


NATIONAL COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI - 620 001

Nationally Accredited at 'A' Level by NAAC

**B. Sc. BOTANY
COURSE STRUCTURE UNDER C.B.C.S.**

(Applicable to the candidates admitted from the academic year 2013-14 Onwards)

Sem.	Part	Course	Course Title	Ins. hours/ week	Credit	Exam Hrs.	Marks			
							CIA	External		Total
								W	O	
I	I	Language Course-I - (LC-I)		6	3	3	25	75	-	100
	II	English Language Course-I (ELC-I)		6	3	3	25	75	-	100
	III	Core Course-I (CC-I)	Algae and Bryophytes	5	5	3	25	75	-	100
		Core Course-II - (CC-II)	Practical I (CCI & CC-III)	3	-	-	-	-	-	-
		First Allied Course-I - (1AC-I)	Allied Chemistry-I	5	3	3	25	75	-	100
		First Allied Course-II - (1AC-II)	Allied Chemistry Practical I	3	-	-	-	-	-	-
	IV	Skill Based Electives-I - (SBEC-I)	Computer Applications-I	2	2	3	25	75	-	100
		Total		30	16					500
II	I	Language Course-II - (LC-II)		6	3	3	25	75	-	100
	II	English Language Course-II(ELC-II)		4	2	3	25	75	-	100
		Communicative English	Course-I (CEC-I)	2	1	3	25	70	5	100
	III	Core Course-II - (CC-II)	Practical I (CCI & CC-III)	3	5	3	25	70	5	100
		Core Course-III - (CC-III)	Fungi, Lichen, Plant Pathology & Plant Protection	5	5	3	25	75	-	100
		First Allied Course-II - (1AC-II)	Allied Chemistry Practical I	3	3	3	25	70	5	100
		First Allied Course-III - (1AC-III)	Allied Chemistry -II	5	3	3	25	75	-	100
	IV	Environmental Studies Course (ESC)	Environmental Studies	2	2	3	25	75	-	100
		Total		30	24					800
III	I	Language Course-III - (LC-III)		6	3	3	25	75	-	100
	II	English Language Course-III (ELC-III)		4	2	3	25	75	-	100
		Communicative English-II - (CEC-II)		2	1	3	25	70	5	100
	III	Core Course-IV - (CC-IV)	Pteridophytes, Gymnosperms & Paleobotany	5	5	3	25	75	-	100
		Core Course-V - (CC-V)	Practical II (CC-IV & VI)*	2	-	-	-	-	-	-
		Second Allied Course-I - (2AC-I)**	Allied Zoology -I	5	3	3	25	75	-	100
		Second Allied Course-II - (2AC-II)**	Allied Zoology Practical I	2	-	-	-	-	-	-
	IV	Skill Based Elective Course-II (SBEC-II)	Computer Application-II	2	2	3	25	75	-	100
		Skill Based Electives-III - (SBEC-III)	Computer Applications-III (DTP Lab)	2	2	3	25	70	5	100
		Total		30	18					700

Sem.	Part	Course	Course Title	Instru. hours/ week	Cre- dit	Exam hr	Marks			Total
							CIA	External		
								W	O	
IV	I	Language Course-IV (LC-IV)		6	3	3	25	75	-	100
	II	English Language Course-IV (ELC-IV)		6	3	3	25	75	-	100
	III	Core Course-V (CC-V)	Practical II (CC-IV & VI)*	3	5	3	25	70	5	100
		Core Course-VI (CC-VI)	Anatomy & Embryology	5	5	3	25	75	-	100
		Second Allied Course -II (2AC-II)**	Allied Zoology Practical I	3	3	3	25	70	5	100
		Second Allied Course-III -(2AC-III)**	Allied Zoology -II	5	3	3	25	75	-	100
	IV	Non-Major Elective Course-I (NMEC-I)	Horticulture	2	2	3	25	75	-	100
		Total		30	24					700
V	III	Core Course-VII (CC-VII)	Cell and Molecular Biology	5	5	3	25	75	-	100
		Core Course-VIII (CC-VIII)	Morphology, Taxonomy and Economic Botany	5	5	3	25	75	-	100
		Core Course-IX (CC-IX)	Practical III (CC-VII, CC-XI & XII)*	2	-	-	-	-	-	-
		Core Course-X (CC-X)	Practical IV (CC-VIII & CC-XIII)*	3	-	-	-	-	-	-
	IV	Elective Course-I (EC-I)	Microbiology	5	4	3	25	75	-	100
		Elective Course -II (EC-II)	Biotechnology	4	4	3	25	75	-	100
		Non-Major Elective Course-II (NMEC-II)	Biofertilizer, and Biopesticides	2	2	3	25	75	-	100
		Value Education Course - VEC	Value Education	2	2	3	25	75	-	100
		Soft skills		2	2	3	25	75	-	100
	Total		30	24					700	
VI	III	Core Course-IX	Practical III (CC-VII, CC-XI & XII)*	3	5	3	25	70	5	100
		Core Course-X	Practical IV (CC-VIII & CC-XIII)*	3	5	3	25	70	5	100
		Core Course-XI (CC-XI)	Genetics and Evolution	6	6	3	25	75	-	100
		Core Course-XII (CC-XII)	Plant Physiology and Ecology	6	6	3	25	75	-	100
		Core Course-XIII (CC-XIII)	Biochemistry, Biophysics and Bioinstrumentation	6	6	3	25	75	-	100
		Elective Course -III (EC-III)	Biostatistics and Bioinformatics	5	4	3	25	75	-	100
	V	Gender Studies Course (GSC)	Gender Studies	1	1	3	25	75	-	100
		Total		30	33					700
	V	Extension Activities		-	1	-	-	-	-	-
	Grand Total			140					4000	

Part-I	Language	4 Courses	12 Credits
Part-II	English	4 Courses	10 Credits
Part-II	Communicative English	2 Courses	02 Credits
Part-III	Core Course	13 Courses	70 Credits
	Elective Course	3 Courses	12 Credits
	Allied Course-I	3 Courses	09 Credits
	Allied Course-II	3 Courses	09 Credits
Part-IV	Environmental Studies	1 Course	02 Credits
	Value Education	1 Course	02 Credits
	Non-Major Elective	2 Courses	04 Credits
	Skill Based Elective	3 Courses	06 Credits
	Gender Studies	1 Course	01 Credit
Part-V	Extensive Activities		01 Credit
	Total		140 Credits

CIA: Continuous Internal Assessment, **W:** Written; **O :** Oral

* Examinations will be in the even semester

** Allied Botany Theory and Practicals are offered for Zoology students at the Department of Botany.

There will be oral test for all Practical Examination and Communicative English Courses.

The oral test will carry 5 marks in the external component.

**nraAs; (, f,fhy , yf,fak) > ci uei l > rWfi j > , yf,fpa tuyhW >
gadKi wjj kp; - U13T1**

gUtk; : l

ghl k; : l

fwgpfFk; fhyk; : 6

j ugGssp : 3

myF - 1:

ghuj pahu; f tpi j fs; :] u] ;tj p Nj tpa; Gfo; ghuj
ehL

ghuj gj hrd; f tpi j fs; : j kpa; , dpi k , dgj j kpa;
c yfk; c dDi l aJ > nfhl l

KuNr

gl lFNfhl i l ahu; f tpi j fs; : c i ogGk; Nj i t
, td; NrhW NghLfphd;
mtd; \$W NghLfphd;

ehkff; f tpi Qu; ghl yfs; : , sej kpaDfF
fz z j hrd; f tpi j fs; : ghL tJ ehdyy

myF - 2:

mgJy; uFkhd; : kz ;
i tuKj J : ghuj p epi dffggLfphd;
Nkj j h : nrUgGl d; xU Ngl b
khh : Nt f k j kpaGgW > Ruz j ykh >

rpt gGehl h > fhj Nyh fhj y >
goffk; nghyyhj J

, dFyhg; : xU Gddi fr; rkpf i fahy;

mKj ghuj p : i ` f;\$

ehl LgGwg; ghl yfs; : xgghug; ghl y; grpahwg; Nghtj pyi y

myF - 3:

ci uei l:

ghuj pahu; - j pahdq; fS k; kej uq; fS k;

j pU. tpf. - kdj d;

c .Nt. rh - vJ j kpa?

uh. gp NrJggps; i s - FbAk; gi l Ak;

K. t. - nkhop , yyhj epi y

GJ i kggj j d; - j kpa; ehfupf j j py;

fphkthof; f

fy; fp - Gi d f s p d; Nti y epWj j k;

r pvd; mz z hJ i u - gWw

R [hj h - fl Ts; , Uf; fphuh?

myF - 4: rWfi j:

tɔbay; fhyk; - Ki dtu; , uh.ghyRgukz ɔad;

myF - 5:**, yffɔa tuyhW**

- , Ugj hk; E}wwhz L
(Gj ɔdk> ehl fk; eb;fyhf)

gadKi wj j kɔ;

- tykɔFk; tj ɔfsɔd; nj hFgG
kɔfhi kɔ;Fɔa tj ɔfs; (eyy j kɔ;
vOj Ntz Lkh gf;260 - 290.

ghl E)y;

1. nraAs> ci uei l - fy;Y}up ntsɔal
2. rWfi j - tɔbay;fhyk>Ki dtu;, uh. ghyRgukz ɔad;
3. , yffɔa tuyhW - nghJ
4. gadKi wj j kɔ; - eyyj kɔ; vOj Ntz Lkh>
m.fɔ guej hkdh> gf;260-290

nraAs; (, i l fhy , yffɔak)> Gj ɔdk> , yffɔa tuyhW nraAs; - U13T2**gUtk; : ll****ghl k; : ll****fwgɔFk; fhyk; : 6****j ugGssɔ : 3****myF - 1**

- 1.1 j ɔUQhdrkgej u; Nj thuk; j ɔUfNfhhb;fh j ɔUj j yk; (11 ghl yfs) , dW..
- 1.2. j ɔUehTffuru; Nj thuk; j ɔUgGfY}u; j ɔUj j yk; (10 ghl yfs) kUsth..
- 1.3. Rej uu; Nj thuk; j ɔUthi dff;fh j ɔUj j yk; (10 ghl yfs); ki wfs;..
- 1.4. khz ɔff;thrfu; j ɔUthrfk; - j ɔUntkghi t (10 ghl yfs) Mj ɔAk;..

myF - 2

- 2.1. Mz }hs; j ɔUgghi t (10 ghRuqfs) Xqɔɔ
- 2.2. nj hz l ubgnghbah;thuj ɔUkhi y (10 ghRuqfs) gri r
- 2.3. j ɔUgghz ho;thuj;mkydhj ɔgɔhd; (10 ghRuqfs)
- 2.4. FyNrfuho;thuj;ngUkhs; j ɔUnkhop (11 ghRuqfs) CNdW

myF - 3

- 3.1. - Kj ;J fFkhurhkɔ ɔɔsi sj j kɔ; (2 ghl yfs)
- 3.2. - eej ɔff;fykgfk; - 5 ghl yfs;
- 3.3. - Kf;\$l wgsS - 5 ghl yfs;
- 3.4. - xsi tahu; ghl yfs; - 4 ghl yfs;
- 3.5. - fhsNkfgGytu; ghl yfs; - 3 ghl yfs;
- 3.6. - rfj ɔKj j gGytu; ghl y; - 1 ghl y;
- 3.7. - fkgu; ghl yfs; - 3 ghl yfs;

myF - 4

Gj ɔdk; - rKj ha tɔɔ p - eh. ghuj j rhuj p

myF - 5**5.1. , yffjæ tuyhW**

- 5.1.1. - gfj p , yffjæk; [i rtk> i tz tk]
 5.1.2. - rpwpyffjæk; [gisi sj j kpo> fykgfk>gsS
 5.1.3 - Gj pd , yffjæk;

fhgjæk> ehl fk> , yffjætuyhW - U13T3**gUtk; : III****ghl k; : III****fwgpfFk; fhyk; : 6****j ugGssp : 3****myF - 1**

1. rpyggj pfhuk; (, sqNfhtbfs) - tofFi u fhi j
 2. kz pNkfi y (rj j i yrrhj j dhu)- Mj pi u gpi rapl l fhi j

myF - 2

3. fkguhkhaz k; (fkgu)- , uhkhtj huk;- fhl rgggl yk;
 4. ngupæGuhz k; (Nrf;fjohu) - Gryhu; ehadh; Guhz k;

myF - 3

5. , NaRfhtjæk; (fz z j hrd) - ki ygnghoT
 6. rlvhgGuhz k; (c kWgGytu) - khDf;Fg; gpi z epdw gl yk;

myF - 4 :

7. j z z B; j z z B; (Nfhky; Rthkpehj d) - ehl fk;

myF - 5

8. , yffjætuyhW - fhggjæk> Guhz k> ehl fk;

gz j l , yffjæk> , yffjætuyhW> nkhoggawrp - U13T4**gUtk; : IV****ghl k; : IV****fwgpfFk; fhyk; : 6****j ugGssp : 3****myF - 1**

1. FWenj hi f - 10 ghl yfs; (8>18>25>40>58>99>131>135>167>196)
 2. ewwpi z - 5 ghl yfs; (1> 3> 16> 30> 355)
 3. l qFE)W - 10 ghl yfs; (nryT mOqFtj j ggj J)

ENGLISH THROUGH EXTENSIVE READING - U13E2

Semester : II **English Language Course : II**
Instruction Hours/Week:4 **Credit: 2**

Unit I

R.K.Narayan An Astrologer's Day
 Boman Desai Between the Mosque and the Temple

Unit II

O.Henry The Gift Of the Magi
 Premchand The Child

Unit III

R.P. Sisodia The Last Salvation
 Kasturi Sreenivasan I Prepare to gotoCoimbatore

Unit IV

F.E.B. Gray A Slip of the Tongue
 Ruskin Bond The Eyes are not Here

Unit V

Rabindranath Tagore The Cabuliwallah
 Guy de Maupassant The Diamond Necklace

Text book

Glimpses of Life ; An Anthology of Short Stories ; Board of Editors [Orient Longman]

COMMUNICATIVE ENGLISH I – U13CE1

Semester : II **Communicative English Course: I**
Instruction Hours/Week:2 **Credit: 1**

OBJECTIVES

01. To Facilitate communication
02. To expose the students to various levels/types of communication.
03. To help the students achieve communicative competency

UNIT I

01. At the College
02. on the Campus
03. Outside the class

(d) Tag questions

Unit –II:

- (a) Errors and how to avoid them
- (b) Spotting errors
- (c) Reconstructing passages
- (d) Précis writing

Unit –III

Reading comprehension

Unit –IV:

Vocabulary – synonyms, antonyms, prefix & suffix, Homonyms, sentence completion, spelling Phrasal verbs & Idiomatic Expressions.

Unit –V:

Writing letters and drafting a resume /cv

Types of essays and how to write them

Guidance to a group discussion and

Guidance to attending an interview

Text book :

English for Competitive Examinations by R.P.Bhatnagar & Rajul Bhargava macmillan
India Ltd. Delhi.

COMMUNICATIVE ENGLISH II – U13CE2

Semester : III

Communicative English Course : II

Instruction Hours/Week:2

Credit: 1

Unit-I:

Enriching Vocabulary – Register Development; who is who; Synonyms, antonyms,
Active and Passive vocabulary, proverbs

Unit –II:

Tense Forms with emphasis on differences between Present and Present
Continuous; Past and Present Perfect – Framing questions, Auxiliaries, if clauses;
conjunctions, and linkers; Prepositions

Unit –III

Pronunciation, Good Pronunciation habits, R.P., Greetings, Farewells commands etc.,

Unit –IV:

Conversational Skills – Affirmative or Negative Language – idiomatic expressions,
Phrases, Dialogue Writing,

Unit –V:

Writing Skills – Note- taking, note- making, e-mail- Describing an object- narrating a
story

Reference Books

- i) A Practical English Grammar by A.J Thomson and A.V. Martinet.
- ii) Remedial English Grammar, by F.T. Wood.
- iii) English for competitive Examinations by R.P Bhatnagar & Rajul Bhargava.

READING POETRY AND DRAMA– U13E4

Semester : IV

English Language Course: IV

Instruction Hours/Week:6

Credit: 3

POETRY:

Unit: I	John Milton	:	On His Blindness
	Oliver Goldsmith	:	The village Schoolmaster
	William Wordsworth	:	The Solitary Reaper
UNIT II	P.B.Shelley: Ozymandias		
	John Keats	:	La Belle Dame Sans Merci
	Browning	:	Incident of the French Camp
UNITIII	John Masfield	:	Laugh and Be Merry
	Robert Frost	:	Stopping By the Woods On a Snow
	Evening		
	John Drink water	:	The Vagabond

DRAMA:

Unit: IV	Anton Chekhov	:	The Bear
	Norman Mckinnel	:	The Bishop's Candlesticks
Unit: V	Fritz Karinthy	:	Refund
	F.M. Synge	:	Riders to the Sea.

Textbooks:

- 1) **An Introduction to Poetry** edited by A.G.Xavier; [Macmillan]
- 2) **Nine Modern Plays:** ed. B.T Reddy, Oxford University Press

**CORE COURSE I – U13B01
ALGAE AND BRYOPHYTES**

Semester : I

Core Course: I

Instruction Hours/Week : 5

Credit : 5

Unit-I (Teaching-1 h / week)

Algae: General characteristic of the various divisions of algae by G. M. Smith (1955). Habit and habitats of Fresh Water, Marine and Soil algae. Economic importance of algae.

Unit-II (Teaching-1 h / week)

Vegetative forms, cell structure, pigmentation, food reserves, life cycle of the following genera: *Oscillatoria*, *Volvox*, *Oedogonium* and *Caulerpa*.

Unit-III (Teaching-1 h / week)

Thallus organisation, Cell structure and Life cycle of *Ectocarpus*, *Dictyota*, and *Polysiphonia*.

Unit-IV (Teaching-1 h / week)

Bryophytes: General characteristics, Classification (K. R. Sporne), Morphology, Structure, Reproduction of the main classes of Bryophytes. Economic importance of bryophytes.

Unit-V (Teaching-1 h / week)

A detailed study of the following genera: *Marchantia*, *Anthoceros* and *Polytrichum*.

References

Algae

- Bold, H. C. and Wynne, M. J. (1978). Introduction of Algae - Structure and Reproduction. Prentice Hall of India, New Delhi.
- Chapman, V. J. and Chapman, D. J. (1973). The Algae. 2nd ed. Macmillan, London.
- Fritsch, F. E. (1945). The Structure and Reproduction of the Algae. Vol. I & II. Cambridge University Press, London.
- Kumar, H. D. and Singh, H. N. (1976). A Textbook of Algae. East-West Press Pvt. Ltd., New Delhi.
- Kumar, H. D. (1990). Introduction to Phycology. East-West Press Pvt. Ltd., New Delhi.
- Round, F. E. (1973). Biology of the Algae. 2nd Edition. Edward Arnold Press, London.
- Sharma, O. P. (1990). Textbook of Algae. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- Smith, G. M. (1955). Cryptogamic Botany. Vol. I. McGraw Hill, New York.
- Vashishta, B. R. (1988). Botany for Degree Students (Algae). S. Chand and Co. Ltd., New Delhi.
- Venkateswarlu, V. (1970). A Textbook of Algal Maruti Book Depot, Gunter, Hyderabad.

Bryophytes

Cavers Frank. (1911) The Interrelationship of Bryophytes. New Phytologist, Indian Reprint.

Chopra, R. N. and Kumara, P. K. (1988). Biology of Bryophytes. Wiley Eastern Ltd., New Delhi.

Dublish, P. K. and Agarwal, D. K. (1973). A Textbook of Bryophyta, rajeeva Prakashan, Meerut, India.

Parihar, N. S. (1972). An Introduction to Embryophyta. Vol.II: Bryophyta. Central Book Depot, Allahabad.

Rashid, A. (1998). An Introduction to Bryophyta. Vikas Publishing House Pvt. Ltd., New Delhi.

Smith, G. M. (1955). Cryptogamic Botany. Vol. II. (Bryophytes and Pteridophytes), (2nd ed). Tata McGraw Hill, New Delhi.

Vashishta, B. R. (1983). Botany for Degree Students: Bryophyta. S. Chand and Co. Ltd., New Delhi.

Watson, E. V. (1968). British Mosses and Liverworts. Cambridge University Press, London.

CORE COURSE II - U13BO2P**PRACTICAL I (Pertaining to BO1 & BO3)**

Semester : I&II

Core Course : II

Instruction Hours/Week : 3+3

Credit : 5

A study of the Morphology and Anatomy of both vegetative and reproductive parts of the following genera:

Algae:

Oscillatoria, Volvox, Oedogonium, Caulerpa, Ectocarpus, Dictyota, Polysiphonia and Gracilaria.

Bryophytes:

Marchantia, Anthoceros and Polytrichum.

Fungi and Lichen:

Plasmodiophora, Albugo, Peziza, Polyporus, Puccinia, Aspergillus, Fusarium, Lichen (Usnea)

Plant Pathology:

Mycoplasma - Little leaf of brinjal. Virus - Tobacco Mosaic Virus. Bacteria - Citrus canker. Fungus: Red rot of sugarcane, Tikka disease of Groundnut, Blast disease of paddy.

Plant Protection:

Fungicides and pesticides - Toxic hazards of pesticides - Plant protection appliances - Seed protection.

CORE COURSE III - U13B03**FUNGI, LICHEN, PLANT PATHOLOGY AND PLANT PROTECTION**

Semester : II

Core Course: III

Instruction Hours/Week : 5

Credit : 5

Unit-I (Teaching-1 h / week)

Fungi: A study of the general characteristics and mode of life of main classes of Fungi by C. J. Alexopoulos (1962) Methods of isolation and culture of Fungi. Economic Importance of Fungi.

Unit-II (Teaching-1 h / week)

A study of the structure and reproduction of *Plasmodiophora*, *Albugo*, *Peziza*.

Unit-III (Teaching-1 h / week)

Structure and mode of reproduction of *Polyporus*, *Puccinia*, *Aspergillus*, *Fusarium*, Lichen (*Usnea*)

Unit-IV (Teaching-1 h / week)

Plant Pathology: Mycoplasma - Little leaf of brinjal. Virus - Tobacco Mosaic Virus. Bacteria - Citrus canker. Fungus: Red rot of sugarcane - Tikka disease of Groundnut, Blast disease of paddy.

Unit-V (Teaching-1 h / week)

Plant Protection: Methods of protection - Cultural, Physical, Chemical and Biological controls – Fungicides and Pesticides – forms and methods of their application - hazards of using pesticides - Plant protection appliances - Seed protection.

References**Fungi**

Alexopoulos, C. J., Mims, C. W. and Blackwell, M. (1996). Introductory Mycology. John Wiley & Sons Inc., New York.

Bold, H. C., Alexopoulos, C. J. and Delavoryas, T. (1987). Morphology of Plants and Fungi. Harper & Row Publishers, New York.

Burnett, J. H. (1968). Fundamentals of Mycology. Edward Arnold (Publishers) Ltd., London.

Elizabeth Moore - Landecker (1972). Fundamentals of the Fungi. Prentice Hall Inc., New Jersey, USA.

Ingold, C. T. (1976). The Biology of Fungi. Hutchinson, London.

Mehrotra, R. S. and Aneja, K. R. (1990). An Introduction to Mycology. Wiley Eastern Ltd., New Delhi.

Vashista, B. R. (1982). Botany for Degree Students - Fungi. S. Chand & Co., New Delhi.

Webster, J. (1999). Introduction to Fungi. 2nd ed. Cambridge University Press.

Plant Pathology

Bilgrami, K. S. and Dube, H. C. (1990). A Textbook of Plant Pathology. Vikas Publishing House Pvt. Ltd., New Delhi.

Govindaswamy, C. V. and Alagiamagalingam, M. N. (1981). Plant Pathology. Popular Book Depot, Chennai.

CORE COURSE IV- U13BO4

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Semester : III

Core Course : IV

Instruction Hours/Week :5

Credit : 5

Unit-I

Pteridophytes - General characteristics and classification by G. M. Smith - External and Internal features, reproduction and life-cycle of *Psilotum*, *Lycopodium*, *Selaginella* and *Equisetum*.

Unit-II

External and internal features, reproduction and life-cycle of *Adiantum*, *Gleichenia* and *Marsilea*. Stelar evolution in Pteridophytes. Heterospory and origin of seed habit.

Unit-III

Gymnosperms - General characteristics and classification of Gymnosperms by K. R. Sporne - External and internal structure, mode of reproduction and life-cycles of *Cycas*, *Pinus* and *Gnetum*. Economic importance of gymnosperms

Unit-IV

Paleobotany - Fossils - types of fossils and methods of fossilization - Geological time-scale - Age of fossils - Radio-Carbon Dating – Uses of fossils.

Unit-V

Study of the fossil forms forms - *Rhynia*, *Lepidodendron* *Calamites* and *Williamsonia*.

Units 1 & 2 - Teaching- 2 hrs / week; Units 3 - Teaching- 1 h / week;

Units 4 & 5 - Teaching- 1 h / week;

References

Pteridophytes

Eames, A. J. (1936). Morphology of Vascular Plants (Lower Groups). McGraw Hill, New York.

- Parihar, N. S. (1999). An Introduction to Embryophyta. Vol. II. Pteridophyta. Central Book Depot, Allahabad.
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Paleobotany

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CORE COURSE V - U13BO5P

PRACTICAL II (Pertaining to BO4 & BO6)

Semester : III & IV

Core Course: V

Instruction Hours/Week:2+3

Credit : 5

A study of the morphology and anatomy of both vegetative and reproductive parts of the living genera and fossil forms.

Pteridophyta:

Psilotum, Lycopodium, Selaginella, Equisetum, Adiantum, Gleichenia and Marsilea

Gymnosperms:

Cycas, Pinus and Gnetum

Paleobotany:

Fossils - *Rhynia, Lepidodendron, Calamites and Williamsonia* (spotters only)

Anatomy:

Study of internal structure: Stem, root and leaf of monocot (eg.: *Zea mays*) and dicot (eg.: *Tridax procumbens*)

Study of normal (eg.: *Tridax procumbens*) and anomalous secondary thickening (eg.: *Dracena* and *Boerhaavia*) in stem:

Nodal anatomy: Study of unilocular, trilocular and multilocular nodes

Embryology:

T. S. of mature anther (spotters only) - L. S. of ovule - Types of ovules - Orthotropous and Anatropous (spotters only)

Embryo Dissection: Dissect out embryo at various stages from *Tridax procumbens*

Endosperm types (spotters only)

CORE COURSE VI - U13BO6
ANATOMY AND EMBRYOLOGY

Semester : IV

Core Course : VI

Instruction Hours/Week : 5

Credit : 5

Unit-I

Anatomy - Plant tissues: Meristematic Tissues - classification of meristems, shoot and root apical meristems, theories on apical meristem (apical meristem theory, apical cell theory, histogen theory, tunica corpus theory and Korper-Kappe theory) - Epidermal Tissues – stomata and their types and Secretary Tissues - laticifers.

Unit-II

Simple Permanent Tissues: Parenchyma, collenchyma and sclerenchyma. Complex Permanent Tissues: Xylem and Phloem.- their structure and functions. Primary structure of root, stem and leaf in dicot and monocot.

Unit-III

Normal Secondary growth in stem and root - heartwood, sapwood - annual rings - Periderm formation.

Unit-IV

Anamalous secondary growth in dicot stems (eg.: *Nyctanthus* and *Boerhaavia*) and monocot stem (eg.: *Dracaena*). Nodal anatomy – uni lacunar, tri-lacunar and multilacunar types

Unit-V

Embryology: Anther - structure of mature anther - pollen wall structure. Ovule – types, structure of embryosac (*Polygonum* type) and development. Fertilization process. Endosperm: types (Nuclear, cellular, helobial and ruminant). Development of monocot and dicot embryo

Unit - 1 – Teaching- 1 h / week; Unit - 2 - Teaching- 1 h / week;

Units - 3 & 4 - Teaching- 1 h / week; Unit - 5 - Teaching- 1 h / week;

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CORE COURSE VII- U13B07
CELL AND MOLECULAR BIOLOGY

Semester : V

Core Course : VI

Instruction Hours/Week :5

Credit : 5

Unit-I (Teaching- 2 hrs / week)

Basic principles of microscopy. Structure of Prokaryotic and Eukaryotic cells - Ultra structure and functions of plasma membrane - Ultra structure of cell organelles - Plastids, Mitochondria, Golgibody, ER- Lysosome.

Unit-II (Teaching-1 h / week)

Nucleus - Nucleolus - Structure of euchromatin and hetrochromatin - Special types of chromosomes - Lamp brush chromosomes and polytene chromosomes - Mitosis, meiosis, cell cycle and stages.

Unit-III (Teaching-1 h / week)

Genetic material - Properties and replication of genetic material - Structure - Hershey and Chase experiment - C-value paradox - Organisation of DNA sequences - Satellite DNA, repetitive DNA sequences.

Unit-IV (Teaching-1 h / week)

Gene regulation in Prokaryotes (*Lac* operon concept) and Eukaryotes – Transcription, Translation, Initiation, Elongation and Termination.

Unit-V (Teaching-1 h / week)

Chloroplast and mitochondrial genome - Semi autonomous organisation, Receptors, Signal transduction pathway – protein targeting to organelles.

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Old, R. W. and Primrose, S. B. (1994). Principles of Gene Manipulation. Blackwell Science, London.

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CORE COURSE VIII - U13B08

MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

Semester : V Core Course : VIII

Instruction Hours/Week : 5 Credit : 5

Unit-I (Teaching-1 h / week)

Morphology and taxonomic description of a flower and floral parts - Inflorescence - Types - racemose, cymose, mixed and special types.

Fruit - simple, fleshy, dry dehiscent and dry indehiscent.

Unit-II (Teaching-1 h / week)

Taxonomy - Binomial nomenclature – ICBN. Bentham and Hooker classification - Merits and demerits. Herbarium techniques.

Unit-III (Teaching-1 h / week)

A detailed study of the following families with their economic importance - Annonaceae, Rutaceae, Anacardiaceae, Leguminosae (Papilionaceae, Cesalpiniaceae and Mimosaceae) and Cucurbitaceae.

Unit-IV (Teaching-1 h / week)

Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Euphorbiaceae, Orchidaceae and Poaceae.

Unit-V (Teaching-1 h / week)

Economic Botany - A brief study of the following economic plants and their main economic importance products:

- i) Food - Cereals (*Oryza*, *Eleusine*), Pulses (*Phaseolus*), Edible oil (*Arachis*, *Seasamum*), root tubers (*Manihot*), sugar (*Saccharum*).
- ii) Fibres - Textiles (*Gossypium*), Jute (*Corchorus*).
- iii) Medicinal plants - *Ocimum*, *Phyllanthus*, *Azadirachta*, *Solanum*.
- iv) Forest products - Timber [*Tectona* (Teak), *Artocarpus* (Jack)], Tannins, Gums, Rubber, Resins, Turpentine.

References**Taxonomy**

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Economic Botany

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Elective Course I – U13B09E**MICROBIOLOGY****Semester : V****Elective Course : I****Instruction Hours/Week : 5****Credit : 4****UNIT-I** (Teaching-1 h / week)

History and scope of microbiology, characterization and classification of microorganisms - R. H. Wittaker's five kingdom concept - Morphology, growth, nutrition and reproduction of bacteria. Structure, classification and reproduction of Viruses - A general account on Rickettsias, Chlamydias and Mycoplasmas.

UNIT-II (Teaching-1 h / week)

Culture of microorganisms: Pure cultures, batch and continuous cultures. Methods of Isolation and preservation of microorganisms - Microorganisms and human diseases - food borne (Botulism), water borne (Typhoid and Cholera) and air borne (Tuberculosis)

UNIT-III (Teaching-1 h / week)

Soil Microbiology - Role of microbes in agriculture - Microbes in nitrogen fixation and phosphate solubilization - Role of microbes in Biogeochemical cycles (carbon, nitrogen and sulphur) - Aquatic microbiology - Microbiology of air.

UNIT-IV (Teaching-1 h / week)

Food microbiology - Microbiology of milk and dairy products - Industrial Microbiology - Role of microbes in various industries - Fermentors and fermentation technology - large scale production of ethanol, single cell protein, lactic acid.

UNIT-V (Teaching-1 h / week)

Microbes and biogas production - Sewage treatment - Primary, secondary and tertiary treatments, Biodegradation of cellulose, lignin, petroleum wastes and heavy metals.

References

Pelczar, J., Chan, E. C. S. and Krieg, R. (1999). Microbiology. Tata McGraw Hill Publishing Co. Ltd., New Delhi.

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Elective Course II – U13BO10E

BIOTECHNOLOGY

Semester : V

Elective Course : II

Instruction Hours/Week : 4

Credit : 4

UNIT-I (Teaching-1 h / week)

Tissue culture techniques – Sterilization: techniques – preparation of MS medium. Shoot culture: Organogenesis - direct and indirect – Micropropagation - Applications in Agriculture, Horticulture and Forestry.

UNIT-II (Teaching-1 h / week)

Culture of Haploids, somatic embryogenesis, synthetic seeds, - Production of Transgenic plants – basic knowledge and application

UNIT-III (Teaching-1 h / week)

Genetic engineering: Introduction - Gene cloning - Enzymes of Genetic engineering (exonucleases, endonucleases) - Restriction endonuclease, DNA - Ligases, reverse transcriptase.

UNIT-IV (Teaching-1 h / week)

Gene cloning strategy – Vectors in gene cloning - Plasmids : Ti plasmid, pBR322 and cosmids.

UNIT-V (Teaching-1 h / week)

Biotechnology – Prospects and Application with reference to Agriculture, Medicine and Industry. Limitations of Biotechnology.

Reference

Dodds, J. H. and Roberts, I. W. (1985). Experiments in Plant Tissue Culture. Cambridge University Press, UK.

Dubey, R. C. (2008). A Textbook of Biotechnology. S. Chand & Co., New Delhi

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CORE COURSE IX - U13BO11P

PRACTICAL III (Pertaining to BO7, BO11 & BO12)

Semester : V & VI

Core Course: IX

Instruction Hours/Week: 2+3

Credit : 5

Cell and Molecular Biology

1. Observation of plant cells in the onion scale leaf peeling and *Rheo* Leaf epidermis
2. Non-living inclusions: Raphides, cystolith and Starch grains (spotters).
3. Cell division: Observation of mitotic stages - Squash technique in onion root tips
4. Study of ultra Structure of organelles using photographs (spotters)

Genetics and Evolution

Problems on simple monohybrid and Di-hybrid ratios. Simple Problems on interaction on factors included in the theory. (Spotters only)

Physiology

To be performed by each student:

1. Determination of osmotic pressure of onion tissue or *Rheo* leaf or potato tuber,.
2. Determination of absorption and transpiration ratio of plant twigs.
3. Measurement of respiration rate using germinating seeds and flower buds with simple respiroscope.
4. Determination of photosynthetic rate in Hydrilla plants under different CO₂ concentration.
5. Measurement of oxygen evolution under different colours and lights using Wilmott's bubbler.

Ecology

6. Study of anatomical features of Hydrophyte (*Hydrilla*)
7. Study of anatomical features of Xerophyte (*Nerium*)
8. Study of morphological feature of Epiphyte (*Vanda*)
9. Study of morphological feature of Parasite (*Cuscuta*)
10. Study of morphological feature of Halophyte (*Avecinia / Rhizophora*)

CORE COURSE X - U13BO12P**PRACTICAL IV (Pertaining to BO8 & BO13)****Semester : V & VI****Core Course: X****Instruction Hours/Week: 3+3****Credit : 5****Morphology, Taxonomy and Economic Botany**

1. Study on inflorescence types and fruits as given in theory (spotters only)
2. Morphological description of plants, training in dissection, observation, identification, sketching of floral parts, drawing floral diagram and describing it technically in terms of floral formula of different plants belonging to the families mentioned in theory
3. Study on the economic importance of plants, covered in Core Course-X (spotters)
4. Field study of flora and submission of **10 herbarium specimens**.

Biochemistry

1. Colorimetric Estimation of Total Sugar.
2. Colorimetric Estimation of Starch.
3. Separation of plant pigments by paper chromatography.
4. Estimation of protein by Lowry's method.
5. Estimation of lipid by gravimetric methods.
6. Enzyme activity using amylase (Demonstration only).

Biophysics and Bioinstrumentations

7. Principle / Operation / Uses of pH meter.
8. Principle / Operation / Uses of Centrifuge.
9. Principle / Operation / Uses of Colorimeter / Spectrophotometer.
10. Principle / Operation / Uses of Electrophoresis.

Core Course XI -U13BO13**GENETICS AND EVOLUTION****Semester : VI****Core Course : XI****Instruction Hours/Week : 6****Credit : 6****Unit-I (Teaching-1 h / week)**

Genetics: Mendel's laws, monohybrid, dihybrid, back cross and test cross. Allelic interactions: Incomplete and codominance - complementary factor hypothesis, epistasis, lethal factor complementary factor and epistasis (dominant),

Unit-II (Teaching-2 hrs / week)

Multiple factor hypothesis. Non-allelic Interaction- Lethal factor. Linkage, crossing over, recombination, cytological proof of crossing over, mapping of genes on the chromosomes, sex linkage - *Drosophila* (eye colour) and humans (colour blindness) and cytoplasmic inheritance.

Unit-III (Teaching-1 h / week)

Sex determination in plants and animals.. Polyploidy - autopolyploidy and allopolyploidy - role of polyploidy in evolution with examples.

Unit-IV (Teaching-1 h / week)

Biochemical genetics of *Neurospora*, Gene action, Gene units-cistron, recon, muton, codon and operon - Gene mutation, physical and chemical mutagens. Mutation rate - Its role in evolution.

Unit-V (Teaching-1 h / week)

Evolution - Evolutionary concepts in explaining the diversity of life - Theories of Lamarck, Charles Darwin and the modern synthetic theories.

References**Genetics**

- Sinnott, E. W., Dunn, L. C. and Dobshansky, J. (1958). Principles of Genetics. (5th ed.) McGraw Hill, New York.
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Evolution

- Savage, J. M. (1969). Evolution (2nd ed). Amarind Publishing (P) Ltd., New Delhi.
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- Anna Sproule (1998). Charles Darwin Scientists who have changed the World. Orient Longmans, Hyderabad.

CORE COURSE XII - U13BO14
PLANT PHYSIOLOGY AND ECOLOGY

Semester : VI **Core Course : XII**

Instruction Hours/Week : 6 **Credit : 6**

Unit-I (Teaching-1 h / week)

Water relations: Significance, osmotic and non-osmotic uptake of water - Ascent of sap- cohesion theory: Root pressure, transpiration, physiology of stomatal action, Translocation of solutes and assimilates - Mass flow - Membrane permeability mineral uptake: Passive and active - Role of major and minor elements - Mineral deficiency symptoms.

Unit-II (Teaching-2 hrs / week)

Photosynthesis: Absorption spectrum, Action spectrum, role of pigments enhancement effect, Photosystems I & II - Photosynthetic electron transport, Photophosphorylation - Carbon Assimilation: Calvin cycle, Hatch & Slack pathway, CAM pathway - Respiration: Respiratory substrates, Aerobic and anaerobic, Glycolysis, Krebs' cycle and oxidative phosphorylation, energetic of respiration.

Unit-III (Teaching-1 h / week)

Plant Growth: Regulatory substances, auxins, kinetins, gibberellins, abscissic acid and their function - Role of hormones in flowering, senescence and abscission - Photoperiodism - Phytochrome - Vernalization.

Unit-IV (Teaching-1 h / week)

Autecology- Synecology - Plant Environmental factors - Climatic, edaphic and biotic factors. Ecosystem concept - Ecological pyramids, Food chain - Food web and energy flow in ecosystem - Plant succession - Hydrosere and Xerosere.

Unit-V (Teaching-1 h / week)

Pollution and its control - Air pollution, Soil pollution and Water pollution - Radiation pollution, Noise pollution and Thermal pollution. Global warming and acid rain.

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Saraswathy Rangamannar (1973). Thaavara Valarchithai Martram (Metabolism and Biosynthesis) (in Tamil). Tamil Nadu Textbook Society.

Periyasamy, K. (1978). Cell Iyakka Viyal (Cell Physiology) (in Tamil). Tamil Nadu Textbook Society.

Hans Meidner (1984). Class Experiments in Plant Physiology. George Allen & Unwin, London.

Srivastava, H. N. (1986). Plant Physiology. Pradeep Publications, Jalandhar.

Jain, V. K. (1990). Fundamentals of Plant Physiology. S. Chand & Co. Ltd., New Delhi.

Pandey, S. N. (1991). Plant Physiology. Vikas Publishing House (P) Ltd., New Delhi.

Mukherjee, S. and Ghosh, A. K. (1998). Plant Physiology. Tata McGraw Hill Publishing Co. Ltd., New Delhi.

Verma, S. K. (1999). Plant Physiology and Biochemistry. S. Chand & Co. Ltd., New Delhi.

Verma, S. K. (1999). A Textbook of Plant Physiology. S. Chand & Co. Ltd., New Delhi.

Salisbury, F. B. and Ross, C. W. (1999). Plant Physiology. CBS Publishers and Printers, New Delhi.

Gill, P. S. (2000). Plant Physiology. S. Chand & Co. Ltd., New Delhi.

Verma, V. (2001). A Textbok of Plant Physiology. Emkay Publications, New Delhi.

Ecology

Puri, G. S. (1960). Indian Forest Ecology (Vol. I & II), Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Billings, W. B. (1965). Plants and Ecosystem.

Misra, R. (1968). The Ecology Workbook. Oxford & INH Publishing Co., Calcutta.

Odum, E. P. (1971). Fundamentals of Ecology. Saunders & Co., Philadelphia.

Ambasht, R. S. (1974). Textbook of Plant Ecology. Students & Friends Co., Varanasi.

Odum, E. P. (1975). Ecology. Holt, Rinert & Winston.

Oosting, H. G. (1978). Plant and Ecosystem. Wadworth Belmont.

Kochhar, P. L. (1975). Plant Ecology. S. Nagi & Co., Jullandhar.

Shukla, R. S. and Chandel, P. S. (1991). Plant Ecology and Soil Science. S. Chand & Co. Ltd., New Delhi.

Arumugam, N. (1994). Concepts of Ecology (Environmental Biology). Saras Publications, Nagrcoil.

Verma, P. S. and Agarwal, V. K. (1999). Concept of Ecology (Environmental Biology). S. Chand & Co. Ltd., New Delhi.

CORE COURSE XIII - U13BO15

BIOCHEMISTRY, BIOPHYSICS AND BIOINSTRUMENTATION

Semester : VI

Core Course : XIII

Instruction Hours/Week : 6

Credit : 6

Unit-I (Teaching-1 h / week)

Physical forces and chemical bonds. Carbohydrates, classification, structure and functions of monosaccharides (pentoses and hexoses), disaccharides (maltose, lactose and sucrose) and polysaccharides (starch, glycogen, cellulose, inulin and pectin).

Unit-II (Teaching-1 h / week)

Amino acids - basic structure, classification and properties. Proteins - Classification, levels of organisation (primary, secondary, tertiary and quaternary structure) - Lipids - classification, saturated and unsaturated fatty acids – Nucleic acids –structure of DNA and RNA

Unit-III (Teaching-1 h / week)

Enzyme classification, mechanism of action - Enzyme inhibitors (competitive, uncompetitive, and non-competitive) - Factors affecting enzyme activity. Elementary study of secondary plant metabolites - Terpenoids, Flavonoids and Alkaloids.

Unit-IV (Teaching-1 h / week)

Biophysics – Electromagnetic radiation of light – properties and components - Laws of Thermodynamics, enthalpy and entropy - electron transfer process – Redox reactions – Bioenergetics – ATP generation

Unit-V (Teaching-2 hrs / week)

Basic knowledge of principle, instrumentation and working of pH meter, colorimeter, spectrophotometer, Centrifuge and Electrophoresis. Chromatography - types, technique and their application.

References

Biochemistry

Jain, J. L. (1979). Fundamentals of Biochemistry. S. Chand & Co. Ltd., New Delhi.

Conn, E. and Stumpf, P. K. (1979). Outline of Biochemistry. Wiley Eastern Ltd., New Delhi.

Metz, E. T. (1960). Elements of Biochemistry. V. F. & S (P) Ltd., Bombay

Biophysics

Casey, E. J. (1969). Biophysics - Concepts and Mechanisms - Van Nostrand Reinhold Co., New Delhi

Narayanan, P. (2000). Essentials of Biophysics. New Age international Publishers (P) Ltd., New Delhi.

Annie and Arumugam, N. (2000). Biochemistry and Biophysics. Saras Publications, Nagercoil.

Salil Bose, S. (1982). Elementary Biophysiscs. Vijaya Printers, Madurai.

Elective Course III – U13BO16E

BIostatISTICS AND BIOinformatics

Semester : VI

Elective Course : III

Instruction Hours/Week : 5

Credit : 4

Unit-I (Teaching-1 h / week)

Biostatistics – Definition and application - Sampling methods - Measures of central value - Mean, median and mode - Graphical methods: Histogram, Bar Chart and Pie diagram.

Unit-II (Teaching-1 h / week)

Mean deviation, Standard Deviation and Standard Error. General account on correlation and its types

Unit-III (Teaching-1 h / week)

Distribution types - Definition - Properties - Area under normal curve - Interpreting areas as probabilities - Importance of normal distributions.

Unit-IV (Teaching-1 h / week)

Biological Databases – Classification - Nucleic acid databases - NCBI, Genbank and DDBJ. Protein databases - PDB and SwissPROT

Unit-V (Teaching-1 h / week)

Bioinformatics - Challenges and applications. Internet and its role. Software – Bioedit, Clustral- W – Alignment of sequences

Reference

Olive Jean Dunn - Basic Statistics - A primer for the Biomedical Sciences - John Wiley and Sons.

Nageswara Rao, G. - Statistics for Agricultural Science - Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Bryan Bergeron (2003) - Bioinformatics Computing. Prentice Hall of India Pvt. Ltd., New Delhi.

Gautham, N. (2006) - Bioinformatics Database and Algorithms - Narosa Publishing House, New Delhi.

Murthy, C. S. V. (2003) - Bioinformatics - Himalayas Publishing House.

Ranga (2003) - Bioinformatics - Agrobios, India.

David E. Mount (2001) - Bioinformatics Sequence and Genome Analysis - Cold Spring Harbour Laboratory Press, New Delhi.

Shanmugavel (2005) - Principles of Bioinformatics - Pointer Publisher, India.

Andreas D Baxevanis and Francis, B. F. (2001) - Bioinformatics - John Willy & Sons Westhead (2003) - Bioinformatics - Viva Books Pvt. Ltd.

Ignacimuthu, S. (2005) - Basic Bioinformatics - Narsa Publishing House.

ALLIED CHEMISTRY I – U13ACH1

Semester : I

First Allied Course: 1

Instruction Hours/Week: 5

Credit: 3

UNIT - I

Shapes of Molecules: Application of valence shell electron pair repulsion theory to simple molecules - BF_3 , CH_4 and H_2O . **Molecular Orbital Theory:** Some important basic concepts of MO theory - LCAO, bonding and antibonding orbitals and bond order - application of MO theory to H_2 , He_2 , N_2 , O_2 , F_2 .

UNIT - II

Chemical Thermodynamics: First law of thermodynamics - state and path functions- need for the second law - Carnot's cycle and thermodynamic scale of temperature, spontaneous and non spontaneous processes- entropy - Gibb's free energy. Entropy change and free energy change to decide spontaneity, elementary idea of third law - statement and explanation.

UNIT - III

Chemotherapy: Definition of chemotherapy- examples each for (i) Analgesics, (ii) antibacterial, (iii) anti-inflammatory, (iv) antipyretic, (v) antibiotic, (vi) antitubercular, (vii) antiviral, (viii) antitussive, (ix) antiallergic, (x) antidiabetics, (xi) antihypertensive,

(xii) anaesthetics (local and general) Structure not necessary. **Organic reactions:** Osazone test, biuret test, condensation reactions for aldehydes and ketones, Esterification reaction, Diazotization followed by coupling and phthalein fusion test.

UNIT - IV

Amino Acids and Proteins: Amino acids - classification based on structure - essential and non-essential amino acids - proteins - classification based on physical properties and biological functions, structure of proteins- primary, secondary and tertiary (elementary treatment).

UNIT - V

Colloids: Definition - classification of colloidal solutions - preparation, purification, properties - Non-settling, osmotic pressure, Tyndall effect, electrical charge, electrophoresis, Imbibition. **Chemical kinetics:** Order of reactions and their determinations - activation energy, effect of temperature on reaction rate.

References:

01. P.L. Soni Textbook of Inorganic chemistry
02. P.L. Soni Textbook of Organic chemistry
03. P.L. Soni Textbook of Physical chemistry

ALLIED CHEMISTRY PRACTICAL – U13ACH2P

Semester : I & II

First Allied Course: II

Instruction Hours/Week:6

Credit: 3

I VOLUMETRIC ANALYSIS

(for pcs st iii&iv)

1. Acidimetry and alkalimetry

- (a) Strong acid vs strong base
- (b) Weak acid vs strong base

2. Permanganimetry

- (a) Estimation of ferrous sulphate/Mohr's salt
- (b) Estimation of oxalic acid

3. Iodometry

- (a) Estimation of $K_2Cr_2O_7$

II ORGANIC ANALYSIS

Qualitative analysis of the following organic compounds

1. Carboxylic acid
2. Amide
3. Primary aromatic amine
4. Aromatic aldehyde
5. Aromatic ketone
6. Carbohydrate
7. Simple phenol

ALLIED CHEMISTRY II – U13ACH3

Semester : II

First Allied Course: III

Instruction Hours/Week: 5

Credit: 3

UNIT - I

Coordination Chemistry: Complexes - Classification, IUPAC Nomenclature of mononuclear complexes. Chelation and its industrial importance with particular reference to EDTA. Biological role of haemoglobin and chlorophyll. Applications of complexes in qualitative and quantitative analytical chemistry.

Industrial Chemistry: Fuel gases - Water gas, producer gas, L.P.G. gas, gobar gas and natural gas. Fertilizers - NPK and mixed fertilizers, micronutrients and their role in plant life and biofertilizers.

UNIT - II

Surface Chemistry: Adsorption - factors affecting the adsorption of gases by solids - types of adsorption - differences between physisorption and chemisorption - catalysis - homogeneous and heterogeneous catalysis - examples.

Photochemistry: Laws governing the absorption of light - Lambert's law and Beer's law - laws of photochemistry - Grotthus law, Stark-Einsten's law and - quantum efficiency.

UNIT - III

Fundamental concepts in Organic chemistry: Bond length - bond energy - polar and nonpolar molecules - resonance effect - rules governing resonance - hydrogen bonding - effect on boiling points - effect on water solubility.

Synthetic polymers: Definition - Teflon, alkyd and epoxy resins, polyesters - general treatment only.

UNIT - IV

Dyes: Definition - classification of dyes based on structure and method of application.

Fats and oils: Definition of fats and oils - distinction between fats and oils - properties - analysis of fats and oils - saponification value, iodine value.

Carbohydrates: Introduction - Classification - Preparation, properties and structural elucidation of glucose.

UNIT - V

Electrochemistry: Specific and equivalent conductivities - their determinations - effect of dilution on conductivity - an elementary idea about basic theory - Ostwald's dilution law, Kohlraush law, conductivity measurements and conductometric titrations.

Phase rule: Definition of phase, component and degree of freedom. Explanation of one - component system (Water).

References:

1. P.L. Soni Textbook of Inorganic chemistry
2. P.L. Soni Textbook of Organic chemistry
3. P.L. Soni Textbook of Physical chemistry

BIOLOGY OF INVERTEBRATES AND CHORDATES -U13AZY1

Semester : III

Second Allied Course : I

Instruction Hours/Week :5

Credit : 3

UNIT – I

General characters and outline classification of Invertebrates. Detailed study of *Paramecium*.

UNIT – II

***Fasciola hepatica*:** External features, digestive system, respiratory system, circulatory system, nervous system, reproductive system and Life history.

Earthworm: External features, digestive system, respiratory system, circulatory system nervous system and reproductive system

UNIT – III

Cockroach: External features, digestive system, respiratory system, circulatory system nervous system and reproductive system

Star fish: External features, digestive system and water vascular system.

UNIT – IV

General characters of Chordates, Outline Classification of Chordate up to Class.

Shark and Frog: External features, digestive system, respiratory system, circulatory system, urinogenital system and brain.

UNIT – V

Pigeon and Rabbit.: External features, digestive system, respiratory system, circulatory system, urinogenital system and brain.

References:

1. Ekambaranatha Ayyar, M. 1988. Outlines of Zoology. Viswanathan Publications.
2. Ekambaranatha Ayyar, M. 1988. A Manual of Zoology, Vol. I & II. Viswanathan Publications.
3. Nair, N.C. 2006. A Text Book of Invertebrates, Saras Publications, 3rd Ed.
3. Jordan, E.L. 2000. Invertebrate Zoology. S.Chand and Co.
4. Jordan, E.L. 2000. Chordate Zoology. S.Chand and Co.
5. Arumugam. N. Outlines of Zoology, 1998. Saras Publications.

ALLIED PRACTICAL- U13AZY2P

(Pertaining to AZY1 & AZY3)

Semester : III & IV

Second Allied Course : III

Instruction Hours/Week :2+3

Credit : 3

1. Dissections

Earthworm : Nervous system
Frog : General Anatomy (Virtual laboratory)

2. Mountings

Earthworm : Body and Penial setae
Cockroach : Mouth parts
Honey bee : Mouth parts
Shark : Placoid scale

3. Spotters

Paramecium, Simple sponge-Ascon, Obelia colony, Sea anemone, Ascaris, Fasciola hepatica, Taenia solium, Earthworm, Leech, Prawn, Scorpion, Grass hopper, Fresh

water mussel, Pila, Starfish, Amphioxus, Shark, Catla, Frog, Newt, Calotes, Snake, Pigeon, Rat and Bat.

4. Species of animals used in vermiculture, apiculture, lac culture, sericulture, aquaculture and poultry farming.
5. Products: Honey, Bee's Wax, Silk, Cod liver oil, pearl, eggs of different poultry birds.

A record of lab work should be maintained and submitted at the time of practical exam

ECONOMIC ZOOLOGY -U13AZY3

Semester : IV

Second Allied Course : III

Instruction Hours/Week :5

Credit : 3

UNIT – I

Vermiculture: Types of earthworm, rearing technology, management, economic importance.

UNIT – II

Apiculture : Species of honey bees. Types of bee hives, Care and management, honey extraction, Nutritive and medicinal value of honey.

UNIT – III

Sericulture : Types, Rearing techniques. Diseases: Maggot, Pebrine, Flacherie and Grasserie. Life cycle of silk worm (*Bombyx mori*). Economic importance of silk worm and silk.

UNIT – IV

Fish culture: Catla, Rohu, Live feed culture (Rotifers), Induced breeding, Fish diseases (any three). Fish byproducts.

UNIT – V

Poultry farming: Types of poultry, management, poultry nutrition, diseases and their prevention, Economics of poultry production.

References:

1. Shukla, G.S. and V.B. Upadhyay 2003 Economic Zoology, Rastogi publications.
2. Ahsan, J. and S.P. Shiha 2005 A hand book of Economic Zoology, S. Chand & Co.
3. Sardar Singh – Bees keeping in India.
4. Santhanam – 1991. Aquaculture
5. Arumugam, N. 2008. Aquaculture, Saras Publications.
6. Sundarraj, V. 1997. Aquaculture, TANUVAS.
7. Singh – Live stock and poultry production.
8. Rama Rao, V., 2004, Poultry Science, Mangal Deep Publications.

OFFICE AUTOMATION - U13SBE1**Semester : I****Skill Based Elective Course- I****Instruction Hours/Week: 2****Credit: 2****Unit - I**

MS- Word- Introduction to Computers - Hardware - Software, Operating System: Windows XP -MS-Paint, Notepad, WordPad, Introduction to MS-Word, Creating, Editing and Formatting Document - Working with Drawing objects - Text Manipulation

Unit-II

Working with Tables – Columns – Labels - Plotting, editing and Filling drawing objects-Bookmark – Header & Footer - Checking and Correcting a document - Creating Labels – Envelops – Mail Merge – Formatted output and Report generation Printing Documents, Working with Internet.

Unit-III

Ms – Excel - Ms – Excel: Introduction – Data Entry – Cell Formatting - Plotting Graphs – Workbook Features – Library Functions

Unit-IV

Conditional Functions and Data Sorting – Limit the data on a worksheet - Data Validation –Data consolidation - Chart creation - Checking and Correcting Data - Tracking and Managing Changes- Advanced Features

Unit-V

Ms – PowerPoint- Introduction - Creating, Editing and Formatting Presentation – Applying Transition and Animation Effects - Applying Design Templates - Viewing and Setting up a Slide Show - Navigating among Different Views - Ms Outlook: Introduction to Folder List – Address

Book.References

1. Jill Murphy, Microsoft Office Word- Comprehensive Course, Labyrinth Publications, 2003.
2. McGraw-Hill/Irwin-Deborah Hinkle, Microsoft Office 2003 PowerPoint: A Professional Approach, Comprehensive w/ Student CD, New Delhi, 2003.
3. Nellai Kannan, C., MS-Office, Nels Publications, Tamil Nadu, 2002.

DESKTOP PUBLISHING - U13SBE2**Semester: III****Skill Based Elective Course: II****Instruction Hours/Week: 2****Credit: 2****PHOTOSHOP:****UNIT – I****Photoshop Tools :**

Move, Type, Marquee, Lasso, Crop, Shapes, Healing, Brush, Patch, Cloning Stamp, Eraser, Gradient, Blur, Smudge, Dodge, Pen, Eye Dropper, Patch selection and Zoom tool.

Layer:

New layer, Layer set, Duplicate layer, Rasterize and Merge down

Layer Styles:

Drop shadow, inner shadow, outer glow & inner glow, Bevel and Emboss, Gradient overlay, Stroke. Text formatting

UNIT – II**File:**

Save, File formats, Page set up.

Edit:

Check spelling, Copy merged, Fill, Transform, Define pattern.

Image:

Motion blur, Twirl, lens flare, Glowing edges, lighting effects, solarize, water paper, Stained glass, Mosaic Tiles.

Window:

Character and Paragraph settings.

COREL DRAW:**UNIT – III****Drawing Tools:**

Pick, Shape, Knife, eraser, Smudge, Roughen brush, free transform, Zoom ,hand, Free hand, Bezier, Artistic, Pen, Poly line, Point, Interactive connective, Spiral tool.

Colour Tool:

Paint Bucket Tool, Eye Dropper, Fill Tools. Fill Options, Stroke Options.

UNIT – IV**Special Effects:**

3D effects, Add perspective, Blend, Contour, Artistic media, lens, and Power clip.

Shaping Options:

Weld, trim, Intersect.

Text Effects:

Format text, bullet, and fit text to path, align and straighten, spell check.

File Menu:

Save, Save as, Import, Page set Up.

PAGE MAKER:**UNIT – V****Page Maker Tools:**

Pointer, Rotate, Line, Rectangle, Ellipse, Polygon, Hand, Text, Crop, Rectangle frame tools.

Text layout, Style and Objects: Alignments, Styles, fill, frame options, Stroke, Group, Lock, unlock, mask, polygon settings character and paragraph settings.

Text Editing:

Edit story: Undo, Redo, Cut, Copy, Paste, paste Special, Spelling check and Find.

File:

Page set up, save, Save as.

Reference Book:**CorelDraw**

CorelDraw IN Simple Steps – Shalini Gupta Corel DRAW Bible - DEBORAH MILLER

PhotoShop

Teach Yourself Adobe Photoshop – Rose Carla Adobe Photoshop Cs Classroom in a Book by Adobe Press

PageMaker

Using Microsoft Word - Asmita Bhatt Pagemaker In Easy Steps - Scott Basham Ctoa Material By Genesis.

OFFICE AUTOMATION & DESKTOP PUBLISHING LAB - U13SBE3P

Semester : III

Skill Based Elective Course : III

Instruction Hours/Week: 2

Credit: 2

Unit – I (Office Automation)

1) Ms – Word : Text Formatting , Mail Merge,

2) Ms – Excel : Implement the Statistical & Mathematical Function

(Using Min ,Max, Median, Average, Standard Deviation, Correlation, Logical 'if' Condition)

for the given data, Prepare a Chart for a given Data using Pie diagram / Histogram

Unit – II (Photoshop)

- 3) Design a College Broacher / Birthday Card.
- 4) Cropping, rotating and Overlapping the image.
- 5) Create a single image from Multiple image.
- 6) Creating an image with multilayer's.

Unit – III (Corel Draw)

- 7) Design a Visiting Card \ Greeting Card using Draw & Text tools.
- 8) Create a logo for a Company \ College .

Unit – IV (Page Maker)

- 9) Type and format a letter using text tool.
- 10) Prepare a Invitation for College Day \ Sports Day.

ENVIRONMENTAL STUDIES - U13ES

Semester : II

Environnemental Studies Course

Instruction Hours/Week: 2

Credit: 2

Unit 1 :

Environment and Natural Resources :

Definition, scope, importance of Environmental Studies - Need for public awareness.

Natural resources — classification - Associated problems

- a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
 - d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
 - e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
 - f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable lifestyles.

Unit 2: Ecosystems

- Concept of an ecosystem.
 - Structure and function of an ecosystem.
 - Producers, consumers and decomposers.
 - Energy flow in the ecosystem.
 - Ecological succession.
 - Food chains, food webs and ecological pyramids.
 - Introduction, types, characteristic features, structure and function of the following ecosystem:
- a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Biodiversity and its conservation

- Introduction — Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity In-situ and Ex-situ conservation of biodiversity.

Unit 4: Environmental Pollution

Definition

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

Unit 5 : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.

- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

REFERENCE

- a) Agarwal, K.C. 2001 Environmental Biology, Nidi Pubi. Ltd. Bikaner.
- b) Sharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad — 380 013, India, Email:mapin@icenet.net (R)
- c) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- d) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- e) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- f) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- g) Down to Earth, Centre for Science and Environment (R)
- h) Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- i) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- j) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- k) Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- l) Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
- m) Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- n) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- o) Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- p) Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Pubi. Co. Pvt. Ltd. 345p. q) Sharma B.K., 2001. Environmental Chemistry. Geol Pubi. House, Meerut

- r) Survey of the Environment, The Hindu (M)
- s) Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB) t)
Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines,
Compliances and Stadards, Vol I and II, Enviro Media (R)
- u) Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) v)
Wanger K.D., 1998 Environmental Management. W.B. Saunders Co.Philadelphia, USA
499p (M) Magazine

(R) Reference

(TB) Textbook

VALUE EDUCATION - U13VE

Semester :V

Value Education Course

Instruction Hours/Week: 2

Credit: 2

UNIT 1: PHILOSOPHY OF LIFE

Human Life on Earth (Kural 629), Purpose of Life (Kural 46) Meaning and Philosophy of Life(Kural 131, 226) The Law of Nature (Kural 374) Glorifying All form of Life in this Universe (Kural 322, 327) – Protecting Nature /Universe (Kural 16, 20, 1038)

UNIT 2: INDIVIDUAL QUALITIES

Basic Culture (Kural 72, 431) Thought Analysis (Kural 282, 467, 666) Regulating desire (Kural 367), Guarding against anger (Kural 158, 305, 306, 314), To get rid of Anxiety (Kural 629), The Rewards of Blessing (Kural 3), Benevolence of Friendship (Kural 786), Love and Charity (Kural 76), Self – tranquility/Peace (Kural 318)

UNIT 3: SOCIAL VALUES (INDIVIDUAL AND SOCIAL WELFARE)

Family (Kural 45), Peace in Family (Kural 1025), Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) , The Pride of Womanhood (Kural 56) Five responsibilities/duties of Man : a) to himself, b) to his family, c) to his environment, d) to his society, e) to the Universe in his lives (Kural 43, 981), Thriftness (Thrift)/Economics (Kural 754), Health (Kural 298), Education (Kural 400), Governance (Kural 691), People's responsibility/ duties of the community (Kural 37), World peace (Kural 572)

UNIT 4: MIND CULTURE

Mind Culture (Kural 457) Life and Mind - Bio - magnetism, Universal Magnetism (God – Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelising the Mind, Stages - Meditation (Kural 261, 266, 270), Spiritual Value (Kural 423)

UNIT 5: TENDING PERSONAL HEALTH

Structure of the body, the three forces of the body, life body relation, natural causes and unnatural causes for diseases (Kural 941), Methods in Curing diseases (Kural 948, 949)

The Five units, simple physical exercises.

Books for Reference:

1. Philosophy of Universal Magnetism (Bio-magnetism, Universal Magnetism) The World Community Service Centre Vethatri Publications (for Unit IV)
2. Pope, G.U., Dr. Rev., Thirukkural with English Translation, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613004 (for All Units)
3. Value Education for Health, Happiness and Harmony, The World Community Service Centre Vethatri Publications Rs 35/- (for All Units)

SOFT SKILLS - U13SS

Semester :V

Soft Skills

Instruction Hours/Week: 2

Credit: 2

Learning objective

Today's world is all about relationship, communication and presenting oneself, one's ideas and the company in the most positive and impactful way. This course intends to enable students to achieve excellence in both personal and professional life.

Unit I

Know Thyself / Understanding Self

Introduction to soft skills self discovery – Developing positive attitude – Improving perceptions – Forming values.

Unit II

Interpersonal Skills/ Understanding Others

Developing interpersonal relationship –Team building –group dynamics –Net working- Improved work relationship

Unit III

Communication Skills/ Communication with others

Art of Listening –Art of reading –Art of speaking –Art of writing –Art of writing emails-e mail etiquette

Unit IV

Corporate Skills/ Working with Others

Developing body language –Practising etiquette and mannerism – Time management – Stress management.

Unit V

Selling Self/ Job Hunting

Writing resume /cv-interview skills – Group discussion –Mock interview Mock GD –Goal setting –Career planning

TEXT BOOKS

Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors, No, B-20 &21, V.M.M Complex, Chatiram Bus Stand, Tiruchirapalli -620 002.

(Phone No: 0431-2702824: Mobile No: 94433 70597, 98430 7442)

Alex K. (2012) Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi -110 055.

Mobile No: 94425 14814(Dr.K.Alex)

REFERENCE BOOKS

- (i) Developing the leader within you John C Maxwell
- (ii) Good to Great by Jim Collins
- (iii) The Seven habits of highly effective people Stephen Covey
- (iv) Emotional Intelligence Daniel Goleman
- (v) You can Win Shive Khera
- (vi) Principle centred leadership Stephen Covey

GENDER STUDIES - U13GS

Semester :VI

Gender Studies Course

Instruction Hours/Week:1

Credit: 1

Objectives

To make boys and girls aware of each other strengths and weakness

To develop sensitivity towards both genders in order to lead an ethically enriched life.

To promote attitudinal change towards a gender balanced ambience and Women empowerment

Unit-I

Concepts of Gender: Sex-Gender-Biological Determinism- Patriarchy- Feminism -Gender Discrimination -Gender Division of Labour -Gender Stereotyping-Gender Sensitivity - Gender Equity —Equality-Gender Mainstreaming Empowerment

Unit-II

Women's Studies Vs Gender Studies: UGC's Guidelines - VII to XI Plans- Gender Studies: Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

Unit III

Areas of Gender Discrimination: Family Sex Ratio-Literacy -Health -Governance Religion Work Vs Employment- Market - Media - Politics Law Domestic Violence — Sexual Harassment — State Policies and Planning

Unit-IV

Women Development and Gender Empowerment: Initiatives International Women's Decade - International Women's Year - National Policy for Empowerment of Women - Women Empowerment Year 2001- Mainstreaming Global Policies.

Unit-V

Women's Movements and Safeguarding Mechanism:— In India National / State Commission for Women (NCW) - All Women Police Station Family Court- Domestic Violence Act - Prevention of Sexual Harassment at Work Place Supreme Court Guidelines - Maternity Benefit Act - PNDT Act - Hindu Succession Act 2003 Eve Teasing Prevention Act - Self Help Groups 73 and 74 Amendment for PRIS.

References

Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited
2004

Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited,
2004

Bhasin Kamala, What is Patriarchy? : Gender Basics, New Delhi: Women Unlimited,
1993

Pernau Margrit Ahmad Imtiaz, Reifeld Hermut (ed.) Family and Gender: Changing
Values in Germany and India, New Delhi: Sage Publications, 2003

Agarwal Bina, Humphries Jane and Robeyns Ingrid (ed.) Capabilities, Freedom, and
Equality: Amartya Sen's Work from a Gender Perspective, New Delhi: Oxford
University Press, 2006

- Rajadurai.S.V, Geetha.V, Themes in Caste Gender and Religion, Tiruchirappalli:
Bharathidasan University, 2007
- Misra Geetanjali, Chandiramani Radhika (ed.) Sexuality, Gender and Rights:
Exploring Theory and Practice in South and Southeast Asia, New Delhi: Sage
Publication, 2005
- Rao Anupama (ed.) Gender &Caste: Issues in Contemporary Indian Feminism, New
Delhi: Kali for Women, 2003
- Saha Chandana, Gender Equity and Gender Equality: Study of Girl Child in Rajasthan,
Jaipur: Rawat Publications, 2003
- Krishna Sumi,(ed.) Livelihood and Gender Equity in Community Resource
Management New Delhi: Sage Publication, 2004
- Wharton .S Amy, The Sociology of Gender: An Introduction to Theory and Research,
USA: Blackwell Publishing, 2005.
- Mohanty Manoranjan (ed.) Class, Caste, Gender: Readings in Indian Government
and Politics- 5, New Delhi: Sage Publications,2004.
- Arya Sadhna, Women, Gender Equality and the State, New Delhi: Deep & Deep
Publications,2000.
