

**SRI SANKARA ARTS & SCIENCE COLLEGE
(AUTONOMOUS)**

(CHOICE BASED CREDIT SYSTEM)

PART – IV – NON-MAJOR ELECTIVES - SYLLABUS

All UG DEGREE COURSES (B.A., / B.Com., / B.B.A., / B.Sc., / B.C.A.,)

(For the candidates admitted from the academic year 2017-2018)

In choosing papers, conducting examination and awarding marks and credits, the regulations framed by the core subject departments should be followed.

List of Subjects Offered:

S. No.	Department	Sem	Title of the Paper
1	English	I	English for Competitive Examinations I
		II	English for Competitive Examinations II
2	Tamil	I	Basic Tamil – I
		II	Basic Tamil – II
		I	ஊடகவியல் - I
		II	ஊடகவியல் - II
3	Commerce & Business Administration	I	Basics of Computer
			Basics of Retail Marketing
			An Overview of ISO
			Basics of Health Care Management
		II	Consumer Protection and Consumer Rights
			Basics of Business Insurance
			Fundamentals of Disaster Management
			Concept of Self Help Groups
4	Biochemistry	I	Health and Nutrition
		II	Human Diseases and Preventive Aspects
5	Biotechnology	I	Microbiology
			Plant Physiology
			Animal Physiology
			Bio-Diversity

		II	Chemistry
			Evolution
			Behavioural Biology
			Basics of Ecology
6	Computer Science & BCA	I	Business and Office Applications (only for CS)
			Web Applications (only for BCA)
			MS Access
			HTML
			Flash
		II	Business and Office Applications Lab (only for CS)
			Web Applications Lab (only for BCA)
			MS Access Lab
			HTML Lab
			Flash Lab
7	Mathematics	I	Functional Mathematics - I
			Functional Statistics
			Functions and Their Applications
			Mathematical Logic
		II	Functional Mathematics - II
			Mathematical Modeling
			Mathematics of Finance
			Applications of Differential Equations
8	Microbiology	I	Cellular Organization
			Cell Communication and Cell Signaling
			Developmental Biology
			Plant Physiology
		II	Inheritance Biology
			Diversity of Life Forms
			Evolution and Behaviour
			Methods in Biology
9	Physics	I	Astrophysics
			Everyday Physics
		II	Basic Physics
			Non-Conventional Energy Sources

Department of English**Semester I****English for Competitive Examinations I**

Unit – I Fundamental and functional English

Unit – II Vocabulary

Unit – III Reading and Listening Skills

Unit – IV Comprehending and Reproducing

Unit – V Verbal Reasoning

Books for Reference

1. N. Krishnaswamy, T. Sriraman, *Current English for Colleges*. Chennai: Macmillan.
2. Dr. M. Narayana Rao and Dr. B. G. Barki – *Anu's Current English for Communication*. Chennai: Anu Chitra Publications.
3. Dr. Geetha Nagaraj, *Comprehend and Compose*, New Delhi: Foundation Books.
4. R.P. Bhatnagar, Rajul Bhargava, *English for Competitive Examinations*. New Delhi: Macmillan.
5. Allen, W. Stannard - *Living English Structure*.

Semester II

English for Competitive Examinations II

- Unit – I** Spotting Errors
- Unit – II** Note Making and Precis Writing
- Unit – III** Letter Writing in different formats and Report Writing
- Unit – IV** Attending Interviews
- Unit – V** Idioms and Phrases.

Books for Reference

1. N. Krishnaswamy, T. Sriraman, *Current English for Colleges*. Chennai: Macmillan.
2. Dr. M. Narayana Rao and Dr. B. G. Barki – *Anu's Current English for Communication*. Chennai: Anu Chitra Publications.
3. Dr. Geetha Nagaraj, *Comprehend and Compose*, New Delhi: Foundation Books.
4. R.P. Bhatnagar, Rajul Bhargava, *English for Competitive Examinations*. New Delhi: Macmillan.

Department of Tamil

Basic Tamil – I

பள்ளியில் தமிழ் பயிலாத மாணவர்களுக்கான அடிப்படைத் தமிழ்ப்பாடம் எனிய முறையில் தமிழ் கற்பித்தல்.

தமிழ் மொழியின் அடிப்படைக் கூறுகள்

1. எழுத்துகள்

முதல் எழுத்துகள் (உயிர் எழுத்து, ஆய்த எழுத்து, மெய் எழுத்து, உயிர்மெய் எழுத்து)

2. சொற்கள்

வகைகள் (பெயர்ச்சொல், வினைச்சொல், இடைச்சொல், உரிச்சொல்)

3. தொடர்

தொடர் அமைப்பு (எழுவாய், செயப்படுபொருள், பயனிலை)

4. குறிப்பு எழுதுதல்

பத்து – பதினைந்து தொடர்களில் குறிப்பு எழுதுதல்

பிழை நீக்கம்- (ஒற்றுப் பிழை, எழுத்துப் பிழை, தொடர் பிழை)

5. எண்களும் பெயர்களும்

தமிழ் எண்கள், உறவுப்பெயர்கள், வாழ் இடங்களும் பொருள்களும்.

பார்வை நூல்

முனைவர். S. தியகாமணி. அடிப்படைத் தமிழ். (Basic Tamil with English Translation) கண்டிப்பேடு:
கருணா பதிப்பகம். வேலூர்

Basic Tamil – II

பள்ளியில் தமிழ் பயிலாத மாணவர்களுக்கான அடிப்படைத் தமிழ்ப்பாடத்தை எளிய முறையில் கற்றுத் தருதல்.

1.நீதி நூல்கள்

ஆத்திச் சூடி

(முதல் 12) (அறம் செய விரும்பு முதல் ஓளவியம் பேசேல் வரை)

கொன்றை வேந்தன்

‘அன்னையும் பிதாவும் முன்னறி தெய்வம்’ முதல் ‘எண்ணும் எழுத்தும் கண்ணெனத் தகும்’ வரை

திருக்குறள் (5 குறள்கள்)

1. அகர முதல் (1)
2. செயற்கரிய..... (26)
3. மனத்துக் கண் ...(34)
4. கற்க கசடறக்(391)
5. எப்பொருள் யார்யார் (423)

2. எளிய நீதிக்கதைகள்

தெனாலிராமன் கதைகள், பீர்பால், கதைகள், கிராமியக் கதைகள், ஈசாப் கதைகள்,

3. தமிழ் இலக்கியங்கள்

வரலாறு - குறிப்பு -அறிமுகம்

(எ.டு) குறள் பற்றி எளிய தொடர்களில் அறிமுகம்

தமிழகம் -உணவுமுறைகள் - விழாக்கள்-கலைகள் பற்றியக் குறிப்புகள்

பார்வை நூல்

முனைவர். S. தியகாமணி. அடிப்படைத் தமிழ். (Basic Tamil with English Translation)

கண்டிப்பேடு: கருணா பதிப்பகம். வேலூர்

FIRST SEMESTER**ஊடகவியல்-I**

அலகு - 1

இதழியல் - விளக்கம் - வரலாறு - வகைகள்

அலகு - 2

இதழியல் சட்டங்கள்

அலகு- 3

செய்தி - விளக்கம் - வகைகள்,விளம்பரக் கலை

அலகு- 4

அரசும் மக்கள் தொடர்புமுறைகளும்.

அலகு- 5

வானொலிநிகழ்ச்சிகள் - விதிமுறை

பார்வை நூல்

1.இதழியல் கலை -மா.பா.குருசாமி, குரு - தேமொழி, தாயன்பகம்,திண்டுக்கல்-1, 2011.

SECOND SEMESTER

ஊடகவியல்-II

அலகு - 1

மக்கள் தகவல் தொடர்பியல் - விளக்கம் - தமிழ்த் திரைப்படத்தின் தோற்றம் - வரலாறு-
வளர்ச்சி - நன்மை தீமை.

அலகு - 2

தொலைக்காட்சி -தோற்றம் - வரலாறு - வளர்ச்சி - நிகழ்ச்சிகள்

அலகு - 3

இணையம் தோன்றிய வரலாறு - விளக்கம் - இணையதள வசதி பெறும் முறை

அலகு - 4

இணையதளத்தின் பயன்பாடு

அலகு - 5

வலைப்பின்னலின் வகைகள் - மின்னஞ்சல் பயன்பாடு

பார்வை நூல்கள்

இதழியல் கலை - மா.பா.குருசாமி, குரு - தேமொழி, தாயன்பகம், திண்டுக்கல்-1, 2011.

மக்கள் தகவல் தொடர்பியல்-டாக்டர் எஸ்.ஸ்ரீகுமார், டாக்டர் என். கிருஷ்ணன், செண்பகா
பதிப்பகம், சென்னை- 600017, 2002.

Department of Commerce
&
Department of Business Administration
B.Com. (General) , B.Com (Accounting Finance), B.Com (Banking Management),
B.Com (Marketing Management), BBA, & B.Sc. ISM

I Semester

1. Basics of Computer

Introduction - Unit – I

1. Introduction to computers
2. Input Devices
3. Output Devices
4. Operating System

MS Word – Unit - II

5. Text Manipulations
6. Usage of Numbering, Bullets, Footer and Headers
7. Usage of Spell check, Find & Replace
8. Text Formatting
9. Picture insertion and alignment
10. Creation of documents, using templates
11. Creation templates
12. Mail Merge Concepts
13. Copying Text & Pictures from Excel

MS-Excel - Unit – III

14. Cell Editing
15. Usage of Formulae and Built-in Functions

16. File Manipulations
17. Data Sorting (both number and alphabets)
18. worksheet Preparation
19. Drawing Graphs
20. Usage of Auto Formatting

MS-Power Point – Unit – IV

21. Inserting Clip arts and Pictures
22. Frame movements of the above
23. Insertion of new slides
24. Preparation of Organization Charts
25. Presentation using Wizards
26. Usage of design templates

Internet – Unit – V

27. Introduction to Internet
28. WWW
29. E-Mail

Reference Books:

1. Saxena, Sanjay. *A first Course in Computers*, Vikas Publishing House Pvt. Ltd.,
2. Copestake, Stephen. *Microsoft Office in Easy steps*, Comdex Computer Publishing.
3. Sandler, Corey. *Teach yourself, MS Office for Windows*. Tom Bedgelt, Jan Weingarten, BPB Publication.

2. Basics of Retail Marketing

Unit – I

Retailing – Definition – Retail Marketing – Growth of organized retailing in India – Importance of retailing

Unit – II

Functions of Retailing – characteristics of Retailing – Types of Retailing – store retailing – Non-store retailing

Unit – III

Retail location factors – Branding in retailing – private labeling – Franchising concept.

Unit – IV

Communication tools used in Retailing – Sales promotion, e-tailing- window display

Unit - V

Supply chain management – definition – importance – Role of information Technology in retailing.

Reference Books:

1. J.N.Jain & P.P.Singh, *Modern Retail Management*, New Delhi: Regal Publications.
2. Nair, Suja. *Retail Management*, Himalaya Publishing house.

3. An Overview of ISO

Unit-I

An Introduction to ISO 9000, 9001, 9002, 9003. The Quality systems to be certified-
Meaning of ISO- Benefits of ISO 9001- Certification- General Scheme of ISO 9001.

Unit-II

QMS (Quality Management Systems). Meaning- Principles of ISO 9001-2000-
Preparing a specimen QMS – future of ISO? – QMS Documentation- QMS Process &
Measurement.

Unit-III

ISO 9001-2000 Requirements- Explanation of main clauses – Time Line and cost
Implication of Implementing.

Unit-IV

ISO 9001-2000 and QIS- Comparison of ISO 901 and the capability Maturity Model
for software. Certification bodies operating Multinationals.

Unit-V

ISO and how to hire an ISO 9000 Consultant- What is Internal Quality Auditing.

Reference Books

A.K.Chakraborty, P.K.Basu, S.C.Chakravarthy, “Guide to ISO 9001-2000”, Asian Books
Pvt. Ltd.

4. Basics of Health Care Management

Unit – I: Personal (Self) Health Care

Personal Hygiene – Personal Diet pattern – Self health maintenance by yoga and other spiritual practice – Drills

Unit – II: Family Health Care

Family hygiene – group health care by vaccination – propitiation and prevention – Sanitation and diet patterns

Unit – III: Communal Health Care

Mass – Hygiene (Social Hygiene) – Environmental Hygiene - Communal health care centres – Hospitals – Statistical bodies - Government and Non government organizations (NGO) for propagation of nutritious diet patterns - maintained by voluntary health organizations and government schemes.

Unit – IV: Health Awareness

Health awareness programme organized by governmental and non governmental agencies. Communal amenity programme.

Unit – V: Health Disaster Management

First Aid – Disaster management techniques like epidemic eruption control, management and eradication.

Reference Books:

K. Park. *Text Books on Social and Preventive Medicine*. Brimnot publishers.

Second Semester

5. Consumer Protection and Consumer Rights

Unit - I

Introduction of consumer protection act 1986-other amendments-salient features

Unit – II

Definitions of the terms- : consumer - appropriate laboratory - complainant - consumer dispute -complaint-restrictive trade practice.

Unit - III

The various consumer rights:-right to safety, Right to information, Right to choose, - right to be heard -Right against exploitation -Right to consumer education

Unit - IV

Consumer protection councils:-Central - State.

Unit - V

Consumer disputes redressal agencies:-Direct forum-state commission-national commission

Reference Books:

Dr.Regu Surya Rao. *Lectures On Torts And Consumer Protection Laws*, Hyderabad:
Asia Law House.

Prof.Rakesh Khanna. *Consumer Protection Laws*, Central Law Agency.

6. Basics of Business Insurance

Unit – I

Introduction to Insurance – Type of Insurance – Principles of Insurance.

Unit – II

Salient features of IRDA Act – Administration of IRDA Act – Regulatory measures of IRDA

Unit – III

Life insurance products – Term, Whole life, Endowment.

Unit – IV

Introduction to general Insurance – fire, marine and motor insurance.

Unit – V

Government and insurance companies – LIC India- private players in Insurance in India.

Text Books Recommended:

Dr. N. Premavathy, *Elements of Insurance*, Chennai: Sri Vishnu Publications.

Dr.A.Murthy, *Elements of Insurance*, Chennai: Margham Publications.

Mishra, M.N. *Insurance, Principles and practice*, New Delhi: S.Chand & Co. Ltd.

References Books:

Nalini Prava Tripathy & Prabir Paal. *Insurance Theory & Practice*, Prentice Hall of India

Ganguly, Anand. *Insurance Management*, New Age International Publishers.

7. Fundamentals of Disaster Management

Unit I

Meaning, definition, basic aspects and types of disasters.

Unit II

Stages IN Disaster - Pre, during and post disaster.

Unit III

Disaster Mitigation – guiding principles of Mitigation. Formulation and implementation of Mitigation programmes.

Unit IV

Disaster training – Utilisation of resources, training and public awareness.

Unit V

Disaster Management policy and legislation; Disaster Management – Strategy in India.

Books for Reference:

I Sundar, T. Sezhiyan “Disaster Management” 1st Edition, New Delhi: Sarup and Sons, 2007.

Hand book; Carter.W, “Disaster Management”, A Disaster Manager’s ASTAN Development Bank. Manila.

Prasad, S. *Natural Disaster Management, Destruction, Safety and Pre cautions*, New Delhi : Mangalam publishers and Distributors, 2007.

K.D.Gangrade, S.Dhadde, *Challenge and Response*, Delhi: Rachna publications, 1973.

8. Concept of Self Help Groups

Unit - I

Meaning, Concept and Functions of SHGS

Unit - II

Women empowerment through SHGS

Unit - III

Micro finance through SHGS

Unit - IV

Social Development through SHGS

Unit -V

Role of Govt and NGO's in fostering SHGS

Reference Books:

“Clinical approach to promotion of entrepreneurship” ED.Setty, Anmol publications Pvt., Ltd, New Delhi 2004.

“India economic Empowerment of Women”, V.S. Ganesamurthy, New Century publications, New Delhi, 1st published – May 2007.

“Readings in Microfinance”, N. Lalitha Dominant publishers and Distributors, New Delhi, 1st Edition 2008.

“Rural Credit and Self Help Groups, Micro finance needs & concepts in India”, K.G.Karmakar, Sage publications, New Delhi, 1999.

“Rural empowerment through, SHGS, NGO's & PRI's S.B.Verma, Y.T. Pavar, Deep & Deep publications, New Delhi 2005.

“Women's Own; the Self help movement of Tamil Nadu”. C.K. Gariyali, S.K. Vettivel, Vetri publishers, New Delhi, 2003.

Journals

Yoja na, A Development Monthly, Chief Editor Anurag Misra, Published by Ministry of information and Broad casting.

Kurukshetra, A Journal on Rural Development, Montly Journal, Editors; Kapil kumar, Lalitha Khurane published by Ministry of Rural Development.

Websites :

1. www.shg-india.net
2. www.tnruralbazaar.com

Department of Biochemistry

Semester – I

1. Health and Nutrition

Unit I

Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet.

Unit II

Vitamins - definition, classification, sources, properties, functions and deficiency symptoms. Recommended daily allowances of pantothenic acid, folic acid, biotin, cyanocobalamine. Vitamin D, E and K.

Unit III

Sources and functions of dietary fats, role of fats and lipids in health. Calorific value.

Unit IV

Minerals- Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to chromium, cobalt, copper, manganese, molybdenum, selenium, iodine and zinc.

Unit V

Supplementation programmes in India and their implications – Applied Nutrition Programme (ANP), Special Nutrition Programme (SNP), One Meal a Day Programme. Integrated Child Development Services (ICDS). Role of International Agencies, Health Based Nutrition Programme.

Books Recommended:

1. S.Davidson and J.R.Passmore *Human Nutrition and Dietetics*, (8th ed), Churchill Livingstone,1986.
2. J. S. Garrow, W. Philip T. James, A. Ralph, *Human Nutrition and Dietetics* (10th ed), Churchill Livingstone, 2000.
3. M.Swaminathan, *Principles of Nutrition and Dietetics*, Bappco, 1995.
4. Margaret Mc William, *Food Fundamentals* (10th ed) ,Prentice Hall, 2012.

2. Human Diseases and Preventive Aspects

Unit I

Diseases – definition – Examples for bacterial, viral and fungal diseases. Endemic and epidemic diseases – causes and symptoms. Major diseases of young children with special reference to diarrhea, primary complex, whooping cough, Kwashiorkor and Marasmus and their preventive aspects.

Unit II

Cancer- differences between benign and malignant tumors. Growth characteristics of cancer cells. Agents causing cancer - physical, chemical, biological. Prevalence of cancer in South India. Cancer therapy - surgery, radiation and chemotherapy. Cancer prevention.

Unit III

Diabetes mellitus – causes and types. Type I and type II diabetes mellitus. Role of anti-diabetic drugs. Dietary prevention of diabetes mellitus. Examples for anti-diabetic medicinal plants. Kidney stones – causes – influence of diet.

Unit IV

Cardiovascular disease – causes and symptoms. Role of dietary lipids. HDL and LDL as risk factors. Dietary prevention of CHD. Hypolipidemic medicinal plants and their products. Liver diseases – jaundice, hepatitis – causes and symptoms. Dietary prevention of disease progression.

Books Recommended

1. M.N.Chatterjee and Rana Shinde *Textbook of Medical Biochemistry* (7th ed), 2007.
2. Ambika Shanmugam, *Fundamentals of Biochemistry for Medical Students* (7th ed), 2012.
3. Tietz *Fundamentals of Clinical Chemistry and Molecular Diagnostics* (7th ed), Saunders, 2014.
4. Catherine A. Ross, *Modern nutrition in health and diseases* (11th ed). Lippincott Williams and Wilkins.
5. Michael. G. Wohl, Robert. S. Goodhart, Maurice E.Shils, *Modern nutrition in health and disease* (9th ed), Lippincott Williams and Wilkins, 1999.
6. R.Ananthanarayan and C.K.Jayarane *Paniker Text book of Microbiology* (8th ed), India: Universities press private Limited. 2009.

Department of Biotechnology

Semester I

1. Microbiology

Unit I

History and Scope of Microbiology- Anatomy of Prokaryotes and Eukaryotes- Bacteria, Fungi, Algae, Protozoa and Viruses- structure and functions of the cellular components- Growth and nutrition- media and culture.

Unit II

Classification of microbes- DNA analysis, Ribosomal RNA analysis- Numerical taxonomy- Molecular taxonomy- methods of microbial identification.

Unit III

Environmental Microbiology- role of microorganisms in the productivity of ecosystems- Role of microorganisms in food production; dairy and non-dairy products- fermented foods and alcoholic beverages- production of food (single cell protein), Fuel (ethanol).

Unit IV

Medical Microbiology- Pathogenic microbes- Bacterial, Viral, Fungal and Protozoan diseases. Cure, control and prevention- Pharmaceuticals (antibiotics, vaccines etc.), Biofertilizers (BGA), Biopesticides, biopolymers, biosurfactants.

Unit V

Industrial use of microbes- fermentation products- bioconversions- products of industrial microbiology- Streptomyces, yeasts (Saccharomyces, Hansenula), Spirulina and Penicillium.

Recommended Texts:

1. Pelczar, M.J., Chan, E.C.S., King, N.R., . *Microbiology- Concepts and Applications*. New Delhi: Tata McGraw – Hill, 2001
2. Ananthanarayan, R. and Paniker, C.K.J. *A text book of Microbiology*. 6th edition. Hyderabad: Orient Longman Ltd., 2000.
3. Pelzar. *Microbiology*. 5th edition. New Delhi: Tata McGraw Hill., 2000.
4. Ingraham, J.L., and Ingraham, C.A. *Introduction to microbiology*, 2nd edition. USA: Brooks/Cole, Thomson Learning, 2000.

Reference Books:

1. Kathleen Park Talaro and Talaro, A. *Foundation in Microbiology*, 3rd edition, New York: McGraw-Hill. 1999.
2. Cappuccino, J.G and Sharman, N. *Microbiology: A Laboratory manual*, 4th edition. New York: Addition Wesley Longman Inc., 1999.
3. Daniel Lim. *Microbiology*, 2nd edition. New York: McGraw-Hill, 1998.

Web Site:

1. <http://science.nhmccd.edu/biol/microbio.html>

2. Plant Physiology

Unit I

Photosynthesis: Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO₂ fixation-C₃, C₄ and CAM pathways.

Unit II

Respiration and photorespiration: Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

Unit III

Nitrogen metabolism: Nitrate and ammonium assimilation; amino acid biosynthesis.

Unit IV

Plant hormones: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

Unit V

Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress.

Text Books:

1. Pandey, S. N., Sinha, B. K. *Plant Physiology*, 4th Edition, Noida: Vikas publishing company, 2009.
2. Sinha, Rajiv Kumar. *Modern Plant Physiology*, England: Alpha Science International Ltd, 2004.
3. Janat Shah, *Plant Physiology*. New Delhi : New Age International Pvt Ltd,. 2003.
4. N.K. Gupta, S. Gupta, *Plant Physiology*, New Delhi: Oxford & IBH Publishing Company Pvt Ltd, 2005.

Reference books:

1. Lincoln Taiz, Eduardo Zeiger. *Plant Physiology and Development*. 6th edition. 2014. Sinauer Associates.
2. [William G. Hopkins](#), [Norman P. A. Huner](#) Introduction to plant physiology, 5th Edition. Wiley publishers, 2008.

3. Animal Physiology

Unit I

Blood and circulation: Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.

Unit II

Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.

Unit III

Respiratory system: Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.

Unit IV

Nervous system: Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.

Unit V

Excretory system: Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.

Text Books:

1. S. C. Rastogi, 2005. *Essentials of Animal Physiology*, 3rd Edition, New Age International Pvt Ltd, New Delhi.
2. Surendra Nath Paipuru, 2013. *Essentials of Animal Physiology*. Lap Lambert Academic Publishing GmbH KG.

Reference Books:

1. Richard W. Hill, Gordon A. Wyse, Margaret Anderson, *Animal Physiology*. U.K: Incorporated Publishers. 2012.
2. Lauralee Sherwood, *Human Physiology from Cells to Systems Cengage*, Learning Publishing Company, 2008.

4. Bio-Diversity

Unit I

Principles and methods of taxonomy: Concepts of species and hierarchical taxa, biological nomenclature, classical and quantitative methods of taxonomy of plants, animals and microorganisms.

Unit II

Levels of structural organization: Unicellular, colonial and multicellular forms; levels of organization of tissues, organs and systems; comparative anatomy.

Unit III

Outline classification of plants, animals and microorganisms: Important criteria used for classification in each taxon; classification of plants, animals and microorganisms; evolutionary relationships among taxa.

Unit IV

Natural history of Indian subcontinent: Major habitat types of the subcontinent, geographic origins and migrations of species; common Indian mammals, birds; seasonality and phenology of the subcontinent.

Unit V

Organisms of health and agricultural importance: Common parasites and pathogens of humans, domestic animals and crops.

Text Books:

- 1) Ramakrishnan, N. *Biodiversity in Indian Scenarios*, New Delhi: Daya Publishing House, 2006.
- 2) Krishnamurthy, K. V. *An Advanced Textbook on Biodiversity: Principles and Practice*. New Delhi: Oxford & IBH Publishing Company Co. Pvt. Ltd. 2009.
- 3) Singh, J. S, Gupta, S. R. & Singh, S. P. *Ecology Environmental Science and Conservation*. New Delhi: S. Chand Publishing Company, 2014.

Reference Books:

- 1) Sharad Singh Negi. *Biodiversity and Its Conservation in India*, New Delhi: Indus Publishing Company, 1993.
- 2) Krishnamurthy, K. V., *Textbook of Biodiversity*, USA: Science Publishers, Enfield 2003.
- 3) Kevin J. Gaston, John I. Spicer. *Biodiversity: An Introduction*. New York : John Wiley Co. 2004.
- 4) Joseph Thatheyus, A. *Textbook of Environmental Studies*. UK: Oxford, 2011

Semester II

5. Chemistry

Unit I Structure of Atoms

Dalton's Atomic theory- Subatomic particles- concepts of atoms and molecules- symbols for elements- electronic configuration of atoms- isotopes- shapes of atomic orbitals-periodical table- periodic classification- periodicity- valency- chemical bond.

Unit II Materials on earth

Properties of gas, liquid, solid, compound, mixtures, solutions, colloids, suspension- Acids, bases and salts- Conductors and non-conductors.

Unit III Changes around us

Slow and fast changes- reversible and irreversible reactions- exothermic and endothermic reactions- condition of chemical reactions- types of chemical reactions- mole concept and stoichiometry in chemical reaction- order of chemical reaction- technique used to determine chemical reactions.

Unit IV Organic chemistry and energy

Organic compounds- classification- functional groups- aromatic, aliphatic, heterocyclic compounds- alkanes in gasoline- fuel from biogas, coal, hydrogen .

Unit V Chemistry in living world

Physical and chemical properties of amino acids and proteins- properties and kinetics of enzymes- thermodynamics.

Recommended Texts:

1. Mathews, P. *Advanced chemistry*, Oxford-Low Prize Edition: Cambridge University Press, 1996.
2. Lee, J.D. *Inorganic Chemistry*. London: Blackwell Science, 2001.
3. Negi, A.S., and Anand. *A text book of physical chemistry*. New Delhi: Taj Press., 2001.
4. Sony, P.L. 2000. *A Text Book Inorganic Chemistry*. Sultan Chand & Sons., New Delhi.

Reference Books:

1. Voet, D. and Voet, J.G. *Biochemistry*, 2nd edition. New York: John Wiley and Sons, Inc., 1995.
2. Lehninger, A.L., Nelson D.L., and Cox, M.M. *Principles of Biochemistry*. 2nd edition. Delhi: CBS Publishers & Distributors, 1993.
3. Amend, J.R., Mundy, B.P. and Armlid, M.T. *General Organic & Biological Chemistry*. London: Saunders College Publishing., 1990.
4. Greenwood, N.N. and Earnshaw, A. *Chemistry of the Elements*. London: Maxwell Macmillan intl. Ed., 1989.
5. Cotton, F.A and Wilkinson, G. *Inorganic Chemistry*. New York: John Wiley and Sons, Inc., 1989.
6. Finar, I.L. *Organic Chemistry*. Volume 1 & 2, London: ELBS., 1986.

Websites:

- <http://dir.yahoo.com/Science/Chemistry/>
<http://www.chemistry.mcmaster.ca/faculty/bader/aim/>

6. Evolution

Unit I

Emergence of evolutionary thoughts: Lamarck; Darwin—concepts of variation, adaptation, fitness and natural selection.

Unit II

Origin of molecules: Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers.

Unit III

Origin of cells and unicellular evolution: Evolution of prokaryotes; origin of eukaryotic cells; evolution of unicellular eukaryotes.

Unit IV

Evolutionary history: The evolutionary time scale; eras, periods and epoch; major events in the evolutionary time scale.

Unit V

Human evolution: Stages in primate evolution including human.

Text Books:

1. Stephen Baxter, *Evolution*, Orion Books Ltd, Monroe.
2. W. Strickberger *Evolution* Third Edition, Jones and Bartlett publishers. 2010.
3. Rajagopalan, R. *Environment & Ecology*, New Delhi: Oxford University Press, 2009,
4. P.S.Verma, *Cell Biology, Genetics, Evolution & Ecology* (M.E.), 14th Edition. S.Chand Publishing. 2004,

Reference Book:

1. Carl Zimmer. *Evolution: The Triumph of an Idea*. Arrow books London. 2011

7. Behavioural Biology

Unit I

Approaches and methods in study of Behavior.

Unit II

Proximate and ultimate causation; altruism and evolution-group selection, kin selection, reciprocal altruism.

Unit III

Neural basis of learning, memory, cognition.

Unit IV

Sleep and arousal; biological clocks.

Unit V

Development of behavior; social communication; social dominance. Use of space and territoriality.

Text Books:

- 1) Mandal, FB. *Text Book of Animal Behaviour* (Third Edition), New Delhi: PHI Learning Pvt. Ltd. 2015.
- 2) Agarwal, V.K. *Animal Behaviour (Ethology)*. New Delhi: S. Chand Publishing Company, 2013.

Reference Books:

- 1) John Alcock. *Animal Behavior: An Evolutionary Approach*. Sinauer Associates. Sunderland. 2013.
- 2) Marc Breedlove, Neil Verne Watson. *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*, Sunderland: Sinauer Associates. 2013.
- 3) Claudio Carere, Dario Maestripieri. *Animal Personalities: Behavior, Physiology, and Evolution*, Chicago: The University of Chicago Press. 2013.
- 4) Lee Alan Dugatkin. *Principles of Animal Behavior* (Third Edition), New York: W. W. Norton Company, 2013.

8. Basics of Ecology

Unit I

The Environment: Physical environment; biotic environment; biotic and abiotic interactions. Symbiosis. Concept of habitat and niche;

Unit II

Population ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations.

Unit III

Community ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

Unit IV

Ecological succession: Types; mechanisms; changes involved in succession; concept of climax.

Unit V

Ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

Text Books:

1. Dash. *Fundamentals of Ecology* 3rd Edition, New Delhi: Tata Mac Graw Hill Education Pvt Ltd, 2009.
2. P. S. Verma, V. K. Agarwal, *Environmental Biology: Principles of Ecology*. New Delhi: S. Chand Limited, 2000.
3. S. S. Purohit, Ashok Agrawal, *Ecology and Environmental Biology*. New Delhi: Agrotech Publishing House, 2011.

Reference Books:

1. Eugene Pleasants Odum, *Basic Ecology*. Saunders College Publishing Company. 2002.
2. J. L. Chapman, M. J. Reiss, *Ecology Principles and Applications* 2nd Edition, U.K.: Cambridge Publishing, 2009.

Department of Computer Science & Computer Application

1. Business and Office Applications (only for CS)

Unit – I

Word Processor – Introduction – Features of MSWord – components – create , Open & Save Ms Word Documents. Navigation & Selection in MS Word – editing Documents – printing documents – formatting .

Unit – II

Advanced Formatting Techniques – Alignment – Tab settings – creating tables – working with table views. Mail merging – find & replace – spell check – auto text – book marks – headers & footers – word tools.

Unit – III

Spread sheets – Introduction – concepts – excel features – entering and editing data – addressing techniques – simple formulas & functions – formatting cells – aligning cells – copying and linking cell and sheets.

Unit – IV

Working with fill methods – data analysis – charts – types of charts – converting data to chart – macros – forms – pivot table – goal seek – auditing - sorting – freezing panes – inserting objects & pictures.

Unit – V

MS Power point – Introduction to MS Power point - Features – Understanding slide types – creating & viewing slides – creating slide shows. Applying special object – including objects & pictures – adding navigation buttons – slide transition – animation effects –timing.

Reference Books:

1. Taxali, R.K. *PC Software for Windows*, Tata McGraw Hill.
2. The O'Leary Series, Microsoft Word 2000, Tata Mc Graw Hill.
3. Content Development Group: *Working with MS Office 2000*, Tata Mc Graw Hill.
4. Courter: *Mastering Office 2000*, BPB Publications.
5. Bott and Leonhard: *Using Microsoft Office 2000*, Prentice Hall of India.
6. Saxena, Sanjay. *First course in Computers*, New Delhi: Vikas Publishing house.

2. Web Applications (only for BCA)

Unit – I

Basics of Adobe Photoshop – Getting started with Photoshop – title bar – Menu bar - option bar – tool box – screen modes.

Unit – II

Introduction to digital Image editing, Create your own painted images – Edited scanned images – import rendered visuals – Working with images and colors

Unit – III

Using tools and palettes – selection tools, Painting and editing tools – menu commands – creating type – change the type settings – styles

Unit – IV

Methods and Techniques of Adobe photoshop - Layers – working with layers – merging layers –linking layers –transforming layers and layer effects- filters

Unit – V

Getting started with Dreamweaver – creating web applications with Dreamweaver.

Reference Books:

1. Photoshop – The Complete reference – Greenberg – TMH
2. Dream Weaver – Complete reference

3. MS Access

Unit- I

Introduction to database - What is a Database , Why use a Relational Database, Overview of database design – Data Normalization(Determining tables, Determining Fields, Determining Relationships)Integrity Rules (Primary/Foreign Key, One-to-Many, Many-to-Many, One-to-One) Introduction to MS Access .

Unit- II

Create a Table in MS Access - Data Types, Field Properties , Fields:names, types, properties--default values, format, caption, validation rules Data Entry Add record delete record and edit text Sort, find/replace, filter/select, re-arrange columns, freeze columns . Edit a Tables- copy, delete, import, modify table structure find replace.

Unit – III

Setting up Relationships- Define relationships, add a relationship, set a rule for Referential Integrity, change the join type, delete a relationship, save relationship Queries & Filter – difference between queries and filter , filter using multiple fields AND,OR , advance filter Queries create Query with one table , find record with select query, find duplicate record with query , find unmatched record with query, run query ,save and change query.

Unit – IV

Introduction to Forms Types of Basic Forms: Columnar, Tabular, Datasheet, Main/Subforms, add headers and footers, add fields to form, add text to form use label option button, check box ,combo box, list box Forms Wizard, Create Template.

Unit – V

Introduction to Reports , Types of Basic Reports: Single Column,Tabular Report Groups/Total, single table report multi table report preview report print report, Creating Reports and Labels, Wizard

Reference Books:

1. Saxena, Sanjay. *First course in Computers*, New Delhi: Vikas Publishing house Ms Office XP complete BPB Publications
2. Wempen, Faithe. *Ms Access 2002 fast and easy by PHI*

4. HTML

Unit - I

Introduction :Web Basics: What is Internet – Web browsers – What is Web page – HTML
Basics: Understanding tags.

Unit- II

Tags for Document structure(HTML, Head, Body Tag). Block level text elements: Headings
paragraph(<p> tag) – Font style elements: (bold, italic, font, small, strong, strike, big tags)

Unit - III

Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR-
Using Images – Creating Hyperlinks.

Unit - IV

Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan,
Colspan – Cell padding.

Unit - V

Frames: Frameset – Targeted Links – No frame – Forms : Input, Textarea, Select, Option.

Recommended Texts

Lemay, Laura. *HTML Complete Reference, Teach Yourself Web Publishing with HTML*

Reference Books

E Stephen Mack, Janan Platt. *HTML*

5. Flash

Unit – I

Introduction to Flash – simple drawing techniques – adding some easy animations – learning the tools - buttons

Unit – II

Controlling drawing object – creating symbols – instances- making use of Library – painting – motion guide path.

Unit – III

Flash tweening – using masking techniques – layers and frames.

Unit – IV

Overview of animation -Animating your production – sound – video - publish flash movies – importing.

Unit – V

Introduction to scripting - Action script applications

Books for Reference:

1. K. K. Thyagarajan, A.P. B. Anbumani, K.K, “**Flash** 2004”
2. Robert Reinhardt. *Flash 5 Bible*

Semester II
6.. Business and Office Applications Lab (only for CS)

MS Word

1. Text Manipulations.
2. Usage of Numbering, Bullets, Footer and Headers.
3. Usage of Spell check, and Find & Replace.
4. Text Formatting.
5. Picture insertion and alignment.
6. Creation of documents, using templates.
7. Creation templates
8. Mail Merge Concepts
9. Copying Text & Pictures from Excel

MS-Excel

10. Cell Editing
11. Usage of Formulae and Built-in Functions
12. File Manipulations
13. Data Sorting (both number and alphabets)
14. Worksheet Preparation
15. Drawing Graphs
16. Usage of Auto Formatting

Power Point

17. Inserting Clip arts and Pictures
18. Frame movements of the above
19. Insertion of new slides
20. Preparation of Organisation Charts
21. Presentation using Wizards

7. Web Applications Lab (only for BCA)

1. Working with the clone stamp tool
2. Drawing Watch using custom shapes
3. Testing lab mode
4. Using multichannel mode
5. Using the sponge Tool
6. Antique framing
7. Creating a supernova
8. Adding an arrowhead.
9. Isolating a Complex Image
10. Removing an element from an image
11. Captain kirk myopia effect
12. Adjusting the focus
13. Creating an edge mask
14. Applying Transformations
15. Correcting brightness and contrast.

8. MS Access Lab

MS-Access

1. Pay Bill
2. Electricity Bill
3. Mark list preparation of a student
4. Inventory report preparation
5. Invoice report preparation
6. Income tax preparation

9. HTML Lab

1. Write a script to create an array of 10 elements and display its contents.
2. Create a simple calculator using form fields. Have two fields for number entry and one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
3. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (user is not required to click on the link)
4. Create a document which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
5. Design an HTML page that includes document structure tags, title, line break, multiple headings and link to e-mail address.
6. Create an HTML file which is the main page with an image and some text messages along with hyperlinks which is linked to various pages. The navigation should be such that the links take you to the appropriate page and then back to the main page.
7. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
8. Design an application for pay slip through HTML forms

10. Flash Lab

1. Drawing a Semi Circle by snap tool, a sine wave, 24 spokes on a wheel, five pointed star using, a flower by changing the center coordinates
2. Placing a text along a curved path.
3. Changing on objects shape using shape tweening, text tweening
4. Application using buttons, animating the button
5. Tweening a using the shape hints, motion tweening
6. An application to show the masking effect in Flash
7. Slide show presentation (minimum 5 slides)
8. Creating smudge effect for an image using Hybrid Tweening.
9. Applications using Action scripts
10. Usage of textbox, dynamic text box, buttons with action scripts

Department of Mathematics

Semester – I

1. Functional Mathematics - I

Unit I

Ratio and proportions

Unit II

Percentages

Unit III

Profit and Loss , Discounts

Unit IV

Simple Interest and Compound Interest

Unit V

Solutions of simultaneous equations problems on ages and two digit number

Book for Reference:

Agarwal, R.S. *Quantitative Aptitude*. New Delhi: S.Chand Publisher, 2004.

2. Functional Statistics

Unit I

Set theory- union and intersection of two and three sets – subsets- complements of a set- power set – problems

Unit II

Permutation and combination

Properties of nPr and nCr (no derivation),cyclic permutation –problems based on these

Unit III

Probability theory : Definition, mutually exclusive events; independent events –

Addition theorem – multiplication theorem on probability, conditional probability(no derivation) – problems

Unit IV

Measures of averages – Arithmetic mean – Geometric Mean , Harmonic Mean, weighted Arithmetic Mean – Median – Mode – problems

Unit V

Measures of Dispersion :- Range ,Quartile Deviation ,Variance ,Standard Deviation – problems.

Books for Reference :

1. Vittal, P.R. *Business Statistics*. New Delhi: Tata McGraw-Hill Publishing Co. Ltd.,
2. Gupta, S.P. *Business Statistics*

3. Functions and Their Applications

Unit I

Functions – definition – types of functions, Domain, Range, Increasing and Decreasing Function, Even and Odd functions

Unit II

Graphs of linear functions – Exponential function- Logarithmic function, Power function-quadratic function
Application to linear functions in Business and Economics

Unit III

Linear cost models – simple problems

Unit IV

Break – Even Analysis – simple problems

Unit V

Linear supply and Demand curves – Market Equilibrium – simple problem

Reference Book:

P.N.Arora and S.Arora, CA – *Foundation Course – Mathematics* (chapter-5)

4. Mathematical Logic

Unit I

Connectives – Negation ,Conjunction ,Disjunction using Truth table ; other connectives –Symmetric ,Associative , Distributive.

Unit II

Conditional and Biconditional statements – Tautologies using Truth table-simple problems

Unit III

Equivalence formula – Duality law – simple problems

Unit IV

Normal forms – Disjunctive Normal form – Conjunctive Normal form(using only equivalence formula)

Unit V

Principal disjunctive normal form (PDNF)-Principal Conjunctive Normal Form(PCNF)- using only truth table.

Books for Reference:

1. J.P.Tremblay,R.Manokar, *Discrete Mathematical structures with applications to computer Science*
2. Dr.M.K.Venkataraman,Dr.N.Sridhararn ,N.ChandraSekaran, *Discrete Mathematics*

II Semester**5. Functional Mathematics - II****Unit I**

Time and work – pipes and cisterns – Problem

Unit II

Time and Distance, Relative Speeds- Problems on Races, Boats and Streams and Trains

Unit III

Mensuration – Problems

Unit IV

Polygons-Interior angles – Numbers of diagonals – Regular polygons – Problem

Unit V

Stocks and Shares – Problems

Reference Book:

Agarwal, R.S. *Quantitative Aptitude*

6. Mathematical Modeling

Unit I

Steps in Building a Mathematical Model-need for Mathematical Modeling – Model for surveying the earth and Heaven

Unit II

Height of a Tower- width of a River – Digging a tunnel through a mountain

Unit III

Radius of earth – radius of Moon-Radii of Sun and Planets

Unit IV

Distance of earth – Distance of a star – shortest distance between two points on the surface of the earth.

Unit V

Models in terms of difference equations – growth of population – influence on pollution – on population growth – influence of age structure on population growth

Reference Book

Kapur , J.N. *Insight into Mathematical Modelling*. New Delhi: Mathematical Science Trust Society.1992.

7. Mathematics of Finance

Unit I

Rates of interest – simple and compound interest rates – Effective rate of interest – Nominal rate of interest constant force of interest- relationship between these rates of interest

Unit II

Accumulation and present value of single payment using these rates of interest – Accumulation and present value of a single payment using symbols – when the force of interest is a function of t , $\varphi(t)$.

Unit III

Definition of $A(t_1, t_2)$, $A(t)$, $v(t_1, t_2)$ and $v(t)$ – expressing accumulation and present value of a single payment using these symbols - when the force of interest is a function of t , $\varphi(t)$

Unit IV

Series of payments (even and uneven), definition of annuity (examples in real life situation) – accumulations and present values of annuities with level payment and where the payments and interest rates have same frequencies.

Unit V

Definition of perpetuity and examples – Accumulation and present values of annuities where payments and interest rates have different frequencies

Books for Reference:

J.J. Scott, William F. *An introduction to Mathematical of Finance.*

8. Applications of Differential Equations

Unit I

Applications of first order differential equations – Growth, Decay and chemical reactions

Unit II

Flow of water from an orifice

Unit III

Falling bodies and other rate problems

Unit IV

The Brachistochrone, Fermat, Bernoulli – problems

Unit V

Simple Electric Circuits

Content and Treatment as in:-

S.Narayanan and T.K.Manickavachagam Pillay, *Differential equations and its Applications*, Chapter III upto section 6.

Department of Microbiology

1. Cellular Organization

Unit I

Membrane structure and function: Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes.

Unit II

Structural organization and function of intracellular organelles: Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility.

Unit III

Organization of genes and chromosomes: Operon, interrupted genes, gene families, structure of chromatin and chromosomes, unique and repetitive DNA, heterochromatin, euchromatin, transposons.

Unit IV

Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle.

Unit V

Microbial Physiology: Growth, yield and characteristics, strategies of cell division, stress response.

Reference Books:

1. Karp, Gerald. *Cell and Molecular Biology : Concepts and Experiments*, 3rd Edn. New York. John Wiley, 2002.
2. Lodish, H., Baltimore, O., Berk, A., Zipursky, S.L., Matsudaira, P. and Darnell, J. *Molecular Cell Biology*, USA: Scientific American Books, 1995.
3. Abbas, A.K., Lichtman, A.H. and Pober, J.S. *Cellular and Molecular Immunology*, 2nd Edn. USA: WB Saunders, 1994.
4. The Cell: A Molecular Approach Geoffrey M. Cooper, et al.
5. Prescott, L.M., Harley, J.P. and Klein, D.A. *Microbiology*. New Delhi: McGraw Hill, 1999.

2. Cell Communication and Cell Signaling

Unit I

Host parasite interaction: Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

Unit II

Cell signaling: Hormones and their receptors, cell surface receptor, signalling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component signaling systems, bacterial chemotaxis and quorum sensing.

Unit III

Cellular communication: Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.

Unit IV

Cancer: Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

Unit V

Innate and adaptive immune system: Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules, generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell-mediated immune responses, primary and secondary immune modulation, the complement system, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immune deficiencies, vaccines.

Reference Books:

1. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter *Molecular Biology of the Cell*, 4th edition. New York: [Garland Science](#); 2002. (ISBN-10: 0-8153-3218-1)
2. Ralph A. Bradshaw and Edward A. Dennis *Handbook of Cell Signaling* (Second Edition). Elsevier Publication, 2009.
3. Lodish, H., Baltimore, O., Berk, A., Zipursky, S.L., Matsudaira, P. and Darnell, J. *Molecular Cell Biology*, New York: Scientific American Books, 1995.
4. The Cell: A Molecular Approach Geoffrey M. Cooper, et al.

3. Developmental Biology

Unit I

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development.

Unit-II

Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*; eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination.

Unit IV

Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*.

Unit-V

Programmed cell death, aging and senescence.

Reference Books:

1. Scott. F Gilbert, *Developmental Biology*, 6th edition. Sunderland (MA): Sinauer Associates, 2000.
2. ISBN-10: 0-87893-243-7
3. Jonathan M. W. Slack *Essential Developmental Biology*, 3rd Edition. Wiley-Blackwell, 2012.
4. Subramaniam, T. *Molecular developmental biology*. Narosa Pub. 2008.
5. Goel, Suresh C. *Principles of animal developmental biology*. Himalaya 1984.

4. Plant Physiology

Unit I

Photosynthesis: Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO₂ fixation-C₃, C₄ and CAM pathways.

Respiration and photorespiration: Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photo respiratory pathway.

Unit-II

Nitrogen metabolism: Nitrate and ammonium assimilation; amino acid biosynthesis.

Plant hormones: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

Unit III

Sensory photobiology: Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.

Unit-IV

Solute transport and photoassimilate translocation: Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.

Unit V

Secondary metabolites - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress.

Reference Books:

1. Kochhar, P.L. *A textbook of plant physiology*, 1985.
2. Laiz, Lincoln; Zeiger, Eduardo. *Plant physiology*. Sunderland Sinauer Associates 2010
3. Salisbury, Frank B. *Plant physiology*. Wadsworth Pub. 1992.

Second Semester

5. Inheritance Biology

Unit I

Mendelian principles: Dominance, segregation, independent assortment, deviation from Mendelian inheritance.

Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests.

Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.

Unit II

Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.

Extra chromosomal inheritance: Inheritance of mitochondrial and chloroplast genes, maternal inheritance.

Unit III

Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

Human genetics: Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Unit IV

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal versus somatic mutants, insertional mutagenesis.

Unit V

Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

Recombination: Homologous and non-homologous recombination, including transposition, site-specific recombination.

Reference Books:

1. Maloy, S.R., Cronan, J.E., Jr. and David Freifelder. *Microbial Genetics*, 2nd Edn. Jones and Bartlett, Boston, 1994.
2. Arora, M.P., Gurdarshan and Sandhu, S. *Genetics*, 5th Edn. New Delhi: New Age International Publishers, 2004.
3. Hayes, W. *The Genetics of Bacteria and their Viruses*. London: Blackwell Scientific Publications, 1968.
4. Strachan, T. and Read, A. P. *Human Molecular Genetics*, U.K.: Bios Scientific Publishers, 1996.
5. Bridge, E.A. *Bacterial and Bacteriophage Genetics*, 3rd Edn, 1994.

6. Diversity of Life Forms

Unit I

Principles and methods of taxonomy: Concepts of species and hierarchical taxa, biological nomenclature, classical and quantitative methods of taxonomy of plants, animals and microorganisms.

Unit II

Levels of structural organization: Unicellular, colonial and multicellular forms; levels of organization of tissues, organs and systems; comparative anatomy.

Unit III

Outline classification of plants, animals and microorganisms: Important criteria used for classification in each taxon; classification of plants, animals and microorganisms; evolutionary relationships among taxa.

Unit IV

Natural history of Indian subcontinent: Major habitat types of the subcontinent, geographic origins and migrations of species; common Indian mammals, birds; seasonality and phenology of the subcontinent.

Unit V

Organisms of health and agricultural importance: Common parasites and pathogens of humans, domestic animals and crops.

Reference Books:

1. Edward O. Wilson, *The Diversity of Life: With a New Preface* (Questions of Science) 2nd Edition. 2013. ISBN-13: 978-0674058170
2. Prescott, L.M., Harley, J.P. and Klein, D.A. *Microbiology*. New Delhi: McGraw Hill, 1999.
3. Colwd, D. *Microbial Diversity*, Academic Press. 1999.
4. Perry. *Microbiology: dyanamics and diversity*.

7. Evolution and Behaviour

Unit I

Emergence of evolutionary thoughts: Lamarck; Darwin—concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; spontaneity of mutations; the evolutionary synthesis.

Origin of cells and unicellular evolution: Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers; concept of Oparin and Haldane; experiment of Miller (1953); the first cell; evolution of prokaryotes; origin of eukaryotic cells; evolution of unicellular eukaryotes; anaerobic metabolism, photosynthesis and aerobic metabolism.

Unit II

Paleontology and evolutionary history: The evolutionary time scale; eras, periods and epoch; major events in the evolutionary time scale; origins of unicellular and multicellular organisms; major groups of plants and animals; stages in primate evolution including Homo.

Unit III

Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks; molecular tools in phylogeny, classification and identification; protein and nucleotide sequence analysis; origin of new genes and proteins; gene duplication and divergence.

Unit IV

The Mechanisms: Population genetics – populations, gene pool, gene frequency; Hardy-Weinberg law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; adaptive radiation and modifications; isolating mechanisms; speciation; allopatricity and sympatricity; convergent evolution; sexual selection; co-evolution.

Unit V

Brain, Behavior and Evolution: Approaches and methods in study of behavior; proximate and ultimate causation; altruism and evolution-group selection, kin selection, reciprocal altruism; neural basis of learning, memory, cognition, sleep and arousal; biological clocks; development of behavior; social communication; social dominance; use of space and territoriality; mating systems, parental investment and reproductive success; parental care; aggressive behavior; habitat selection and optimality in foraging; migration, orientation and navigation; domestication and behavioral changes.

Reference Books:

1. Slater, P.J.B. *Behaviour and evolution*. CUP 1994
2. Quiatt, Duane, *Primate behaviour: information, social knowledge, and the evolution of culture*. CUP, 1993
3. Choe, Jae C. *The evolution of social behaviour in insects and Arachnids*. CUP 1997.

8. Methods in Biology

Unit I

Molecular biology and recombinant DNA methods: Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods; analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, isoelectric focusing gels; molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems; expression of recombinant proteins using bacterial, animal and plant vectors; isolation of specific nucleic acid sequences; generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors; in vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms; protein sequencing methods, detection of post-translation modification of proteins; DNA sequencing methods, strategies for genome sequencing; methods for analysis of gene expression at RNA and protein level, large scale expression analysis, such as micro array based techniques; isolation, separation and analysis of carbohydrate and lipid molecules; RFLP, RAPD and AFLP techniques

Unit II

Histochemical and immune techniques: Antibody generation, detection of molecules using ELISA, RIA, western blot, immune precipitation, flow cytometry and immune fluorescence microscopy, detection of molecules in living cells, *in situ* localization by techniques such as FISH and GISH.

Unit III

Biophysical methods: Analysis of biomolecules using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy, structure determination using X-ray diffraction and NMR; analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

Radiolabeling techniques: Properties of different types of radioisotopes normally used in biology, their detection and measurement; incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.

Unit IV

Microscopic techniques: Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods for EM, image processing methods in microscopy.

Unit V

Electrophysiological methods: Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT.

Computational methods: Nucleic acid and protein sequence databases; data mining methods for sequence analysis, web-based tools for sequence searches, motif analysis and presentation.

Reference Books:

1. Gerhardt, P., Murray, R.G., Wood, W.A. and Kreig, N.R. (Eds) *Methods for General and Molecular bacteriology*. Washington, DC: ASM Press, 1994.
2. Maniatis, T., Fritsh, E.F. and Sambrook, J. *Molecular cloning A Laboratory Manual*, Vol I to III, New York, USA: Coldspring Harbour Lab., 1998.
3. Kuby, J. *Immunology*, 2nd Edn. New York: H.W.Freeman and Company, 1994.
4. Wilson, K. and Walker, J. *Practical Biochemistry: Principles & Techniques*, 5thEdn. Cambridge: Cambridge University Press, 2002
5. Karp, Gerald. *Cell and Molecular Biology : Concepts and Experiments*, 3rd Edn. New York: John Wiley, 2002.

Department of Physics

1. Astrophysics

Unit I: Astronomical instruments

Optical telescopes-refracting telescope-reflecting telescope- types of reflecting telescopes – detectors and image processing.

Unit II: Solar system

The Sun- physical and orbital data-photosphere-chromosphere-corona-solar prominences – sunspot - solar flare- mass of the sun- solar constant- temperature of the sun- sources of solar energy-solar wind.

Unit III: Members of the solar system

Mercury – Venus- Earth – Mars – Jupiter- Saturn- Uranus- Neptune- Pluto- Moon – Bode's law – asteroids- comets – meteors.

Unit IV: Stellar evolution

Birth and death of a star –brightness of a star – stellar distance- Chandrasekar limit- white dwarfs- Neutron stars – black holes- Supernovae.

Unit V: Theories of the Universe and Galaxies

Origin of the Universe - the big bang theory- the steady state theory- the oscillating universe theory – Hubble's law. Galaxies – types of galaxies- Milky way

Books for Study:

1. Astrophysics - a modern perspective by K.S.Krishnaswamy, New Age International (P) Ltd, New Delhi (2002).
2. An introduction to Astro physics by Baidyanath Basu, second printing, Prentice – Hall of India (P) Ltd, New Delhi (2001).

Books for Reference:

1. Murugesan, R. *Modern Physics*, 11th edition, New Delhi: S.Chand & Company Ltd, 2003.
2. S.Kumaravelu, Janki. *Astronomy Calendar Corporation*, Sivakasi, 1993.
Baker and Fredrick, *Astronomy*, 9th edition, New York: Van Nostrand reinhold Co, 1964.
3. Illustrated World of Science Encyclopedia –Vol I to VIII, Chicago: Creative World Publications.
4. S.Krane, Kenneth. *Modern Physics*, New York: John Wiley & Sons Inc., 1983.

2. EVERYDAY PHYSICS

Unit I

Physics behind Home appliances – Light bulb – Fan – Hair drier – Television – Air Conditioners – microwave ovens – Vacuum cleaners – Dishwasher – Washing machines

Unit II

How things work – Basic principles – Rape recorder – Taps – Lifts – Submarines – Jet planes – Helicopters – Rockets – fax machines – Pagers – Cellular phones

Unit III

Demonstration – making a switch board with multiple points – wiring – one lamp controlled by one switch/Two switches – fixing a fuse – soldering – P.C.B
Preparation

Unit IV

Study of resistors, chokes, Capacitors and Transformers – multimeter – Basic principles – measurement of resistance, Voltage AC & DC

Unit V

Servicing of domestic appliances – iron box – mixie – grinder – motor – emergency lamp

Books for Study

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi
2. The Hindu speaks on Science, Vol I & II, Kasturi Ranga Publishers, Chennai

Books for Reference

1. D. Halliday, R. Resnick and J. Walker. *Fundamentals of Physics*, 6th edition, New York: Wiley, 2001.
2. D. Halliday, R. Resnick and K.S. Krane, *Physics*, Vols I, II, III, 4th Edition, New York: Wiley, 1994.
3. R.P. Feynmann, *The Feynmann Lectures on Physics* Vols I, II, III New Delhi: R.B. Leighton & M. Sands, Narosa, 1998.

3. BASIC PHYSICS

Unit I: Mechanics

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing machine

Unit II: Heat

Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air conditioner – Principle and their capacities – Bernoulli principle – Aero plane

Unit III: Sound and Optics

Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular – Camera

Unit IV: Geophysics and Medical Physics

Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays – Ultrasound scan – CT scan – MRI scan

Unit V: Space science and Communication

Newton's law of gravitation – Weather forecasting and communication satellites – Indian satellites – Electromagnetic spectrum – Radio waves – AM and FM transmission and reception

Books for Study:

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai

Books for Reference:

1. D. Halliday, R. Resnick and J. Walker. *Fundamentals of Physics*, 6th edition, New York: Wiley, 2001.
2. D. Halliday, R. Resnick and K.S. Krane, *Physics*, Vols I, II, III, 4th Edition, New York: Wiley, 1994.
3. R.P. Feynmann, *The Feynmann Lectures on Physics* Vols I, II, III New Delhi: R.B. Leighton & M. Sands, Narosa, 1998.

4. NON-CONVENTIONAL ENERGY SOURCES

Unit I : Solar energy

Conventional Energy sources – Renewable Energy sources- solar energy – solar radiation and its measurements- solar energy collectors- parabolic collector- storage of solar energy

Unit II : Applications of solar energy

Solar water heater- solar driers- solar cells- solar electric power generation- solar distillation- solar pumping – solar cooking

Unit III: Wind energy

Basic principles of wind energy conversion- power in the wind – forces in the Blades- wind energy conversion- Advantages and disadvantages of wind energy conversion systems (WECS) Energy storage- Applications of wind energy

Unit IV: Oceanic energy

Energy from the oceans- Energy utilization- Energy from tides- Basic principle of tidal power – Utilization of tidal energy

Unit V : Energy from other sources

Chemical energy – Nuclear energy - Energy storage and distribution

Books for Study

Rai, G.D. *Non-conventional sources of energy*, 4th edition, New Delhi: Khanna Publishers, 1996.

Sukhatme, S.P. *Solar Energy, Principles of thermal collection and storage*, 2nd edition, New Delhi: Tata McGraw-Hill Publishing Co. Ltd., 1997.

Book for Reference

S.Rao and Dr. Parulekar, *Energy Technology*. New Delhi: Tata McGraw-Hill Publishing Co. Ltd.,