Study &Evaluation Scheme

Of

Bachelor of Science

[Applicable w.e.f. Academic Year 2017-18]

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P)-244001

Study & Evaluation Scheme
Of
Bachelor of Science

SUMMARY

Programme	:	Bachelor of Science
Duration	:	**Three year course**
Medium	:	**English And Hindi Both**
Minimum Required Attendance	:	**75%**
Maximum credits	:	**122**
Minimum credits required for the degree	:	**122**

Evaluation of theory Papers :

External	Internal	Total
60	40	100

Internal Evaluation of theory Papers :

Class Test I	Class Test II	Class Test III	Attendance	Assignment	Total
Best two out of the three					
10	10	10	10	10	40

Evaluation of Practical :

External	Internal	Total
50	50	100

Duration of examination :

External	Internal
3 hrs	1.5 hrs

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external).

A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have secured at least 45% marks in aggregate to clear the semester.

Question Paper Structure

1. The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).

2. Remaining question will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No.2 to 6 shall be 10 marks each.

3. Usually each question in the examination should be designed to have a numerial component, where part of syllabus.

Study & Evaluation Scheme
Programme:- Bachelor of Science

Semester - I									
Sr. No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BSC 102	General Hindi	4	-	-	4	40	60	100
For PCM Group									
2	BSC 103	Trigonometry & differential calculus	4	-	-	4	40	60	100
3	BSC 104	Mechanics	4	-	-	4	40	60	100
4	BSC 105	Organic Chemistry	4	-	-	4	40	60	100
5	BSC 151	Mechanics Lab	-	-	2	1	50	50	100
6	BSC 152	Organic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 155	Skill Mathematics - Algebra		-	2	1	50	50	100
For ZBC Group									
8	BSC 105	Organic Chemistry	4	-	-	4	40	60	100
9	BSC 106	Diversity of Microbes and Cryptogans (Thallophyta)	4	-	-	4	40	60	100
10	BSC 107	Animal Diversity Part-I (Protozoa to Annelida)	4	-	-	4	40	60	100
11	BSC 152	Organic Chemistry Lab	-	-	2	1	50	50	100
12	BSC 153	Diversity of Microbes and Cryptogans (Thallophyta) Lab	-	-	2	1	50	50	100
13	BSC 154	Animal Diversity Part-I (Protozoa to Annelida) Lab	-	-	2	1	50	50	100
Total			16	-	6	19	310	390	700

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Programme:- Bachelor of Science

Semester - II									
Sr. No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BSC 201	Environmental Studies	4	-	-	4	40	60	100
2	BSC 202	Computer Fundamentals, Internet, & MS-Office	3	-	2	4	40	60	100
For PCM Group									
3	BSC 203	Partial Differential Equations	4	-	-	4	40	60	100
4	BSC 204	Electricity and Magnetism	4	-	-	4	40	60	100
5	BSC 205	Inorganic Chemistry	4	-	-	4	40	60	100
6	BSC 251	Electricity and Magnetism Lab	-	-	2	1	50	50	100
7	BSC 252	Inorganic Chemistry Lab	-	-	2	1	50	50	100
8	BSC 255	Skill Mathematics - Algebra And Matrices	-	-	2	1	50	50	100
For ZBC Group									
9	BSC 205	Inorganic Chemistry-I	4	-	-	4	40	60	100
10	BSC 206	Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany)	4	-	-	4	40	60	100
11	BSC 207	Animal Diversity Higher non Chordata	4	-	-	4	40	60	100
12	BSC 252	Inorganic Chemistry Lab	-	-	2	1	50	50	100
13	BSC 253	Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany) Lab	-	-	2	1	50	50	100
14	BSC 254	Animal Diversity Higher non Chordata Lab	-	-	2	1	50	50	100
		Total	19	-	8	23	350	450	800

Study & Evaluation Scheme
Programme: Bachelor of Science

Semester – III									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 301	Physical,Health & Yoga Education	4	-	-	4	40	60	100
2	BSC 399	English Communication & Soft Skills – I	3	-	2	4	50	50	100
3	BSC 303	Physical Chemistry	4	-	-	4	40	60	100
For PCM Group									
4	BSC 304	Real analysis	4	-	-	4	40	60	100
5	BSC 305	Optics	4	-	-	4	40	60	100
6	BSC 351	Optics Lab	-	-	2	1	50	50	100
7	BSC 352	Physical Chemistry Lab	-	-	2	1	50	50	100
8	BSC 355	Skill Mathematics - Integral calculus	-	-	2	1	50	50	100
For ZBC Group									
10	BSC 306	Plant Taxonomy And Embryology	4	-	-	4	40	60	100
11	BSC 307	Chordata	4	-	-	4	40	60	100
12	BSC 352	Physical Chemistry Lab	-	-	2	1	50	50	100
13	BSC 353	Plant Taxonomy And Embryology Lab	-	-	2	1	50	50	100
14	BSC 354	Chordata Lab	-	-	2	1	50	50	100
Total			19	-	8	23	360	440	800

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Semester – IV									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 499	English Communication & Soft Skills – II	3	-	2	4	50	50	100
2	BSC 402	Organic & Inorganic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 403	Complex Analysis	4	-	-	4	40	60	100
4	BSC 404	Oscillations & Wave	4	-	-	4	40	60	100
5	BSC 451	Oscillations & Wave Lab	-	-	2	1	50	50	100
6	BSC 452	Organic & Inorganic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 455	Skill Mathematics - Ordinary Differential Equations			2	1	50	50	100
For ZBC Group									
8	BSC 405	Plant Physiology and Metabolism	4	-	-	4	40	60	100
9	BSC 406	Evolution and Developmental Biology	4	-	-	4	40	60	100
10	BSC 452	Organic & Inorganic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 453	Plant Physiology and Metabolism Lab	-	-	2	1	50	50	100
12	BSC 454	Evolution and Developmental Biology Lab	-	-	2	1	50	50	100
Total			15	-	8	19	320	380	700

Study & Evaluation Scheme
Programme: - Bachelor of Science

Semester – V									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 599	English Communication & Soft Skills – III	3	-	2	4	50	50	100
2	BSC 502	Physical & Inorganic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 503	Differential Geometry And Tensor	4	-	-	4	40	60	100
4	BSC 504	Semiconductor and Solid State Devices	4	-	-	4	40	60	100
5	BSC 551	Semiconductor and Solid State Devices Lab	-	-	2	1	50	50	100
6	BSC 552	Physical & Inorganic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 555	Skill Mathematics - Statistics	-	-	2	1	50	50	100
For ZBC Group									
8	BSC 505	Economic Botany and Plant Biotechnology	4	-	-	4	40	60	100
9	BSC 506	Cell Biology & Genetics	4	-	-	4	40	60	100
10	BSC 552	Physical & Inorganic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 553	Economic Botany and Plant Biotechnology Lab	-	-	2	1	50	50	100
12	BSC 554	Cell Biology & Genetics Lab	-	-	2	1	50	50	100
		Total	15	-	8	19	320	380	700

Study & Evaluation Scheme
Programme: - Bachelor of Science

Semester – VI									
Sr. No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 699	English Communication & Soft Skills – IV	3	-	2	4	50	50	100
2	BSC 602	Physical & Organic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 603	Applied Statistics	4	-	-	4	40	60	100
4	BSC 604	Thermal Physics and Statsticial Mechanics	4	-	-	4	40	60	100
5	BSC 651	Thermal Physics and Statsticial MechanicsLab	-	-	2	1	50	50	100
6	BSC 652	Physical & Organic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 655	Mammalian Physiology - Operation Research	-	-	2	1	50	50	100
For ZBC Guoup									
8	BSC 605	Environmental Biotechnology	4	-	-	4	40	60	100
9	BSC 606	Mammalian Physiology	4	-	-	4	40	60	100
10	BSC 652	Physical & Organic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 653	Environmental Biotechnology Lab	-	-	2	1	50	50	100
12	BSC 654	Mammalian Physiology Lab	-	-	2	1	50	50	100
Total			15	-	8	19	320	380	700

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3	BSC 104	Mechanics	4	-	-	4	40	60	100
4	BSC 105	Organic Chemistry	4	-	-	4	40	60	100
5	BSC 151	Mechanics Lab	-	-	2	1	50	50	100
6	BSC 152	Organic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 155	Skill Mathematics - Algebra		-	2	1	50	50	100
For ZBC Group									
8	BSC 105	Organic Chemistry	4	-	-	4	40	60	100
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Total			16	-	6	19	310	390	700

SYLLABUS FOR I SEMESTER
Paper - सामान्य हिन्दी

Course Code- BSC 102
(Common with BSCEI 102)

L	T	P	C
4	-	-	4

उद्देश्य–

- छात्रों में भाषा को समझने तथा मूल्यांकन करने की दृष्टि बढाना
- शब्द संरचना प्रक्रिया के प्रति छात्रों का ध्यानाकर्षण कराना।
- छात्रों को प्रयोजनमूलक हिन्दी की व्यापकता से अवगत कराना।
- हिन्दी भाषा की व्यवहारिक उपयोगिता का परिचय देना।

पाठ्य–विषय–

Unit-1 **हिन्दी ध्वनियों का स्वरूप–**

- स्वर और व्यंजन
- संज्ञा, सर्वमान, क्रिया, विशेषण, क्रिया विशेषण
- वाक्य संरचना

Unit-2 हिन्दी शब्द संरचना–

- पर्यायवाची, समानार्थक, विलोमार्थक, अनेकार्थक, अनेक शब्दों के स्थान पर एक शब्द समूहार्थक शब्दों के प्रयोग, निकटार्थी शब्दों केसूक्ष्म अर्थ–भेद, समानार्थक शब्दों के भेद, उपसर्ग, प्रत्यय

Unit-3 **वर्तनी, विराम चिन्ह एवं** संशोधन

- वर्तनी सम्बधी अशुद्धियाँ, मात्राओं की अशुद्धियाँ
- वर्तनी सम्बधी अशुद्धियो के कारण, वर्तनी सम्बधी अशुद्धियो के सुधारने उपाय।
- विराम चिन्ह–पूर्ण विराम, प्रश्नवाचक चिन्ह सम्बोधन या आश्चर्य चिन्ह, निर्देशक चिन्ह, अवतरण चिन्ह

Unit-4 **लेखन सम्बन्धी** कौशल

- लिखित भाषा शिक्षण के उद्देश्य
- लेखन की विभिन्न विधियाँ, लेखन के दोष
- निबन्ध लेखन, कहानी लेखन
- राष्ट्रीय–अर्न्तराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन

Unit-5 **हिन्दी पत्राचार एवं लेखन**

- औपचारिक पत्राचार
- अनौपचारिक पत्राचार
- राष्ट्रीय–अर्न्तराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन

सन्दर्भ–

01– राजभाष हिन्दी– गोविन्द दास– हिन्दी साहित्य सम्मेलन, प्रयाग।
02– राष्ट्रभाषा आन्दोलन– गोपाल परशुराम–महाराष्ट्र सभा।
03– विराम चिन्ह– महेन्द्र राजा जैन– किताबघर, दिल्ली
04– प्रशासनिक एवं कार्यालयी हिन्दी– रामप्रकाश, राधाकृष्ण प्रकाशन, दिल्ली।
05– प्रयोजनमूलक कामकाजी हिन्दी– कैलाश चन्द्र भाटिया, तक्षशिला प्रकाशन, दिल्ली
06– प्रशासनिक हिन्दी टिप्पण, प्रारूपण एवं पत्र लेखन– हरिमोहन, तक्षशिला प्रकाशन, दिल्ली

MATHEMATICS SYLLABUS FOR I SEMESTER
TRIGONOMETRY & DIFFERENTIAL CALCULUS

Course Code: BSC 103	**L**	**T**	**P**	**C**
(Common with BSCEI 103)	**4**	**0**	**0**	**4**

Objective-To understand the topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic, Expansion of functions and it aims to and knowledge in the areas of Differential Calculus.

Course Outcomes:

- To show how Trigonometry can be used to evaluate Calculus
- To explain the distinction between a Trigonometry & Differential Calculus

Course Content:

Unit I

Circular and hyperbolic functions of complex quantities, Separation of real and imaginary parts of trigonometric, logarithmic, and exponential functions.

Unit II

Gregory's series, summation of series, Expansion of Functions .

Unit III

Successive differentiation, Leibnitz theorem (without proof), Euler's theorem, Mean value theorems, tangent and normal, maxima and minima, limit and its properties.

Unit IV

Mac Laurin's and Taylor's expansion of functions, errors and approximation, Asymptotes and curvature of curves in Cartesian and polar coordinates, Partial differentiation.

Unit V

Tracing of curves in Cartesian, parametric and polar coordinates (conics, asteroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardioids, Lemniscates, equiangular spiral), Jacobian, Indeterminate forms, Envelop and Evolutes

Text Books:

1. "Differential Calculas" by Gorakh Prasad, Pothishala Pvt Ltd.
2. "Trigonometry" by A. K. Saxena, Aeykay Prakashan.Bareilly

Reference Books:

1. "Trigonometry" by J. C. Sharma, P. H. Sharma, Students Friends & Co.
2. "Trigonometry" by A.R. Vashistha and R. K. Gupta, Krishna Prakashan Mandir.
3. "Differential Calculus" by N. Pishkunor, Peace Publishers Moscow
4. "Differential Calculus" by M. Ray, Shiv Lal Agarwal &Co Agra.
5. "Differential Calculus" by Khalil Ahmed, Anamya Publication, New Delhi
6. "Differential Calculus" by A. K. Saxena, Aeykay Publication

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR I SEMESTER
MECHANICS

Course Code: BSC104	**L**	**T**	**P**	**C**
(Common with BSCEI 104)	**4**	**0**	**0**	**4**

Objective: To understand the fundamentals of physics like Linear Momentum, Rotational Dynamics, Motion under Central Forces, Properties of Matter etc. Course

Outcomes: The student will be able:
- To compute basic quantities in linear and rotational mechanics
- To formulate, analyze and solve a multi level problem in mechanics.
- To apply mathematical tools to mechanics.

Course Content:

Unit I

Conservation of Energy and Linear Momentum Mechanics of a particle, work-energy theorem. Conservative and non-conservation forces and their examples. Conservation force as negative gradient of potential energy. Center of mass of a system of particles. Conservation of linear momentum and energy. Systems of variable mass, single and multistage rockets. Elastic and inelastic collisions.

Unit II

Rotational Dynamics Rigid body motion. Rotation motion, torque and angular momentum. Moment of inertia and its calculations for disc, cylinder, spherical shell and solid sphere, Body rolling down on and inclined plane. Fly wheel, Motion of Top.

Unit III

Motion under Central Forces Concept of central force. Kepler's laws of planetary motion.

Gravitational law, Gravitational Potential and fields due to spherical shell and solid sphere. Gravitational potential energy and escape velocity. Two particle central force problem and reduced mass. Motion of planets and satellites.

Unit IV

Properties of Matter

Elasticity, small deformations, Hooke's law, Elastic constants and relation among them.

Beam supported at the ends, cantilever. Streamline and turbulent flow, equation of continuity, viscosity, Poiseulie's law critical velocity, Reynolds's number. Surface tension and surface energy, pressure on a curved liquid surface.

Unit V

Nuclear Physics

Nuclear Forces, Binding Energy, Liquid Drop Model, Fission, Fusion, Nuclear Reactors and Energy Processes in Stars, Controlled Thermonuclear Reactions.

Text Books:

1. "Mechanics", D S Mathur; Khanna Publications
2. "Mechanics", Goldstein; New Age Publications.

*** Latest editions of all the suggested books are recommended.**

CHEMISTRY SYLLABUS FOR I SEMESTER
ORGANIC CHEMISTRY

Course Code: BSC 105	**L**	**T**	**P**	**C**
(Common with BSCEI 105)	**4**	0	**0**	**4**

Objective:

It consists of preparation, properties & structure & mechanism of haloalkanes, alcohols, phenols, ether, and epoxides. The name reactions have been taught to the students to clear the concept of reaction mechanism. Carbonyl compounds are of great interest as they show zero oxidation states of metal. Mechanism of named reactions for examples Perkin, canizzaro has been studied. Carboxylic acid & their derivatives have been prepared.

Course Outcome:

Nucleophilic substitution reactions & their mechanism is of great interest for the students. The preparation of organometallic compounds & its uses gives many new syntheses. Acidic character of phenol & different named reactions has been explained to the students. Ether, epoxides, carbonyl compounds & carboxylic acids have been studied in details with their physical & chemical properties.

Course Content:

Unit I

Basics of Organic Chemistry

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Homolytic and Heterolytic fission with suitable examples. Electrophiles and Nucleophiles; Nucleophlicity and basicity; Types, shape and their relative stability of Carbonations, Carbanions, Free radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

Unit II Stereochemistry

Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules. Relative and absolute configuration: D/L and R/S designations**.**

Unit III

Chemistry of Aliphatic Hydrocarbons Carbon-
Carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz- Fittig Reactions, Free radical substitutions: Halogenation - relative reactivity and selectivity.

Unit IV

Carbon-Carbon pi bonds

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, reactions. Saytzeff eliminations. Reactions of alkenes: Electrophilic additions, their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration- oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti hydroxylation (oxidation).

Unit V

Aromatic Hydrocarbons

Aromaticity: Huckel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups**.**

Recommended Texts:

1. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of NaturalProducts*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. & Wilen, S. H. *Stereochemistry of Organic Compounds*; Wiley: London, 1994.

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR I SEMESTER

DIVERSITY OF MICROBES AND CRYPTOGAMS (THALLOPHYTA)

Course Code: BSC106	**L**	**T**	**P**	**C**
(Common with BSCEI 106)	4	**0**	**0**	**4**

Course Objectives:

- To make students understand about the various features of plant kingdom and algae.
- To make students aware about the various characteristics of Bacteria and Fungi.
- To impart knowledge about the different Plant diseases.

Outcomes:

- Students will learn about the general characters of Cryptogams.
- Students will learn the basic concept of Botany.
- Students will gain knowledge about the plant diseases.

Course Content:

Unit I:

Atomic Structure

Viruses and Bacteria : General account of viruses and mycoplasma, bacteria-structure, nutrition. reproduction and economic importance, General account of Cyanobacteria, economic importance, Nostoc, Oscillatoria.

Unit II

Algae : General Characters, classification and economic importance, important features and life history of chlorophyceae : Volvox, Oedogonium, Coleochaete, Chara.

Unit III

Algae : General Characters, classification and economic importance, important features and life history of Xanthophyceae - Vaucheria, Phaeophyceae-Ectocarpus Sargassum,Rhodophyceae - Polysiphonia.

Unit IV

Fungi : General characters, classification and economic importance; important features and life history of Mastigomycotina- Phytophthora Oomycotina-Albugo,Ascomycotina-Saccharomyces, Penicillium, Erysiphae, Basidiomycotina-Puccinia, Ustilago and Agaricus, Deuteromycotina-, Colletotrichum, Alternaria.

Unit V

Plant diseases and General account of Lichens, special studies about green ear disease, white rust, Stem rust disease of Wheat, Smut disease, Citrus canker, Tobacco mosaic disease, Little leaf disease of brinjal.

Recommended Texts:

1. Pandey S.N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Dehli
2. Gupta P.K. 1999. Genetics Rastogi Publications Meerut.
3. Vashistha, B.R. 1989, Algae, S. Chand and Co. Delhi.
4. Vashistha, B.R. 1989, Fungi, S. Chand and Co. Delhi.

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR I SEMESTER

DIVERSITY OF MICROBES AND CRYPTOGAMS (THALLOPHYTA)

Course Code: BSC 107	**L**	**T**	**P**	**C**
(Common with BSCEI 107)	**4**	**0**	**0**	**4**

Objectives : The objective is to give students basic idea of the lower invertebrates through taxonomy of different phylum of lower invertebrates and by educating them on the fundamental of structural organization, physiologies and life histories of different life forms fall in this category.

Outcomes : As an outcome we are expecting the students will understand and learn the differences in the cellular organization of the organism at different levels and they will be able to write and draw the structure of various organism.

Course Content:

Unit I:

Taxonomy: - Classification of Protozoa. Porifera, Coelenterata, Platyhelminthes and Nematoda up to order with examples. Fundamentals of body organization emphasizing symmetry, metamerism, coelome and levels of structural organization.

Unit II

Protozoa: - Study of structural organization and life history of Trypanosoma and paramecium. Study of locomotion, osmoregulation, nutrition and reproduction in protozoa. Parasitism, pathogenecity and control in protozoans with special reference to Entamoeba, Giardia, Leishmania, Trichomonas and Plasmodium.

Unit III

Porifera: - Habit, habitat, structure and function of Sycon. Types of canal system.
Coelenterata: - Habit, habitat, structure, function and life history of Aurelia. Polymorphism in coelenterata, coral reef.
Ctenophora - Structural organization and affinities.

Unit IV

Platyhelminthes: - Structural organization and life history of Dugesia & Fasciola. Parasitic adaptation in Helminthes.
Nematyhelminthes: - Study of structure and life history of Dracunculus medinensis Nematode parasites and human diseases.

Unit V

Classification of Annelida (up to subclass); metamerism and coelome in Annelida General account and types of Annelida (earthworm) structural organization, Physiology & life history of Hirudinaria, Trochophore larva.

Recommended Texts:

1. Gence, Cells, & Brains Hilary Rose & Steven Rose
2.Zoology Invertebrates (text book) R.L. kotbal E.L. Jordan & P.S. Varma

*** Latest editions of all the suggested books are recommended.**

PHYSICS PRACTICAL SYLLABUS FOR I SEMESTER
MECHANICS

Course Code: BSC 151 **L T P C**
(Common with BSCEI 151) **0 0 2 1**

LIST OF EXPERIMENTS

Note: Select any ten experiments from the following list

1. To determine length, radius of circular body by using screw gauge and Vernier calipers.
2. To determine modulus of rigidity of a wire by Maxwell's needle.
3. To determine moment of inertia of an irregular body by inertia table.
4. To determine Elastic constant of a wire by Searl's method.
5. To determine Moment of inertia of a Flywheel.
6. To determine Young's Modulus in case of Uniform bending using Scale, telescope and optic lever.
7. To determine Young's Modulus in case of Cantilever using Pin and Microscope
8. To determine Modulus of Rigidity by using Torsion pendulum.
9. To determine Viscosity by the Capillary flow (Radius using Mercury pellet).
10. To determine Surface tension by using Capillary rise (Radius using Vernier microscope).
11. To verify Bernoulli's theorem.
12. To determine viscosity by Poiseuille's method.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

CHEMISTRY PRACTICAL SYLLABUS FOR I SEMESTER
ORGANIC CHEMISTRY

Course Code: BSC 152 **L T P C**
(Common with BSCEI 152) **0 0 2 1**

LIST OF EXPERIMENTS

1. Estimation of Fe (II) and oxalic acid solutions using standardized $KMnO_4$ solution.
2. Estimation of Fe (II) solutions with $K_2Cr_2O_7$ using external indicator.
3. Determination of the melting points of organic compounds and unknown organic compounds (electrically heated melting point apparatus).
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
5. Determination of boiling point of liquid compounds. (Boiling point lower than and more than 100° C).

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

*** Latest editions of all the suggested books are recommended.**

BOTANY PRACTICAL SYLLABUS FOR I SEMESTER
DIVERSITY OF MICROBES AND CRYPTOGANS

	L	T	P	C
Course Code: BSC 153				
(Common with BSCEI 153)	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. Microscopic preparations and study of the following algal material : Nostoc, Oscillatoria, Chlamydomonas, Volvox, Coleochaete, Oedogonium, Vaucheria, Chara, Ectocarpus Sargassum and Polysiphonia
2. Staining of different types of Bacteria
3. Study of some locally available plant diseases caused by Viruses. Mycoplasma, Bacteria and Fungi in field/laboratory.
4. TMV, Little leaf of Brinjal. Citrus canker.
5. Green ear disease of Bajra.
6. Study of External morphology and microscopic preparations of following Bryophytes : Riccia, Marchantia, Anthoceros, Sphagnum and Polytrichum.
7. Microscopic examination of fossil slides, specimen/photograph-Rhynia, Lepidodendron Calamites and Cladoxylon.
8. Microscopic temporary, double stained preparations and study of stem/cone/sporocarp of Selaginella. Equisetum and Marsilea.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
ANIMAL DIVERSITY

Course Code: BSC 154 **L T P C**
(Common with BSCEI 154) **0 0 2 1**

LIST OF EXPERIMENTS

General survey of Invertebrate (Spot & Slides)

(A) **Protozoa: -** Entamoeba, Polystomella, Monocystis, Euglena, Noctiluca Leismania, Nyctotherus, Paramecium, Vorticella. **Porifera-** Sycon, Hyalonema, Euplectella, Spongilla and Euspongia. **Coelenterate-** Obelia colony (polyp & medusa) Physalia, Porpita, Aurelia, Rhizostom, Alcyonium, Corallium, Gorgonia, Pennatula, Madrepora.
Platyhelminthes-: Dugesia, Fasciola, Taenia, Schistosoma.**Nematode-** Filaria, Dracunculus, Wuchereria, Enterobius
Annelida: - Neries (Heroneries with parapodia) Aphrodite, Arenicola, Pontobdella, Hirudinaria, Peripatus.
(B) Study of TS/LS of organs & developmental stages.
(i) **Porifera: -** T.S. of Sycon. (ii) **Coelenterata-** Planula larva of jelly fish.
(iii) **Platihelminthes-** T.S of Fasciola, scolex of Taenia, mature & gravid segment of Taenia, Hexacanth, bladderworm & cysticercus stage of Taenia, miracidium, sporocyst, redia, circaria larva of Fasciola. (iv) **Annelida-** T.S through different region of leach & .+

(C) Dissection Through chart / model / Photograph / CD. – Hirudinaria – Morphology, general anatomy, digestion, nervous & excretory and reproductive system.
Earthworm – Anatomy, morphology, digestive and nervous system.
(D) Mounting- (Permanent)

Protozoa – Euglena, Paramecium,Polystomela Porifera- Spicules, fibres, gemmule Coelenterata- Obelia medusa
Platyhelminthes – Taenia (proglotid) Annelida – Nereis (parapodia)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS PRACTICAL SYLLABUS FOR I SEMESTER

ALGEBRA

Course Code: BSC 155 **L T P C**
(Common with BSCEI 155) **0 0 2 1**

Objective-

• Understand the nature and purpose of axiomatic systems.
• Appreciate the power of mathematical abstraction and symbolism.
• Follow logical arguments and judge their validity.

Course Outcomes-They will develop and apply the fundamental properties of abstract algebraic structures, their substructures, their quotient structure, and their mappings. Students will also prove basic theorems such as Lagrange's theorem, Cayley's theorem, and the fundamental theorems for groups and rings.

Course Content:

Unit I

Groups, sub-groups, Costes, Lagranges theorem, permutation group, Cayley's theorem, Isomorphism of groups.

Unit II

Basic concepts of Rings, Subrings, Integral domain and fields

Unit III

Automorphism, Normaliser, Centre of a group, Syllabus theorem

Unit IV

Homomorphism of rings and its properties, Rings of Polynomials etc.

Unit V

Vector Space, properties and theorem of vector space

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Algebra" by I. N. Hertein, Wiley and Company.
2. "Modern Algebra" by Shanti Narayan, S.Chand and Company.
3. "Algebra" J. K. Goyal and K. P. Gupta, Pragati Prakashan

Reference Books:

1. "Algebra" by M. Jacobson, Banz, W.H.Erconma New Delhi.
2. "Abstract Algebra" by D. S. Malic, J. N Mordesas and M. K. Sen, Pragati Prakashan
3. "Modern Algebra" by Saran and Goyal, Pothishala Publication
4. "Modern Algebra" by A. R. Vasistha, Krishana Prakashan Mandir.

*** Latest editions of all the suggested books are recommended.**

Semester - II									
Sr. No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BSC 201	Environmental Studies	4	-	-	4	40	60	100
2	BSC 202	Computer Fundamentals, Internet, & MS-Office	3	-	2	4	40	60	100
For PCM Group									
3	BSC 203	Partial Differential Equations	4	-	-	4	40	60	100
4	BSC 204	Electricity and Magnetism	4	-	-	4	40	60	100
5	BSC 205	Inorganic Chemistry	4	-	-	4	40	60	100
6	BSC 251	Electricity and Magnetism Lab	-	-	2	1	50	50	100
7	BSC 252	Inorganic Chemistry Lab	-	-	2	1	50	50	100
8	BSC 255	Skill Mathematics - Algebra And Matrices	-	-	2	1	50	50	100
For ZBC Group									
9	BSC 205	Inorganic Chemistry-I	4	-	-	4	40	60	100
10	BSC 206	Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany)	4	-	-	4	40	60	100
11	BSC 207	Animal Diversity Higher non Chordata	4	-	-	4	40	60	100
12	BSC 252	Inorganic Chemistry Lab	-	-	2	1	50	50	100
13	BSC 253	Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany) Lab	-	-	2	1	50	50	100
14	BSC 254	Animal Diversity Higher non Chordata Lab	-	-	2	1	50	50	100
		Total	19	-	8	23	350	450	800

EDUCATION SYLLABUS FOR II SEMESTER
ENVIRONMENTALSTUDIES

Course Code – BSC 201	**L**	**T**	**P**	**C**
(Common with BSCEI 201)	**4**	**-**	**-**	4

Objective: To create awareness among students about environment protection.

Course Outcomes:
Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

CourseContent:

Unit I

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development.

Ecology andEnvironment:ConceptofanEcosystem-its structure andfunctions, Energy Flow in an Ecosystem,Food Chain,Food Web, Ecological Pyramid& Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit II

Natural Resources: Renewable & Non-Renewable resources; Landresources and landuse change;Land degradation, Soil erosion & desertification.
Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population.
Energy Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies.
Biodiversity: Hot SpotsofBiodiversity inIndiaandWorld,Conservation,Importanceand FactorsResponsibleforLossofBiodiversity, Biogeographical Classification ofIndia

Unit III

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Unit IV

Environmental policies & practices: Climate change & Global Warming (GreenhouseEffect),Ozone Layer -Its Depletion andControl Measures, PhotochemicalSmog,AcidRain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V

Human Communities & Environment:

Human population growth;impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case studies.

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

1. "Environmental Chemistry", De, A. K., New AgePublishers Pvt.Ltd.
2. "Introduction to Environmental Engineeringand Science", Masters, G. M., PrenticeHall India Pvt. Ltd.
3. "Fundamentals of Ecology",Odem, E. P., W. B. Sannders Co.

ReferenceBooks:

1. "BiodiversityandConservation",Bryant, P. J., Hypertext Book
2. "Textbook of Environment Studies", Tewari, Khulbe&Tewari,I.K. Publication

***Latest editions of all the suggested books are recommended.**

EDUCATION SYLLABUS FOR II SEMESTER
Computer Fundamentals, Internet, & MS-Office

L	T	P	C
3	0	2	4

Course Code: BSC 202
(Common with BSCEI 202)

Objective: To give the basic knowledge of Computer hardware, Internet and application software with DOS keys to the students.

Course Contents

Unit I:

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes.

Unit II:

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY.

Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

Unit III:

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge.

Unit IV:

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.

MS Power Point: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database.

Unit V:

MS-POWERPOINT: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents.

Course outcomes:

After studying this course, you should be able to:

- Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components
- Understand the difference between an operating system and an application program, and what each is used for in a computer
- Describe some examples of computers and state the effect that the use of computer technology has had on some common products
- Be familiar with software applications
- Understand file management
- Accomplish creating basic documents, worksheets, presentations with their properties.
- Experience working with email and recognize email netiquette.

Text Books:

1. Sinha P.K., Computer Fundamentals, BPB Publishing.
2. Bill Bruck., The Essentials Office 2000 Book, BPB Publishing.
3. Leon A. & Leon M., Introductions to Computers, Vikas Publications.

Reference Books:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.
2. Price Michael, Office in Easy Steps, TMH Publication.

***Latest editions of all the suggested books are recommended.**

MATHEMATICS SYLLABUS FOR II SEMESTER
PARTIAL DIFFERENTIAL EQUATIONS

Course code: BSC 203 **L T P C**

(Common with BSCEI 203**)** **4 0 0 4**

Objective –Toacquaint the students with various mathematical techniques viz. variable separable method, Monge's form of solution, Classification and application of PartialDifferential Equation.

Course Outcomes: To learn the Nonlinear first order PDEs which arise in fluid dynamics, continuum mechanics and optics.

Course Content:

Unit I

Partial differential equation of I order and I degree, Origin of partial differential equation, Lagranges method for P.p +Q.q = R.

Unit II

Partial differential equation of II order, Linear partial differential equation, its complete integral, particular integral and general solution, general solution of linear partial differential equation with constant coefficients.

Unit III

Monge's form of solution of form Rr + Ss + Tt = V

Unit IV

Classification of Partial differential Equation

Unit V

Application of Partial differential Equation

Text Books:

1. "Partial differential Equation" by M. D. Raisinghania, S.Chand&Company
2. "Partial differential Equation" by P. P. Gupta, G. S. Malik and S. K. Mittal, Pragati Prakshan

Reference Books:

1. "Partial differential Equation" by I. N. Sneddon, Mc graw Hill&Company
2. "Partial Differential With Boundary value Problems" S Singh ,J .P.Chauhan Shikaha Sahitiya Prakasha

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR II SEMESTER
ELECTRICITY & MAGNETISM

Course Code: BSC204	**L**	**T**	**P**	**C**
(Common with BSCEI 204**)**	**4**	**0**	**0**	**4**

Objective: To provide a detailed and through knowledge of basic concept of electricity and magnetism.
Course Outcomes: After completion of the course, student will be able to understand
- The basic concept of electric field and potential and the method of their calculation using Gauss Law.
- Basics of dielectric polarization of matter, capacitor.
- The applications of magnetic field, ampere law etc.

Course Content:

Unit I

Electric Circuits AC Circuits: - Complex Reactance and Impedance. Series LCR Circuit: Resonance, Power Dissipation, Quality Factor and Band Width; Parallel LCR Circuit ; Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, and Maximum Power Transfer theorem.

Unit II

Electric Field: Electric Field and Lines. Electric Field E due to a Ring of Charge. Electric Flux. Gauss's law. Gauss's law in Differential form. Applications of Gauss's Law : E due to an Infinite Line of Charge, a Charged Cylindrical Conductor, an Infinite Sheet of Charge and Two Parallel Charged Sheets,

Unit III

Dielectric Properties of Matter

Dielectrics:- Electric Field in Matter. Dielectric Constant. Parallel Plate Capacitor with a Dielectric. Polarization, Polarization Charges and Polarization Vector. Electric Susceptibility. Gauss's law in Dielectrics. Displacement vector D. Relations between the three Electric Vectors.

Unit IV

Magnetic Field Magnetic Effect of Currents :- Magnetic Field B. Magnetic Force between Current Elements and Definition of B. Magnetic Flux. Biot-Savart's Law ,Magnetic Dipole and its Dipole Moment Ampere's Circuital law Gauss's law of magnetism. Relative Permeability of a Material. Magnetic Susceptibility.B-H Curve and Energy Loss in Hysteresis.

Unit V

Electromagnetic induction :-Faraday's law (Differential and Integral forms). Lenz's Law. Self and Mutual Induction. Energy stored in a Magnetic Field Ballistic Galvanometer Potential Energy of a Current Loop. Ballistic Galvanometer: Current and Charge sensitivity & Damping.

Text Books:

1. Electricity and Magnetism By Edward M. Purcell (McGraw-Hill Education, 1986)
2. Fundamentals of Electricity and Magnetism By Arthur F. Kip (McGraw-Hill, 1968)
3. Electricity and Magnetism by J.H.Fewkes & John Yarwood. Vol. I (Oxford Univ. Press, 1991).

Reference Books:

4. Electricity and Magnetism. By D C Tayal (Himalaya Publishing House,1988).
5. David J. Griffiths, Introduction to Electrodynamics, 3rd Edn, (Benjamin Cummings,1998).

*** Latest editions of all the suggested books are recommended.**

CHEMISTRY SYLLABUS FOR II SEMESTER
INORGANIC CHEMISTRY

Course Code: BSC 205	**L**	**T**	**P**	**C**
(Common with BSCEI 205/BAS-121**)**	**4**	**0**	**0**	**4**

Objective: To expose with different type of physical phenomenon and instruments in Fundamentals of inorganic chemistry like study of atomic structure, periodicity of elements, chemical bonding and basics of inorganic chemistry.

Course Outcomes: After completion of the course, student will be able to understand

• The Schrödinger equation which provide explanation about the origin of Quantum number, shape of atomic orbital.

• Student will learn the periodicity of elements in which they understand the effective nuclear charge, enthalpy, electronegativity required to understand trend in periodic table and predicting their chemical behavior.

• The course also provides a detail understanding of covalent, ionic bond.

• A basic understanding of metallic bond hydrogen bond.

Course Content:

Unit I:

Atomic Structure

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's uncertainty principle and its significance, Schrodinger's wave equation, significance of ψ and ψ2. Quantum numbers and their significance. Shapes of *s*, *p*, *d* and *f* orbitals.

Unit II

Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

Unit III

Classification of Elements based on their electronics structure

The long form of periodic table *s*, *p*, *d*, *f* block elements. Their position in periodic table and general properties related to their electronic structures.

Unit IV

Periodicity of Elements

Detailed discussion of the following properties of the elements, with reference to *s*&*p*-block.

(a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

(b) Atomic radii (Vander Waals)

(c) Ionic and crystal radii.

(d) Covalent radii (octahedral and tetrahedral)

(e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.

(g) Electro negativity, Pauling's/ Mullikan's/ Electro negativity scales.

Unit V

Chemistry of Hydrogen, Hydrogen peroxide including manufacturing and structure, Heavy Hydrogen, Heavy water, ortho and Para Hydrogen. Hardness of water, removal of hardness, estimation of hardness of water.

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR II SEMESTER

DIVERSITY OF CRYPTOGAMS (BRYOPHYTA, PTERIDOPHYTA AND PALEOBOTANY)

Course Code: BSC 206	**L**	**T**	**P**	**C**
(Common with BSCEI 206**)**	**4**	**0**	**0**	**4**

Course Objectives:

- To make students capable of differenciation between different classes of Bryophyta.
- To impart knowledge about advancement of characters in Pteridophyta with respect to Bryophyta.
- To make students well versed with the Geological time scale.

Outcomes:

- Students will learn about the general characters of Bryophyta.
- Students will learn the general characters of Pteridophyta
- Students will learn the basic concept of fossil Bryophyta through Geological time scale.

Course Content:

Unit I:

Bryophyta : General characteristics and classification of bryophyta, alternation of generation

Unit II

Structure, reproduction and economic importance of Hepaticopsida. Riccia, Marchantia and Pellia, Anthoceratopsida-Anthoceros, Bryopsida-Sphagnum, Polytrichum.

Unit III

Pteridophyta : The first vascular land plant, types of steles, important characteristies of Psilopsida, Lycopsida, Sphenopsida, and Pteropsida, classification of Pteridophyta.

Unit IV

Structure and reproduction in Fossilization, Types of fossils, Techniques of fossil study, Geological time scale. General characters of Lycopodium, Selaginella, Equisetum, Adiantum and Marsilea.

Unit V

Gymnosperm:- Gereral characteristies, classification Cycas, Pinus, Ephedra.

Recommended Texts:

1. Pandey S.N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Dehli
2. Pandey S.N. & others. 1995, A Text Book of Botany Vol. II, Vikas Publications Dehli

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR II SEMESTER
ANIMAL DIVERSITY: HIGHER NON-CHORDATA

Course Code: BSC 207	**L**	**T**	**P**	**C**
(Common with BSCEI 207**)**	**4**	**0**	**0**	**4**

Objectives : The objective is to give students the exposure of some higher invertebrate phylum like Arthopoda, Molusca and Echinodermata and the life histories of the organism fall in this category. To make them understand about the structure and function of the cells and differences.

Outcomes : The outcome will be in terms of understanding the body organization of different life forms in higher invertebrates and they will be able to explain the differences in the taxonomic characters of different phylum. Students can draw and write about the structure and functions of the cells.

Course Content:

UNIT I

1. **Taxonomy**: Classification of Arthropoda, Mollusca and Echinodermata, Mouth parts of insects, economic importance of insects, Pearl formation.

UNIT II

Arthropoda: Habit, habitat, morphology, physiology, reproduction, development of ***Palaemon***(Prawn).

UNIT III

Mollusca: Habit, habitat, morphology, physiology, reproduction, development of ***Pila***(Apple snail).

Unit IV

Echinodermata: : Habit, habitat, morphology, physiology, reproduction, development of ***Pentacerous***(Sea star).

UNIT V

CellBiology: Structure and function of cell, structure and function of cell organelles viz: mitochondria, Golgi bodies, nucleus, ribosome and endoplasmic reticulum.

Recommended books:

1. Biology of non-chordates: H.C. Nigam.
2. Invertebrate Zoology: E.L. Jordan and P.S. Verma
3. A text book of Zoology Invertebrate: R.L. Kotpal
4. Cell Biology P.S. Verma & V K Agarwal, Publisher: S. Chand
5. Cytology, Genetics, Evolution & Ecology**,** P. K. Gupta, RastogiPublications

PHYSICS PRACTICAL SYLLABUS FOR II SEMESTER
ELECTRICITY AND MAGNETISM

Course Code: BSC 251 **L T P C**
(Common with BSCEI 251/ BAS 258**)** **0 0 2 1**

LIST OF EXPERIMENT

Note : Select any ten experiments from the following list

1. Verify network theorem (i) Superposition Theorem (ii) Thevinen Theorem (iii) Norten Theorem.
2. Use multimeter for measuring (a) Resistance (b) AC and DC Voltage (c) DC current.
3. Calibration of ammeter by Potentiometer.
4. Calibration of Voltmeter by Potentiometer.
5. To determine a Low Resistance by Carey Foster's Bridge.
6. To determine resistance of galvanometer by Kelvin's method.
7. To determine the (a) Charge Sensitivity and (b) Current Sensitivity of a B.G.
8. To plot graph showing the variation of magnetic field with diastance along the axis of circular coil.
9. To determine internal resistance of a leclanche cell by Mance's method using post office Box.
10. To determine Self Inductance of a Coil by Rayleigh's Method.
11. Conversion of Galvanometer in ammeter of given range.
12. To verify Ohm's law in electricity.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

*** Latest editions of all the suggested books are recommended.**

CHEMISTRY PRACTICAL SYLLABUS FOR II SEMESTER
INORGANIC CHEMISTRY

Course Code: BSC-252	**L**	**T**	**P**	**C**
(Common with BSCEI 252**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. Estimation of Cu (II) and $K_2Cr_2O_7$ Using sodium thiosulphate solution (Iodimetrically).
2. Estimation of available chlorine in bleaching powder iodometrically.
3. Preparation of Aluminium Potassium sulphate $KAl(SO4)_2.12H_2O$ (Potash alum) or Chrome alum.
4. Acetylation of one of the following compounds: amines (aniline, o-,m- ,p- toluidines) and phenols (β-naphthol, salicylic acid)
5. Benzolyation of one of the following compounds: amines (aniline, o-,m-,p- toluidines) and phenols (β-naphthol, resorcinol) by Schotten- Baumann reaction

6. Nitration of one the following compounds: nitrobenzene, chlorobenzene, bromobenzene

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

*** Latest editions of all the suggested books are recommended.**

BOTANY PRACTICAL SYLLABUS FOR II SEMESTER

DIVERSITY OF CRYPTOGAMS (BRYOPHYTA, PTERIDOPHYTA AND PALEOBOTANY)

Course Code: BSC 253	**L**	**T**	**P**	**C**
(Common with BSCEI 253**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. Study of External morphology and microscopic preparations of following bryophytes : Riccia, Marchantia, Anthoceros, Sphagnum and Polytrichum.
2. Microscopic temporary, double stained preparations and study of stem/cone/sporocarp of Lycopodium, Selaginella, Equisetum, Adiantum and Marsilea.
3. Study of External morphology and microscopic preparations of following gymnosperm: Cycas. Pinus and Ephedra.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER
ANIMAL DIVERSITY

Course Code: BSC 254 **L T P C**
(Common with BSCEI 254**)** **0 0 2 1**

LIST OF EXPERIMENTS

Observation of the following slides / spotters / models

Arthropoda: *Palaemon, Lepas, Crab, Lobester, Squilla, Balanus, Apis, Lepisma, Apis, Limulus, Scolopendra, Peripleneta*.

Mollusca: *Lamellidense, Pila,Chiton,Teredo,Doris,Aplysia,Detalium,Nautilus,Sepia.*

Echinodermata: *Pentacerous,Echinis,Ophiothrix,Holothuria,Antidon.*

Slides:
Mouth parts of *Anopheles* (male and female), *Culex* (male and female), *Cyclops*, *Dephnia*, *Zoea* larva.
Cell structure,

Cell division,

chromosome.

Activity:

Preparation of onion root tip for the stages of mitosis.

Rexene Charts

1. Prawn nervous system.
2. Prawn digestive system.
3. *Pila* nervous system.
4. *Unio* nervous system.
5. Starfish water vascular system.
6. Anatomy of *Pheritima*.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS PRACTICAL SYLLABUS FOR II SEMESTER
ALGEBRA AND MATRICES

Course code: BSC 255 **L T P C**

(Common with BSCEI 255**)** **0 0 2 1**

Objective-To understand the topics like Matrices and determinants, Eigen values and eigen vectors, Matrices, Isomorphism and Homomorphism and Elementary Number systems. The stress is on the development of problem solving skills.

Course Outcomes: On successful completion of course students will have

• To solve the pure and applied mathematics.

• To apply principles of algebra and trigonometry to physics and chemistry, wherever required

Course Content:

Unit I

Matrices and determinants, Elementary row and column transformation, Linear transformations, Rank of matrix.

Unit II

Consistency of linear system of equations, Linear dependence and independence, Hermitian and skew Hermitian matrices, general form of matrices.

Unit III

Inverse of matrix by elementary operations, Solutions of simultaneous equations, Characteristic equation, Caley-Hamilton theorem (without proof), Eigen values and eigen vectors, Diagonalization.

Unit IV

Sets, Relations, Functions, Binary operations, permutation, Groups and subgroup its elementary properties.

Unit V

Isomorphism and Homomorphism of Groups, Caley's theorem, Order of an element, Rings, Fields and integral domains.

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Matrices" by Dr. J.K.Goel and K.P.Gupta, Students Friends & Co.
2. "Modern Algebra" by A. R. Vashisth, Krishana Prakshan Mandir

Reference Books:

1. "Matrices" by Shanti Narain, S Chand &Co.
2. "Matrices" by N. Saran and J. K. Goyal, Pragati Prakashan
3. "Modern algebra" by I N Herstein, Wiley Eastern Ltd.

Study & Evaluation Scheme
Programme: Bachelor of Science

Semester – III									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 301	Physical,Health & Yoga Education	4	-	-	4	40	60	100
2	BSC 399	English Communication & Soft Skills – I	3	-	2	4	50	50	100
3	BSC 303	Physical Chemistry	4	-	-	4	40	60	100
For PCM Group									
4	BSC 304	Real analysis	4	-	-	4	40	60	100
5	BSC 305	Optics	4	-	-	4	40	60	100
6	BSC 351	Optics Lab	-	-	2	1	50	50	100
7	BSC 352	Physical Chemistry Lab	-	-	2	1	50	50	100
8	BSC 355	Skill Mathematics - Integral calculus	-	-	2	1	50	50	100
For ZBC Group									
10	BSC 306	Plant Taxonomy And Embryology	4	-	-	4	40	60	100
11	BSC 307	Chordata	4	-	-	4	40	60	100
12	BSC 352	Physical Chemistry Lab	-	-	2	1	50	50	100
13	BSC 353	Plant Taxonomy And Embryology Lab	-	-	2	1	50	50	100
14	BSC 354	Chordata Lab	-	-	2	1	50	50	100
Total			19	-	8	23	360	440	800

SYLLABUS FOR III SEMESTER
PHYSICAL, HEALTH AND YOGA EDUCATION

Course Code – BSC 301	**L**	**T**	**P**	**C**
(Common with BED 104/BSCEI 302)	**4**	**-**	**-**	4

Objectives : To enable the student-teacher to-

- To introduce the concept of holistic health.
- To understand the various dimensions and determinants of health.
- To acquaint them with school health programme and its importance.
- To understand the need and importance of physical education.
- To make them aware of the benefits of physical fitness and activities for its development.
- To introduce them the need of Yoga and its importance.

Unit:-I Health

- Introduction, Definition and Meaning of health & health education
- Dimensions of health & Determinants of health
- Meaning & Importance of balanced diet
- School health programme and role of teacher in development of health

Unit: -II Physical Fitness

- Definition, Meaning and Types of physical fitness
- Factors affecting physical fitness
- Benefits of Physical Fitness
- Importance of physical activities at school level
- Principles of physical fitness

Unit:-III Health Problems in India

- Communicable and Non Communicable Diseases
- Obesity, Malnutrition, Explosive Population.
- Personal and Environmental Hygiene for schools
- Objectives of school health services, Role of health education in schools

Unit:-IV Yoga

- Introduction, Meaning and mis-concepts of Yoga
- Introduction to Ashtang Yoga
- Classification of Yoga
- Importance of Yogasanas, Pranayama and Shudhikriya

Unit V: Meditation & Stress Management

- Meditation: Meaning, Nature & Relationship with mind.
- Importance of Meditation at school level
- Stress: Meaning, Nature, Types and Factors
- Role of Meditation in Stress Management.

Practical:As per the topic mentioned above the concerned faculty will give them practical exposer as well as practical assignment and this will be evaluated as an integral part of the internal assessment.

Suggestive Readings:

- Dr. Ajmer Singh (2003).Essentials of physical Education. Ludhiana: Kalyani publishers.
- Daryl Syedentop (1994). Introduction to physical education, fitness and sports (2nd ed.). London: Mayfield publishing company.
- Dr. A.K.Uppal and Dr. G. P. Gautam (2004). Physical education and Health. Delhi: Friends publisher.
- Dr. Sopan Kangane and Dr. Sanjeev Sonawane (2007). Physical Education (D. Ed.). Pune: Nirali publication.
- Krishna Patel (2017-18). Physical Health and Yoga Education, Agarwal Publication, Agra.
- Rajeev Jain Trilok (2016).Sampoorn Yog Vidhya, Bhopal: Manjul Pub.
- C.S Gore(2011). Yoga and Health, New Delhi: Sports Publication.
- Wazir Singh (2013). Yoga and Health Promotions in Schools, New Delhi: Srishti Book Distributors.
- I.N Singh.(2015). The Complete Book of Yoga & Health, New Delhi: The Reader Paradise.
- Dr. Sanjay R. Agashe (2013). Introduction to Health Education, New Delhi: Khel Sahitya Kendra.
- Dr. Anil Kumar Tripathi (2015). Fundamentals of Health Education, New Delhi: Khel Sahitya Kendra,
- Prof A.M Moorthy(2005). Management of Health Education(Part-II), Delhi: Friends publisher.

EDUCATION SYLLABUS FOR III SEMESTER
English Communication & Soft Skills – I

Course Code – BSC 399 **L T P C**
3 0 2 4

Objective: To comprehend and communicate in simple English

Course Content

Module -1: Introduction to English language

a) Role and significance of English language in the present scenario
b) English Language: Its relevance for the Indian industry
c) Introduction to Listening, Speaking, Reading, Writing (LSRW) and benchmarking of the class
[Note: As part of classroom activity, a guest lecture from an industry representative/Director (CRC) and maintaining progress card for each student on LSRW for future reference]

Module -2: Phonetics& Functional Grammar

a) Pronunciation and daily usage correction (speak with differences between p/b, s/sh, f/ph, t/d, v/w sounds)
b) Parts of speech, articles, tenses, verbs and modals
c) Practice of daily use words, numerals and tongue twisters
d) Vocabulary building, Construction of simple sentences: Basic sentence pattern, subject and Predicate
[Note: As part of classroom activity, language games, tongue & jaw exercises,simple passages from the newspapers for oral drills in the classroom and practice tests (written and oral)]

Module -3: English Communication- About Myself

a) Let's talk, making conversation, meeting and greeting
b) Introducing myself, my family and my friends
c) My opinions, my likes and dislikes
d) Life at college, hostel and workplace
[Note: As part of classroom activity, use the Workbook forreferencefor classroom and home assignments,carry out practice tests (written and oral)]

Module -4: Personality Development-I

a) First impression: Dressing sense, good manners, speaking well and respectably
b) Positive Attitude: Being happy and alert, a good listener and a good friend
c) Consultation among peers: Soliciting advice and giving advice
d) Goal setting, confidence building& handling rejection
[Note: As part of classroom activity, refer Workbookfor classroom and home assignments, carry out practice tests (written and oral)]

Third Semester Outcome:

1. Students will realise the significance of English for their career progression
2. Benchmarking the students in the first semester to observe their progression in terms of LSRW
3. Students will be able to understand distinct sounds and improve pronunciation
4. Students will improve their English vocabulary of daily usage
5. Students will be able to form simple sentences to talk about themselves, friends and relatives.
6. Students will be able to imbibe the pre-requisites of personality development.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

External Exam	*Internal Assessment*	*Total*
50	50	100

Internal Assessment: 50

Best 2 out of Three CTs	*Attendance*	*Workbook Assignments& Viva*	*Total*
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

Reference Books:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers
3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press

CHEMISTRY SYLLABUS FOR III SEMESTER
PHYSICAL CHEMISTRY

Course Code: BSC 303	**L**	**T**	**P**	**C**
(Common with BSCEI 304**)**	**4**	**0**	**0**	**4**

Objective: Gaseous state has been studied taking ideal gas equation & modification of the ideal gas equation. Liquefaction of gases and critical temp, pressure & volumes enhances the interest of the student.

Course Outcomes:

The student will able to find out a detailed knowledge of applicability of different states of matter in our day to day life. Explanation of the phenomenon of liquefaction of gases will be easier.

Course Content:

Unit I:

ChemicalKinetics

- Definition of order and molecularity. Derivation of rate const. for zero first second and third order reactions and example.
- Effect of tem. Concentration, catalyst & Pressure on rate of reaction
- Arhenius equation.
- Pseudo order reaction
- Simple Collision Theory & Transition State Theory For Reaction Rate.

Unit IISurface Chemistry

- Definition of colloids
- Preparation purification & props. Of colloidal Solution (Solutions)
- Hardy – Schulze law
- Preparation. Properties & uses of emulsion
- Preparation. Properties & uses of gel
- Protective colloids

Unit III Solid State: -

- Unit cell, Lattice point (Def)
- Defects in crystals- Stoichiometric and Nonstoichiometric defects
- Bravis ----- lattices & crystal system
- Properties of solids
- Types of solids

Unit IVLiquid State:-

- Structural differences. between solids liquid & Gases
- Properties of liquid – Surface tension Viscosity Vapour pressure
- Liquid crystal & its classification in somatic & nematic type
- Application of liquid crystal.

Unit VGaseous State:-

- Intermolecular attractive forces
- Deviation of real gases from ideal behaviour
- The vanderwal's equation.
- Maxwell's distribution of velocity & energies
- Critical Phenomenon-Temperature, Pressure and Volume.
- Andrew's isotherm of CO_2
- Calculation of root mean square vel.' Average. velocity, most probable vel.
- Collision Diameter, Collision Number, Collision Frequency.

Reference Books

1. Prutton and Marron , teachings of teaching (classroom teaching). APH publishing, New Delhi.

*** Latest editions of all the suggested books are recommended.**

MATHEMATICS SYLLABUS FOR III SEMESTER
REAL ANALYSIS

Course code: BSCEI 304 **L T P C**

(Common with BSCEI 305**)** **4 0 0 4**

Objective-To understand various limiting behaviour of sequences & series; limiting processes viz. continuity, uniform continuity; Sequence of real numbers, Tests and to enhance the mathematical maturity and to work comfortably with concepts.

Course Outcomes:

- To understand the concepts of real in depth.
- To analyze the world of formal/abstract mathematics in which formal proofs and definitions are used in abundance.

Course Content:

Unit I

Limits, left and right hand limit, Theorems on limit, Concept of Continuity and discontinuity, Types of continuity and discontinuity, properties of continuous function, A necessary and sufficient conditions of discontinuity, Darboux's theorem, Mean Value theorems, differentiability.

Unit II

Sequence of real numbers convergent and non-convergent, Sequence algebra of sequences, Theorem on limit on limit of sequence, Monotone Sequence, Real sequence, Bounded sequence, convergent sequence, Least upper bound and greatest lower bound, limit of a sequence, theorem on convergent sequence, Subsequence.

Unit III

Infinite Series and its convergences, Test for convergences of positive term series, comparison test, Ratio test, Cauchy's Root test, Raab's test, Logarithmic test, Integral test.

Unit IV

Definition existence and properties of Riemann integral of a bounded function, Darboux theorem, Condition of integrability, Integral as limit of sum, Fundamental Theorem of Calculus.

Unit V

Definition of uniform convergence, Cauchy's criterion for uniform convergence Weirstress test, M-test, Uniform convergence and continuity, Definition of improper integral and convergence of improper integral.

Text Books:

1. "A course of Mathematical Analysis" by Shanti Narayan, S.Chand.& Co.
2. "Mathematical Analysis" by S. C. Malik, Willy. Eastern Co.
3. "Real Analysis" by M. L. Khanna and L. S. Varshney, Jay Prakash Nath & Co.

Reference Books:

1. "Real Analysis" by P. K. Mittal, S.J.Prakashan.
2. "Real Analysis" by P. K. Gupta and Sharada Gupta, S. Chand &Co

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR III SEMESTER
OPTICS

Course code: BSC 305 **L T P C**

(Common with BSCEI 306**)** **4 0 0 4**

Objective: To understand the fundamentals of physics like geometrical optics: diffraction, interferometer and holography etc.

Course Outcomes: After completion of the course, student will be able to **-**

1. To get the idea of geometrical optics including the wave motion
2. Toprovide basic and advanced concept of holography, interference and diffraction.

Course Content:

Unit I

Geometrical Optics: Fermat's Principle: Principle of extremum path and its simple application as reflection, refraction and straight line motion of light. General theory of Image formation: Cardinal points of an optical system, general relationship, thick lens, combination of two thin lenses, nodal slide and Newton's formula, Huygens and Ramsden's eyepieces.

Unit II

Physical Optics I: Interference. Interference of Light: The principle of super position, two slide interferences, coherence requirement of the sources, optical path retardation, lateral shift of fringes, Rayleigh refractometer and other applications. Thin films, application for precision measurement for displacements. Interference in thin films, Newton's ring, its application in determination of wave length, refractive index of liquid.

Unit III

Physical Optics-II Interference. Michelson interferometer: Its application for a precision determination of wave length, wave length deference refractive index of thin transparent film and width of spectral lines. Intensity distribution in multiple bean interference, Fabry - Perot interferometer & elaton

Unit IV

Physical Optics-III Diffraction. Diffraction of Light: Fresnel diffraction, intensity due to cylindrical wavefront by Fresnel half period method, zone plate, Diffraction at straight edge.Fraunhofer Diffraction: Diffraction at a slit & circular aperture, Diffraction at N-parallel slits, its intensity distribution, plane diggraction grating, concave grating and different mounting. Resolution of images, Rayleigh criterion, resolving power of grating, telescope and prism.

Unit V

Physical Optics-IV Polarization. Double refraction and Optical Rotation: Refraction in uniaxial crystal, its electromagnetic theory, Phase retardation, Quarter waveplate and half waveplate, double image prism. Rotation of plane of polarization. Fresnel explanation of rotation.

Text Books:

Optics by Ajoy Ghatak, Tata Mc Graw Hill.

Reference Books:

Engineering Physics by V S Yadav, Tata Mc Graw Hill

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR III SEMESTER
PLANT TAXONOMY AND EMBRYOLOGY

Course Code: BSC 306 **L T P C**
(Common with BSCEI 307**)** **4 0 0 4**

Course Objectives:

• To make students understand about the Botanical gardens and Herbarium.
• To make students aware about the different classification of Angiosperms.
• To impart knowledge about general characteristics of members of Angiosperm family.

Outcomes:

- Students will learn the systematic position of flowering plants.
- Students will be able to do identification of plants using scientific classification.
- Students will learn to describe the general leaf, flower and fruit characteristics of members of the Angiosperm family.

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Course Content:

Unit I : Introduction To Plant Taxonomy

- Fundamental components of taxonomy (identification, nomenclature, classification)
- Taxonomic resources: Herbarium- functions& important herbaria, Botanical gardens, Flora,
- Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication)

Unit II : Classification

- Types of classification- Artificial, Natural and Phylogenetic.
- Bentham & Hooker's system of classification- merits and demerits.
- Engler & Prantle's system of classification- merits and demerits

Unit III :

- Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcurbitaceae, and Apiaceae

Unit IV :

- Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae,Arecaceae,and Poaceae.

Unit V : Embryology

- Anther structure, microsporogenesis and development of male gametophyte.
- Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporic and Tetrasporic types (*Peperomia ,Drusa, Adoxa*) of embryo sacs.
- Pollination and Fertilization (out lines) Endosperm development and types.
- Development of Dicot and Monocot embryos, Polyembryony.

Recommended Texts:

- Porter, C.L. ( ): Taxonomy of flowering Plants, Eurasia Publishing ouse, New Delhi.
- Lawrence, G.H.M. (1953): Taxonomy of Vascular Plants, Oxford & IBH Publishers, New Delhi
- Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House(P)Ltd., UBS Publisher's Distributors, New Delhi.
- Maheswari,P(1963) :Recent Advances in the Embryology of Angiosperms(Ed.,) International Society of Plant Morphologists- University of Delhi.
- Maheswari, P.(1985):An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co.,Ltd., New Delhi.

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR III SEMESTER
CHORDATA

	L	T	P	C
Course Code: BSC 307				
(Common with BSCEI 308**)**	**4**	**0**	**0**	**4**

Objectives : The objective is to give an idea of the Chordata and their five classes. To teach the students about the chordate animals like fishes, amphibians,aves, reptiles and mammals and some of their behavior and difference in structures and life histories.

Outcomes : Upon the completion of the semester the students are expected to explain taxonomy of different classes and their difference. The physiology, structure and life histories of animals fall in this category.

Course Content:

UNIT I

1- **Urochordata** : Classification and detailed study (Habit, Morphology, anatomy, Physiology,) of Herdmaina
2- **Cephalochordata** : Classification and detailed study of Branchiostoma (Amphioxus)

UNIT II

1. **Pisces** : General characters and classification of Pisces (up to orders with examples) Parental care in fishes.
2. **Amphibia :** General characters and classification of amphibia (up to orders with examples) Parental care in amphibia.

UNIT III

Reptilia : General characters and classification of Reptilia (up to orders with examples) Identification of Poisonous and non- poisonous snakes. Biting mechanism of poisonous snakes.

Unit IV

Aves : General characters and classification of Aves (up to orders with examples) Characters of Archaeopteryx, Flight adaptation in Birds.

UNIT V

Mammalis : General characters and classification of Mammalia up to orders. Rentition in Mammals.

Recommended books:

1- Young, J. Z, The life of Vertebrates III^{ed} edition oxford University press. London.
2- vertebrate Zoology: E.L. Jordan and P.S. Verma
3- A text book of Zoology vertebrate: R.L. Kotpal Rastogi publication
4- vertebrate Zoology, Publisher: S. Chand

PHYSICS PRACTICAL SYLLABUS FOR III SEMESTER
OPTICS (LAB)

Course Code: BSC 351 **L T P C**
(Common with BSCEI 351/ BAS 259**)** **0 0 2 1**

LIST OF EXPERIMENT

Note : Select any ten experiments from the following list

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's biprism.
3. To determine the specific rotation of the cane sugar solution with the help of Polarimeter.
4. To determine the resolving power and dispersive power by a prism.
5. To determine the resolving power of grating.
6. To study the elliptically polarised light.
7. To determine slit width using He-Ne laser.
8. To determine the Flashing & Quenching of Neon bulb.
9. To determine the Resolving power of a telescope
10. To determine the wavelength of the sodium lamp by Michelson interferometer.
11. To study characteristics of Photo-cell.
12. Familiar with Schuster's focusing, determination of angle of Prism.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

*** Latest editions of all the suggested books are recommended.**

CHEMISTRY PRACTICAL SYLLABUS FOR III SEMESTER
PHYSICAL CHEMISTRY

Course Code: BSC-352	**L**	**T**	**P**	**C**
(Common with BSCEI 352**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

Inorganic

Analysis of simple salt containing an anion and cations
Anion --- CO_3^{-2}, SO_4^{-2},Cl^-,Br^-, CH_3COO^-,NO_3^- BO_3^{-3},PO_4^{-3}.
Cation – Lead, Copper, Iron, Aluminium, Zinc Nickel, Calcium, Potassium, & NH_4^+.

Organic Functional Gr. Reaction (At Least 4)

- Alcohol, Phenols, Aldehydes, ketones Clones, Carboxylic acids & Amides.

Titrimetric Analysis.

- Determination of Fe (II) using $KMnO_4$ with Oxalic Acid as Primary Acid Standerd.
- Determination of CU (II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ Acid as Primary Standard .

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

*** Latest editions of all the suggested books are recommended.**

BOTANY PRACTICAL SYLLABUS FOR III SEMESTER
PLANT TAXONOMY AND EMBRYOLOGY

Course Code: BSC 353 **L T P C**
(Common with BSCEI 353**)** **0 0 2 1**

LIST OF EXPERIMENTS

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus.
2. Demonstration of herbarium techniques.
3. Structure of pollen grains using whole mounts (*Catharanthus, Hibiscus, Acacia*, Grass).
4. Demonstration of Pollen viability test using *in- vitro* germination (*Catharanthus*).
5. Study of ovule types and developmental stages of embryo sac using permanent slides /Photographs.
6. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot Embryos using permanent slides / Photographs
7. Isolation and mounting of embryo (using *Symopsis / Senna* / *Crotalaria*)
8. Field visits . Study of local flora and submission of Field Note Book.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER
CHORDATA

Course Code: BSC 354 **L T P C**
(Common with BSCEI 354**)** **0 0 2 1**

LIST OF EXPERIMENTS

Study of Specimens

Urochordata– Herdmania ,salpa , doliolum

Cephalochordata– Amphioxus

Cyclostomata –petromyzon ,myxine

Pisces –Pristis , torpedo , notopterus , exocoetus , clarius , ophiocephalus , catla , rohu , mrigal

Amphibia– Ichthyophis ,bufo , salamander , uraeotyphlus , necturus, hyla, rhacophorus

Study of permanent slide

Balanoglossus sections through probossiss,collar ,branchiogenital and hepatic region

Amphioxus – oral hood , whole mount section through pharyngeal , intestinal & caudal region ,

Temporary unstained preparation of placoid , cycloid and ctenoid scales

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS PRACTICAL SYLLABUS FOR III SEMESTER
INTEGRAL CALCULUS

Course code: BSC 355 **L T P C**

(Common with BSCEI 355**)** **0 0 2 1**

Objective-To introduce the students with fundamental principles, concepts and knowledge in the areas of Integral Calculus and prepare them to apply these fundamental concepts and working knowledge to other courses.

Course Outcomes:

·To solve problems in integral calculus,

·To apply these fundamental concepts and working knowledge to other courses.

Course Content:

Unit I

Definite integration (Miscellaneous Examples), integration as the limit of sum, Reduction Formula.

Unit II

Multiple integration, Beta and gamma functions and applications, length of curves, Areas bounded by the curves.

Unit III

Drichlet's integral, Volume and surfaces of revolutions

Unit IV

Differential equation of first order and first degree, Differential equation of first order but not of first degree. Miscellaneous differential equations.

Unit V

Linear differential equation of second order with constant coefficient, Linear differential equation of other types.

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Integral Calculus" by Gorakh Prasad, Pothishala Pvt. Ltd.
2. "Integral Calculus" by M. Ray, Shiv Lal Agarwal & Co Agra
3. "Integral Calculus" by P. V. Pishkuno, Peace Publishers Mascow

Reference Books:

1. "Integral Calculus" by Shanti Narayan and P.K Mittal, S.Chand & Company Ltd
2. "Integral Calculus" by Brahmanand, B. S. Tyagi, and B. D. Sharma, Kedarnath Ram Nath.
3. "Integral Calculus by" Shani Narayan, S.Chand & Company Ltd

Study & Evaluation Scheme
Programme: - Bachelor of Science

Semester – IV									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 499	English Communication & Soft Skills – II	3	-	2	4	50	50	100
2	BSC 402	Organic & Inorganic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 403	Complex Analysis	4	-	-	4	40	60	100
4	BSC 404	Oscillations & Wave	4	-	-	4	40	60	100
5	BSC 451	Oscillations & Wave Lab	-	-	2	1	50	50	100
6	BSC 452	Organic & Inorganic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 455	Skill Mathematics - Ordinary Differential Equations			2	1	50	50	100
For ZBC Group									
8	BSC 405	Plant Physiology and Metabolism	4	-	-	4	40	60	100
9	BSC 406	Evolution and Developmental Biology	4	-	-	4	40	60	100
10	BSC 452	Organic & Inorganic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 453	Plant Physiology and Metabolism Lab	-	-	2	1	50	50	100
12	BSC 454	Evolution and Developmental Biology Lab	-	-	2	1	50	50	100
Total			15	-	8	19	320	380	700

SYLLABUS FOR IV SEMESTER
English Communication & Soft Skills – II

Course Code – BSC 499 **L T P C**
3 0 2 4

Objective: To build vocabulary, make simple sentences and communicate freely in simple English and overall professional development

Course Content

Module -1: Basic Communication & Soft Skills

a) Reading comprehension
b) Building conversational skills
c)Verbal & Non-verbal communication
[Note: As part of classroom activity, review and recap the last semester and carry out (oral and written) practice test toupdate the progress card of each student, refer to the Workbook]

Module -2: Vocabulary: Building Blocks

a) Word Formation: Prefix, suffix, conversion and compounding
b) Homophones and one-word substitution
c) Words often confused and misused
d) Idiomatic phrase, Antonyms and Synonyms
[Note: As part of classroom activity, organise and learning language games, initiate the learning of 5 new words per class]

Module-3: English Communication: World around Me

a) Market place, Bus stop, Bank, Post Office
b) Village, Town and City
c) Eating out: Stall, Dhaba and Restaurant
[Note: As part of classroom activity, refer Workbookfor classroom and home assignments, carry out practice tests (written and oral)]

Module -4: Personality Development-II

a) Etiquettes: Telephone, e-mail and at a wedding or social gathering
b) Public dealing: Making enquiries and requesting for help, handling difference of opinion, giving directions, instructions and getting assistance
c) Expressions: Giving compliments, making complaints, Feeling sorry and saying thank you
d) Entertainment: Radio, music, television, and computers
[Note: As part of classroom activity, refer Workbook for classroom and home assignments, carry out practice tests (written and oral)]

Fourth Semester Outcome:

1. Gradual but significant improvement in student's progression in terms of LSRW to be noted
2. Students will improve their English vocabulary of daily usage
3. Students will be able to understand the world around them and communicate in diverse situations
4. Students will be able to imbibe the requisites of personality development for demonstrating good manners in society
5. Students will be able to exhibit basic etiquettes of personal communication

Evaluation & Assessment: Students will be evaluated on all the four parameters of LSRW

External Exam	*Internal Assessment*	*Total*
50	50	100

Internal Assessment: 50

Best 2 out of Three CTs	*Attendance*	*Workbook Assignments & Viva*	*Total*
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

Reference Books:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers
3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press
5. Newspapers

CHEMISTRY SYLLABUS FOR IV SEMESTER
ORGANIC & INORGANIC CHEMISTRY

Course Code: BSC 402 **L T P C**
(Common with BSCEI 404**)** **4 0 0 4**

Objectives: To develop an understanding of different approaches to types of chemical bonding.
To develop an understanding of behavior, chemical nature of various compounds like ether, alcohol, Phenols, Proteins, Amino acids.

Outcomes: Students will be able to appreciate general trends in the chemistry of elements of gr. 13,14,15,16,17 in Periodic table.

Course Content:

Unit I: Chemical Bonding

- Valence Bond Theory.
- Molecular orbital Theory.
- Construction of Mo. Diagrams for homo nuclear & heleronulear diatomic unbleules (N_2,O_2,CO,no)
- Types of bond (Ionic covalent, Coordinate, metallic
- Concept of Hybridization
    a. Definition Types, Prediction of Hybridization
    ($BeCl_2$, CH_4, ClF_4, $POCl_3$, NH_4^+, $H_3O^+CO_3^{-2}$, Cl_4^-)

Unit II: P-Block Element (I)

Group13- Synthesis & structure of diborane, higher borane (B_4H_{10}) (B_5H_9), Boron nitrogen compounds. ($B_4HN_3H_6$) (BN),

Group14- Preparation & Application of silane & Silicones.

Group15-Preparation & Reaction of hydrazine and hydroxylamine.

Group16-Classification of oxides based on 1- Chemical behaviour 2- Oxygen content.

Group17-Inter halogen compounds(Hydro and oxy acids of Chlorine, Structure and comparison of acid strength.)

Preparation, properties & Applications of alkyls of Lithium.

Unit III: Hydrogen Bonding and Vanderwal Forces

Hydrogen bonding and Vanderwals forces

Hydrogen Bonding- Definition,types, effects of H-bonding on properties of substances, applications brief discussion of various types of vanderwals forces.

Metallic Bond, Bond Theory of metallic bond

Semiconductors Types Of Applications.

Unit IV Alcohols Phenols & Ether:-

Alcohols :-

- Preparation.
- Physical Props.
- Reaction of Alcohol.
- Industrial sources of ethyl alcohol Proof Spirit, Denatured Spirit, absolute alcohol.

Phenols:-

- Preparation.

Cumene Hydroperoxide method, from dizonium salts, Reaction-Electrophilic Substitution. Nitration, halogenation & salphonation, Reimer-Tiemann Reaction, Gattarmann-Koch Reaction, Houben-Hoesch condensation.

Ether :-

- Nomenclature,
- Physical Properties
- Laboratory Preparation
- Williamsons Synthesis
- Diazomethane method
- Reactions of ether.

Unit V

Amino acids, Peptides & proteins

Preparation of Amino Acids

- Strecker synthesis using Gabriels phthalimide synthesis, Zwitterion, Isoelectric Point & Electrophoresis.
- Reactions of Amino acid.
- Nin Hydrin test
- Overview of primary, secondary & Tertiary & quaternery st. of protein
- Determination of Primary St. of peptides by Edmann degradation of (N Terminal) & (C-Terminal)
- Synthesis of simple Peptides (up to dipeptides) By N- Protection (t- butyloxycarbonyl & phtholoye), Merrifield Solid phase synthesis.

Reference Books

*** Latest editions of all the suggested books are recommended.**

MATHEMATICS SYLLABUS FOR IV SEMESTER
COMPLEX ANALYSIS

Course code: BSC 403 **L T P C**

(Common with BSCEI 405**)** **4 0 0 4**

Objective –To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions, Residue and Conformal.

Course Outcomes:

- To understand the basic facts of complex analysis, in particular the nice properties enjoyed by the derivatives and integrals of functions of a complex variable
- To show how complexanalysis can be used to evaluate real integrals.

Course Content:

Unit I

Analytic functions, conjugate function, Harmonic function, N.S.C. for Cauchy Remann equations, construct conjugate analytic functions.

Unit II

Complex Integration, Complex line integral, Cauchy integral function, Poisson integral, Lioville's theorem taylor theorem, Lorentz theorem.

Unit III

Zero's & Singularity, Zero's of a function, singular point, poles and different types of singularities, limiting point of zero's and poles, Weirstress theorem.

Unit IV

The Calculus of Residue, Residue of a pole at infinity Residue theorem Integration around $\int_{-\infty}^{\infty} f(z)\,dz$ unit circle, evaluation of integral .

Unit V

Conformal mappings, transformation w = z2, w = z1/2 , z = c sin w

Text Books:

1. "Complex Variable" by T Pati, Pothishala Pvt Ltd
2. "Complex Variable" by J. K. Goyal and K. P. Gupta, Pragati Prakashan
3. "Complex Variable" by J. C. Chaturvedi and S.S. Seth, Student Friends & Co.

Reference Books:

1. "Complex Variable" by L. V. Alfors, Mc-GrawHill &Co,
2. "Complex Variable" by R. K. Gupta, R. V. Churchiland J. W. Browin, Mc-GrawHill &Co,
3. Complex Variable by Shanti Narayan, S.Chand &Company

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR IV SEMESTER
OSCILLATIONS & WAVE

Course code: BSC 404 **L T P C**
(Common with BSCEI 406**)** **4 0 0 4**

Objective: To understand the fundamentals of physics like oscillations & wave motion,
Course Outcomes: After completion of the course, student will be able to **-**

1. Toget the idea of geometrical oscillations including the wave motion
2. Toprovide basic and advanced concept of wave motion.

Course Content:

Unit I Oscillations SHM :-

Simple Harmonic Oscillations. Differential Equation of SHM and its Solution. Amplitude, Frequency, Time Period and Phase. Velocity and Acceleration. Kinetic, Potential and Total Energy and their Time Average Values. Reference Circle. Rotating Vector Representation of SHM.

Unit II Free Oscillations of Systems with One Degree of Freedom :-

(1) Mass-Spring system, (2) Simple Pendulum, (3) Torsional Pendulum, (4) Oscillations in a U-Tube, (5) Compound pendulum: Centres of Percussion and Oscillation, and (6) Bar Pendulum.

Unit III Superposition of Two Collinear Harmonic Oscillations :-

Linearity and Superposition Principle. (1) Oscillations having Equal Frequencies and (2) Oscillations having Different Frequencies. Superposition of Two Mutually Perpendicular Simple Harmonic Motions with Frequency Ratios 1:1 and 1:2 .

Unit IV System with Two Degrees of Freedom :

Coupled Oscillators. Normal Coordinates and Normal Modes. Energy Relation and Energy Transfer. Normal Modes of N Coupled Oscillators.Free Oscillations. Damped Oscillations Transient and Steady States, Amplitude, Phase, Resonance ,Power Dissipation and Quality Factor. Helmholtz Resonator.

Unit V Wave Motion:

Plane and Spherical Waves. Longitudinal and Transverse Wave Equation. Particle and
Wave Velocities. Velocity of Waves :- Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.

Text Books:

1- Vibrations and Waves by A. P. French.(CBS Pub. & Dist., 1987)
2- The Physics of Waves and Oscillations by N.K. Bajaj (Tata McGraw-Hill, 1988)
3- Fundamentals of Waves & Oscillations By K. Uno Ingard (Cambridge University Press, 1988) .

Reference Books:

1- An Introduction to Mechanics by Daniel Kleppner, Robert J. Kolenkow (McGraw-Hill, 1973)
2- Waves: BERKELEY PHYSICS COURSE (SIE) by Franks Crawford (Tata McGraw-Hill, 2007).

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR IV SEMESTER

PLANT PHYSIOLOGY AND METABOLISM

Course Code: BSC 405 **L T P C**
(Common withBSCEI 407 **)** **4 0 0 4**

Course Objectives:

- To make students capable of understanding basic physical processes occurring in plants.
- To impart Knowledge about plant growth regulatorsrelated togrowth and development.
- To make student learn about the Mineral nutrition in plants.

Learning Outcomes:

- Students will learn about the physical processes occurring in plants.
- Students will learn the function of different plant growth regulators.

Course Content:

Unit 1: Plant-water relations

Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

Unit 2: Mineral nutrition and Translocation

Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements, Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps.

Translocation in phloem. : Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading

Unit 3: Photosynthesis and Respiration

Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation.

Respiration: **g**lycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation.

Unit 4: Enzymes and Nitrogen metabolism

Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition. Nitrogen metabolism **:** Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit 5: Plant growth regulators and Plant response to light and temperature

Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.
Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.

Recommended books:

1. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.

2. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
3. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR IV SEMESTER
EVOLUTION AND DEVELOPMENT BIOLOGY

Course Code: BSC 406	**L**	**T**	**P**	**C**
(Common with BSCEI 408**)**	**4**	**0**	**0**	**4**

Objectives : To educate the students on the concept and theories of the evolution and embryology. The development of chick and placentation.

Outcomes : As an outcome the student will be able to explain and write the different theories given to explain the evolution during the time period like Darwininsm and Lamarkism and can be understand the developmental biology.

Course Content:

Unit – 1

1- Concept of evolution. evidences of evolution
2- Theory of evolution (including Neo-Lamarckism
Darwin – Wallace theory of natural selection, Neo- Darwinism modern synthetic theory.

Unit-2

1- Gametogenesis : spermatogenesis and oogenesis, vitellogenesis egg membrane
2- Fertilization, Parthenogenesis

Unit-3

1- Types of animal eggs : structure of eggs
2- Types and patterns of cleavage

Unit -4

1- Process of blastulaion and gastrulation
2- Development of chick up to the formation of primitive streak and extra embryonic membrane

Unit -5

1- Development of extra embryonic membrane in mammals
2- Placentation and types of placenta

Recommended books:

1. Gilbert, S.F. (2006) , development biology , VIII edition , sinauer associates inc publishers, sunder land, Massachusetts, USA.
2. Balinsky, B.I. (2008) An introduction to embryology, international Thomson computer press.
3. Kalthoff,(2000) Analysis of biological development ,II edition, mc graw hill professional
4. Verma P.S. & V.K. agrawal , chordate embryology, s. Chand & co.
5. Berril & crop development biology. Mc graw hill book company , m,c,new York
6. Jain P.C. 1998, elements of development biology . vishal publication , new delhi

PHYSICS PRACTICAL SYLLABUS FOR IV SEMESTER
OSCILLATIONS & WAVE

Course Code: BSC451 **L T P C**
(Common with BSCEI 451**)** **0 0 2 1**

LIST OF EXPERIMENT

Note : Select any ten experiments from the following list

1. To determine acceleration due to gravity (g) by Bar Pendulum.
2. To determine acceleration due to gravity (g) by Kater's Pendulum.
3. To study the Motion of a Spring and calculate (a) Spring Constant (b) acceleration due to gravity and (c)Modulus of Rigidity
4. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment
5. To determine frequency of A.C. mains by mean of sonometer.
6. To determine the motion of coupled oscillator.
7. To determine frequency of A.C. mains by electric vibrator.
8. To study Lissajous figures.
9. To study AF and RF oscillator.
10. To stuy simple harmonic motion of a body.
11. To determine gravity (g) and velocity of freely falling body using digital technique.
12. To determine the wave form, voltage and frequency of a given signal using C.R.O.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

CHEMISTRY PRACTICAL SYLLABUS FOR IV SEMESTER
CHEMISTRY PRACTICAL

Course Code: BSC-452	**L**	**T**	**P**	**C**
(Common with BSCEI-452)	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

Inorganic Chemistry

Preparation of inorganic compounds

a) Microcosmic Salt
b) Potassium Permangnate

Oraganic

- Detection of Special Elements
  (N., S, CL, Br, I&P)

Physical

- Determination of Surface tension of liquid
- Determination of Viscosity of liquid

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

BOTANY PRACTICAL SYLLABUS FOR IV SEMESTER
PLANT PHYSIOLOGY AND METABOLISM

Course Code: BSC 453 **L T P C**
(Common with BSCEI 453**)** **0 0 2 1**

LIST OF EXPERIMENTS

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Separation of amino acids by paper chromatography.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR IV SEMESTER
EVOLUTION AND DEVELOPMENT BIOLOGY

Course Code: BSC 454	**L**	**T**	**P**	**C**
(Common with BSCEI 454**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1- **Reptiles –** study of chamelon , varanus , pharynosoma , draco , tortoise , cobra , krait , russel's , viper , sea snake testuda ,
2- Hemidactytus, uromastix , ophiosaurus , hydrophis , crocodiles
3- **Birds –** study of owl, woodpecker , king fisher, kite , duck, parrot, study of dozen birds of delhi
4- **Mammals –** study of squirrel, mangoose, bat, loris, rabbit,

Development biology

1- **Frog-** study of developmental stage w.m &section through permanent slides cleavage , stage, blastula , gastrula , neurula tadpole
2- **Chick –** study of developmental stage primitive streak ,- 21h , 24h , 28h, 33h, 36h, 48h, 72h
3- Section of testis and ovary (mammalian)
4- Slides of mammalion sperm and ovum

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS SYLLABUS FOR IV SEMESTER
ORDINARY DIFFERENTIAL EQUATIONS

Course code: BSC- 455 **L T P C**

(Common with BSCEI 455**)** **0 0 2 1**

Objective: Differential equations arise in every field of science and engineering. So, the solutions of these DEs are of great interest in understanding various physical phenomena.

Course Outcomes: To formulate and solve differential equations arising from changes in physical world.

Course Content:

Unit I

Linear Equation of second order finding general solution of $\frac{d^2y}{dx_2} + p\frac{dy}{dx}$ + Qy = 0 by removing first derivative; changing Independent variable; Method of Variation of parameters, Normal form and Method of operational operators.

Unit II

Ordinary Simultaneous linear differential Equation. Linear differential Equation of the form dx = dy = dz PQ R

Unit III

Pfaffian differential forms and equations. Necessary and sufficient condition for Inerrability of Pdx + Qdy + Rdz = 0

Unit IV

Integration in series

Unit V

Picards' Iteration method. Uniqueness and existence theorems.

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Differential Equation" by Zill, Cengage Learning.
2. "Differential Equation" by R. K. Gupta and J. N. Sharma, Krishana Prakashan Mandir
3. "Differential Equation" by Zafar Ahsan, Prentice Hall of India

Reference Books:

1. "Differential Equation" by M. D. Raisinghania, S .Chand & co.
2. "A Treatise on diff. Equation" by A. R. Forsyth, Macmillan & company Ltd.
3. "Introduction on Differential Equation" by D.A. Murray, Orient Longman India.

* Latest editions of all the suggested books are recommended.

Study & Evaluation Scheme
Programme:- Bachelor of Science

Semester – V									
Sr.No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 599	English Communication & Soft Skills – III	3	-	2	4	50	50	100
2	BSC 502	Physical & Inorganic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 503	Differential Geometry And Tensor	4	-	-	4	40	60	100
4	BSC 504	Semiconductor and Solid State Devices	4	-	-	4	40	60	100
5	BSC 551	Semiconductor and Solid State Devices Lab	-	-	2	1	50	50	100
6	BSC 552	Physical & Inorganic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 555	Skill Mathematics - Statistics	-	-	2	1	50	50	100
For ZBC Group									
8	BSC 505	Economic Botany and Plant Biotechnology	4	-	-	4	40	60	100
9	BSC 506	Cell Biology & Genetics	4	-	-	4	40	60	100
10	BSC 552	Physical & Inorganic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 553	Economic Botany and Plant Biotechnology Lab	-	-	2	1	50	50	100
12	BSC 554	Cell Biology & Genetics Lab	-	-	2	1	50	50	100
		Total	15	-	8	19	320	380	700

SYLLABUS FOR V SEMESTER
English Communication & Soft Skills-III

Course Code – BSC 599 **L T P C**
3 0 2 4

Objective: To learn job oriented, presentation and interview skills and business correspondence.

Course Content

Module -1 Functional Grammar-II
a) Sentence construction: Simple, Complex and Compound
b) Application writing
c) Paragraph writing, essay writing and precis writing
d) Pre-testing of oral and writing skills
[Note: As part of classroom activity,Review and recap of last semester and update progress of each student refer Module 3 of Workbook]

Module-2 Professional Skills

a) Biodata, CV and resume writing
b) Joining Letter,Cover Letter&Resignation letter
c) Inter-Office Memo, Formal Business Letter, Informal Notes
d) Minutes of the Meeting,Reporting Events, Summary Writing

[Note: As part of classroom activity, use of standard templates and scenario buildings, practice sessions in classroom and homework assignments, refer to Workbook]

Module -3Presentation Skills

a) Power-point presentations & presentation techniques
b) Body language
c) Describing people, places and events
d) Extempore speech and Just-a minute sessions

[Note: As part of classroom activity, practice sessions carried out in class on different topics of the domain expertise, refer to Workbook]

Module -4Interview Skills

a) Developing skill to (a) Debate (b)Discussion, Basics of GD &styles of GD
b) Discussion in groups and group discussion on current issues
c) Steps to prepare for an interview and mock interviews

[Note: As part of classroom activity, language games, extensive coverage of contemporary issues for GDs, facing mock interview sessions with faculty, respective TPOs and Director CRC]

Fifth Semester Outcome:

1. Considerable improvement in student's progression in terms of LSRW to be noted.
2. Students will improve their writing skills for official communication.
3. Students will be able to give presentationand extempore speech on select topics.
4. Students will be able to discuss among peers and participate in group discussions on current issues.

Evaluation & Assessment: Students will be evaluated on all the four parameters of LSRW

External Exam	*Internal Assessment*	*Total*
50	50	100

Internal Assessment: 50

Best 2 out of Three CTs	*Attendance*	*Workbook Assignments & Viva*	*Total*
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

Reference Books*:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. Communication Skills for Engineers and Scientists by Sangeeta Sharma &Binod Mishra, PHI Learning Private Limited, New Delhi.
3. Professional Communication by Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press
5. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi

CHEMISTRY SYLLABUS FOR V SEMESTER
PHYSICAL & INORGANIC CHEMISTRY

Course Code: BSC 502	**L**	**T**	**P**	**C**
(Common with BSCEI 504**)**	**4**	0	**0**	**4**

Objectives: To formulate the values and attitude related to environment.

To develop the understanding of Energy exchange processes in terms of various forms of energy, heat and work.

To develop basic understanding of co-ordination chemistry.

Outcomes: Sensitivity will develop in students towards environment.

Students will be able to state the various laws and will be able to correlate them in day to day life.

Course Content:

Unit I

- **Electrochemistry**
  - Specific Conductance.
  - Equivalent Conductance.
  - Kohlrausch's law
  - Arhenius Theory of electrolyte dissociation & Limitations
  - Oswald's dilution law.
  - Debye Huckel – onsagar^{S} equationSeq^{n} for Strong. Electrolyte
  - Definition of Transport Number.
  - Determination by Hittorf's Method

Unit II

- **Thermodynamics**
  - Types of System
  - Intensive and Extensive Properties
  - Zeroth Law & First Law of thermodynamics.
  - Enthalpy & Internal Energy (def).
  - Heat capabilities & their relationship
  - Second Law of Thermodynamics.
  - Concept of entropy
  - Entropy Change during Phase transitions
  - Carnot cycle & its efficiency.
  - Gibbs free energy.
  - Joule thomson effect.

Unit III

- **Ionic Equilibria**
  - Strong, moderate weak electrolytes.
  - Degree of Ionization .
  - Ionization Constant
  - Ionic product of water
  - Common ion effect.
  - PH Scale.
  - Salt Hydrolysis.
  - Calculation of hydrolysis Constant. and degree of hydrolysis.
  - Buffer solution, Buffer Action.
  - Solubility Product of Sparingly Soluble salt, application of Solubility product.

Unit IV

- **Environmental Chemistry**
    - Importance of environment now-a-days.
    - Natural resources (Renewable Resources).
    - Non renewable resources.
    - Photochemical Smog.
    - Biological Oxygen demand.
    - COD
    - Pesticides & its Biochemical effects, toxicity of Lead, Mercury, arsenic & cadmium.

Unit V

- **Coordination Chemistry**
    - IUPAC Nomenclature.
    - Werner's Theory
    - Valence bond Theory
    - Crystal field theory
    - Isomerism in coordinate compounds (structural and stereo Isomerism)
    - Importance of co-ordination compounds.

Recommended Texts:

*** Latest editions of all the suggested books are recommended.**

MATHEMATICS SYLLABUS FOR V SEMESTER
DIFFERENTIAL GEOMETRY AND TENSOR

Course Code: BSC 503	**L**	**T**	**P**	**C**
(Common with BSCEI 505**)**	**4**	**0**	**0**	**4**

Objective: To introduce space curves and their intrinsic properties of a surface. Further the nonintrinsic properties of surface Tensor law of transformation and the differential geometry of surfaces are explored

Course outcomes: To aware of interplay of D.G. and tensor.

Course Content:

Unit I

Curves in space, space curves, are lengths, tangent plane lines, osculating plane, normal plane, unit vectors t, n, b, serret fernet formula, curvature and torsion of curves helix, osculating circle and osculation sphere.

Unit II

Fundamentals of surfaces, definition of surface, class of a surface, regular and singular point, tangent and normal planes, fundamental form and relation between E, F, G, Fundamental magnitude of slandered surface.

Unit III

Envelopes and Developable surfaces, characteristics envelop, edge of regression, developable surface, envelops of a plane etc.

Unit IV

Contra variant & Covariant Vectors & Tensors, Contraction, Tensor algebra, Associated Vectors and Tensors.

Unit V

Christoffel Symbols, Tensor law of transformation, Covariant derivative of Tensors. Riemann Christoffel Tensor.

Text Books:

1."Differential Geometry" by A. R. Vasistha and J. N. Sharma, Kedarnath Ramnath
2. "Tensor Calculus" by G. C. Sharma and S.K. Singh Laxmi Narayan Publisher Agra

Reference Books:

1. "Differential Geometry" by A.B. Chandra Moule and J. B. Chauhan, Siksha Sahitya Prakashan
2. "Differential Geometry" by P. P. Gupta and G. S. Malik, Pragati Prakashan
3. "Differential Geometry" by S. C. Mittal and D. C. Agarwal, Krishna Pracashan
4. "Differential Geometry" by T. J. Willmore Oxford University Press, New Delhi

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR V SEMESTER
SEMICONDUCTOR/ SOLID STATE DEVICES

Course Code: BSCEI 504	**L**	**T**	**P**	**C**
(Common with BSCEI 506 **)**	**4**	**0**	**0**	**4**

Objective: The aim of the course is to develop physics and engineering strategies of semiconductor materials and to discuss their functionalities in modern electronic and optoelectronic devices.

Course Outcomes: After completion of the course, student will be able to understand

- Solid state materials and k-space representation etc.
- Fermi distribution, DOS and carrier transport, etc.
- The processing of semiconductor devices like 1D, 2D & 3D photonic crystals.

Course Content:

Unit I

CRYSTAL AND LATTICE : Crystal lattice, Packing fraction, Crystal planes and sections, Crystal structure of Ge, Si and GaAs, Band theory of semiconductors, Metals, semiconductors and insulators, Semiconductors crystals, Effective mass concept.

Unit II

CARRIER CONCENTRATIONS : The Fermi level, Electron and Hole concentration at equilibrium, Direct and Indirect recombination of electrons and holes, Hall effect, Steady-state carrier generation, Quasi-Fermi levels.

Unit III

TRANSPORT PHENOMENA : Drift and Diffusion of Carriers, Recombination, Continuity and Diffusion equations, Hynes-Shockley experiment. P-N JUNCTIONS: The Contact Potential, Space Charge at a junction, Steady state condition, Current at a junction, Carrier injection, Junction breakdown, Time variation of stored charge, P-N junction capacitance, Graded junction.

Unit IV

JUNCTION DIODES : Varactor Diode, Concept of negative resistance Devices, Tunnel Diode, Current and Voltage in an illuminated junction, Photo Diode, Photo detector, Solar Cells, Light Emitting Diode, Metal Semiconductor Junction. Principle of PIN photo detector and Avalanche photodiode, Noise in photo detectors, Detector response time, Photodiode materials.

Unit V

BIPOLAR JUNCTION TRANSISTOR (BJT) : Charge transport and current in a BJT, Current transfer ratio, Terminal currents, Generalized biasing, Charge control analysis, BJT switching, Turn-on and Turnoff transients, Base narrowing, Frequency limitations of a transistor. FET, MOSFET: Principle of Operation and I-V Characteristics of FET, MESFET, MOSFET, MOS Capacitor, Threshold voltage in MOSFET.

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Integrated Electronics" – Millman & Halkies, Tata McGraw.
3. "Physics of Semiconductor Devices" – S. M. Sze..

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR V SEMESTER
ECONOMIC BOTANY AND PLANT BIOTECHNOLOGY

Course Code: BSC 505	**L**	**T**	**P**	**C**
(Common with BSCEI 507**)**	4	**0**	**0**	**4**

Course Objectives:

- To make students capable of understanding the centres of origin of different crops.
- To impart knowledge about economic importance of some cash crops.
- To make student learn about the techniques in plant biotechnology.

Outcomes:

- Students will learn about the centres of origin of different crops.
- Students will learn the origin and plant parts used in some important cash crops.
- Students will learn the latest techniques in plant biotechnology.

Course Content:

Unit I:

Origin of Cultivated Plants : Concept of centres of origin and diversity of cultivated plants, Vavilovian centres. Cereals : Rice -Origin, morphology, uses
Legumes : General account with special reference to Gram and soybean

Unit II

Spices and Beverges : General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)
Beverages : Tea (morphology, processing, uses)

Unit III

Fat and Fibre yielding plants : General description with special reference to groundnutFibre Yielding Plants: General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

Unit IVIntroduction to Biotechnology

Plant tissue culture: Micropropagation; haploid production through androgenesis and gynogenesis; briefaccount of embryo and endosperm culture with their applications

Unit V

Recombinant DNA Techniques

Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR.
Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy.

Recommended Texts:

- Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
- Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
- Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology-Principles and Applications of recombinant DNA. ASM Press, Washington.

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR V SEMESTER
CELL BIOLOGY AND GENETICS

Course Code: BSC 506	**L**	**T**	**P**	**C**
(Common with BSCEI 508**)**	**4**	**0**	**0**	**4**

Objectives : The objective of this semester is to educate students on cell biology and genetics. Structure and function of cell and other cell organelles will be taught to them. Knowledge on Mendel's principles on genetics, Structure of chromosomes, DNA and RNA will be given to them.

Outcomes : After completion of the semester the student will be able to explain the genetics and how the traits transfers from one generation to another. They can also be able to draw and explain the structure of cell and cell organelles

Course Content:

Unit I:

Structure and function of cell

Ultrastructure of Plasma membrane

Unit II

Structure and function of cell organelles with special emphasis on mitochondria, golgibodies, nucleus, ribosome and endoplasmicreticulum.

Unit III

Structureof Chromosomes, Watson & Crick Modelof DNA, Differences Between DNA & RNA
Cell Division : Mitosisand Meiosis.

Unit IV

Mendels principles of heredity on chromosomal basis
Monohybrid cross, test cross, dihybrid cross, backcros, incomplete dominance,
Multiple Alleles, Blood group inheritance.

Unit V

Linkageand crossingover, interaction of genes. Theory of DNA in heredity.
Sex determination, sex differentiation, Sex-linked characters,
Genetic diseases and abnormalities, chromosomal aberrations,

Recommended Texts:

1- De Robertis, E.D.P. and De Robertis, E.M.F. 2006 Cell and molecular Biology 8th edition-lippincott willians and Wilkins, Philadelphia
2- Gupta P.K. Genetics Rastogi publication merrut .
3- Verma P.S.and V.K. Agarwal, Concept of cell Biology S chand & co.
4- Lodish etal :- molecular cell Biology (scientific American book)
5- Veer bala rastogi . Introduction to Cell biology, rastogi publication merrut

*** Latest editions of all the suggested books are recommended.**

PHYSICS PRACTICAL SYLLABUS FOR V SEMESTER

SEMICONDUCTOR/ SOLID STATE DEVICES LAB

Course Code: BSC 551 **L T P C**
(Common with BSCEI 551/ BAS 151**)** **0 0 2 1**

LIST OF EXPERIMENTS

Note: Select any ten experiments from the following list

1. To determine Plank's constant using LEDs of at lest 4 different colors filter.
2. To determine Ionization Potential of a gas.
3. To draw forward and reverse bias characteristics of a semiconductor diode.
4. To study the characteristics of Zener Diode voltage regulation.
5. To verify the inverse square law by photo-cell.
6. To study the characteristics of a solar cell.
7. To measure the Resistivity of a Ge Crystal with Temperature by Four-Probe Method (from room temperature to 200^{o} C) and to determine the Band Gap Eg for it.
8. To determine the Hall Coefficient and the Hall angle of a Semiconductor.
9. To study the PE Hysteresis loop of a Ferroelectric Crystal.
10. To measure the Magnetic susceptibility of Solids and Liquids.
11. To determine wavelength of H-alpha emission line of hydrogen atom.
12. Study of logic gates.

Evaluation of Practical
Examination: Internal Evaluation
(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

CHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER
PHYSICAL & INORGANIC CHEMISTRY LAB

Course Code: BSC 552 **L T P C**
(Common with BSCEI 552**)** **0 0 2 1**

LIST OF EXPERIMENTS

Inorganic

Sepration of mix of sugar solution. (glucose, Fructose & Sucrose) by paper Chromatography.

Organic

Analysis of an organic compounds through systematic qualitative procedure for functional gr. Identification including the determination of M.P & B.P (Alcohol, phenol, Aldehydes, kelons, carboxlic acid, aromatic pri amines.

Physical

Determination of $Conc^N$ of HCl Conductometrically using standard NaOH Soln.
Determination of $Conc^N$ of CH_3COOH Conductometrically using standard NaOH Soln.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

*** Latest editions of all the suggested books are recommended.**

BOTANY PRACTICAL SYLLABUS FOR V SEMESTER
ECONOMIC BOTANY AND PLANT BIOTECHNOLOGY

Course Code: BSC 553 **L T P C**
(Common with BSCEI 553**)** **0 0 2 1**

LIST OF EXPERIMENTS

1. Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests
2. Familiarization with basic equipments in tissue culture.
3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
CELL BIOLOGY&GENETICS LAB

Course Code: BSC 554 **L T P C**
(Common with BSCEI 554**)** **0 0 2 1**

LIST OF EXPERIMENTS

1- Microscopy – Theoretical knowledge of light and electron microscope.
2- Study of structure of cell organelles through electron microscope.
3- Study of mitosis and meiosis from permanent slides
4- Preparation and study of slides for mitosis using squash technique (onion root tip)
5- Study of hardy – Weinberg law using simulations (seed)
6- Osteology – study of skeleton of fowl
I- Axial skeleton
II- Appendicular skeleton

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE	VIVA	TOTAL
EXPERIMENT	FILE WORK	VIVA	(10 MARKS)	(10 MARKS)	INTERNAL
(10 MARKS)	(10 MARKS)	(10 MARKS)			(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS PRACTICAL SYLLABUS FOR V SEMESTER
STATISTICS

Course Code: BSC 555 **L T P C**
(Common with BSCEI 555**)** **0 0 2 1**

Objective-The objective of this course is to provide an understanding for the graduate business student on statistical concepts to include measurements of location and dispersion, sampling, estimation, hypothesis testing, regression, and correlation analysis, multiple regression and business/economic forecasting.

Course Outcomes: By completing this course the student will learn to perform the following:

Course Content:

Unit I

Methods of least squares, and its use for Curve Fitting and fitting of straight lines and parabola, Normal equations, Most plausible lines.

Unit II

Bivariate distribution, Karl's Pearson's coefficient of Correlation, Rank Correlation and Line of Regression, Proof of $-1 < r < 1$.

Unit III

Consistency and Association of attributes, Theory of Attributes and their combination, class frequency. Association of datas, dependent and independent attributes

Unit IV

Hypothesis Testing:Types of Hypothesis, level of significance, Critical Region, Power of a test, Types of Error, t-test, z-test, Anova.

Unit V

Properties of $\chi 2$ distribution, calculation of theortical freequences, problem of $\chi 2$ distribution at significant level.

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Statistics" by M. Ray and H. S. Sharma, Ram prashad & Sons
2. "Statistics" by J. N. Kapoor and H. C. Saxena, S.Chand & Company
3. "Statistics" by B. D. Gupta and O. P. Gupta, Krishana Prakashan Mandir

Reference Books:

1. "Statistics" by O. P. Gupta, Kedar Nath Ram Nath
2. "Statistics" by J.K. Goyal and J. N. Sharma, Krishana Prakashan Mandir
3. "Statistics" by V. K. Kapur and S. C. Gupta, Sultan Chand & Sons

*** Latest editions of all the suggested books are recommended.**

Study & Evaluation Scheme
Programme:- Bachelor of Science

Semester – VI									
Sr. No	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Core Courses									
1	BSC 699	English Communication & Soft Skills – IV	3	-	2	4	50	50	100
2	BSC 602	Physical & Organic Chemistry	4	-	-	4	40	60	100
For PCM Group									
3	BSC 603	Applied Statistics	4	-	-	4	40	60	100
4	BSC 604	Thermal Physics and Statsticial Mechanics	4	-	-	4	40	60	100
5	BSC 651	Thermal Physics and Statsticial MechanicsLab	-	-	2	1	50	50	100
6	BSC 652	Physical & Organic Chemistry Lab	-	-	2	1	50	50	100
7	BSC 655	Mammalian Physiology - Operation Research	-	-	2	1	50	50	100
For ZBC Guoup									
8	BSC 605	Environmental Biotechnology	4	-	-	4	40	60	100
9	BSC 606	Mammalian Physiology	4	-	-	4	40	60	100
10	BSC 652	Physical & Organic Chemistry Lab	-	-	2	1	50	50	100
11	BSC 653	Environmental Biotechnology Lab	-	-	2	1	50	50	100
12	BSC 654	Mammalian Physiology Lab	-	-	2	1	50	50	100
Total			15	-	8	19	320	380	700

SYLLABUS FOR VI SEMESTER
English Communication & Soft Skills-IV

Course Code – BSC 699 **L T P C**
3 0 2 4

Objective: To inculcatebehavioural skills in students for the Corporate World

Course Content

Module -1Fundamentals of Time Management & Managing Change

a) Time Management
b) Managing People and managing change
c) Team building, Leadership and taking decisions
d) Stress Management

[Note: As part of classroom activity, refer to the Workbook, guest lecture by management faculty]

Module -2Public Speaking

a) Art of public speaking
b) Welcome speech
c) Farewell Speech
d) Vote of thanks

[Note: As part of classroom activity, extensive practice sessions in class and home assignments]

Module -3Personality Development-III

a) Rude vs Polite Behaviour
b) Ethics and human values
c) Concern for environment
d) Crisis Management

[Note: As part of classroom activity, refer to the Workbook, guest lecture by management faculty and industry representative]

Module -4Oral Practice

a) Debate
b) Just-a-minute
c) Group Discussions
d) Mock Interviews

[Note: As part of classroom activity, extensively test the oral skills and update the progress card of each student]

Sixth Semester Outcome:

1. Notable improvement in student's progression in terms of LSRW.
2. Students will be able to imbibe good practices of self-discipline and professionalism required in the corporate world.
3. Students will be able to develop the art of public speaking.
4. Students will be able to learn behavioural skills suitable for the corporate world.

Evaluation & Assessment: The students will be evaluated on all four parameters of LSRW

External Exam	*Internal Assessment*	*Total*
50	50	100

Internal Assessment: 50

Best 2 out of Three CTs	*Attendance*	*Workbook Assignments & Viva*	*Total*
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

Reference Books*:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. Communication Skills for Engineers and Scientists by Sangeeta Sharma &Binod Mishra, PHI Learning Private Limited, New Delhi.
3. Professional Communication by Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press
5. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi

CHEMISTERY SYLLABUS FOR VI SEMESTER
PHYSICAL & ORGANIC CHEMISTRY

Course Code- BSC 602 L T P C
(Common with BSCEI 603**)** **4 0 0 4**

Objectives: To develop an understanding of important concept of Electrochemistry and various properties.
To develop understanding of Halogen compound, carbonyl and carboxylic acid compound.
To build solid foundation of Spectroscopy.

Outcomes: Students will be able to write the mechanism of electrophilic and nucleophilic substitution reaction.
Students will gain knowledge of spectrum, Electromagnetic radiations and other important topic related to Spectroscopy.

UNIT 1 (a) Halogen Compounds:

- Nomenclature & Classification of alkyl (into Primary, Secondary & Tertiary) aryl, allyl, benzyl halides, vinyl.
- Nucleophilic aliphatic substitution reaction classification into SN^1 & SN^2 (reaction mechanism with Example)
- Wurtz Fitting reaction, ulmann reaction.

(b) Nitro Compounds:

- Preparation Of Nitro Alkanes and Nitro Arenes and their chemical reaction.
- Mechanism Of Electrophilic substitution Reaction in Nitro Arenes and their reduction in acidic, neutral and alkaline medium.

UNIT 2 Carbonyl Comp.

- Nomenclature of aliphalic & aromatic carbonyl Compounds.
- Synthesis of aldehydes from acid Chlorides.
- Synthesis of aldehydes Ketones using 1,3 dithianes.
- Synthesis of aldehydes from nitriles, & from carboxylic acids.
- Physical Properties.
- Reactivity of carbonyl group in aldehydes & ketones.
- Nucleophillic addition reaction with- (1) $NaHSO_3$ HCN, RMgX, NH_2OH.
  (Canizaro reaction, Perkin Reaction, Benzoin Condensation)
  (Knoevenenagel reaction, Clemmensen reaction,)
  (Wolf kishner reaction,)
- Analysis of aldehydes & Kelones with→Tollen reagent fehling test , Schiff test..

UNIT 3 A. Carboxylic acid & derivatives.

- Nomenclature & Classification of Carboxlic acids.
- Method of preparation by-:
  a) Hydrolysis of nitriles amides.
  b) Hydrolysis of esters by acids & bases
  c) Carbonation of Grignard reagent.

Physical Properties

- Acidity strength of acids with Example of trimethylacetic acid & trichloro acetic acids.
- Relative differences In acidities of aromatic & aliphatic acids.
- Chemical Properties.
  a) Salt formation
  b) Anhydride formation

c) Acid Chloride formation
d) Amide formation
e) Esterification

- Degradation of carboxlic acids by huns diecker reaction, decorboxylation by schimadt reaction.

Arndt Eistert Synthesis.
Hell Volhard Zelinsky reaction

UNIT 4 Dilute Solution

- Colligative properties, Raoult's law Relative Lowering of vapour pressure, Its relation to molecular weight of non Volalite solute , Elevation in B.P & Depression of F.P
- Derivation of relation between molecular weight & Elevation in B.P & Depression in F.P.
- Osmosis, Osmotic, presure.
- Theory of dilute Solution
- Abnormal colligative properties.
- Vant Hoff factor.

UNIT 5 |Electro Chemistry II

- Single electrode potential sign convention.
- Reversible & irreversible cells, Nernst equation.
- Reference Electrode.
- Standard Hydrogen electrode calomel electrode
    1. Indicatore Electrode
    2. Determination of EMF of All
    3. Potentoimetric Titration.
- Spectroscopy: Electromagnetic Radiation, Regions Of Spectrum, Basic Features of spectroscopy, statement of Born-oppenheimer approximation, degree of freedom.

MATHEMATICS SYLLABUS FOR VI SEMESTER
APPLIED STATISTICS

Course Code: BSC 603	**L**	**T**	**P**	**C**
(Common with BSCEI 604/ BAS 605**)**	**4**	**0**	**0**	**4**

Objective: To apply Statistics Methods for Mathematical Problems with the help of Quality control, Time Series, Index Number and Decision Theory.

Course outcomes: To study, correctly apply and interpret different statistical methods.

Course Content:

Unit I

Statistical Quality control: General theory of control charts, causes of variation in quality, control limits, sub-grouping, summary of out of control criteria, charts for attributes np chart, pchart, c chart, Chart for variables X R and sigma charts.

Unit II

Time Series: Introduction, components of time series, models of time series, measurement of Trend-graphic, semi-average, least square and moving average methods, Measures of seasonal variation – Simple average, Ratio to M. A., Ratio to trend, link relative method.

Unit III

Demographic Methods : Sources of demographic data-census, register, adhoc survey, hospital records, demographic profile of Indian census, Rates & ratios of vital events, Measurements of mortality and life tables-crude, death rates, Infant mortality rates, death rate by cause, standardized death rate, complete life table-its main features, mortality rate and probability of dying, use of survival tables, Measurement fertility-crude birth rate, general fertility rate, total fertility rate, gross reproduction rate, net reproduction rate.

Unit IV

Index Number: Its definition, application of index numbers, price quantity and value relatives, link and chain relatives, problems involved in computation of index numbers, use of averages, simple and weighted aggregative and average methods, Laspeyre's Passche's, Marshall Edgeworth and Fisher's index numbers, time and factor resersal tests of index numbers, Consumer price Index.

Unit V

Decision Theory: Different kind of decision theory, inventory control, CPM, PERT.

Text Books:

1. "Mathematical Statistics" by S.C. Gupta, S. Chand & co.
2. "Operation Research" by D. S. Hira, S. Chand & co.

Reference Books:

1. "Operation Research" by Winston, Cengage Learning
2. "Operation Research" by H. A. Taha
3. "Statistics" by J. N. Kapoor and H. C. Saxena, S.Chand & Company.

*** Latest editions of all the suggested books are recommended.**

PHYSICS SYLLABUS FOR VI SEMESTER
THERMAL PHYSICS AND STATISTICAL MECHANICS

Course Code: BSC 604	**L**	**T**	**P**	**C**
(Common with BSCEI 605**)**	**4**	**0**	**0**	**4**

Objective: To learn laws of thermodynamics, entropy, and Maxwell's thermodynamic relations.

Course Outcomes: After completion of the course, student will be able to understand

1. Laws of thermodynamics, entropy, and Maxwell's thermodynamic relationsetc.

2. The Kinetic theory of gases-distribution of velocities, molecular collisions in Physics

3. The basics of real gases

Course Content:

Unit I

Kinetic Theory of Gases: Maxwell's speed distribution, Mean free path, flow and Thermal conduction in gases. Real gases, Andrew's curves, Equation of state, Virial coefficients, Van der Waals equation, JouleThomson effect, Thermodynamic analysis, Inversion temperature, Thermodynamic equations for a Van der Waals gas. Liquefaction of gases.

Unit II

Thermodynamics: Reversible and irreversible processes, Examples of thermal, mechanical and chemical irreversibility, Carnot's cycle and Carnot's theorem. Second law of thermodynamics, Thermodynamic scale of temperature. Concept of entropy, Entropy change in reversible and irreversible processes. Entropy and disorder, Principle of increase of entropy, Entropy and unavailable energy, Entropy of ideal gases, Entropy as a thermodynamic variable, S-T diagram.

Unit III

Maxwell's Thermodynamics Equations and Radiation : Maxwell's thermodynamical equations and their applicationsEnergy and heat capacity equations Clapeyron equations, Application to sublimation, vaporization and freezing processes, Heat capacity of saturated vapours.The blackbody spectrum, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.

Unit IV

Some Systems at Low Temperatures: Low temperature technique, Use of liquid air and other liquified gases, Superfluidity in He II, Bose-Einstein Condensation in atomic clouds. Trapping and cooling of atoms, Superconductivity, Soft and Hard superconductors, Specific Heat and energy band gap for superconductors, Applications and Examples of superconductors.Liquefaction of H_2 and He, Solidification of He. Liquid He II, Thermodynamics of phase- transition, Adiabatic demagnetization, Low temperature thermometry.

Unit V

Statistical Mechanics: Probability and thermodynamic probability, principle of equal a prior probabilities, probability distribution and its narrowing with increase in number of particles. . The expressions for average properties. Constraints; accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states.

Text Books:

1. Heat and Thermodynamics: K.W. Zeemansky.
2. Thermal Physics: B.K. Agarwal.
3. Heat and Thermodynamics: Brij Lal and N. Subramanyam.
4. Solid State Physics, Pillai

Reference Books:

1. Heat and Thermodynamics: Dayal, Verma and Pandey.
2. A Treatise on Heat: M.N. Saha and B.N. Srivastava.

*** Latest editions of all the suggested books are recommended.**

BOTANY SYLLABUS FOR VI SEMESTER
ENVIRONMENTAL BIOTECHNOLOGY

Course Code: BSC 605	**L**	**T**	**P**	**C**
(Common with BSCEI 606**)**	**4**	**0**	**0**	**4**

Course Objectives:

- To make students capable of understanding current environmental issues.
- To impart knowledge about role of Microbiology in treatment of waste.
- To make student learn about role of common people in Environment protection.

Learning Outcomes:

- Students will learn about the current environmental issues.
- Students will learn the role of different microorganisms in treatment of waste.
- Students will learn how the public participation can help in protection environment.

Course Content:

Unit I Environment

Basic concepts and issues, global environmental problems - ozone depletion, UV-B, greenhouse effect and acid rain, their impact and approaches for management.

Environmental pollution - types of pollution, sources of pollution, measurement of pollution, methods of measurement of pollution, fate of pollutants in the environment, Bioconcentration, bio/geomagnification.

Unit II Microbiology of waste water treatment and Xenobiotic compounds

Aerobic process - activated sludge, oxidation ponds, trickling filter, rotating drums, oxidation ditch. Anaerobic process - anaerobic digestion, anaerobic filters, upflow anaerobic sludge blanket reactors. Xenobiotic compounds **:** Bioremediation of xenobiotics in environment - ecological consideration, decay behavior and degradative plasmids, techniques in bioremediation, degradation of pesticides and hydrocarbons.

Unit III Role of immobilized cells/enzymes in treatment of toxic compounds

Biopesticides, bioreactors, bioleaching, biomining, biosensors, biotechniques for air pollution abatement and odour control.

Unit IV Sustainable Development

Economics and Environment: Economic growth, Gross National Productivity and the quality of life, Tragedy of Commons, Economics of Pollution control, Cost-benefit and cost effectiveness analysis, WTO and Environment, Corporate Social Responsibility, Environmental awareness and Education; Environmental Ethics.

Unit V Public Participation for Environmental Protection

Environmental movement and people's participation with special references to Gandhamardan, Chilika and Narmada Bachao Andolan, Chipko and Silent valley Movement; Women and Environmental Protection, Role of NGO in bringing environmental awareness and education in the society.

Reference Books:

1. Waste water engineering - treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi.
2. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi.
3. Introduction to Biodeterioration, D.Allsopp and K.J. Seal, ELBS / Edward Arnold.
4. Bioremidation, Baaker, KH and Herson D.S., 1994. Mc.GrawHill Inc, NewYork.

5. Environmental Molecular Biology, Paul. A, Rochelle, 2001.Horizon Press.
- Environmental Protection and Laws by Jadhav and Bhosale, V.M.Himalaya publ. House 13. Biodiversity Assessment and Conservation by PC Trivedi

*** Latest editions of all the suggested books are recommended.**

ZOOLOGY SYLLABUS FOR VI SEMESTER
MAMMALIAN PHYSIOLOGY

	L	T	P	C
Course Code: BSC 606				
(Common with BSCEI 607**)**	**4**	**0**	**0**	**4**

Objectives : In this semester the students will be provided the knowledge of different physiologies. They will also learn the mechanism of different organs functions in the body of animals. Each physiology will comprise the structure of central organ and their functions and what are their importance in the life of animal.

Outcomes : One can expected to learn the process of physiology like digestion, respiration, excretion and blood circulation etc. They will be able to draw and write all about they had learnt.

Course Content:

Unit-1

Nutrition and digestion

1- Histology and function of gastrointestinal tract and its associated glands .
2- Digestion and absorption of proteins, carbohydrates &lipids.
3- Role of hormones in digestion.

Unit-2

Respiration

1- Mechanism and regulation of breathing.
2- Transport of oxygen and carbon dioxide
3- Respiratory disorders and effects of smoking .

Unit-3

Blood and circulation

1- Composition , structure and functions of blood.
2- Coagulations of blood –blood group and Rh factor.
3- Cardiac cycle, heart beat & its regulation
4- Blood pressure and Electrocardiogram

Unit-4

Excretion

1- Structure of urinoferous tubule mechanism of urine formation
2- Role of kidney in osmoregulation , kidney failure and dialysis .

Muscle

Histology of different types of muscle, structure and mechanism of muscle contraction
Nervous system: - conduction of nerve impulse , reflex action .

Unit-5

Endocrinology

Structure and function of major endocrine glands – (Pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, etc.)

Reproduction

Male and female sex hormones & menstrual cycle

Reference Books:

1- Human physiology – chatterjee A.G. vol.- I&II
2- Parameswaran , Anantakrishnan and Ananta subramanyam, 1975, outline of Animal physiology .
3- Tortora G.J. & Grabowski , S (2006).

Principle of anatomy &physiology . XI edition , Jhon wiley &sons . Inc.
4- Guyton , A.C.& hall J.E. (2006). Textbook of medical physiology . XI edition , hercourt asia PTE Ltd . W.B. saunders company .
5- Wood D.W. , 1983, principle of animal physiology 3rd edition
6- Introduction to animal physiology & related biotechnology – H.R.singh
7- General endocrinology – turner bagnaro
8- Animal physiology – Veerbala Rastogi
9- Animal physiology - Verma Tyagi
10- Animal physiology – Arora M.P.

*** Latest editions of all the suggested books are recommended.**

PHYSICS PRACTICAL SYLLABUS FOR VI SEMESTER
THERMAL PHYSICS AND STATISTICAL MECHANICS LAB

Course Code: BSC 651	**L**	**T**	**P**	**C**
(Common with BSCEI 651/BAS 151**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

Note: Select any ten experiments from the following list

1- To determine J by Callender and Barne's constant flow method.
2- To determine the Coefficient of Thermal Conductivity of Copper by Searle's Method.
3- To determine the Coefficient of Thermal Conductivity of Copper by Angstrom's Method.
4- To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
5- To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
6- To calibrate a Resistance Temperature Device (RTD) to measure temperature in a specified range using Null Method/ Off-Balance Bridge with Galvanometer based measurement.
7- To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
8- To Calibrate a Thermocouple to measure Temperature in a Specified Range using Null Method.
9- Measurement of Plank's constant using blackbody radiation.
10- To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode.
11- To determine the value of Stefan's Constant.

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

CHEMISTRY PRACTICAL SYLLABUS FOR VI SEMESTER
ORGANIC CHEMISTRY

Course Code: BSC 652 **L T P C**
(Common with BSCEI 652**)** **0 0 2 1**

LIST OF EXPERIMENTS

Qualitative Inorganic Analysis

Qualitative Inorganic Analysis

Estimation of water of crystallization in mohrs salt by titrating with $KMNO_4$

Estimation of Sodium Carbonate & Sodium hydrogen Carbonate Present mixture.

Organic

Benzoic Acid, Cinnamic Acid, Phenol.

Physical

A)Measurement of ph of different solution like aerated drinks,fruit juices shampoos and soaps using ph meter

B) Preparation of Buffer Solution

1)Sodium acetate acetic acid 2)Ammonium chloride and ammonium hydroxide

Evaluation of Practical examination:
Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

*** Latest editions of all the suggested books are recommended.**

BOTANY PRACTICAL SYLLABUS FOR VI SEMESTER
ENVIRONMENTAL BIOTECHNOLOGY

Course Code: BSC 653	**L**	**T**	**P**	**C**
(Common with BSCEI 653**)**	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. Water/Soil analysis - DO, salinity, pH, total hardness, alkalinity, acidity
2. Gravimetric analysis-Total solid, dissolved solid, suspended solid in an effluent
3. Isolation and pure culture of microbial strains from air, water and soil sample
4. Colony counting on nutrient agar media
5. Measurement and optimization of microbial growth and kinetics

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

ZOOLOGY PRACTICAL SYLLABUS FOR VI SEMESTER
MAMMALIAN PHYSIOLOGY

Course Code: BSC 654 **L T P C**
(Common with BSCEI 654**)** **0 0 2 1**

LIST OF EXPERIMENTS

Experiments to be performed by candidates:-

1- Test for amylase on starch
2- Preparation of haemin crystals
3- Determination of Hb% in blood sample.
4- RBC count by haemocytometer in blood.
5- Test for sugar, proteins and lipids

Experiments for demonstration and comments

1- Osmosis
2- Muscle twitch by stimulating it with mechanical, chemical and thermal stimuli.
3- Reflex action
4- Respiration
5- Recording of blood pressure using a sphygnomanometer

Prepared slides:-

Study of Histological slides of mammals –

1- T.S. salivary gland , T.S. pancreas, T.S. liver, T.S. Intesting,
2- T.S. kidney, T.S. lungs , T.S. stomach
3- Pituitary , gland, thyroid gland
4- Medulated and nonmedulated nerve fibre
5- Smooth & striated muscle

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale (two for experiment, two for file work and one for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

MATHEMATICS PRACTICAL SYLLABUS FOR VI SEMESTER
OPERATION RESEARCH

Course Code: BSC 655	**L**	**T**	**P**	**C**
(Common with BSCEI 655**)**	**0**	**0**	2	1

Objective -This course aims to introduce OR, LPP, Transportation, Assignment, Sequencing and game problems.

Course Outcomes:

- To learn the different methods of solving optimization problems in the areas of linear programming.
- To apply numerical methods for optimization problems.

Course Content:

Unit I

History and Back ground of subject, Different meaning of O.R. and Phases, characteristic and Models of O.R.

Unit II

Linear Programming, Mathematical formation of LPP, Graphical solution of LPP, general linear programming problem, simplex methods, duality.

Unit III

Transportation Problem, Assignment Problem, matrix form of: Transportation Problem. Initial basic physible solution, Optimality and transportation algorithms, balanced and unbalanced transportation problem and assignment problem.

Unit IV

Job sequencing, Replacement model, sequencing method of two machine three machine and n amachine problem, graphic solution, Replacement of item deterioting with time, Replacement of item that fails continuously, and general replacement problem.

Unit V

Game Theory, two person zero sum game, sadle point maximin and minimax, game of type 2 · 2, n· 2 game graphic solution and with dominance property.

Each exercise would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale (exam, file work and for viva) which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			ATTENDANCE	TOTAL
EXAM	FILE WORK	VIVA	(10 MARKS)	INTERNAL
(20 MARKS)	(10 MARKS)	(10 MARKS)		(50 MARKS)

External Evaluation (50 marks)

Experiment	File work	Viva	Total
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Text Books:

1. "Operation Research" by Winston, Cengage Learning
2. "Operation Research" by S. D. Sharma, Kedarnath Ramnath&Company
3. "Operation Research" by Kanti Swroop, P. K. Gupta and Man Mohan, SultanChand & Sons

Reference Books:

1. "Operation Research" by H.A Tata, Maemillar & Company
2. "Operation Research" by P. K. Gupta and D.S. Hira, S Chand & Company
3. "Operation Research" by R. K. Gupta, Krishna Prakasha

*** Latest editions of all the suggested books are recommended.**