, Didier, Paris, 2004.
- MIQUEL, Claire, Vite et Bien-1, CLE International, Paris, 2009.
- POISSON QUINTON, Sylvie, SIREJOLS, Evelyne, Amical -1, CLE International, Paris, 2011

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SHN1102	HINIDI -II	L	T	P	Credits	Total Marks
		3	0	0	3	100

Unit- I

- (i) पत्य – Poetry
- (ii) गत्य – Prose
- (iii) एकांकी एवं नाटक – One Act Play and Drama
- (iv) कहानी एवं उपन्यास – Story and Novel

Unit -II

- (v) हिन्दी व्याकरण (Hindi Grammer)
1.सज़ं, 2. सर्वनाम, 3.विशेषण, 4.क्रिया-विशेषण, 5.काल, 6.लिंग, 7.वचन, 8.वाक्य-विचार, 9. शधुद लेखन.

Unit -III

- (vi) परिभाषिक शब्द – 250 आग्रेजी पारिभाषिक शब्दों को हिन्दी परिपाषिक शब्द
Translate from English to Hindi – 250 Official words.
- (vii) अनुवाद अभ्यास (Translation):

Unit -IV

- (viii) निबंध लेखन(Essay):
गाँधी, नेहरु, अंबेडकर, बगत सिंह, अब्दुल कलाम
- (ix) पत्र लेखन(Letter Writing):
आवेदन पत्र, रासकीय पत्र, अर्धशासकीय पत्र, प्रत्यावेदन पत्र, प्रतिवेदन पत्र
Application letter, Official letter, Semi-Official letter, Government letter.

Unit -V

- (x) संक्षेपण और विस्तारण (Comprehensions)
- (xi) लोकोक्तियाँ एवं मुहावरे (Proverbs)

SHS1110	GENERAL ENGLISH – II	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- The paper provides opportunities for students to read and respond to representations of current issues through texts that present themes and topics that are familiar, insightful and informative. The thrust is on preparing students to effectively communicate by applying reflective thinking practices. Students will have an opportunity to improve their vocabulary related to immediate environment, practice speaking skills by discussing about issues based on reading texts, read texts that include everyday problems that provide opportunities to develop problem solving skills in cooperative learning situations, develop writing skills by summarising substance of a poems, letters and composition of dialogues and paragraphs.

UNIT 1 UNITY OF MINDS - A P J ABDUL KALAM**12 Hrs.**

Listening for details, Speaking - making a presentation, Reading for details and Global Comprehension UNITY of Minds by APJ Abdul Kalam -Vocabulary Binomials Writing: Writing compare contrast paragraphs by representing data given in pie chart, Tables; Writing Speeches. Vocabulary : Binomials, Affixes Language Focus : Active and Passive Voice, Punctuation. Critical Thinking : Comparing & Contrasting presenting information by including important characteristics on which the items should be compared or contrasted

UNIT 2 LEAVE THIS CHANTING AND SINGING AND TELLING OF BEADS BY RABINDRANATH TAGORE AND ENGINE TROUBLE BY R K NARAYANAN**12 Hrs.**

Listening for details Speaking: Giving impromptu speech based on topics given in the class for clarifying one's point of view. Reading for Comprehension and for overall idea -Leave this Chanting and Singing and Telling of Beads by Rabindranath Tagore and Engine Trouble by R K Narayanan, Vocabulary : Archaic words, phrases Writing: Language Focus Imperatives. Writing: Writing Instructions and recommendations based on quotations given as prompts, writing an advertisement Critical Thinking: Expressing point of view

UNIT 3 THE HAPPY PRINCE BY OSCAR WILDE**12 Hrs.**

Speaking Telephonic conversation, Drama In the class based on the story prescribed Reading for details and Global Comprehension The Happy Prince by Oscar Wilde Language Focus: Adjective- degrees of Comparison, Functional and personal Nouns Vocabulary : positive and negative connotations. Writing: Letter writing- personal letters Critical Thinking Self-regulation: Continuing improvement in thinking, involving monitoring one's cognitive process and correcting errors and biases as needed.

UNIT 4 TWO GENTLEMEN OF VERONA BY A J CRONIN**12 Hrs.**

Listening for Overall information of 'Anthem for Doomed Youth' by Wilfred Owen Speaking: Making requests and suggestions. Reading for details Two Gentlemen of Verona by A J Cronin, Vocabulary: Simile, metaphor, adjectives to describe people and their personalities. Idioms. Writing: Writing recommendations; Narratives based on prompts on plot and characters. Critical Thinking: identifying the subject of the investigation and presenting a well-articulated solution to the confusions or contradictions associated with the situation based on listening speaking tasks in the class. Creative writing - stories and poems Language Focus: Reported Speech

UNIT 5 THE AVENGER BY ANTON CHEKHOV**12 Hrs.**

Listening for specific details speaking using imagination. Reading to identify factual and inferential information Writing: Imaginative writing by predicting. Vocabulary: Countable forms and meaning, foreign nouns and framing of plurals. Language focus: Modal verbs, use of would. Critical Thinking: Deductive reasoning- generating a valid prediction or conclusion by articulating the relationship between the predictions or conclusion

Max Hours.60

TEXT / REFERENCE BOOK

P Bhaskaran Nair, C Radha Krishna Pillai, Geetha Rajeevan, CLN Prakash, Nadhini Nayar Reflections - An Anthology of Prose, Poetry and Fiction (2015) Foundation Books, Chennai . Foundation Books. ISBN 978-93-85386-008

Sen S , Mahendra etal. (2015) Communication and Language Skills . Foundation books. Chennai

<https://designteachengage.wisc.edu/course-activities-learner-interaction/sdc-activity-types-active-learning/>

<https://www.uen.org/rubric/previewRubric.html?id=1219>

<https://www.diigo.com/profile/Teachonlineuw?query=%22Critical+Thinking%22+rubric>

SBB1201	CELL BIOLOGY	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- Cell biology is the study of the structure and function of prokaryotic and eukaryotic cells. In this course the students will learn different areas of cellular biology including the structure and functions of cell, its organelles, synthesis and function of macromolecules such as carbohydrate, protein, lipid, DNA & RNA; membrane structure and function; bioenergetics; cellular communication; and microscopic techniques to understand the cell structure.

UNIT 1 FUNDAMENTALS OF CELL STRUCTURE**12 Hrs.**

Discovery of cells; Basic properties of cells; Different classes of cells – Prokaryotic and eukaryotic cells. Cell division: Cell cycle; mitosis; meiosis, binary fission.

UNIT 2 CELLULAR MEMBRANES AND MATRICES**12 Hrs.**

Chemical composition and fluidity of membranes; dynamic nature of membranes; transportation across cell membrane; membrane potentials; extracellular matrices – structure and function; cytoskeleton – structure and function.

UNIT 3 CELLULAR ORGANELLES IN ENERGY METABOLISM**12 Hrs.**

Mitochondria – structure and function; Chloroplast – structure and function. Structure of nucleus – nuclear membrane, nucleolus, chromatin, structure of nucleic acids

UNIT 4 CELLULAR ORGANELLES IN METABOLISM**12 Hrs.**

Endoplasmic reticulum – smooth & rough; function of endoplasmic reticulum; Golgi complex – structure and function; Ribosomes – Types, structure and function; Morphology and functions of peroxisomes and glyoxisomes; Plant cell vacuoles..

UNIT 5 TRANSPORT ACROSS CELL MEMBRANE**12 Hrs.**

Passive and active transports, Permeases, Sodium -potassium pumps, Ca²⁺ ATPase pump, ATP dependant proton pumps, co-transport, symport, antiport, Endocytosis and Exocytosis. Introduction to intra and extra cellular products of medicinal use.

Max Hours.60**TEXT / REFERENCE BOOKS**

- Freifelder D. 1985. Molecular Biology, Narosa Publishing House. New Delhi.
- Lewin B. 2007. Genes IX. Oxford University Press, London.
- Ajoy Paul. 2011. Textbook of Cell and Molecular Biology. Books and Allied Ltd.
- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter. 2008. Molecular Biology of Cell. 6th Edition. Garland Science, Taylor & Francis group Publishers.
- Harvey Lodish, Arnold Berk, S Lawrence Zipursky, Paul Matsudaira, David Baltimore, and James Darnell. 1995. Molecular Cell Biology. 3rd Edition. W.H. Freeman Publishers.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBC1201	ZOOLOGY	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

UNIT 1 INVERTEBRATE AND CHORDATA

12 Hrs.

General characters of the following phyla: Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata. General characters of the following phyla: Prochordates, Pisces, Amphibia, Reptilia, Aves and Mammalia.

UNIT 2 ANATOMY AND PHYSIOLOGY

12 Hrs.

Nutrition, Digestion, Circulation, Blood, Respiration, Support and movement, Nervous and chemical control, Senses, Animal behavior, Animal and Human reproduction.

UNIT 3 DEVELOPMENTAL BIOLOGY

12 Hrs.

Cleavage: Patterns of cleavage - Amphibia, chick and mammal. Gastrulation: Gastrulation in amphibia, chick and mammal. Organogenesis: Development of eye, heart and urinogenital system; Placentation: Types of placenta, in vitro fertilization, Test tube babies. Metamorphosis: Metamorphosis in amphibia, insects. Asexual reproduction: Fission, budding, gemmule formation, parthenogenesis.

UNIT 4 EVOLUTION, ADAPTIVE RADIATION AND FOSSILS

12 Hrs..

Concept of evolution, Origin of life, Darwinism and modern synthetic theory of evolution. Mutations, Isolation, Natural selection, Hardy-Weinberg principle. Structural and functional adaptations, Mimicry and protective coloration, Zoo-Geographical distribution of animal species (Realms). Paleontology: Fossils, Formation, Kinds, Interpretation, Age and significance. Evolution of Man.

Unit 5 APPLIED ZOOLOGY

12 Hrs.

Epidemiology of infectious diseases, transmission, prevention and control of diseases: Tuberculosis, Dengue, Malaria, and Swine flu. Integrated Pest Management: Monitoring, Decision making, Biological Controls. Insecticide application, classes, mode of action, toxicity, and environmental impact. Genetic improvements in aquaculture industry. Outlines of apiculture, sericulture and Lac culture.

Max Hours.60

TEXT / REFERENCE BOOKS

1. Invertebrate Zoology – E.L. Jordon and P.S. Verma (2009) S. Chand & co. New Delhi. 1127 pages.
2. Chordate Zoology – E.L. Jordon and P.S. Verma (2013) S. Chand & co. New Delhi. Fourteenth edition 1076 pages.
3. Animal Physiology by N Arumugam and Maria Kuttikan (2014) SaraS Publication, 672 pages.
4. A Text Book of Embryology (Developmental Zoology) by N Arumugam (2014) SaraS Publication, 504 pages.
5. Organic Evolution (Evolutionary Biology) by Veer Bala Rastogi (2017) Medtech; 13th edition, 590 pages.
6. Economic Zoology by Jaiswal V (2014) Prentice Hall India Learning Private Limited., 280 pages.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each - No choice

20 Marks

PART B : 2 questions from each unit of internal choice; each carrying 16 marks

80 Marks

SBC1202	BASICS OF COMPUTERS	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVE

- To familiarize in MS Office applications and C programming
- To learn the basic concepts of computer hardware

UNIT 1 INTRODUCTION TO COMPUTERS**12 Hrs.**

Introduction to Computer Hardware – Processors – Assembling a Personal Computer – Hard disk partitioning – Installing Hardware Drivers – Installation of Operating System

UNIT 2 WORD PROCESSING**12 Hrs.**

Word Processor – Introduction – Alignments – Formats – Table - Mail Merge – Spell Check – Grammar – Macros

UNIT 3 SPREAD SHEETS**12 Hrs.**

Spread Sheet – Introduction – Cells – Cell Formats – Auto Fill – Pivot Table – Formulas – Conditional Formatting – Sort – Filter – Data Validation – Charts - Macros

UNIT 4 PRESENTATION**12 Hrs.**

Presentation – Introduction – Master Slide – Format – Insert Images – Videos – Graphs – OLE – Animation – Hyper Links- Introduction to Online Tools – Online Forms – Online Storage – Collaboration – Calendar

UNIT 5 INTRODUCTION TO ALGORITHMS**12 Hrs.**

Introduction: Algorithms, Pseudocodes & flowcharts, Overview of C, features of C, Structure of C program, Compilation & execution of C program. Identifiers, variables, expression, keywords, data types, constants, scope and life of variables, and local and global variables. Operators: & Type conversion in expressions. Basic input/output and library functions: Single character input/output i.e. getch(), getchar(), getche() & putchar(). Formatted input/output: printf() and scanf(). Control structures and functions- Arrays and strings- storage classes and pointers, Memory management

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Peter Weverka, Office 2010 All-in-One For Dummies,2010
2. N. Saravanan, Computer Fundamentals With Ms Office Applications,2008
3. <https://www.tutorialspoint.com/word/>
4. Subburaj . R , “Programming in C” , Vikas Publishing, First Edition, 2000

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBB4101	CELL BIOLOGY LAB	L	T	P	Credits	Total Marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Light Microscopy
2. Simple staining
3. Studying algal cell
4. Studying fungal cell
5. Studying plant cell (Onion cells)
6. Studying animal cell (Human cheek cells)
7. Studying mitotic cell division in root tips of *Allium cepa*
8. Identifying meiotic cell division

SBC4201	ZOOLOGY LAB	L	T	P	Credits	Total Marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

- 1) Observation of animal associations: symbiosis, commensalism, parasitism and predation
- 2) Collection, preservation and identification of plankton.
- 3) Collection, preservation and identification of locally available insects
- 4) Study of adaptive radiations in mouth parts of insects viz Mosquito, Housefly, Honeybee, Dragonfly, Butterfly and Grasshopper.
- 5) Anatomy of Shrimp
- 6) Anatomy of Fish
- 7) Collection and identification of Placoid, Cycloid and Ctenoid scales of fish
- 8) Estimation of oxygen consumption of fish with reference to body weight
- 9) Report bird biodiversity in your area
- 10) Maintenance of a freshwater aquarium

SPOTTERS:

- 1) Amoeba, Paramecium, Plasmodium, Hydra, Obelia, medusa, Tape worm, Liver fluke, Ascaris, Wucheraria, Earth worm, Leech, Clams, Mussels, oysters, Star fish, Amphioxus, Balanoglossus, Any two edible fishes, Cobra, Natrix, Viper.
- 2) Observation of frog development and tadpole regeneration
- 3) Developmental stages of frog embryo: egg, sperm, blastula and gastrula.
- 4) Sheep placenta Homologous and Analogous organs.
- 5) Fossils – Archaeopteryx, Peripatus and Limulus.

SBC2101	MOLECULAR BIOLOGY I	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- Molecular Biology I is an introductory course deals with the fundamental principles of DNA structure, organization and its function in both prokaryotes and eukaryotes.

UNIT 1 BASIC CONCEPTS IN MOLECULAR BIOLOGY**12 Hrs.**

History of significant discoveries in Molecular Biology. Central dogma – DNA as genetic material. Evidence to prove DNA as genetic material- Griffith's transforming principle; Avery, McLeod and McCarty's experiment; Hershey and Chase experiment. Chargaff's law. Watson and Crick model of DNA (B form). Other different forms of DNA- A, Z. Physical Properties of DNA- Denaturation, Renaturation, hyper and hypochromic effect, Cot curve significance.

UNIT 2 DNA REPLICATION**12 Hrs.**

Meselson-Stahl's experiment to prove semi-conservative model of replication. DNA replication in prokaryotes and eukaryotes. Types of DNA polymerases, enzymes and proteins associated with DNA replication. Mechanism of replication- Initiation, Elongation and Termination. Other modes of replication: rolling circle replication, D-loop mechanism.

UNIT 3 GENETIC CODE AND TRANSCRIPTION**12 Hrs.**

Genetic code properties; initiation and termination codon; Wobble hypothesis. Transcription in prokaryotes and eukaryotes. RNA polymerases; mechanism of transcription- initiation, elongation and termination. Types of RNA – rRNA, mRNA, tRNA, snRNA. Post transcriptional modifications; 5' capping and poly A tailing. RNA splicing- Splicing pathways and Spliceosome. Concept of Alternate Splicing.

UNIT 4 PROTEIN SYNTHESIS**12 Hrs.**

Translation in prokaryotes and eukaryotes. Mechanism of translation; initiation, elongation and termination. Co and post translational modifications of proteins. Import into nucleus.

UNIT 5 GENE REGULATION**12 Hrs.**

Regulation of gene expression- regulatory proteins, promoters, enhancers. Operon concept- negative and positive regulation- Lac, Trp, Ara operon- structure and function.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Friefelder, David and George M. Malacinski "Essentials Of Molecular Biology" 6th Edition, Panima Publishing, 1993.
2. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.
5. Darnell, Lodish and Baltimore. Molecular Cell Biology, Scientific American Publishing Inc, 2000
6. Tropp, Burton E. "Molecular Biology: Genes To Proteins". 3rd Edition. Jones And Bartlett, 2008.
7. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Molecular biology of the Cell. 4th ed. Garland publishing Inc, 2002
8. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
9. Benjamin Lewin. Gene VII. Oxford University Press, Nelson Cox.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SCY1213	CHEMISTRY - I	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To know about the quality parameters of water and methods to estimate the toxic elements and softening methods.
- To understand the properties and various synthetic methods for the preparation of nanomaterials and their applications.
- To give an overview about types of batteries and fuel cells, corrosion mechanisms and preventive methods.
- To have a basic idea about polymers and various moulding techniques.

UNIT I WATER TECHNOLOGY**12 Hrs**

Introduction: Water quality parameters - Contamination of water by arsenic, lead, fluoride, mercury and their removal. Hardness: Types - Expression - Units. Estimation of hardness of water by EDTA method - Problems. Estimation of iron, calcium and magnesium: AAS method. Water softening: Zeolite process – Demineralization process. Desalination: Reverse osmosis - Electrodialysis.

UNIT II ELECTROCHEMICAL POWER SOURCES**12 Hrs**

Electrochemistry: Galvanic cell - Electrochemical cell representation - EMF series and its significance. Batteries: Terminology - Lead-acid accumulator - Nickel-cadmium batteries. Lithium batteries: Li/SOCl₂ cell- Lithium ion batteries. Fuel Cells: Hydrogen-oxygen fuel cells - Solid oxide fuel cell (SOFC).

UNIT III PHASE EQUILIBRIA**12 Hrs**

Introduction: Definition of phase rule - Terms involved in phase rule with examples. One component system: Water system. Two component alloy systems: Classification - Reduced phase rule - Thermal analysis. Simple eutectic system: Lead-silver system. Congruent system: Zinc-magnesium system. Incongruent system: Sodium potassium system.

UNIT IV SYNTHESIS OF NANOMATERIALS**12 Hrs**

Introduction: Nanomaterials: Definition - Classification based on dimensions - Size dependent properties. Types of nanomaterials: Nanoparticles: Synthesis by chemical reduction method. Nanoporous materials: Synthesis by sol-gel method. Nanowires: Synthesis by VLS mechanism. Carbon Nanotubes (CNTs): Single walled and multi walled nanotubes - Applications of CNTs - Synthesis of CNTs by electric arc discharge method and laser ablation method.

UNIT V POLYMER CHEMISTRY**12 Hrs**

Introduction to polymers: Nomenclature - Functionality. Types of polymerization. Mechanism of polymerization: Free radical mechanism - Cationic mechanism - Anionic mechanism. Plastics: Types - Thermoplastics and thermosetting plastics. Properties: Strength - Crystalline and amorphous state – Average molecular weight - Polydispersity. Compounding of plastics. Moulding of plastics: Compression moulding – Injection moulding - Extrusion moulding. Introduction to conducting polymers.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Jain P.C. and Monica Jain, Engineering Chemistry, 15th Edition Dhanpat Rai Publishing Co., 2009.
2. Dara S.S., Text Book of Engineering Chemistry, S. Chand & Co, 2008.
3. Sheik Mideen A., Engineering Chemistry (I & II), 13th Edition, Shruthi Publishers, 2010.
4. Kuriakose J.C. and Rajaram J., Chemistry in Engineering and Technology". Vol.1 & 2, 5th reprint, Tata McGraw Hill, Publishing Company (P) Ltd., 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC2102	ENZYMES	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- The objective of the course is to provide a deeper insight into the fundamentals, classification, structure, function and kinetics of enzymes. Also know about current applications and future potential of enzymes.

UNIT 1 INTRODUCTION TO ENZYMES**12 Hrs.**

Historical perspective, Nomenclature and Classification of Enzymes – Properties of Enzymes, Enzyme Activity and Units, Specific Activity, Catalytic Power and Specificity, Lock and Key Theory, Induced Fit Model, Transition State and Strain Theory of Enzyme Action.

UNIT 2 ENZYME KINETICS AND INHIBITION**12 Hrs.**

Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant, monosubstrate reactions. Michaelis-Menten equation, Lineweaver-Burk plot, Eadie-Hofstee, Hanes-Woolf, and Cornish-Bowden Plots – K_m and V_{max} , K_{cat} and turnover number, Effect of pH, temperature and metal ions on the activity of enzyme, Bi-substrate Reactions, Enzyme Inhibition, Irreversible, Reversible, Competitive, Uncompetitive – Mixed and Non-Competitive inhibition, graphical analysis.

UNIT 3 ENZYMATIC CATALYSIS & COENZYMES**12 Hrs.**

Acid-Base Catalysis, Covalent Catalysis, Metal ion Catalysis, Electrostatic Catalysis, Catalysis through Proximity and Orientation effects, Catalysis by Transition State Binding. Catalysis in Model Enzymes – Ribonuclease A – Chymotrypsin, Carbonic anhydrase – Carboxypeptidase A, Lysozyme. Coenzymes – NAD(P)⁺, FMN & FAD, CoA-SH, TPP, PLP, Biotin, THF, Methylcobalamin, Structure & Function.

UNIT 4 ENZYME REGULATION AND PURIFICATION**12 Hrs.**

Product inhibition, feedback control, enzyme induction and repression and covalent modification. Allosteric regulation. Enzyme isolation and purification, Preliminary and Advanced techniques.

UNIT 5 APPLICATIONS OF ENZYMES**12 Hrs.**

Immobilized enzymes, methods and applications in industry, medicine, Isoenzymes, properties and physiological significance (lactate dehydrogenase). Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase, alkaline and acid phosphatases), enzyme immunoassay (HRPO), enzyme therapy (Streptokinase).

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Lehninger's Principle of Biochemistry by D. L. Nelson and M.M. Cox. 4th ed. Freeman, 2004
2. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry by Trevor Palmer, Philip L.R. Bonner, 2nd Edition, Horwood Publishing Ltd, 2007. Nicholas Price and Lewis Stevens, Fundamentals of Enzymology: Cell & Molecular Biology of Catalytic Proteins by, Third Edition, Oxford University Press. 1999.
3. Dixon & Webb. Enzymes. 3rd Edition Longmans, 1979.
4. Donald Voet, Judith G. Voet, Biochemistry. John Wiley and Sons. 2011.
5. Gray, Calvin and Bhatia, Enzyme Biotechnology, 1st edition, CBS Publishers & Distributors, 2012.
6. Shanmugam, Sathishkumar and Shanmugaparakash, Enzyme Technology, 2nd edition, Ik International Publishing, 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC2103	BIOPHYSICAL CHEMISTRY	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

- Developing of general understanding how physical laws govern biological processes.
- Acquire basic knowledge about how physical methods can be applied to understand biological processes.

UNIT 1 WATER**12 Hrs.**

Structure and interactions, water as solvent, proton mobility, acid-base reactions, pH and buffers, isoelectric pH. Importance of buffers in biological systems (cytosol and blood).

UNIT 2 THERMODYNAMICS**12 Hrs.**

First law of thermodynamics, basic concepts of entropy and second law of thermodynamics, free energy changes, standard free energy change and its relation to equilibrium constant. Oxidation – reduction reactions in biological systems.

UNIT 3 CELL MEMBRANE AND TRANSPORT MECHANISMS**12 Hrs.**

Structure, principles of membrane organization, membrane models, membrane protein types and its functions, Transport through cell membrane, active and passive transport systems, Ping - pong mechanism for transport of diffusion, Macromolecules across the Plasma Membrane, Role of Intercellular spaces in transport process, Homocellular, Transcellular, Intracellular transport, Irreversible thermodynamic treatment of membrane transport.

UNIT 4 BIOMOLECULAR INTERACTIONS**12 Hrs.**

Electrostatic charges and molecular expansion, hydrophobic forces, dispersion force interaction, Multiple equilibria and various types of binding processes in biological system. Hydrogen ion titration curve, Thermodynamics of biopolymers, Van't Hoff's law of osmotic pressure, Theory of osmotic pressure and semipermeability, Behaviour of cells and molecular weight determination from osmotic pressure measurements, Significance of osmosis in biology.

UNIT 5 TECHNIQUES FOR THE STUDY OF MACROMOLECULAR STRUCTURE**12 Hrs.**

Analytical Ultracentrifugation : Sedimentation velocity and equilibrium, determination of molecular weights, Micro calorimetry (DSC and ITC) and its application. Circular Dichroism spectroscopy, UV, visible and Fluorescence spectroscopy, X-ray Diffraction, Nuclear Magnetic Resonance (NMR), Mass Spectrometry

Max Hours.60**TEXT / REFERENCE BOOK**

1. Textbook of Biophysical Chemistry, UN Dash, 2006, Macmillan India Ltd., ISBN 1403-92943-2
2. Biophysical chemistry: Part II 'Techniques for the study of biological structure and function': By CR Cantor and PR Schimmel. WH Freeman and Co, Oxford. ISBN 0-7167-1189-3/0-7167-1190-7
3. Physical Biochemistry by K.E. van Holde, 2nd edition, 2006, ISBN 0-13-046427-9
4. Physical Biochemistry by David Freifelder, W. H. Freeman; 1983 edition (6 January 1983) ISBN-10: 0716714442, ISBN-13: 978-0716714446
5. Biophysical chemistry : (principles and techniques) Avinash Upadhyay; Kakoli Upadhyay; Nirmalendu Nath 2009

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC4301	MOLECULAR BIOLOGY LAB	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- The experiments provide hands-on experience in performing basic molecular biology techniques thereby developing skill in performing molecular biology experiments. This will facilitate the students to take up specialized projects in Molecular biology and will be a pre-requisite for research work.

SUGGESTED LIST OF EXPERIMENTS:**1. Isolation of nucleic acids**

- Isolation of Plasmid DNA
- Isolation of Plant Genomic DNA/ bacterial genomic DNA

2. Analysis, separation and staining of Nucleic acids

- Estimation of DNA/RNA content in the given sample by spectrophotometer
- Determination of T_m of DNA.
- Agarose gel electrophoresis
- Poly acrylamide gel electrophoresis
- Staining of DNA with ethidium bromide
- Staining of proteins with coomassie brilliant blue/ silver

REFERENCE:

1. Sambrook, Joseph and David W. Russell "The Condensed Protocols: From Molecular Cloning: A Laboratory Manual" Cold Spring Harbor, 2006.

	CHEMISTRY LAB	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

SBC2201	INTERMEDIARY METABOLISM I	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

This course aims at understanding the essential metabolic functions of the organism as well as consumption and storage of energy intermediary metabolism of main biomolecules and its regulatory mechanisms.

UNIT I THERMODYNAMIC PRINCIPLES**12 Hrs.**

Laws of Thermodynamics, Enthalpy, enthalpy free energy, forward and reverse reaction equilibrium state, oxidation and reduction, redox reactions, redox potential. Anabolism – catabolism. High energy compounds.

UNIT II METABOLIC PRINCIPLES**12 Hrs.**

Linear and Non-linear metabolic pathways and its types, ATP as the energy currency of the cell. Role of secondary messengers in cell. Metabolites, secondary metabolites and intermediates.

UNIT III PHOTOSYNTHESIS**12 Hrs.**

Photophosphorylation: Cyclic and Non-cyclic photophosphorylation. Central photochemical event. Light driven electron flow, ATP synthesis by photophosphorylation.

UNIT- IV CARBOHYDRATE METABOLISM**12 Hrs.**

Glycolysis and oxidation of pyruvate, Pentose phosphate pathway, Glycogen metabolism: Glycogenesis and glycogenolysis, gluconeogenesis - illustrations, regulation and energetics.

UNIT- V ENERGY PRODUCTION**12 Hrs.**

Tricarboxylic acid cycle, convergence of all metabolic pathways into TCA, Respiratory chain in mitochondria, chemiosmotic theory, oxidative phosphorylation, uncouplers, transport systems in inner mitochondrial membrane.

Max Hours.60**TEXT / REFERENCE BOOK**

1. D. L. Nelson and M. M. Cox, *Lehninger Principles of Biochemistry*. WH Freeman, 2017.
2. J. M. Berg, J. L. Tymoczko, and L. Stryer, *Biochemistry, Fifth Edition: International Version*. W. H. Freeman, 2002.
3. R. K. Murray, D. K. Granner, P. A. Mayes, and V. W. Rodwell, *Harper's Illustrated Biochemistry*. Mcgraw-hill, 2003.
4. P. C. Champe, R. A. Harvey, and D. R. Ferrier, *Biochemistry*. Lippincott Williams & Wilkins, 2005.
5. D. Voet and J. G. Voet, *Biochemistry*. Wiley, 2004.
6. J. L. Jain, S. Jain, and N. Jain, *Fundamentals of Biochemistry*. S. Chand Limited, 2005.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SCY 1214	CHEMISTRY - II	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- To know about the types and properties of solutions.
- To expose the students for various separation techniques for the purification of compounds.
- To provide an idea about the chemical kinetics in terms of order, molecularity and their derivations involved.

UNIT I SOLUTIONS**12 Hrs**

Introduction: Solid solution - Hume Rothery's rule. Types of solid solutions: Liquid solutions: Solubility of partially miscible liquids - Phenol-water system. Colligative properties: Lowering of vapour pressure. Raoult's law: Derivation - Osmotic pressure - Isotonic solution - Relationship between osmotic pressure and vapour pressure. Depression in freezing point - Derivation. Elevation in boiling point - Derivation - Problems.

UNIT II INTRODUCTION TO SPECTROSCOPY**12 Hrs**

Electromagnetic spectrum, Absorption of radiation, electronic transition – Vibrational transition – Rotational transition – Intensities of spectral lines – Beer- Lamberts law – Colorimetric analysis – Estimation of concentration of a solution by colorimetry – Flame photometry – Theory, Instrumentation(block diagram only) and application – UV-Visible spectroscopy – principles, instrumentation(block diagram only) and IR spectroscopy – simple application only.

UNIT III CHEMICAL KINETICS**12 Hrs**

Introduction, Basic Concepts, Factors affecting reaction rates, rate equations for different orders – Derivation of Zero order, First order, Second order (A+A and A+B) reactions, Half life, problem based on First order and second order kinetics. Methods for the determination of the order of a reaction, Steady state hypothesis, Arrhenius Equation, Energy of activation, complex reactions – kinetics of opposing, parallel and consecutive reactions, Theories of reaction rates – Collision theory, Absoulte reaction rate theory.

UNIT IV SURFACE CHEMISTRY AND CATALYSIS**12 Hrs**

Adsorption – types of adsorption – Adsorption of gases on solids – adsorption isotherm – Freundlich, Langmuir isotherms – Adsorption of solutes from solutions – applications – Role of adsorption in catalytic reactions – Ion exchange adsorption – basic principles in adsorption chromatography – catalysis – classification – characteristic of catalysts – Auto catalysis – Enzyme catalysis – Michaelis – Menten equation – Acid – base catalysis.

UNIT V SEPARATION TECHNIQUES**12 Hrs**

Distillation techniques: Fractional distillation - Steam distillation - Vacuum distillation. Chromatography: Elution analysis - Paper chromatography - Thin layer chromatography - Liquid chromatography - High performance liquid chromatography (HPLC) - Gas chromatography (GC).

Max Hours.60**TEXT / REFERENCE BOOK**

1. Puri B.R., Sharma L. R., Madan. S.Pathania, Principles of Physical Chemistry, 41 Edition, Vishal Publishing co., 2004.
2. Keith J. Laidler, Chemical Kinetics, Third Edition, Pearson education limited, 2004.
3. Atkins P. W., Physical Chemistry, 6 edition, Oxford University press, 1998.
4. Barrow G. M., Physical Chemistry, 5th edition, McGraw-Hill, 1988.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC2202	MOLECULAR BIOLOGY II	L	T	P	Credits	Total marks
		3	0	0	3	100

COURSE OUTCOME

- Compare and contrast the general principles of gene organization in both prokaryotic and eukaryotic organisms.
- Demonstrate an understanding of molecular pathways involved in DNA mutation and repair.
- Explain the underlying mechanism of DNA recombination
- Analyze the consequences of DNA transposition
- Predict how a mutation to the anticodon sequence of a tRNA or a promoter sequence would alter its function.
- Relate properties of cancerous cells to mutational changes in gene function.

UNIT I ORGANIZATION OF DNA IN PROKARYOTES AND EUKARYOTIC CHROMOSOME.**12 Hrs.**

Prokaryotic Genomes - Physical organization of bacterial genomes .Structure of the bacterial nucleoid. Eukaryotic genome organization- DNA binding histones, nucleosome, solenoid, chromatin. Eukaryotic genomes contain both non repetitive and repetitive DNA sequences- satellite DNA. Human genome has fewer genes than expected. Mitochondrial DNA organization.

UNIT II MUTATION AND REPAIR**12 Hrs.**

Mutagenesis, Mutations, and Mutants- Terminology, Types of Mutations and their Notation, Biochemical Basis of Mutants, Mutagenesis, Mutational Hot Spots, Reversion. Errors in DNA replication and it's repair. Direct reversal of DNA damage. Base excision repair and nucleotide excision repair. Repair by homologous recombination.

UNIT III GENETIC RECOMBINATION**12 Hrs.**

Genetic Recombination Between Homologous DNA Sequences: Recombination in bacterial transformation. Types of Recombination- Site-specific & illegitimate recombination. Breakage and Rejoining and Heteroduplexes, Branch migration. Mismatch Base Pairs and Their Resolution. Models for Homologous Recombination- Holliday junctions, RecA, RecBCD, RuvAB functions.

UNIT IV TRANSPOSABLE ELEMENTS**12 Hrs.**

Transposable Elements: An Overview of Transposition, Insertion sequences, Types of bacterial Transposons, Transposition, Replication of a transposon during transposition between two plasmids, The Cointegrate as an Intermediate in transposition of Tn3, Deletions and Inversions Caused by Transposons, Role of IS elements in Hfr Formation. Transposable Elements in Eukaryotes- Retroposons, retrotransposons .Limitation of Transposition.

UNIT V MOLECULAR BIOLOGY OF CANCER**12 Hrs.**

Cell cycle regulation and cancer. Activation of oncogenes, Inactivation of tumor suppressor genes, Inappropriate expression of micro RNAs in cancer, Chromosomal rearrangements and cancer, Viruses and cancer, Chemical carcinogenesis.

Max Hours.60**TEXT / REFERENCE BOOK**

1. Friefelder, David And George M. Malacinski "Essentials Of Molecular Biology" 6th Edition, Panima Publishing, 1993.
2. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press,Pearson Pub.
5. Darnell, Lodish and Baltimore. Molecular Cell Biology, Scientific American Publishing Inc, 2000

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBB1201	IMMUNOLOGY	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

- To know the fundamentals of innate and acquired immunity. To understand how immune system fights and combats the infection and diseases. To get an insight about the principle mechanism of immunity.

Unit 1 HISTORY OF IMMUNOLOGY**12 Hrs..**

History of Immunology – Host-parasite relationship – Immunity – Innate and acquired immunity – Humoral and Cell-mediated immunity.

UNIT 2 PROPERTIES OF IMMUNE CELLS**12 Hrs..**

Structure, Functions and Properties of: Immune Cells – Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell; and Immune Organs – Bone Marrow, Thymus, Lymph Node, Spleen, GALT, MALT, CALT

UNIT 3 ANTIGENS AND ANTIBODIES**12 Hrs..**

Antigens – Types, properties – Immunoglobulins – Structure, types and Functions, Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); VDJ rearrangements; Complement – Classical and alternative pathways.

UNIT 4 MONOCLONAL ANTIBODIES**12 Hrs..**

Monoclonal antibodies, Antigen – Antibody reactions: Agglutination – Precipitation – Complement fixation – Immunofluorescence – ELISA, RIA.

UNIT 5 CELL MEDIATED IMMUNITY**12 Hrs..**

Autoimmunity: Hypersensitivity reactions – Antibody mediated – Type I, Type II and Type III – cell mediated - Type IV; Transplantation immunology; Tumor immunology

Max Hours.60**TEXT / REFERENCE BOOK**

1. Zeev Pancer and Max D. Cooper, (2006), The Evolution of Adaptive Immunity, Ann. Rev. Immunol., 24: 497–518
2. Roitt Evan, Brostoff J. Male D. (1993) Immunology 6th Ed., Mosby & Co. London.
3. Roitt I. M. (1988) Essentials of Immunology, ELBS, London.
4. Roitt M. (1984) Essentials of Immunology, P. G. Publishers Pvt. Ltd., New Delhi.
5. Stites D. P., Stobo J. D., Fudenberg H. H. and Wells J. V., (1982), Basic and Clinical Immunology, 4th Ed., Lange Medical Publications, Maruzen Asia Pvt. Ltd., Singapore
6. Janeway Charles A., Paul Travers, Mark Walport, Mark Shlomchik. Immunobiology interactive. 2005. Garland Science Publishing. USA.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBB4201	IMMUNOLOGY LAB	L	T	P	Credits	Total marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Identification of human blood groups.
2. To perform Total Leukocyte Count of the given blood sample.
3. To perform Differential Leukocyte Count of the given blood sample.
4. Agglutination reaction
 - i) Widal test
 - ii) ASO test
 - iii) RA test
 - iv) CRP test
 - v) Pregnancy test (Direct/Indirect)
5. To perform immunodiffusion by
 - i. Single Radial Immunodiffusion
 - ii. Ouchterlony double diffusion.
6. To perform DOT ELISA.
7. To perform immunoelectrophoresis.

SBC4401	ENZYMOLOGY LAB	L	T	P	Credits	Total marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS.

1. Standard Maltose Curve
2. Isolation of Alpha/Beta Amylase
3. Determination of enzyme activity
4. Construction of Protein standard curve by Folin's Lowry method and Determination of specific activity of enzyme.
5. Effect of substrate concentration on Enzyme kinetics and determination of K_m and V_{max}
6. Effect of temperature on Enzyme kinetics
7. Effect of enzyme concentration on Enzyme kinetics
8. Effect of pH on Enzyme kinetics

SBC3101	INTERMEDIARY METABOLISM II	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

- This course aims at understanding the essential metabolic functions of the organism as well as consumption and storage of energy intermediary metabolism of main biomolecules and its regulatory mechanisms.

UNIT 1 LIPID METABOLISM**12 Hrs.**

Fatty acid oxidation – α , β , ω oxidation. Biosynthesis of saturated and unsaturated fatty acids. Metabolism of cholesterol, triglycerides. Biosynthesis of steroid hormones.

UNIT 2 PROTEIN METABOLISM**12 Hrs.**

Ketogenic and Glucogenic amino acids metabolism. Deamination, Transamination and Decarboxylation, Urea cycle.

UNIT 3 NUCLEOTIDE METABOLISM**12 Hrs.**

Biosynthesis of purine and pyrimidines – de novo pathway and salvage pathway. Formation of deoxy nucleotides and its regulation. Degradation of purine and pyrimidine nucleotides.

UNIT 4 DISORDERS OF METABOLISM**12 Hrs.**

Disorders of carbohydrate metabolism, lipid metabolism, protein metabolism, and nucleotide metabolism. Treatment of metabolic disorders.

UNIT 5 INTEGRATION OF METABOLISM**12 Hrs.**

Metabolic effects of hormones (Insulin and Glucagon). The Feed / fast cycle. Diabetes mellitus, obesity. Role of minerals and vitamins in metabolism.

Max Hours.60**TEXT / REFERENCE BOOK**

1. D. L. Nelson And M. M. Cox, *Lehninger Principles Of Biochemistry*. Wh Freeman, 2017.
2. J. M. Berg, J. L. Tymoczko, And L. Stryer, *Biochemistry, Fifth Edition: International Version*. W. H. Freeman, 2002.
3. R. K. Murray, D. K. Granner, P. A. Mayes, And V. W. Rodwell, *Harper's Illustrated Biochemistry*. Mcgraw-Hill, 2003.
4. P. C. Champe, R. A. Harvey, And D. R. Ferrier, *Biochemistry*. Lippincott Williams &Wilkins, 2005.
5. D. Voet And J. G. Voet, *Biochemistry*. Wiley, 2004.
6. J. L. Jain, S. Jain, And N. Jain, *Fundamentals Of Biochemistry*. S. Chand Limited, 2005.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBC3102	GENETICS	L	T	P	Credits	Total marks
		3	0	0	3	100

COURSE OBJECTIVES

- Introduce the concept of Mendelian genetics
- Understand the organization of chromosomes and the defects
- Highlight on the concept of mutations
- Compare the genetic makeup in unicellular organisms
- Comprehend the human chromosome and its anomalies
- Application of genetics in therapy

UNIT 1 MENDELIAN PRINCIPLE**12 Hrs..**

DNA as hereditary material, Mendel and his experiments, laws of inheritance, variations in Mendel's Theme: incomplete dominance, co-dominance and multiple allele, Gene interactions; Epistasis, Duplicate, Complementary, Supplementary and Lethal genes

UNIT 2 CHROMOSOMES**12 Hrs.**

Structural organization, variation in the number and structure of chromosome; Haploids, missing and extra chromosome (Euploid and aneuploid); Deletion, Duplication, Translocation and other structural rearrangements. Chromosomal studies - karyotyping. Chromosomal theory of inheritance; clues from inheritance of sex, linkage, crossing over.

UNIT 3 GENETIC MATERIAL AND MUTATION**12 Hrs..**

Evidence for DNA and RNA as genetic material; Mutations - types and causes of mutation, DNA repair Mechanisms. Physiochemical properties of DNA: Denaturation, Annealing and C-value paradox.

UNIT 4 BACTERIAL GENETICS**12 Hrs..**

Bacterial gene transfer; conjugation, transformation, transduction - general, restricted and abortive transductions; Bacterial plasmids: structure, properties and its types; transposons, types of transposons.

UNIT 5 HUMAN GENETICS**12 Hrs..**

Human Chromosomes, Dosage Compensation, Chromosomal abnormalities - sex chromosomal and autosomal. Inherited disorders, Genetic engineering, gene therapy, inborn errors of metabolism and Genetic counseling. Knock down and gene silencing.

Max Hours.60**TEXT / REFERENCE BOOK**

1. David Friefelder, Molecular Genetics, Narosa publishing house, India, 2006.
2. Karvitah B Ahluwalia, Genetics, New age international publishers, India. 2008.
3. Gardner, E.J, Simmons, Snustad, Principles of Genetics, 8th Edition John Wiley & Sons Ltd, 1991.
4. Griffith, Fundamentals of Genetics analysis, 7th Edition, W.H. Freeman & Company, Newyork, 2000.
5. Robert Tamarin, Principles of Genetics, 7th Edition, Tata McGraw-Hill Edition, New York.2002.
6. Molecular Biology of Genes - Watson, 7th Edition, Benjamin Cummings, 2013

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SBC3103	ENDOCRINOLOGY	L	T	P	Credits	Total marks
		3	0	0	3	100

COURSE OBJECTIVES

- The structure and function of mammalian endocrine tissues
- The regulatory mechanism of individual endocrine tissues to maintain appropriate physiological and metabolic responses in the body

UNIT 1 HORMONES**12 Hrs.**

definition, classification, biosynthesis and degradation. Mechanism of hormone action, class I and II hormone receptors, steroids. Feedback regulation of hormones.

UNIT 2 HYPOTHALAMUS AND PITUITARY HORMONES**12 Hrs.**

Hypothalamic releasing factors vasopressin, oxytocin; biosynthesis, secretion, transport, regulation and biological effects of growth hormones. FSH, LH, TSH, ACTH and prolactin.

UNIT 3 THYROID HORMONES**12 Hrs.**

biosynthesis, secretion, transport, regulation and biological actions. Hypo and hyper thyroidism, antithyroid agents, role of parathyroid hormones, calcitriol, calcium and phosphorous homeostasis. Hypo and hyperparathyroidism.

UNIT 4 PANCREATIC HORMONES**12 Hrs.**

Islets of Langerhans, cell types. Insulin and glucagon: biosynthesis, mechanism of action and biological effects. Hormonal action of somatostatin and pancreatic polypeptide. Adrenal hormones: biosynthesis, secretion, transport, mechanism of action and excretion of glucocorticoids, mineralocorticoids, adrenal medullary hormones – epinephrine and nor epinephrine, steroid hormones – androgens and estrogens.

UNIT 5 STRUCTURE AND FUNCTION OF THE BRAIN**12 Hrs.**

central nervous system, peripheral and autonomic nervous system. Cells of nervous system: Neurons, Glial cells, Oligoendocytes and Schwann cells. Neurotransmitters – synthesis, storage, release, uptake, degradation and action of neurotransmitters. Acetyl choline, GABA serotonin, dopamine, glutamate, aspartate, nitrous oxide. Mechanism of action of anesthetics, analgesics, hallucinogens, depressants, stimulants and toxins on the nervous system, addiction and drug abuse.

Max Hours.60**TEXT / REFERENCE BOOK**

1. Donald Voet , Judith G. Voet , Charlott W. Pratt. Fundamentals of Biochemistry, upgrade edition. John Willey & Sons.Inc,
2. Edward Staunton West , Wilbert R. Todd , Howard S. Mason , John T. Van Bruggen, 1996. Textbook of Biochemistry, 4 th edition , Oxford & IBH publishing Co.Pvt.Ltd.,
3. J.L. Jain, 2004. Fundamentals of Biochemistry, S. Chand publications.
4. Agarwal, 1999. Biochemistry, GOBL publications.
5. David L. Nelson , Michael M.Cox, Lehninger Principles of Biochemistry, 4th edition, W.H. Freeman and company.
6. Lubert Stryer, 1995. Biochemistry, 4th edition, W.H. Freeman & Co.,
7. Concepts in Experimental Biochemistry , 1999, Brooks / Cole Publishing company.
8. White Handler Smith, Mammalian Biochemistry .
9. Francis Sreenspan, Gordon J. Strewler Prentice, 1997. Basic & Clinical Endocrinology – Hall International Inc.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC3104	CLINICAL BIOCHEMISTRY	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

- To impart the knowledge of sample collection and processing
- To describe the diagnostic significance of the main laboratory investigations

UNIT 1 BASIC CONCEPTS OF CLINICAL BIOCHEMISTRY**12 Hrs.**

Organization of clinical laboratory, Introduction to instrumentation and automation in clinical biochemistry laboratories, safety regulations and first aid. Sample collection and processing, Transport of specimens, concepts of accuracy, precision, test sensitivity, test specificity in the quantitative assessment of test performance

UNIT 2 HEMATOLOGY**12 Hrs.**

Blood:- composition and their functions, Anemia:- classifications, erythrocyte indices. Blood coagulation system, Clotting time, Bleeding time, Prothrombin time, RBC count, WBC count, Platelet count, Differential count, determination of Hb, PCV and ESR. Hemoglobinopathies, Thalassemias.

UNIT 3 DISORDERS OF METABOLISM-I**12 Hrs.**

Diseases related to carbohydrate metabolism: Diabetes mellitus:- Types, Clinical features, complications, GTT, galactosaemia, fructosuria, and glycogen storage diseases. Disorders in lipid metabolism: Atherosclerosis – aetiology, clinical features and its complications. Lipid storage diseases and fatty liver.

DISORDERS OF METABOLISM-II

Disorders in protein metabolism: Phenylketonuria, alkaptonuria, cystinuria, albinism and tyrosinemia.
Disorders in nucleic acid metabolism: Gout:- Types, aetiology and clinical features.
Disorders in bilirubin metabolism: Jaundice:- classification, clinical features.

UNIT 4 ORGAN FUNCTION TEST**12 Hrs.**

Liver function test - Icteric index, Vandenberg test, plasma protein changes, PT.
Renal function test : Clearance test – Urea, Creatinine, Inulin, PAH test, Concentration and dilution test.
Gastric function test : Collection of gastric contents, examination of gastric residuum, FTM, stimulation test, tubeless gastric analysis.

UNIT 5 CLINICAL ENZYMOLOGY**12 Hrs.**

Functional and non- Functional plasma enzymes. Isoenzymes with examples. Enzyme patterns in acute pancreatitis, liver damage, bone disorder, myocardial infarction and muscle wasting.

Max Hours.60**TEXT / REFERENCE BOOK**

1. Medical Biochemistry by MN Chatterjee, Rana Shinde, 8 edition, 2013, Jaypee publications.
2. Textbook of Medical Laboratory Technology by Praful B. Godkar and Darshan P. Godkar
3. Medical Laboratory Technology by Ramniksood, 5 Edition, 1999, Jaypee publishers.
4. Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. John Wiley-Liss Inc. Publication.
5. Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC4501	CLINICAL BIOCHEMISTRY LAB	L	T	P	Credits	Total marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Estimation of Lipoproteins
2. Glucose tolerance test
3. Estimation of bilirubin
4. Estimation of blood urea
5. Blood sugar determination by Folin-Wu method
6. Estimation of creatine phosphokinase
7. Normal and abnormal constituents of urine
8. Determination of blood cholesterol
9. Determination of glucose by glucose oxidase method
10. Estimation of glycosylated hemoglobin
11. Estimation of LDH and its isozymes
12. Estimation of alkaline phosphatase from serum
13. Estimation of total protein and albumin from serum
14. Determination of SGPT and SGOT
15. Estimation of serum amylase

SBC4502	GENETICS LAB	L	T	P	Credits	Total marks
		0	0	2	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Studying of plant, animal and bacterial cell structures by microscopy
2. Study of mitotic stages
3. Study of meiotic stages
4. Preparation of buccal smear for identification of Barr Bodies
5. Preparation of Idiogram
6. Study of Chromosomal abnormalities (with the help of permanent slides)
7. Study of cancer cells (with the help of permanent slides)

SBT1002	RESEARCH METHODOLOGY	L	T	P	Credits	Total marks
		3	0	0	3	100

COURSE OBJECTIVES

UNIT 1 RESEARCH METHODOLOGY

12 Hrs.

Research methodology-basic concepts-types- definition of research problems- statistical methods- Correlation and Regression, Binomial, Poisson and Normal Distributions (mean and variance applications only) - Sampling Distributions: Tests based on t, F, Z and Chi square distributions- Analysis of Variance.

UNIT 2

12 Hrs.

Research design-Nature and Classification of research designs, data classification, primary and secondary data, primary and secondary data- sources-advantages- Sampling- sampling concepts and methods

UNIT 3

12 Hrs.

Principles of biophysical methods used for analysis. X-ray diffraction, Fluorescence, UV, ORD/CD, visible, NMR and ESR spectroscopy, Hydrodynamic methods, Atomic absorption, Plasma emission spectroscopy.

UNIT 4

12 Hrs.

Principles and techniques of nucleic acid hybridization and cot curves, sequencing of proteins and nucleic acids, southern, northern and south-western blotting techniques, PCR, methods for measuring nucleic acids and protein interactions.

UNIT 5

12 Hrs.

Principles and applications of tracer techniques in biology, radiation dosimetry, radio-active isotopes and half-life of isotopes, effect of radiation on biological systems, autoradiography, cerenkov radiation and liquid scintillation spectrometry

Max Hours.60

TEXT / REFERENCE BOOK

1. Principles of biochemistry and molecular biology – Keith Wilson & John Walker
2. Biostatistics – Khan & Khanum

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each - No choice

20 Marks

PART B : 2 questions from each unit of internal choice; each carrying 16 marks

80 Marks

SBC3201	PLANT BIOCHEMISTRY	L	T	P	Credits	Total marks
		3	0	0	3	100

COURSE OBJECTIVES

- The objective of the course is to provide knowledge on fundamentals, structures, photosynthesis, metabolism of nitrogen compounds and about molecular mechanisms of signalization and regulation in plants.

**UNIT 1 PHYSIOLOGY OF PLANTS****12 Hrs.**

Diffusion and Osmosis in plants and their significance, relationship among turgor pressure, wall pressure and osmotic pressure, water potential concept. Mechanism of water absorption, Ascent of sap, Transpiration:, types, mechanism of transpiration and factors affecting transpiration.

UNIT 2 INTRODUCTION TO PLANT CELLS & PHOTOSYNTHESIS**12 Hrs.**

Chloroplast, structure and function; Photosynthetic pigments and light harvesting complexes, Structure of PSI and PSII complexes, Light reaction, Cyclic and non cyclic photophosphorylation, Calvin cycle and regulation; C4 cycle and Crassulacean acid metabolism (CAM), Photorespiration.

UNIT 3 NITROGEN METABOLISM & PLANT HORMONES**12 Hrs.**

Physical and biological nitrogen fixation, Ammonification, Nitrification, Denitrification, Biochemistry and Genetics of nitrogen fixation and Ammonium assimilation. Plant Hormones: Biosynthesis, Physiological effects and mechanism of action of Auxins, Gibberellic acids, Cytokinins, Absciscic acid, Ethylene, Brassinosteroids and Polyamines. Functions of alkaloids and phenolics.

UNIT 4 BIOCHEMISTRY OF PLANT GROWTH AND PLANT STRESS PHYSIOLOGY**12 Hrs.**

Biochemistry of seed development, dormancy and germination. Phytochrome, photoperiodism and vernalization. Plant stress, Plant responses to abiotic and biotic stresses, Water deficit and drought resistance, Flooding, Temperature stress, Salt stress, Ion toxicity, Pollution stress and potential biotic stress (insects and diseases).

UNIT 5 APPLICATION OF TRANSGENESIS IN CROP IMPROVEMENT**12 Hrs.**

Insect resistance, disease resistance, virus resistance herbicide resistance, and resistance to abiotic stress. Transgenesis for male sterility and terminator seed. Transgenic plant, Bt cotton, Bt brinjal, Plant genome, Rice

Max Hours.60**TEXT / REFERENCE BOOK**

1. Mukherji, S and Gosh A. K. Plant Physiology. 2nd ed. New Central Book Agency, Kolkata, 2005.
2. Florence Gleason, Raymond Chollet. Plant Biochemistry, Jones & Bartlett Publishers, 2011.
3. Hopkins, W. G and Huner, N. P. A. Introduction to Plant Physiology. 3rd ed. John Wiley & Sons Inc. New York, 2004.
4. Hans, Walter Heldt, Birgit Piechulla. Plant Biochemistry. 4th Edition. Academic publisher, 2011
5. Slater A, NW Scott, MR Fowler. Plant biotechnology, 2nd ed. Oxford University Press, 2008.
6. Dey P.M, Harborne J. B. Plant Biochemistry, Elsevier, 1997.
7. Russell L. Jones, Helen Ougham, Howard Thomas, Susan Waaland, The Molecular Life of Plants. John Wiley & Sons Inc. New York, 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**