

Syllabus for B.Sc., Biotechnology

(From the Academic Year 2016-17 onwards)



PG & Research Department of Biotechnology

National College

(Autonomous)

Tiruchirappalli – 620 001.



Since 1919

NATIONAL COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 620 001.
(Nationally Reaccredited at 'A' Level by NAAC)

B.Sc. BIOTECHNOLOGY
COURSE STRUCTURE UNDER C.B.C.S.

(Applicable to Candidates admitted from the Academic Year 2016-17 onwards)

Sem	Part	Course	Course Title	Inst. Hrs./ Wk	Credit	Exam Hrs.	Marks			Total
							CIA	External		
								W	O	
I	I	U16T1/U16H1/ U16S1	Tamil – I/ Hindi – I/ Sanskrit – I	6	3	3	25	75	-	100
	II	U16E1	English – I	6	3	3	25	75	-	100
	III	U16BT1	Cell Biology	5	5	3	25	75	-	100
		U16BT2P	Lab in Cell Biology & Microbiology	3	-	-	-	-	-	-
		U16ABT1	Plant Biodiversity – I (Algae, Fungi, Lichens, Plant Pathology & Bryophytes)	5	3	3	25	75	-	100
	U16ABT2P	Lab in Plant Biodiversity – I & II	3	-	-	-	-	-	-	
	IV	U16ES	Environmental Studies	2	2	3	25	75	-	100
Total				30	16					500
II	I	U16T2/ U16H2/ U16S2	Tamil – II/Hindi – II/ Sanskrit – II	6	3	3	25	75	-	100
	II	U16E2	English – II	4	2	3	25	75	-	100
		U16CE1	Communicative English – 1	2	1	3	25	70	05	100
	III	U16BT2P	Lab in Cell Biology & Microbiology	3	6	3	25	70	05	100
		U16BT3	Microbiology	5	5	3	25	75	-	100
		U16ABT2P	Lab in Plant Biodiversity – I & II	3	3	3	25	70	05	100
	U16ABT3	Plant Biodiversity – II (Pteridophytes, Gymnosperms & Paleobotany)	5	3	3	25	75	-	100	
IV	U16SBE 1	Computer Applications - I	2	2	3	25	75	-	100	
Total				30	25					800
III	I	U16T3/U16H3/ U16S3	Tamil – III/Hindi – III/ Sanskrit – III	6	3	3	25	75	-	100
	II	U16E3	English – III	6	3	3	25	75	-	100
	III	U16BT4	Genetics, Plant Breeding and Ecology	4	4	3	25	75	-	100
		U16BT5P	Lab in Genetics, Plant Breeding, Ecology, Biochemistry and BioPhysics	3	-	-	-	-	-	-
		U16ABT4	Invertebrate Zoology and Animal Physiology – I	4	3	3	25	75	-	100
	U16ABT5P	Lab in Invertebrate Zoology and Animal Physiology –I, Vertebrate Zoology and Animal Physiology – II	3	-	-	-	-	-	-	
	IV	U16SBE2	Computer Applications – II	2	2	3	25	75	-	100
U16SBE3P		Computer Applications – II Practical (DTP Lab)	2	2	3	25	70	05	100	
Total				30	17					600

IV	I	U16T3/U16H4/ U16S4	Tamil – IV/Hindi – IV/ Sanskrit – IV	6	3	3	25	75	-	100	
	II	U16E4	English – IV	4	2	3	25	75	-	100	
		U16CE2	Communicative English – II	2	1	3	25	70	05	100	
	III	U16BT5P	Lab in Genetics, Plant Breeding, Ecology, Biochemistry and BioPhysics	3	5	3	25	70	05	100	
		U16BT6	BioChemistry and BioPhysics	4	4	3	25	75	-	100	
		U16ABT5P	Lab in Invertebrate Zoology and Animal Physiology –I, Vertebrate Zoology and Animal Physiology – II	3	3	3	25	70	05	100	
		U16ABT6	Vertebrate Zoology and Animal Physiology - II	5	3	3	25	75	-	100	
	IV	U16NMBT1	Microbes and Man / BioProcess Technology	2	2	3	25	75	-	100	
		U16VE	Value Education	1	2	3	25	75	-	100	
	Total			30	25					900	
V	III	U16BT7	Immunology	5	5	3	25	75	-	100	
		U16BT8	Molecular Biology	5	5	3	25	75	-	100	
		U16BT9E	Plant Anatomy, Embryology and Physiology	5	4	3	25	75	-	100	
		U16BT10E	Microbial Biotechnology	5	4	3	25	75	-	100	
		U16BT11P	Lab in Immunology, Animal Biotechnology, Biostatistics and Bioinformatics	3	-	-	-	-	-	-	-
		U16BT12P	Lab in Molecular Biology, rDNA technology and Bioethics, Plant Morphology, Taxonomy and Plant Biotechnology	3	-	-	-	-	-	-	-
	IV	U16NMBT2	Basic Bioinformatics / GeoMicrobiology / Animal Cell Culture Technology	2	2	3	25	75	-	100	
		U16SS	Soft skills	2	2	3	25	75	-	100	
Total			30	22					600		
VI	III	U16BT11P	Lab in Immunology, Animal Biotechnology, Biostatistics and Bioinformatics	3	5	3	25	70	05	100	
		U16BT12P	Lab in Molecular Biology, rDNA technology and Bioethics, Plant Morphology, Taxonomy and Plant Biotechnology	3	6	3	25	70	05	100	
		U16BT13	rDNA technology and Bioethics	6	6	3	25	75	-	100	
		U16BT14	Animal Biotechnology	6	6	3	25	75	-	100	
		U16BT15	Plant Morphology, Taxonomy and Plant Biotechnology	6	6	3	25	75	-	100	
		U16BT16E	Biostatistics and Bioinformatics	5	4	3	25	75	-	100	
	V	U16GS	Gender Studies	1	1	3	25	75	-	100	
			Extension Activities	-	1	-	-	-	-	-	
Total			30	35					700		
Grand Total			180	140					4100		

Part	Course	No. of Papers	Semester(s)
Part – I	Tamil	04	I, II, III, IV
Part - II	English	04	I, II, III, IV
	Communicative English	02	II, IV
Part - III	Core Course	13	I, II, III, IV, V, VI
	Core Course Elective	03	V, VI
	Allied Course	06	I, II, III, IV
Part – IV	Skill Based Elective	03	II, III
	Non Major Elective	02	IV, V
	Environmental Studies	01	I
	Value Education	01	IV
	Soft Skill	01	V
Part - V	Gender studies	01	VI
	Extension Activity	01	VI
	Total	42	-

*Board of studies can modify the course structure of the core papers as per their requirements without changing the total credit.

QUESTION PAPER PATTERN*		
Section - A	10 x 2 = 20	Short Answer
Section - B	5 x 5 = 25	Either ... or ... type, Paragraph for 300 words
Section – C	3 x 10 = 30	3 out of 5 – Essay type – for 1000 words

*If any change kindly enclose a preferred question paper pattern

SEMESTER - I

**j kpha;Tj ;J i w> Nj rpa f;fy;Y}up
(j ddhl rj)> j pUrrpuhggs;sp - 1.**

Kj w; gUt k;

j hs; nkhogghl k; - 1 nraAs; (, f;fhyk)> ci uei l> rpwfi j> , yff;pa tuyhW

U16T1

fwgpfFk; fhyk; 6 kz p

j ugGss;fs; 3

myF 1: ghuj pahu; - guknghUs; thoj ;J
 ghuj pj hrd; - eb;fNs nrhy;Yq;fs;
 ft;kz p - Nfhty; toghL
 gl;Lfnfhl; i l ahu; xz z hapUff;Z k; mz z hrrp
 ehk;f;fy;yu; - Rj ej muk; ahJ?

myF 2: fz z j hrd; - Ntz ;Lk; Ntz ;Lk;
 thyp - Gddi f kddd;
 i tuKj;J - ghuj p epi df;fggLf;pwhd;
 K.Nkj; j h - RtUk; ge;J k;
 mg;Jy; uFkhd; - j twhd vz ;

myF 3: ci uei l:

1. gukgi uff;Z k; - c.Nt.rh
2. fy;tp - ahogghz k; nghddkgyggs;si s
3. , yff;paK k; r%fKk; - v] ;i tahGugggs;si s
4. fi yAk; f;wgi dAk; - uh.gp.NrJggs;si s
5. Fws; fhl Lk; newp - f;M.ng.t;Rteh; k;
6. , awi ff; fhl r;fs; - f;th.[feeh; d;
7. rka , yff;paq;fs;py; mwnewp - Fdwf;Fb mbfshu;

myF 4: rpwfi j:

1. j ei j Ak; kfDk; - fy;fp
2. fl TS k; fej rhk;ggs;si sAk; - GJ i kggj; j d;
3. ej ;gg; p tff;fyhdhu; - mz z hJ i u
4. Kj yg;py; - e.g;rr;%uj; j p
5. fhf;ij c wT - R.rKj; j muk;
6. kNdhghtk; - tyypf;z z d;
7. kd;ij aej muk; - t;ej d;
8. gri rff;dT - yh.r. uhkhk;puj k;

myF 5: tyypdk; kpFk; , l qfs> tyypdk; kpfh , l qfs;
 , yff;pa tuyhW (trdf;tpi j> GJ f;ft;pi j> ci uei l> rpwfi j kl;Lk)

ghl E;y: j kp; - Kj wgUt k; - Nj rpa f;fy;Y}up nts;paL

, yff;pa tuyhW - Nj rpa f;fy;Y}up nts;paL

j kpha;Tj ;J i w> Nj rpa;fy;Y}up (j ddhl rj)> j pUrrpuhggs;sp - 1.

, uz j hk; gUt k;

j hs; nkhogghl k; - 2 nraAs; (gfj p mw , yf;fpaqfs)> Gj pdk> , yf;fpa tuyhW.

U16T2

fwgpfFk; fhyk; 6 kz p

j ugGs;sf; 3

myF 1: j pUQhdrkgej u; - j pUthi dffh gj pfk; - ki oahu; kpl whkO thSi laha;.

j pUehTffuru; - tpl k; j ljj gj pfk; - xdW nfhyhk; mtu; rpei j Aauti u

ngupahothu; - j pUtuqfk; ghRuk; 2 - kutbi aj; j kgpf;F

FyNrfuu; - tjj ;J tf; Nfhl L mkkhi d Ntz b epwvy; - j UJ auk;...10

myF 2: tssyhu; - j pUtUl gh - ngwhgNgW - Mth vdwi d MI nfhz l Us;...10

j hAKhdtu; - gdkhi y - gdkhi y j pus;Uff;...9

, NaRfhtpak; - c ti k top nraj p - fl Nyhuk; xUehs; VR epdwhu;.

Fz q;Fb k] j hd; - epuhkaf;fz z p - 1-25 fz z pf;S;

myF 3: ehdkz pf;fbi f; (ghl y; vz ;fs; 6> 10> 12> 16> 31> 38> 45> 56> 69> 75)

ehybahu; (ghl y; vz ;fs; 2> 29> 35> 77> 95> 109> 114> 172> 248> 269)

r;WgQr;%yk; (ghl y; vz ;fs; 9> 12> 16> 26> 32> 39> 63> 82> 85> 90)

, dpai t ehwgJ; K; j y; gj ;J ghl y;fs;

myF 4: Gj pdk; - fdd;pfh - uFehj d; Ji w nts;paL

myF 5: , yf;fpa tuyhW (i ntk; i tz tk;r; k; k;ngs; j j k;f;pwj ;J tk; K f; k; j pak;

kwWk; Gj pdk; gww;pad kl;Lk)

ghl E}y; j k; p; - , uz j hk; gUt k; - Nj rpa;fy;Y}up nts;paL.

fdd;pfh - ril j gj ;ggf nts;paL> nr;di d.

, yf;fpa; tuyhW - Nj rpa;fy;Y}up nts;paL.

j kpha;Tj ;J i w> Nj rpa;fy;Y}up (j ddhl rj)> j pUrrpuhggs;sp - 1.

%dwhk; gUtk;

j hs; nkhogg; k; - 3 nraAs; (fhggjak)> ehl fk> , yffpa; tuyhW

U16T3

fwgpfFk; fhyk; 6 kz p

j ugGs;fs; 3

myF 1: rpyggj pfhuk; - elggi l fhi j

kz pNkfi y - ghj j uk; ngww fhi j

myF 2: fkguhkhaz k; - Aj j fhz l k; - , ej purj ;J ti j ggl yk;

ngupaGuhz k; - fz z gg ehadhu; Guhz k;

myF 3: Nj kghtz p - tsd; rdj j gl yk;

rhwgGuhz k; - khDfFg; gpi z epdw gl yk;

ghQrhy; rgj k; - #j hl l r; rUf;fk;

myF 4: ehl fk; xj j pi f - m. , uhkrhk; (vdr;gvr; nts;paL)

myF 5: , yffpa; tuyhW (fhggjak> Guhz k> ehl fk; gwwpad kl Lk)

ghl E)y: j kpa; - %dwhkgUtk; - Nj rpa;fy;Y}up nts;paL.

xj j pi f - m. , uhkrhk; (vdr;gvr; nts;paL)

, yffpa; tuyhW - Nj rpa;fy;Y}up nts;paL.

j kpha;Tj ;J i w> Nj rpa f;fy;Y}up (j ddhl rj)> j pUrrp hggssp - 1.

ehd;fhk; gUt k;

j hs; nkhogghl k; - 4 nraAs; (gz i l a , yf;fak> , yf;fpa tuyhW> nkhongaugG)

U16T4

fwgpfFk; fhyk; 6 kz p

j ugGssifs; 3

myF 1:

- ewwpi z :
1. Ntu; gız p ntj pıj ;J - ghi y - , sqfıudhu;
 2. rıyUk; gyUk; fi l ffz ; - neaj y; - c Nyhrrdhu;
 3. mupfhy; khwpa mk; fz ; - kUj k; kpi sf;fıphdeyNt l l dhu;
 4. , i y , y gpl tk;Kyı y - tıprf;fl Ngı j g; ngUqfz z dhu;
 5. Gj y;td; <dw Gqfz ; - FwıQrp

- FWenj hi f :
1. nfhqF Nj u; thofi f - FwıQrp - , i wadhu;
 2. , bfFq; Nfsıu; - FwıQrp - ntssıptıj pahu;
 3. ahuz qFwwı d fl Ny - neaj y; - mk;%tdhu;
 4. khup ahkgydd - neaj y; - Fdwıpadhu;
 5. c kz u; NrueJ fıpej kUqfıpd; - ghi y - ngUqfLqNfh
 6. Mı i k Gi uAk; - ghi y - XNuUotdhu;
 7. Ksıj apı; gpi rej - Kyı y - \$l Yıu; fıphu;
 8. , sı k ghuhu; - Kyı y - xf;\$u; khırhj j pahu;
 9. Ntkgıpd; i gqfha; - kUj k; - kpi sf;fej dhu;

myF 2:

- mfehD}W:
1. gi dj j pıu; mdd - FwıQrp - guz u;
 2. gi rgL gri r - Kyı y - kJı u kssdhu;
 3. , ki k c yfj ;J , i rnahLk; - kUj k; - nry;YıufNfıhrıfıd;
 4. j pi uc oeJ mı r, a - neaj y; - c Nyhrrdhu;
 5. msıpeı y nghwhmJ mkupa - ghi y - ngUqfLqNfh

- fyıj nj hi f:
1. Rı uj nj hB, Nfsha; - FwıQrp

2. fhu; Mug; ngaj; fb; nfhs; - Kyi; y
3. tq;F; e; mtp; e;yk; gfutu; - kUj; k;
4. khkyu; Kz; lfk; - neaj; y;
5. muj; ha; mwndaj; p; - ghi; y

myF 3:

- GwehD}W :
1. xUehl; nryyyk; - ghl; hz; - xsi; tahu
 2. gi; l; gGggy; gi; l; j; j; - ngh; J; t; p; ay; - mw; p; Ti; l; ek; g; p;
 3. ,; i; s; Nahu; #; l; hu; - ngh; J; t; p; ay; - Fl; th; ay; ; f; l; j; j; d; hu;
 4. gy; r; h; d; w; Nu; - ngh; J; t; p; ay; - e; u; p; n; t; & c; j; ; j; i; y; a; hu;
 5. f; h; a; n; e; y; ; m; W; j; ; j; f; f; t; s; q; ; n; f; h; s; p; Nd; - ghl; hz; ; - g; p; p; u; h; e; i; ; j; a; hu;

- j; p; U; f; F; w; s; :
1. mwd; t; y; p; A; W; j; j; y;
 2. g; z; G; i; l; i; k;
 3. x; O; f; f; K; i; l; i; k;
 4. th; ai; k;
 5. C; o;
 6. n; r; h; y; t; d; i; k;

myF 4: Kyi; ygghl; L; KOi; kAk;

myF 5: ,; y; f; f; p; a; t; u; y; h; W; (g; j; p; n; d; z; ; N; k; w; f; z; f; F; > f; b; f; f; z; f; F; > n; k; h; o; p; n; g; a; u; g; G; > ngh; J; f; f; l; i; u;

- ghl E}y;**
1. j; k; p; - e; h; d; f; h; k; g; U; t; k; - N; j; r; p; a; f; f; y; ; Y; } u; p; n; t; s; p; a; l; L.
 2. ,; y; f; f; p; a; t; u; y; h; W; - N; j; r; p; a; f; f; y; ; Y; } u; p; n; t; s; p; a; l; L.

U16H1

Semester – I

PAPER 1 – PROSE, SHORT STORY AND GRAMMAR

PROSE

Prescribed Text Book

INDI GADYA PRABHAKAR, Ed. Dr. Hiranma Shiksha Bharathi, shmiri Gate, Delhi-06.

Prescribed Lessons

- | | | |
|------------------------------------|----|-----------------------|
| 1. Bharat Eke hay | By | Ramdhari Singh Dinkar |
| 2. Japan Mein kaya dekka | By | Premchand |
| 3. Jeevan ke theen pradhan baathay | By | Aacharya Vinobabavey |

SHORT STORY

Prescribed Text Book

KAHANI VIVDHA, V. Mahadeven, Trichy.

Prescribed Lessons

- | | | |
|------------------|----|---------------------------|
| 1. Idhaah | By | Premchand |
| 2. Usne kaha tha | By | chandradhar Sharma guleri |

GRAMMER

Prescribed Portion

1. Noun
2. Verb
3. Gender (Change the gender only)
4. Number (Change the number only)
5. Aarth and Ultey Sabdh Likeye

Reference Book

UNITISED SYLLABUS

PAPER 1 – PROSE, SHORT STORY AND GRAMMAR

Semester – I

Time 3 Hrs

Max Marks 75

UNIT- 1

- 1.Noun
- 2.Bharath Eke Hai
- 3.Gender

UNIT- 2

- 1.Gender
- 2.Idhgaah
- 3.Jaapan mein kya dheka

UNIT- 3

- 1.Jeevan ke theyeen pradhan bhathey
- 2.Idhgaah
3. Number

UNIT-4

- 1.Ling Badhaliye, Vachan Badhaliye
2. Verb
- 3.Aarth (Meanings) Likeye

UNIT-5

- 1.Aarth (Meanings) Likeye
- 2.Ultey Sabdh (opposite) Likeye

QUESTION PAPER PATTERN

SECTION- A (20 Marks)

- I 1. Change the Gender (Ling) **10/12** (10Marks)
2. Change the Number (Vachen) **10/12**

SECTION- B (25 Marks)

II. One Question from each unit (either or)

1. From Prose (1 out of 2) 5 Marks
2. From Short story (1 out of 2) 5 Marks
3. From Grammar (1 out of 2) 5 Marks
4. Meanings 5 nos (Either or) 5 Marks
5. Opposites 5 nos (Either or) 5 Marks

SECTION- C (3x10=30 Marks)

III. One Question from each unit (**Three out of five**)

1. **From Prose**
2. From Prose
3. From Short Story
4. From Grammar
5. From Grammar

Semester – II

PAPER II – COMPREHENSION, DRAMA, GRAMMAR-II, GENERAL ESSAY AND TRANSLATION – I

COMPREHENSION : General Paragraph from Anuvadh
Abyas Bah – 3, Dakshina Bharath Hindi
Prachar Sabha, Chennai – 17.

DRAMA

:
Prescribed Text Book : Subodh Hindi patamala – 2
Dakshina Bharath Hindi
Prachar Sabha, Chennai – 17.

Prescribed Portion : **APPOORVA THYAG**
By Balashori Reddy

GRAMMAR – II

Prescribed Portion : 1. Pronoun
2. Adjectives
3. Adverb
4. Case Endings
(Definition and Name of types only)
5. Paryavachaye Sabdh

Reference Book : **VYAKARANPRADEEP**

By Ramdev, Saraswathi Prakashan, Varansi

GENERAL ESSAY

Prescribed Book : Subodh Hindi Rachna – 2

Dakshina Bharath Hindi

Prachar Sabha, Chennai – 17

Prescribed Portions : 1. Priya Theohar

2. Gaayi

3. Samachar pathra

TRANSLATION -1

Prescribed Book : Anuvadh Abyas Bah – 1,1 to 10 lessons

Dakshina Bharath Hindi

Prachar Sabha, Chennai – 17

Prescribed Portions : 1 to 10 Lessons

UNITISED SYLLABUS

PAPER II – COMPREHENSION, DRAMA, GRAMMAR-II, GENERAL ESSAY AND

TRANSLATION – I

Semester – II

Time 3 Hrs

Max Marks 75

UNIT- 1

Comprehension

Aproova Thyag
Pronoun
Translation 1,2

UNIT- 2

Comprehension
Aproova Thyag
Adjectives
Translation 3,4

UNIT- 3

Comprehension
Priya Theohar
Adverb
Translation 5,6

UNIT-4

Comprehension
Gaayi
Case Endings
Translation 7,8

UNIT-5

Comprehension
Samachar pathra
Paryaivachaye Sabdh
Translation 9,10

QUESTION PAPER PATTERN

SECTION- A (20 Marks)

I . Answer all the Questions:

Write Same meaning (Paryavachi)

10 x 1 = 10

(Each word two meaning must) – 10/12

(a) Answer in one sentence

(Any 5)

5 x 2 = 10

SECTION- B (25 Marks)

II. One Question from each unit (either or)

- | | | |
|-----------------------------------|--------------|---------|
| 1. From Drama | (1 out of 2) | 5 Marks |
| 2. From Grammar | (1 out of 2) | 5 Marks |
| 3. From Grammar | (1 out of 2) | 5 Marks |
| 4. Translation (Hindi to English) | (Either or) | 5 Marks |
| 5. Translation (English to Hindi) | (Either or) | 5 Marks |

SECTION- C (3x10=30 Marks)

III. One Question from each unit (Three out of five)

1. From General Essay
2. From General Essay
3. From Grammar
4. From Grammar
5. Comprehension

SEMESTER – III

PAPER III – MODERN AND MEDIEVAL POETRY, DIALOGUE WRITING AND TRANSLATION – I

1. POETRY

Book Name : 1. KAVYA SAURABH
2. SUBODH HINDI – 2
Pub. Dakshina B. Hindi P.Sabha
Chennai.

Prescribed Lessons : 1. Samaya
2. Chhah
1.Kabir key Dhohay 1to 5
2.Thulsi key Dhohay 1to 5
3.Rahim key Dhohay 1 to 5

2. DIALOGUE WRITING : 1. Doctor Aur Marij
2. Kithab key Dhukhan
3.Pariksha key Bharey Mein

3. TRANSLATION - II

Prescribed Book : Anuvadh Abyas Bah – 1,
Dakshina Bharath Hindi
Prachar Sabha, Chennai – 17

Prescribed Portions : 11 to 20 Lessons

UNITISED SYLLABUS

PAPER III – MODERN AND MEDIEVAL POETRY, DIALOGUE WRITING AND TRANSLATION –

II

Semester – III

Time 3 Hrs

Max Marks 75

UNIT- 1

Samya
Kabir key Dhohay
Translation 11, 12

UNIT- 2

Chhah
Thulsi key Dhohay
Translation 13, 14

UNIT- 3

Rahim key Dhohay
Dialogue – Doctor Aur Marij
Translation 15, 16

UNIT-4

Dialogue – Kithab key Dhukan
Poetry Review
Translation 17, 18

UNIT-5

Dialogue – Parisha key Bharey mein
Translation 19,20

QUESTION PAPER PATTERN

SECTION- A (20 Marks)

I . Answer in one sentence 10 x 2 = 20 Marks

SECTION- B (25 Marks)

II. One Question from each unit (either or)

1. Annotation from modern poetry (1 out of 2) 5 Marks
2. Annotation from modern poetry (1 out of 2) 5 Marks
3. Short Notes from Poetry (1 out of 2) 5 Marks
4. Translation (Hindi to English) (Either or) 5 Marks
5. Translation (English to Hindi) (Either or) 5 Marks

SECTION- C (3x10=30 Marks)

III. One Question from each unit (Three out of five)

Summary of Modern Poetry

1. Summary of Medieval Poetry
2. Summary of Medieval Poetry
3. Dialogue Writing
4. Dialogue Writing

SEMESTER - IV

PAPER IV – FUNCTIONAL HINDI, GENERAL ESSAY, GRAMMAR – III AND TRANSLATION – III

1. LETTER WRITING

Prescribed Book	:	Abinav Patralekhan Hindi Parchar Sabha Chennai.
Prescribed Portion	:	1. Leave Letter 2. Placing Order for Books 3. Complaints Letter 4. Permission Letter for Tour

2. TECHNICAL TERMS

Prescribed Book	:	Hindi Vatayan, by Dr.Chandra Mohan Vishavidyalay Prakashan, Varansi.
Prescribed Portion	:	Annexure enclosed

3. GENERAL ESSAY

Prescribed Book	:	Nibandh Praveshika, Dakshina Bharath Hindi Prachar Sabha, Chennai – 17
Prescribed Portions	:	1. Pushthakalaya 2. Pradhusan 3. Vidhyarthi Jeevan

4. GRAMMAR – II

Prescribed Portions : 1. Tense (Kal parivarthan)
2. Correct the Sentence (Sudha Keyjiye)

Reference Book : **Vyakaranpradeep, by Ramdev, Saraswathi**
Prakashan, Varansi.

5. TRANSLATION – III

Prescribed Book : **Anuvadh Abyas Bah – 2,**
Dakshina Bharath Hindi
Prachar Sabha, Chennai – 17

Prescribed Portions : 1 to 10 Lessons

UNITISED SYLLABUS

PAPER IV – FUNCTIONAL HINDI, GENERAL ESSAY, GRAMMAR – III AND TRANSLATION – III

Semester – IV

Time 3 Hrs

Max Marks 75

UNIT- 1

Leave Letter
Technical Terms
Pushthakalaya
Translation 1,2

UNIT- 2

Placing Order for Books
Technical Terms
Pradhusan
Translation 3,4

UNIT- 3

Compliant Letter
Vidhyarthi Jeevan
Technical Phrases
Translation 5,6

UNIT-4

Permission Letter for Tour
Technical Phrases
Kal Parivarthan (Change the Tense)
Translation 7,8

UNIT-5

Kal Parivarthan (Change the Tense)
Sudha Keyjiye (Correct the Sentence)
Translation 9,10

QUESTION PAPER PATTERN

SECTION- A (20 Marks)

I . Answer all the Questions:

10x2 = 20 Marks

Write 10 Technical Terms in Hindi 10/12 (Only Designation)

SECTION- B (25 Marks)

II. One Question from each unit (either or)

- | | | |
|-----------------------------------------------|--------------|---------|
| 1. Change the Tense | (5 out of 7) | 5 Marks |
| 2. Correct the Sentence | (5 out of 7) | 5 Marks |
| 3. Technical Phrases (English to Hindi) 5 nos | (Either or) | 5 Marks |
| 4. Technical Phrases (Hindi to English) 5 nos | (Either or) | 5 Marks |
| 5. Translation (Hindi to English) | (Either or) | 5 Marks |

SECTION- C (3x10=30 Marks)

III. One Question from each unit (Three out of five)

From General Essay

1. From General Essay
2. From Letter Writing
3. From Letter writing
4. Translation (10nos) English to Hindi

Subject Code:U16S1

National College (Autonomous) Tiruchirapalli
Language Programme Part I Sanskrit Semester I
Paper I - Sanskrit - I

(For the students admitted from the the academic year June 2016 onwards)

Time: 3 Hours

Maximum Marks: 75

Unit I

देवनागरी लिपि: - परिचयः

- १। स्वराः (१५)
- २। व्यञ्जनानि (३३)
- ३। संयुक्ताक्षराणि
- ४। संयुक्ताक्षराणां लेखनप्रकारः
- ५। विसर्गस्य प्रयोगः तस्य उच्चारणप्रकारश्च।

Unit II

कर्तृपदानि - परिचयः

- १। अकारान्त-शब्दाः (पुंलिङ्गः)
देवः
- २। अकारान्त-शब्दाः (नपुंसकलिङ्गः)
फलम्
- ३। लिङ्गाः - सामान्यविधिः
अ। पुंलिङ्गः
आ। स्त्रीलिङ्गः
इ। नपुंसकलिङ्गः
- ४। लिङ्गः वचनम् विभक्तिः च
केवलम् एकवचनम् बहुवचनम् च
- ५। अनुवाद-अभ्यासः -
अ। आङ्गल/तमिल् भाषातः संस्कृते
आ। संस्कृतात् आङ्गल/तमिल् भाषायाम्

Unit III

१। क्रियापदानि (परिचयः)

- १। वर्तमानकाले परस्मैपदिनः धातवः
अ। अन्यपुरुषः/प्रथमपुरुषः
आ। मध्यमपुरुषः
इ। उत्तमपुरुषः
ई। एकवचनम्
उ। बहुवचनम्।

Unit III (continued)

- २। क्रियापदानि - धातवः -
एकवचन-बहुवचन-मात्रम्
अ। गम् (गच्छ्)
आ। पठ्
इ। क्रीड्
ई। वद्
- ३। अव्ययाः
तत्र, अत्र, कुत्र, यत्र, तदा, यदा,
कदा, इदानीम्, शीघ्रम्, अपि,
सह, एव, तु, किम्, च (१५)
- ४। अन्ये अकारान्त-कर्तृपदानि
अश्वः, बालकः, सूर्यः, मनुष्यः, हस्तः,
अध्यापकः, इत्यादीनि (१०)
- ५। अनुवाद-अभ्यासः
अ। आङ्गल/तमिल् भाषायाः संस्कृते
आ। संस्कृतात् आङ्गल/तमिल् भाषायाम्

Unit IV

- १। विभक्ति-अन्त प्रत्ययानां आदेशाः
अ। चतुर्थी विभक्ति-प्रत्ययस्य -
अर्थम् इति आदेशः
आ। पञ्चमी विभक्ति-प्रत्ययस्य -
तः इति आदेशः
- २। तृतीया विभक्तिः
अ। सह सार्धम् साकं इति
अव्ययानां उपयोगः
- ३। प्रश्न-निर्माण-पदानि
किम्, कुत्र, कथं, किमर्थं, कुतः, कदा
- ४। क्रियापदानि - (द्वितीय-स्तरः)
वर्तमानकाले परस्मैपदिनः धातवः
भू (भव्), कृ (कर्), अस्,
धाव्, पठ्, आ-गच्छ्
केवलम् एकवचनम् बहुवचनम् च
- ५। अनुवाद-अभ्यासः
अ। आङ्गल/तमिल् भाषायाः संस्कृते
आ। संस्कृतात् आङ्गल/तमिल् भाषायाम्

Unit V

१। विशेषण-विशेष्यौ

- अ। शुक्ल - नील - पीत - रक्त - हरित - कपिश -
कृष्ण वर्णाः।
आ। संख्या-वाचक-पदानि (० तः ९ पर्यन्तम् मात्रम्)
इ। सुन्दरः - सुन्दरी - सुन्दरम् ,
मधुरः - मधुरा - मधुरम् इत्यादयः।

२। विभक्तीनां पुनः परिचयः (द्वितीयस्तरः)
अकारन्त-शब्दः पुलिङ्गः/नपुंसकलिङ्गः

- १। प्रथमा विभक्तिः
२। द्वितीया विभक्तिः
३। तृतीया विभक्तिः
४। चतुर्थी विभक्तिः

३। विभक्तीनां पुनः परिचयः (तृतीयस्तरः)
अकारन्त-शब्दः पुलिङ्गः/नपुंसकलिङ्गः

- ५। पञ्चमी विभक्तिः
६। षष्ठी विभक्तिः
७। सप्तमी विभक्तिः
८। सम्बोधन-प्रथमा विभक्तिः

४। सर्वनाम-पदानि (अन्यपुरुषः/प्रथमपुरुषः)

- १। सः - एषः
२। सा - एषा
३। तत् - एतत्
प्रथमा विभक्तिः एकवचन-बहुवचन-मात्रम्

५। सर्वनामपदानि (उत्तमपुरुषः)
(मध्यमपुरुषः)

- ४। अस्मद्
प्रथमा विभक्तिः, षष्ठी विभक्तिः च
एकवचन-बहुवचन-मात्रम्।

६। अनुवाद-अभ्यासः

- अ। आङ्गल/तमिल् भाषायाः संस्कृते
आ। संस्कृतात् आङ्गल/तमिल् भाषायाम्

Subject Code:U16S2

National College(Autonomous) Tiruchirapalli
Language Programme Part I Sanskrit Semester II
Syllabus - Paper II - Sanskrit - II

(For the students admitted from the academic year, June 2016 onwards)

Time: 3 Hours

Maximum Marks: 75

Unit I

क्रियापदानि

१। पुनश्चर्या

लट् लकारे (वर्तमानकाले)
पूर्वस्मिन् षाण्मासे अभ्यस्तानां
क्रियापदानां द्विवचनेन साकं
पुनश्चर्या
द्विवचन-परिचयः - उपयोगः च

२। लृट् लकारः - भविष्यत्कालः

१। गम् (गच्छ्)

२। पठ्

३। वद्

३। लृट् लकारः - भविष्यत्कालः (अधिकम्)

४। पत्

५। लिख् (लेख्)

६। क्रीड्

४। लृट् लकारः - भविष्यत्कालः (अधिकम्)

७। आ - गम् (गच्छ्)

८। भू - भव

९। घाव्

५। लृट् लकारः - भविष्यत्कालः (अधिकम्)

१०। पा - पिब्

११। दृश् - पश्

१२। कृ - कर्

Unit II

१। लृट् लकारे अभ्यस्तानां

धातुरूपाणाम् अभ्यासः

वाक्येषु उपयोगः

अनुवाद-अभ्यासः च

(संस्कृत-आङ्गल/तमिल्-संस्कृतेषु)

२। सर्वनामशब्दाः

१। अस्मद् शब्दः - पुनश्चर्या

(त्रिषु वचनेषु)

Unit III १। भोज्य-पदार्थ-नामानि

२। वार्तालापः

३। क्त-प्रत्यय-धातवः

- २। युष्मद् शब्दः
(त्रिषु वचनेषु)
- ३। युष्मद्-शब्द-आधारित-
वाक्येषु लृट् लकार-क्रियापदानां
उपयोगः अनुवाद-अभ्यासः च
(संस्कृत-आङ्गल/तमिल्-संस्कृतेषु)
- ४। तद् शब्दः - त्रिषु वचनेषु
पुंलिङ्ग-मात्रम्।
- ५। सर्वनाम-शब्दान् (युष्मद्-तद्)
आहत्य वाक्येषु उपयोगः
अनुवाद-अभ्यासः।
(संस्कृत-आङ्गल/तमिल्-संस्कृतेषु)

धान्य-नामानि -

चणकः, मुद्गाः, माषः, तण्डुलः,

जीरकम्, मरिचम्, लशुनम्

फल-नामानि -

जम्बीरम्, आमलकम्, दाडिमम्,

नारङ्गः, बदरम्, जम्बूफलम्, कदलीफलम्

शलाटुका-नामानि

आलुकम्, आर्द्रकम्, कन्दर्पः,

भोज्यपदार्थ-नामानि

ओदनम्, रोटिका, पोलिका

दुग्धम्, दधि, तक्रम्, नवनीतम्, घृतम्,

एतावता अभ्यस्त-शब्दानां वाक्येषु

उपयोगः - अनुवाद-अभ्यासः

(संस्कृत-आङ्गल/तमिल्-संस्कृतेषु)

गतः गता गतम्

पीतः पीता पीतम्

पठितः पठिता पठितम्

क्रीडितः क्रीडिता क्रीडितम्

धावितः धाविता धावितम्

पतितः पतिता पतितम्

क्त-प्रत्यय-धातवः

३। क्रियापदानि

४। तुमुव्रत-अव्ययाः

५। अनुवाद-अभ्यासः

Unit IV

१। कृषि-क्षेत्र-सम्बन्धीनि नामानि

२। काल-संबन्धीनि पदानि
संख्यावाचकपदानि च

३। क्रियापदानि

४। नपुंसकलिङ्ग-कर्तृ-पदानि

५। अनुवाद-अभ्यासः

आगतः आगता आगतम्
लिखितः लिखिता लिखितम्
खादितः, खादिता, खादितम्
लट् लकारे एव -

भक्ष्, खेल्, पाल्, तुल्,
मार्, गण्, कथ्, क्षाल्,
गन्तुम्, पातुम्, पठितुम्, क्रीडितुम्,
धावितुम्, पतितुम्, लेखितुम्, भवितुम्,
अर्चितुम्, खेलितुम्, चलितुम्, क्षालयितुम्,
तुलयितुम्, मारयितुम्, गणयितुम्
संस्कृतात् आङ्गले/तमिल् भाषायाम्,
आङ्गलात् संस्कृते

कृषकः, कृषीवलः, बलीवर्दः, वृषभः
सस्यम्, धान्यम्, तृणम्, क्षेत्रम्, हलः
बीजम्, आलवालम्, मेघः, जलदः,
खेटः, ग्रामः, क्रयः, विक्रयः, हट्टः,
आपणः, आपणिकः, व्यवसायः- इत्यादीनि

a. प्रातः, मध्याह्नः, सायम्, रात्रिः
b. समयलेखनम् - सपाद-सार्ध-पादोन-
पदानाम् उपयोगः

c. ऋतु(काल) नामानि

वसन्तः, ग्रीष्मः, वर्षाः, शरद्, हेमन्तः, शिशिर

d. संख्यावाचकपदानि - १ तः २५ पर्यन्तम्
लट् लकारे -

क्री, वि-क्री, रुह् (रोह), वर्ष्, वप्
रच्, कृष् (कर्ष), वस्, अर्घ्

सस्यम्, धान्यम्, तृणम्, क्षेत्रम्, बीजम्,
आलवालम्।

संस्कृतात् आङ्गले/तमिल् भाषायाम्,
आङ्गलात् संस्कृते

Unit V

१। आकारान्त-स्त्रीलिङ्ग-पदानि

a। माला शब्दः

(एकवचन - बहुवचनमात्रम्)

b। अन्यानि स्त्रीलिङ्गपदानि

रमा, शाला, पेटिका, शिखा,

निशा, दिशा, बाला, सभा,

भार्या, स्वसा, नासिका

गत्वा, पठित्वा, क्रीडित्वा, पीत्वा, धावित्वा,

लिखित्वा, भक्षयित्वा, खेलित्वा, धारयित्वा,

पतित्वा, कृत्वा, चलित्वा, क्षालयित्वा,

पालयित्वा, अर्चयित्वा

२। क्त्वा प्रत्यय-अन्त-अव्ययाः

लृट् लकारे (एकवचन-बहुवचन-मात्रम्)

घार्, कथ्, क्षाल्, पाल्, तोल्

३। क्रियापदानि

a. स्वरसन्धिः

b. गुणसन्धिः

c. वृद्धि-सन्धिः

४। सन्धि-प्रकरणम्

पाठ्य-पुस्तके दत्तानां पदानां परिचयः

संस्कृतात् आङ्गले/तमिल् भाषायां तथा

आङ्गलात् संस्कृते

५। अनुवाद-अभ्यासः

Prescribed book:

. Saral Sanskrit Sikshak Part I, Bharatiya Vidya Bhavan (lessons 6 to 9, and 1)
Mumbai 400007.

Reference:

Sanskrit for beginners, Dr Narasimhachari, M, and Dr Ramaratnam, S,
N & R Publications, Chennai 600004.

Subject Code: U16S3

National College (Autonomous) Tiruchirapalli

Language Course Part I Sanskrit Semester III

Paper III - Sanskrit III

(For the candidates admitted from the academic year June 2016 onwards)

Syllabus

Time: 3 Hours

Maximum Marks: 75

Unit I

1. क्रियापदानि कर्तृपदानि च - पुनश्चर्या

लट् लकारे लृट् लकारे च पठितानां
पूर्वस्मिन् षाण्मासद्वये अभ्यस्तानां
क्रियापदानां, कर्तृपदानां च पुनश्चर्या

2. शब्दाः(कर्तृपदानां परिचयः)

१। इकारान्तः पुल्लिङ्गः कवि शब्दः
तस्य केचन समानान्तशब्दाः च।
एकवचनं तथा बहुवचनम् एव।
हरिः, रविः, अरिः ऋषिः, पतिः, यतिः इत्यादयः।

२। सर्वनामशब्दः

दकारान्तः स्त्रीलिङ्गः तद् शब्दः
एकवचनं तथा बहुवचनम् एव।

३। इकारान्तः स्त्रीलिङ्गः मति शब्दः

तस्य एकवचनं तथा बहुवचनम् एव।
तस्य केचन समानान्तशब्दाः - रुचिः, शान्तिः
कीर्तिः, बुद्धिः, मुक्तिः इत्यादयः

४। उपर्युक्त-शब्दानां वाक्येषु उपयोगः

अनुवाद-अभ्यासः च (संस्कृत-तमिल/संस्कृत-
आङ्गल/आङ्गल-संस्कृतेषु)

Unit II

क्रियापदानि

१। जप्

१। लट् लकारः (वर्तमानकालः)

२। चर्

२। लट् लकारः (वर्तमानकालः) - अधिकम्

३। रक्ष्

४। हस्

५। वम्

६। नम्

७। दह्

३। लट् लकारः (वर्तमानकालः) -अधिकम्

८। तप्

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९। वस्

१०। इच्छ्

५। क्रियापदानां वाक्येषु उपयोगः अनुवाद-अभ्यासः च - संस्कृतात् आङ्गले/तमिल् भाषायां अथवा आङ्गलात् संस्कृते वा।

Unit III

१। क्रियापदानि

उपर्युक्त-क्रियापदानां वाक्येषु प्रयोगः

संस्कृतात् आङ्गले/तमिल् भाषायां अथवा आङ्गलात् संस्कृते वा।

२। नूतन-शब्दानां परिचयः

अकारान्त-आकारान्त-इकारान्त कर्तृपदानि क्रियापदानि च

३। वार्तालाप-परिचयः

मिश्रित्य वाक्येषु उपयोगः अनुवाद-अभ्यासः च उपर्युक्त-कर्तृपद-क्रियापदानि उपयुज्य छात्रेषु वार्तालाप-अभ्यासः

४। लृट् लकारः (भविष्यत्कालः)
नूतन-क्रियापदानि

१। अर्ज्

२। दण्ड्

३। चिन्त्

४। ज्वल्

५। लृट् लकारः (भविष्यत्कालः)
नूतन-क्रियापदानि (अधिकम्)

५। तर्ज्

६। तर्क्

७। तप्

८। नट्

Unit IV

१। लङ् लकार-परिचयः (भूतकालः)

१। भूतकालः नाम किम्?

भूतकालिक-क्रियापदानां परिचयः।

१। गम् (गच्छ्)

२। पा (पिब्)

४। पश्य्

२। लङ् लकार-परिचयः (भूतकालः) (अधिकम्)

५। वस्

६। पट्

७। वद्

८। पत्

contd., page 3/-

३। बन्धु-वर्ग-नामानि

माता, जननी, पिता, जनकः, स्वसा
भगिनी, सहोदरः, भ्राता, अनुजः, अग्रजः,
अनुजा, अग्रजा, मातुलः, मातुलानी,
जामाता, वधूः, वरः, मातामहः, मातामही,
पितामहः, पितामही, पुत्रः, पुत्री, पौत्रः, पौत्री
उपर्युक्त-पदानां वाक्येषु प्रयोगः
अनुवाद-अभ्यासः(संस्कृतात् आङ्गले/तमिल्
भाषायाम् , आङ्गलात् संस्कृते वा)

४। वाक्येषु उपयोगः

Unit V

१। गृहे उपयुक्तानां उपकरणानां
नामानि

पर्यङ्कः, मञ्जूषा, तालकम्, कुञ्जिका,
अङ्कनी, लेखनी, उत्पीठिका, आसनम्,
गणकयन्त्रम्, दूरदर्शनम्, आकाशवाणी,
दूरभाषणी, दीपः, विद्युत्, विद्युत्व्यजनम्,
शीतकयन्त्रम्, शीतकपेटिका, अग्निपेटिका,
वस्त्रम्।(अन्यानि मुख्यानि च)

२। वासरनामानि

सोमवासरः, मङ्गलवासरः, बुधवासरः,
गुरुवासरः, शुक्रवासरः, शनिवासरः,
भानुवासरः

३। पक्षनामानि

शुक्लपक्षः, कृष्णपक्षः

४। मास-नामानि

चैत्रः, वैशाखः, ज्येष्ठः, आषाढः, श्रावणः,
भाद्रपदः, आश्वीनः, कार्तिकः, आग्रहायणः, पौषः,
माघः, फाल्गुनः अथवा
मेषः, ऋषभः, मिथुनः, कटकः, सिंहः,
कन्या, तुला, वृश्चिकः, धनुः, मकरः, कुम्भः,
मीनः ।

५। तिथिनामानि

प्रथमा, द्वितीया, तृतीया, चतुर्थी, पञ्चमी,
षष्ठी, सप्तमी, अष्टमी, नवमी, दशमी,
एकादशी, द्वादशी, त्रयोदशी, चतुर्दशी,
अमावास्या (अमाः), पूर्णमा (पौर्णमी)
contd., page 4/-

७। नवग्रहनामानि

सूर्य, चन्द्रः, कुजः, बुधः, गुरुः, शुक्रः, शनैश्वरः,
राहुः, केतुः

८। संख्या-वाचकपदानि

षड्विंशतिः आरभ्य पञ्चाशत् पर्यन्तम्।(२६-५०)

Prescribed Book:

सरलसंस्कृतशिक्षकः भागः २, भारतीयविद्याभवनम्, कुलपति:मुन्शी मार्गः, मुम्बई, ४००००७

Reference:

1. Samskrt for Beginners, Dr M. Narasimhachari & Dr S. Ramaratnam, N&R Publications, Mylapore, Chennai 60004.
2. संस्कृत-व्यवहारसाहस्री, संस्कृत-भारती, माता मन्दिर् गली, झन्डेवाला, नव देहली ११००५५।

Subject Code: U16S4

National College (Autonomous) Tiruchirapalli
Language Course Part I Sanskrit Semester III

Paper IV - Sanskrit IV

(For the candidates admitted from the academic year June 2016 onwards)

Syllabus

Time: 3 Hours

Maximum Marks: 75

Unit I

१। कर्तृपदानि, क्रियापदानि च
पुनश्चर्या

लट् लकारे, लृट् लकारे, लङ् लकारे च
पूर्वस्मिन् षाण्मासत्रये अभ्यस्तानां कर्तृपदानां
क्रियापदानां च पुनश्चर्या।

२। शब्दाः (कर्तृपद-परिचयः)

१। उकारान्तः पुल्लिङ्गः गुरु शब्दः
केचन समानान्त-शब्दाः च।
एकवचनम् तथा बहुवचनम् केवलम्।
पशुः, मनुः, साधुः, शिशुः, प्रभुः इत्यदि शब्दाः।
२। उकारान्तः स्त्रीलिङ्गः धेनु शब्दः
एकवचनम्, तथा बहुवचनम् केवलम्।
३। सर्वनामशब्दः -
दकारान्तः नपुंसकलिङ्गः तद् शब्दः
दकारान्तः पुल्लिङ्गः एतद् शब्दः
एकवचनम्, तथा बहुवचनम् केवलम्।
४। उपर्युक्त-कर्तृपदानां कर्मपदानां च वाक्येषु
उपयोगः।
५। अनुवाद-अभ्यासः (संस्कृतात् आङ्गले/तमिल्
भाषायाम्, तथा आङ्गलात् संस्कृते च)

Unit II

क्रियापदानि

१। लट्/लृट् लकारौ
नूतनक्रियापदानि

१। अञ्च्

२। दल्

३। नन्द्

४। यच्छ्

२। लट्/लृट् लकारौ
नूतनक्रियापदानि

५। धृ (धरति)

६। धृ (धारयति)

७। नद् (नदति)

८। तृ (तर)

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३। लट्/लृट् लकारौ नूतनक्रियापदानि

९। नश्

१०। निन्द्

११। पीङ्

१२। पोष्

४। शरीर-अङ्ग-नामानि

शिरः, केशः, कर्णः, नासिका, नयनम्, मुखम्,
दन्तः, ग्रीवा, कण्ठः, उरः, स्कन्धः, करः, बाहुः,
हस्तः, अङ्गुली, नखः, स्मश्रुः, शिखा, उदरः,
कटिः, जानुः, पादौ, अस्थि, मांसं, रुधिरः, मेघः।
वस्त्रम्, निचोलः, ऊरुकम्, उष्णीषः, उपनेत्रम्,
दण्डः, पादरक्षा, घटी, द्विचक्रिका, त्रिचक्रिका,
कार्-यानम्, लोकयानम्, आकाशविमानम्,
रेल्-यानम्

५। प्रतिदिनं-उपयुक्तानि वस्तु नामानि

Unit III

१। पर्यटन-स्थल-नामानि

१। धर्म-सम्बन्धीनि स्थलानि

२। आह्लादकर-संबन्धीनि स्थलानि

३। देशस्य चरित्र-चारित्र-संबन्धीनि स्थलानि

४। अन्वेषण-संबन्धीनि स्थलानि

५। विदेश-यात्रा

२। प्रतिदिनं गमनीयानि स्थलानि

देवालयः, कार्यालयः, विद्यालयः, धनकोषः,
पुस्तकालयः, आपणः, चलनचित्रशाला,
नाट्यशाला, महाविद्यालयः, विश्वविद्यालयः,
मित्रगृहम्, स्नानगृहम्, शौचालयः, सुविद्यालयः,

Unit IV

१। रचनालेखनम्

रचना-लेखन-प्रकारः

उपोद्घातः, रचना, समापनम् - विधयः

दश-वाक्येषु पर्यटनस्थानमेकमधिकृत्य लेखनम्

पत्रम् नाम किम्?

पत्रलेखन-प्रकारः

पत्रलेखने उपयुक्ताः रीतयः

पत्र-आरम्भः, शरीरम्, समापनम्

contd.,page.3/-

३। पत्रलेखनम् (वैचित्र्यम्)

3

१। मित्राय पत्रम्।

२। विद्यालयाय विरामपत्रम्।

३। जनकाय पत्रम्।

४। अनुच्छेद-अभ्यासः

१। कथा-युक्तम् अनुच्छेदं पठित्वा
उत्तर-लेखनम्।

२। वार्ता-संबन्धि-लेख-युक्तम् अनुच्छेदं
पठित्वा उत्तर-लेखनम्।

Unit V

१। नूतन-कर्तृपदानि

मृगवर्गः - सिंहः, व्याघ्रः, भल्लुकः,
शृगालः, मूषकः, आखुः, सारमेयः, कुक्कुरः,
बिडालः, वानरः, उष्ट्रः, अश्वः, गजः, वृषभः,
अजः, मेषः, वराहः, धेनुः, गौः, महिषः, वत्सः,
हरिणः, शशकः

पक्षिवर्गः - काकः, कुक्कुटः, मयूरः, टिट्ठिमः,
गरुडः, शुकः, कपोतः,

२। व्यवहार-पदानि/वाक्यानि

जलचराः - मीनः, मत्स्यः, कूर्मः, तिमिङ्गलः,
शिष्टाचारः, मित्राणि, प्रयाणम्, छात्राः, परीक्षा,
शिक्षकः, महिला, वेश-भूषा, कार्यालयः,
आरोग्यम्, वाणिज्यम्, वातावरणम्, भोजनम्,
शुभाशयाः, संकीर्ण-पदानि।

३। कर्मकाराः

घटकारः, कुविन्दः/तन्तुवायः, अयस्कारः,
सुवर्णकारः, रजकः, आपणिकः, वणिजः,
चर्मकारः, नापितः, संवाहकः, शाकटिकः, आरक्षकः,
गोपालकः, अश्वपालकः, अजपालकः, पुरोहितः,

३। व्याकरणम्

सन्धिप्रकरणम् -

प्रभेदाः - स्वरसन्धिः, व्यञ्जन-सन्धिः

विसर्गसन्धिः

स्वरे - सवर्णदीर्घः, गुणः, यण्, वृद्धिः,

अयवायावः, प्रकृतिभावः

Prescribed Books:

1. सरलसंस्कृतशिक्षकः, भागः २, भारतीयविद्यामवनम्, कुलपति मुन्शी मार्गः, मुम्बई ४००००७।
2. संस्कृत-व्यवहार-साहस्री 3. सन्देशसंस्कृतम्, -संस्कृतभारती, माता मन्दिर् गली, झण्डेवाला, नव देहली ११००५५

Reference:

1. Samskrit for Beginners, Dr M. Narasimhachari and Dr S. Ramaratnam, N & R Publications, Mylapore, Chennai 600004.

ENGLISH FOR COMMUNICATION – U16E1

Semester: I

English Language Course I

Instruction Hours/Week: 6

Credit: 3

UNIT I:

1. At the College
2. On the Campus
3. Outside the Class
4. At the Post office
5. For Business and Pleasure
6. Review

UNIT II:

7. Are you Smart ?
8. Are You Creative?
9. Is it too hard to improve?
10. How to win ?
11. View Points
12. Snakes and Ladders
13. Yourself

UNIT III:

1. Birbal story- The loyal gardener
2. Hindu mythological story- The origin of coconut tree
3. Achinese story: The generous student
4. An Africal Story ; The Three Runners

UNIT IV:

5. The Golden place
6. The one – hundreth prince
7. The mouse Merchand

- UNIT V:**
8. When wishes come true – Rabindranath Tagore
 9. The World and after
 10. Julius caesar

Text Books: 1. Crystal Streams – A Prose collection by D.E. Benet. Published by New Century Book House (P) Ltd.
2. Creative English for Communication (2nd edition) by Krishnasamy and Sriraman. Published by Macmillan

ENGLISH THROUGH EXTENSIVE READING – U16E2

SEMESTER : II

ENGLISH LANGUAGE COURSE : II

INSTRUCTION HOURS/WEEK : 4

CREDIT : 2

UNIT I

Excitement : Mack R. Douglas

Tight Corners : E.V. Lucas

UNIT II

Water – The Elixir of Life : C.V. Raman

Tree Speaks : C. Rajagopalachari

UNIT III

The Art of Telling Tales : April Hersey

A Job Well Done : Ruskin Bond

UNIT IV

The Panorama of India's Past : Jawaharlal Nehru

The Origin of Grammar : Margaret Bryant & Janet

UNIT V

Dangers of Drug Abuse : Hardin B. Jones

Crime and Punishment : R.K. Narayan

Text Book : Dr. Ananthan , R. Effective Communication. Ed. Chennai : Anu Chithra Pub.2010.

COMMUNICATIVE ENGLISH I – U16CE1

Semester : II

Communicative English Course : I

Instruction Hours/ Week : 2

Credit : 1

UNIT I

Writing Stories

Grammar Components : Articles, Prepositions and Tenses

UNIT II

Precis Writing

Grammar Components : Non- Finite Verbs and Phrasal Verbs

UNIT III

Writing Letters

Grammar Components : Conjunctions and Interjections and Punctuation

UNIT IV

Reporting

Grammar Components : Reported Speech and Transformation of Sentences

UNIT V

Writing an Essay

Grammar Components : Sentence structure (S/V/O/C/A) and Simple, Compound and Complex sentences

Text book : Pillai, Radhakrishna G. English Grammar & Composition Ed. Chennai : Emerald Pub.2016

ENGLISH FOR COMPETITIVE EXAMINATIONS – U16E3

SEMESTER : III

ENGLISH LANGUAGE COURSE : III

INSTRUCTION HOURS/WEEK : 6

CREDIT : 3

UNIT I:

Basics of English(Revision)

(a)Parts of speech and Articles

(b)Active and passive voice

(c)Framing Questions

(d)Tag questions

(e)Indirect speech

(f)Tenses

UNIT II:

(a)Errors and how to avoid them

(b)Spotting errors

(c)Reconstructing passages

(d)Précis writing

UNIT III:

Reading comprehension

UNIT IV:

(a)Sentence completion,

(b) Spelling

(c)Vocabulary – Words often confused or Misused, Synonyms, Antonyms.

UNIT V:

Letter writing , Report writing ,Paragraph writing, Essay writing

Text book : English for Competitive Examinations by R.P.Bhatnagar&Rajul Bhargava macmillanIndia Ltd. Delhi.

COMMUNICATIVE ENGLISH II – U16CE2

SEMESTER : IV

COMMUNICATIVE ENGLISH COURSE : II

INSTRUCTION HOURS/WEEK : 2

CREDIT : 1

UNIT I:

Enriching Vocabulary – Register Development; who is who; Synonyms, 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, Phonetic Transcription, 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.
- Circulars
- Notes - reminders, warnings, farewells, apology.
- Draft invitations – marriage, annual day, inaugural functions of associations, valediction, seminar, workshop.
- Draft Short messages- compliments, birthday wishes, notifications
- Draft Posters- Slogans, Announcements
- Draft Advertisements
- Dialogue writing

Text Book

1. Communicative English by Department of English, National College(Autonomous), Trichy

READING POETRY AND DRAMA – U16E4

SEMESTER : IV

ENGLISH LANGUAGE COURSE : IV

INSTRUCTION HOURS/WEEK : 6

CREDIT : 2

POETRY:

UNIT I : John Milton	: On His Blindness
Oliver Goldsmith	: The Village School Master
William Wordsworth	: The Solitary Reaper
UNIT II : P.B.Shelly	: Ozymandias
John Keats	: La Belle Dame Sans Merci
Robert Browning	: Incident of the French camp
UNIT III : John Masefield	: Laugh and Be Merry
Robert Frost	: Stopping by Woods On a Snowy Evening
John Drinkwater	: The Vagabond

DRAMA:

UNIT IV: Anton Chekov	: A Marriage Proposal
Lady Gregory	: The Rising of the Moon
UNIT V: W.St. John Tayleur	: Reunion
William Shakespeare	: Othello, The Moor of Venice – Act V

Text Books : 1)**An Introduction to Poetry** edited by A.G.Xavier; [Macmillan]
2)**A Book Plays:** A Group of Editors, Published by Orient Blackswan

COURSE CODE: U16BT1

PART – III: CELL BIOLOGY

HOURS: 5

CREDITS: 5

UNIT I:

Architecture of cells, cell theory - Structural organization of prokaryotic and eukaryotic cells – Ultrastructure of microbial, plant and animal cell walls and cell membrane. Cytoskeleton- microfilament, microtubules and intermediary filament structure, composition and functions.

UNIT II:

The ultra structure and functions of nucleus, chloroplast, mitochondria, endoplasmic reticulum, golgi apparatus, lysosome and peroxisome.

UNIT III:

Biomembranes- Structural organization and basic functions- transport across cell membranes- uniport, synport and antiport. Passive and active transport. Membrane electric potential, water channel.

UNIT IV:

Cell division – mitosis, meiosis and cell cycle- Regulation of cell division - basic characteristics of cancer cells – Programmed Cell Death.

UNIT V:

Integration of cells into tissues- cell cell adhesion and cell matrix adhesion, cellular communication, structure and role of cadherin, selectins, integrins, gap junction. Extra cellular matrix – collagen, laminin, fibronectin and proteoglycans structure and biological role.

TEXTBOOKS

1. De Roberties EDP and De Roberties EMF, Cell and Molecular Biology, Saunders Company, 1980.
2. Harvey Lodish, Baltimore, David, Arnold Berk et al Molecular Cell Biology, 1995.
3. Allison, L., Fundamental Molecular Biology, Blackwell Publishing Co., London, 2007.
4. Verma P.S., V.K. Agarwal, Cell Biology and Molecular Biology, 2001.
5. Power C.B., Cell Biology, Himalaya Publishing Co. Mumbai, 1984.
6. Sharma N.S., Molecular Cell Biology, International Book distributors, Dehradun, 2005.

SEMESTER – I & II

COURSE CODE: U16BT2P

PART – III: LAB IN CELL BIOLOGY & MICROBIOLOGY

HOURS: 6

CREDITS: 6

CELL BIOLOGY

1. Equipments used in cell culture laboratory, general practice and maintenances (Demonstration).
2. Morphological characterization of various types of cells
3. Histochemical staining techniques using following stains
 - Carmine, TBO, Saffranine, Crystal Violet, Fast Green.
4. Cell organelle separation by centrifugation methods.
5. Enumeration of cell (any type of prokaryotic/eukaryotic cells).
6. Identification and characterization of different types of Blood cells.
7. Identification of various stages of cell division (mitosis and meiosis).
8. Barrbody identification in cells of Buccal smear.
9. Cell Types - Microbial, Animal and Plant Morphometric measurements.

MICROBIOLOGY

10. Sterilization techniques
11. Demonstration of microbial culture
12. Hanging Drop Experiment
13. Staining Techniques: Simple, Differential, Capsular and Spore
14. Inoculation techniques – pour plate – spread plate –dilution techniques
15. Biochemical tests for bacterial identification – catalase test –oxidase test – IMVIC test – TSI test – Gelatin liquefaction – starch degradation –carbohydrate fermentation.
16. Viable bacteria – haemocytometer
17. Antibiotic Sensitivity Test (Kirby-Bauer Method)
18. Bacterial Growth Curve (Demonstration)
19. Morphological Identification of Fungi.

SEMESTER – I

COURSE CODE: U16ABT1

PART – III: PLANT BIODIVERSITY – I

(ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY & BRYOPHYTES)

HOURS: 5

CREDITS: 3

UNIT I:

Algae – Classification of Algae by Fritsch, Habit and habitats of Freshwater, Marine and Soil algae. Economic Importance of algae. Vegetative forms, size, cell structure, pigmentation, food reserves.

UNIT II:

Methods of reproduction of *Oedogonium*, *Caulerpa*, *Dictyota* & *Gracilaria*.

UNIT III:

Fungi – A study of the General Characteristics and Classification of fungi by Ainsworth. Economic importance of fungi. A study of the structure and reproduction in *Albugo*, *Peziza*, *Puccinia*, *Fusarium*. Lichens – occurrence, classification, structure, reproduction and uses of lichens. Type – *Usnea*.

UNIT IV:

Plant Pathology: Mycoplasma – Little leaf of Brinjal, Virus – Tobacco Mosaic Virus, Bacteria – Citrus canker, Fungus – Tikka disease of Groundnut, Blast disease of paddy

UNIT V:

Bryophytes: General Characteristics, Classification of Bryophyta by Smith, Morphology, Structure, reproduction of *Riccia*, *Lunularia* & *Polytrichum*.

TEXTBOOKS:

1. Round, F.E. (1973): Biology of the Algae(2nd Edition) Edward Arnold, London.
2. Chapman, V.J., & Chapman, D.J., (1973): The Algae(2nd Edition) ELBS & MacMillan.
3. H.D. Kumar & Singh, H.N. (1976): A Text Book of Algae Affiliated East West Press Pvt.Ltd., New Delhi, Madras.
4. Bold, H.C., & Wynne, M.J. (1978): Introduction to the Algae: Structure & Reproduction Prentice Hall of India, New Delhi.
5. Vashista, B.R. (2012) : Botany for degree students-Algae. S. Chand & Co., (P) Ltd., New Delhi.
6. Sharma, O.P. (1990): Text Book of Algae Tata McGraw Hill Publishing Co., Ltd., New Delhi.
7. Pandey, B.P. (1993): A Text book of Botany-Algae S. Chand & Co., (P) Ltd., New Delhi.
8. Prem Puri (1981): Bryophytes: Morphology, Growth and differentiation Atma Ram & Sons., Delhi, Lucknow.
9. Alexopoulos, C.J., Mims, C.W. & Blackwell, M. (1996) : Introductory Mycology John Wiley & Sons., Inc., N.Y., Chicester, Berisbane, Toronto, Singapore.
10. Mehrotra, R.S (1994): Plant Pathology Tata McGraw Hill Publishing Co., Ltd., New Delhi.

11. Rangaswami, G. & A. Mahadevan (1998): Diseases of Crop Plants In India (4th Edition) Prentice Hall of India (P) Ltd., New Delhi.
12. Trivedi, P.C. (1998): Plant Diseases Pointer Publications, Jaipur, Rajasthan, India.
13. Pandey, B.P. (1999): Plant pathology-Pathogens & Plant Diseases S. Chand & Co., New Delhi.
14. Singh, R.S. (2000): Introduction to Principles of Plant pathology (3rd Edition) Oxford & IBH Publishers, New Delhi, Calcutta.

SEMESTER – I & II

COURSE CODE: U16ABT2P

PART – III: LAB IN PLANT BIODIVERSITY – I & II

HOURS: 6

CREDITS: 3

PLANT BIODIVERSITY - I

A study of vegetative & reproductive structures of Genera

Algae: *Zygnema*, *Caulerpa*, *Dictyota* and *Gracilaria*.

Fungi: *Albugo*, *Peziza*, *Puccinia*, *Fusarium*

Lichens: *Usnea*

Plant Pathology: Little leaf of brinjal, TMV, Citrus Canker, Tikka disease of groundnut, Blast disease of paddy.

Bryophytes: *Riccia*, *Lunularia* and *Polytrichum*.

PLANT BIODIVERSITY - II

A study of the Morphology and anatomy of both vegetative and reproductive parts of the living genera and fossil forms of the following Genera.

Pteridophytes: *Psilotum* (Demonstration), *Selaginella* (Stem and Cone Demonstration),

Adiantum - *Rachis*, *Sorus*

Marsilea - Stem, Sporocarp

Gymnosperms: Pinus - Needle –TS, Young stem – TS; Male & Female cone (Demonstration), Gnetum - Stem –TS, Male & Female Strobilus (Demonstration)

Paleobotany: Rhynia, Lepidodendron, Lepidocarpon, Calamites (Slides), Williamsonia

SEMESTER – II

COURSE CODE: U16BT3

PART – III: MICROBIOLOGY

HOURS: 5

CREDITS: 5

UNIT I:

Basics of Microbiology: Microbiology - definition, history and scope – Prokaryotes and eukaryotes – Microorganisms- bacterial cell – size, shape and arrangement - General structure – functions of microbial cellular compounds (viruses, bacteria, algae, fungi, protozoa) – Microscopy – Principles of Light, dark field and Phase contrast microscopy.

UNIT II:

Principles & classification of microbes: Binomial nomenclature, Whittaker five kingdom classification–sterilization and disinfection - Physical and chemical methods of sterilization – MIC: Disc Diffusion, Well Diffusion; Stain and staining methods – principles of staining - simple, differential, capsule, nuclear and spore staining methods.

UNIT III:

Microbial media – Types of Media, Reviving, culturing and sub culturing of microbes; Isolation and enumeration of microorganisms in soil, water and air – methods of obtaining Pure cultures – Inoculum preparation- methods for microbial identification. Microbial growth – Phases of growth curve, Factors influencing the growth of microbes and nutritional types of microorganisms.

UNIT IV:

Food and Industrial Microbiology - Microbiology of fermented food and dairy products – cheese, yogurt, Alcoholic beverages-beer and wine. Food spoilage and Preservation processes. Microbes as source of food - single cell protein, Application of Microbes in industries production of antibiotics (penicillin), amino acids (Glutamic Acid) and organic acids (citric acid).

UNIT V:

Medical microbiology – pathogenesis, lab diagnosis, biological specimen diagnosis, prevention and control of important microbial diseases, Important Pathogenic bacteria diseases (*E.coli*, Leprosy, Tuberculosis, *Salmonella typhi*, *Staphylococcus aureus*, *Vibrio cholera*), Fungal diseases- Mycotoxicoses (*Candida sp*, *Aspergillus*, *Cryptococcus*), Viral Diseases (HIV, Rabies, Hepatitis and Polio Virus) and Protozoan diseases (Plasmodium).

TEXTBOOKS

1. M.J. Pelczar, Jr., E.C.S. Chang and N.R. Krieg Microbiology-, McGraw Hill Company, NY (1986).
2. M.J. Pelczar, Jr., E.C.S. Chang and N.R. Krieg, Microbiology-concepts and applications, McGraw Hill Company (1993).
3. L.M. Prescott, J.P. Hareley D.A. Klein, Microbiology – Wm.c. Brown publishers. Dutique, Jawa, Melbourne. 1993.
4. Wayne w. Umbreit Modern Microbiology, W.H, Freeman and company, London (1962).
5. Ronald M. Atlas Basic and Practical Microbiology, Mac Millan Company, Newyork (1986).

SEMESTER – II

COURSE CODE: U16ABT3

**PART – III: PLANT BIODIVERSITY – II
(PTERIDOPHYTES, GYMNOSPERMS & PALEOBOTANY)**

HOURS: 5

CREDITS: 3

UNIT I:

Pteridophytes -General Characteristics and Classification by Smith - Morphology, Structure, Reproduction and lifecycles: *Psilotum* and *Selaginella*.

UNIT II:

Structure, Reproduction and Lifecycles of *Adiantum* and *Marsilea* - Stellar evolution in Pteridophytes. Heterospory and origin of seed habit.

UNIT III:

Gymnosperms- general characteristics and classification of Gymnosperms by Sporne, Morphology, structure and mode of reproduction and lifecycles: *Pinus* and *Gnetum*.

UNIT IV:

Paleobotany- fossils and methods of fossilization- Geological time-scale-an elementary knowledge of the computation of the age of fossils-Radio-Carbon dating.

UNIT V:

A brief study of the following fossil forms: Rhynia, Lepidodendron, Lepidocarpon, Calamites & Williamsonia.

TEXTBOOKS

1. Smith, G.M. (1955) : Cryptogamic Botany Vol.II (2nd Edn.) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.
2. Sporne, K.R. (1970) : The Morphology of Pteridophytes (The Structure of Ferns and Allied Plants) Hutchinson University Library, London
3. Bierhorst, D.W. (1971) : Morphology of Vascular Plants The MacMillan Co., N.Y. & Collier-MacMillan Ltd., London.
4. Sharma, O.P. (1990) : Textbook of Pteridophyta MacMillan India Ltd., Delhi, Madras, Patna, Jaipur, Vapi, Bangalore, Hyderabad, Lucknow, Trivandrum, Guwahati, Coimbatore, Cuttack, Bhopal
5. Sundara Rajan, S. (1994) : Introduction to Pteridophyta New Age International Publishers Ltd., Wiley Eastern Ltd., New Delhi, Bangalore, Bombay, Calcutta, Guwahati, Hyderabad, Lucknow, Madras, Pune, London
6. Vashista, P.C. (2012) : Botany for Degree Students-Pteridophyta. S. Chand & Co., New Delhi,
7. Rashhed, A. (1999) : An Introduction to Pteridophyta Vikas publishing Co., New Delhi,

8. Sporne, K.R. (1971) : The Morphology of Gymnosperms (The Structure and Evolution of Primitive seed Plants) Hutchinson University Library, London
9. Datta, S.C. (1984) : An Introduction to Gymnosperms Kalyani Publishers, New Delhi, Ludhiana
10. Chopra, G.W., & Verma, Y. (1988) : Gymnosperms Pradeep Publications, Jalandhar,
11. Vashista, P.C. (1996) : Botany for Degree Students-Gymnosperms(2nd Edn.) S. Chand & Co., New Delhi,
12. Arnold, C.A. (1947) : An Introduction to Paleobotany McGraw Hill Book Co., N.Y.,
13. Scott, D.H. (1962) : Studies in Fossil Botany (Vol.I & Vol.II) Hafner Publishing Co., N.Y.
14. Delavoryas, T. (1962) : Morphology and Evolution of Fossil Plants Holt, Rinehart & Winston, N.Y. Chicago, San Francisco, Toronto, London
15. Stewart, W.N. (1983) : Paleobotany & the Evolution of Plants Cambridge University Press, Cambridge, London, N.Y., New Rochelle, Melbourne, Sydney
16. Venkatachala, B.S., Shukla, M. & Sharma, M. (1992) : Plant Fossils-a Link with the Past (A Birbal Sahni Birth Centenary Tribute) Birbal Sahni Institute of Paleobotany, Lucknow, India

SEMESTER – III

COURSE CODE: U16BT4

PART – III: GENETICS, PLANT BREEDING AND ECOLOGY

HOURS: 4

CREDITS: 4

UNIT I:

Genetics-Monohybrid and Dihybrid Ratios (Mendel's Laws). Deviation from Mendelian ratio: Incomplete dominance, lethal factor, complementary factor and Epistasis (dominant), Multiple factor Hypothesis, multiple alleles-Blood groups.

UNIT II:

Linkage, Crossing Over, Recombination, Cytological Proof of Crossing Over, Mapping of Genes on the Chromosomes, Sex Linkage-*Drosophila* (eye colour) and Human (colour blindness), Cytoplasmic Inheritance.

UNIT III:

Sex determination in *Drosophila*, Human and Plants – Polyploidy and its role in plant breeding, types. Biochemical genetics of *Neurospora*, Gene action. Gene units-cistron, recon, Muton, codon and operon. Gene mutation, physical and chemical mutagens.

UNIT IV:

Plant Breeding- Definition and objective, Hybridization Technique, Pure line selection, Clonal selection and Progeny selection, Heterosis.

UNIT V:

Ecology: Vegetation – Units of Vegetation – formation - association, consociation, society – Development of vegetation – Migration, Ecesis, Colonization, Methods of study of vegetation, Plant succession-Hydrosere and Xerosere – Ecology of Hydrophytes, Xerophytes, Mesophytes, Insectivorous and Parasitic Plants.

TEXTBOOKS

1. Sinnott, E.W., L.C. Dunn & J. Dobshansky (1958): Principles of Genetics (5th Edition) McGraw Hill Publishing Co., N.Y. Toronto, London.
2. Winchester, A.M. (1958): Genetics. Oxford & IBH Publishing House, Calcutta, Bombay, New Delhi.
3. Singleton, R. (1963): Elementary Genetics D. Van Nostrand Co., Ltd., Inc., N.Y. & Affiliated East West Press (P) Ltd., New Delhi.
4. Chandrasekaran, S.N. & Parathasarathy, S.V. (1965): Cytogenetics and Plant Breeding P. Varadhachari & Co., Madras.
5. Gardner, E.J. & Snusted, D.P. (1984): Principles of Genetics (7th edition) John Wiley & Sons, N.Y. Chichester, Brisbane, Toronto, Singapore.
6. Lewin, B. (1985): Genes IV Wiley Eastern Ltd., New Delhi, Bombay, Calcutta, Madras, Hyderabad.
7. Gupta, P.K. (2000). Genetics Rastogi Publishers, Meerut, India.

8. Chapman, O.C & Reiss, M.J. (1992). Ecology Principles and Applications, Cambridge University Press, UK.
9. Newman, E. I. (2000). Applied Ecology, Blackwell Scientific Publishers.
10. Verma, P.S. and Agarwal, V.K. (1999), Concept of Ecology. Chand and Co., NewDelhi.
11. Vashistha, P.C. (2010), Plant Ecology, Vishal Publications, Delhi.
12. Odum, E. P. (1975) Fundamentals of Ecology, Saunders and Co., Philadelphia & Natraj Publishers, Dehradun.

SEMESTER – III & IV

COURSE CODE: U16BT5P

**PART – III: LAB IN GENETICS, PLANT BREEDING, ECOLOGY, BIOCHEMISTRY AND
BIOPHYSICS**

HOURS: 6

CREDITS: 5

Genetics, Plant Breeding, Ecology

1. Study of Mendelian Ratio by Statistical methods
2. Study of Interaction of factors by simple problems
3. Collection and culture study of *Drosophila*
4. Induction of mutation in *Drosophila*
5. Induction of mutation in Plants
6. Emasculation, Crossing, Bagging
7. Pollen Viability test (T2 Test)
8. Pollen Tube Germination
9. Morphology and Anatomical Studies of Hydrophyte, Xerophyte, Mesophyte, Insectivorous and Parasitic Plants

Biochemistry and Biophysics

10. Determination of pH from unknown biological samples using pH paper and pH meter.
11. Analysis of carbohydrates (sugars, starch), proteins, lipids, and amino acids in biological samples.
12. Assays of amylase, peroxidase, catalase from biological samples using Spectrophotometer.
13. Separation of plant pigments and amino acids by Paper Chromatography and TLC.
14. Demonstration of gel electrophoresis.
15. Fractionation of biological material into its various components by Centrifuge.

For demonstration only

16. Enzyme activity using amylase.
17. Colorimeter – Operation and Working Principle
18. pH meter - Operation and Working Principle
19. Centrifuge - Operation and Working Principle

SEMESTER – III

COURSE CODE: U16ABT4

PART – III: INVERTEBRATE ZOOLOGY AND ANIMAL PHYSIOLOGY – I

HOURS: 4

CREDITS: 3

UNIT I:

Principles of Taxonomy - Binomial nomenclature – Animal Kingdom Classification. PROTOZOA: General characters and classification up to class with examples. Type study *Plasmodium*, parasitic protozoans (*Entamoeba*, *Trypanosoma* and *Leishmania*).

UNIT II:

PORIFERA: General characters and classification up to classes with examples. Type study Sycon, Canal system in sponges. COELENTERATA: General characters and classification up to classes with examples. Type study - *Obelia*, Polymorphism

UNIT III:

HELMINTHES: General characters and classification up to classes with examples. Type study - *Taenia solium*. Nematode parasites and diseases - *Wuchereria bancrofti*, *Enterobius vermicularis*, *Ancylostoma duodenale*. ANNELIDA: General characters and classification up to classes with examples. Type study - Earthworm, Trochophore larva, and its evolutionary significance.

UNIT IV:

ARTHROPODA: General characters and classification up to classes with examples. Type study - Prawn and its affinities, Insecta, Arachnida.

UNIT V:

MOLLUSCA: General characters and classification up to classes with examples. Type study - Fresh water Mussel. ECHINODERMATA: General characters and classification up to classes with examples. Type study - Sea star. Echinoderm larvae and their significance.

TEXTBOOKS

1. Ekambaranatha Iyer, M. and T.N.Ananthakrishnan (2003). A Manual of Zoology, Viswanathan Publications, Chennai.
2. Jordan, E.L. and P.S. Verma (2005). Invertebrate Zoology, 12th Edition. S. Chand and Co. Ltd, New Delhi.
3. Kotpal, R. L. (2005). Invertebrate Zoology (Protozoa, Porifera, Coelenterata, Arthropoda, Mollusca, Echinodermata Chapters). Rastogi Publications, Meerut.
4. Dhama P.S. and J. K. Dhama. (2003). Invertebrate Zoology. S. Chand and Co. New Delhi.
5. Arumugam, N et al. (2008). Text book of Invertebrata. Saras Publications, Nagerkovil.

SEMESTER – III & IV

COURSE CODE: U16ABT5P

**PART – III: LAB IN INVERTEBRATE ZOOLOGY AND ANIMAL PHYSIOLOGY – I,
VERTEBRATE ZOOLOGY AND ANIMAL PHYSIOLOGY – II**

HOURS: 6

CREDITS: 3

1. Spotters – General Characters, Morphology, Sketch of representative animal from each phyla/sub-phyla.
 - a. *Entamoeba, Trypanosoma, Leishmania*
 - b. *Sycon, Taenia solium, Ascaris*, Leech
 - c. Prawn, Starfish, Hydra, Sea Anemone
 - d. Cockroach, *Pila globosa*, Shark
 - e. Snake, Monitor, Pigeon, Bat, Mouse
 - f. Homologous organs, analogous organs, ontogeny recapitulates phylogeny, pectoral girdle of frog, calotes, pigeon, rabbit/rat, pelvic girdle of frog, calotes, pigeon, rabbit/rat, Forelimbs of frog, calotes, pigeon, rabbit/rat, Hind limbs of frog, calotes, pigeon, rabbit/rat.
2. Computer-Aided Learning Modules/Charts/Sketches
 - a. Cockroach – Digestive, reproductive and nervous system
 - b. Frog – Digestive System, Urinogenital, Arterial and Venous systems
3. Cockroach – Mouth parts
4. Earthworm – Penial setae and body setae
5. Placoid scales of fishes

SEMESTER – IV

COURSE CODE: U16BT6

PART – III: BIOCHEMISTRY AND BIOPHYSICS

HOURS: 4

CREDITS: 4

UNIT I:

Carbohydrates: Definition Classification, monosaccharide, disaccharides, oligosaccharides and polysaccharides. Metabolism: - Glucogenesis, Gluconeogenesis, Glycolysis, TCA cycle and oxidative phosphorylation.

UNIT II:

Definition, classification, simple, compound and derived lipids. Metabolism: α and β oxidation, cholesterol biosynthesis. Vitamins: Sources and deficiency

UNIT III:

Proteins: Definition, classification - simple, conjugated and derived proteins, Structure of proteins: Primary, secondary, tertiary and quaternary. Metabolism: - Deamination and transamination. Enzymes: Definition, concept and nomenclature, Properties, classification, Mechanism of enzyme action, Factors affecting enzyme action (Temperature, pH, substrates & co-enzyme).

UNIT IV:

Scope and methods in Biophysics, Levels of molecular organization, Thermodynamics, Atomic structure of molecules - Conformational analysis and forces; Physical properties of Biomolecules; Molecular interaction of Biopolymers; Biophotonic and its application; Structure of ion channels – Biophysical, Biochemical aspects of ion channels; Voltage depended membrane permeability.

UNIT V:

Introduction to spectroscopy and laws of light; Biophysical method for the determination of biopolymer structure; principles, components and application of X- Ray diffraction; UV – Visible, NMR and ESR Spectroscopy; Calorimeter, Spectrophotometer, pH meter, Principle, Design and applications; LASER – principle and application .

TEXTBOOKS

1. Lehninger, A.L. (1984) : Biochemistry (2nd Edition) Kalyani Publishers, Ludhiana, New Delhi
2. Trehan, K (1987) : Biochemistry Wiley Eastern Ltd., New Delhi
3. Plummer, D.T. (1988) : An Introduction to Practical Biochemistry(3rd Edn.,) Tata McGraw Hill Publishing Co., Ltd.,New Delhi
4. Jayaraman, J. (1981) : Laboratory Manual of Biochemistry Wiley Eastern Ltd., New Delhi
5. Stryer, L. (1989) : Biochemistry W.H. Freeman & Co., New York, San Francisco
6. Jain, J.L. (1998) : Fundamentals of Biochemistry S. Chand & Co., New Delhi
7. Day, P.M. & Harborne, J.B.(Eds.,) (2000) : Plant Biochemistry Harcourt Asia (P) Ltd., India & Academic Press Singapore.

8. Casey, E.J. (1969) : Biophysics-Concepts and Mechanisms Van Nostrand Reinhold Co., & Affiliated East West Press (P) Ltd., New Delhi
9. Narayanan, P. (2000) : Essentials of Biophysics New Age International Publishers(P)ltd., New Delhi, Bangalore, Calcutta, Chennai, Guwahati, Hyderabad, Lucknow, Mumbai
10. Annie & Arumugam, N. (2000) : Biochemistry & Biophysics Saras Publications, Nagercoil, Tamilnadu,
11. Salil Bose, S. (1982) Elementary Biophysics, Vijaya Printers, Madurai

SEMESTER – IV

COURSE CODE: U16ABT6

PART – III: VERTEBRATE ZOOLOGY AND ANIMAL PHYSIOLOGY – II

HOURS: 5

CREDITS: 3

UNIT I:

Salient features, General Classification of Phylum Chordata upto Orders. Origin of Chordata - Protochordata: Hemichordata, Cephalochordata and Urochordata: General Characters and Affinities.

UNIT II:

Agnatha: Outline classification, general characters and affinities of Cyclostomata - Pisces: Outline classification and general character - Scoliodon: - External characters, Digestive system, Respiratory system, Blood Vascular System and Nervous System.

UNIT III:

Amphibia: Outline classification and general characters. Development of frog: - Fertilization Cleavage Blastula Gastulation and formation of germinal layers. Neotony in Amphibia Parental care in amphibia. Reptilia: - Out line classification and general characters. Calotes:-External features, Respiratory system and Blood vascular system. Poisonous and non-poisonous snakes.

UNIT IV:

Aves: Outline classification and general characters. Columba livia: - External features, Respiratory system, Embryology of chick.-Cleavage Blastula Gastulation and formation of germinal layers and extra embryonic membranes. Flight adaptation in birds. Migration in Birds.

UNIT V:

Mammalia: Outline classification and general characters. *Ratus ratus*: - External features, Blood Vascular System, Urino-genital System and Adaptive radiation in mammals. Placentation in Mammals.

TEXTBOOKS

1. Ekambaranatha Iyer M. and T.N.Ananthkrishnan A Manual of Zoology- (2003) Viswanathan Publications, Chennai.
2. Chordate Zoology – E.L. Jordon and P.S. Verma (2006) S.Chand & co. New Delhi.
3. Chordate Zoology - P.S. Dhami and J.K. Dhami. (2006) R.Chand & co. New Delhi.
4. Vertebrate Zoology – R.L.Kotpal, (2005) Rastogi Publications, Meerat

SEMESTER – IV

COURSE CODE: U16NMBT1

PART – IV: MICROBES AND MAN

HOURS: 2

CREDITS: 2

UNIT I:

Microbes and Evolution of Life: The first observation – debate over spontaneous generation – classification of living things – Golden age of microbes in science.

UNIT II:

Microbes in History: Religion and microbes - Fall of Greek and Roman Empires – Presidents and Microbes – World War I – World War II.

UNIT III:

Microbes in Environment: Microbes in Soil - Carbon – Nitrogen – Phosphorus cycles; Microbes in water – Air; Biodegradation - Waste Management.

UNIT IV:

Microbes and Diseases: Principles of disease/ infection – Brief account of diseases caused by microbes to human – Bacteria that help human body.

UNIT V:

Microbes in Industries: Food and Dairy Industry – Fermentation; Pharmaceuticals – Antibiotics – Vaccines – hormones - Vitamins; Genetically modified organisms.

TEXTBOOKS

1. Prescott, LM, Harley, JP and Klein, DA. (2003): Microbiology 5th Edition Mc Graw Hill.
2. Stainer, R Y, Ingrtham, J L., Wheels, M.L and Painter P.R. (1987): General Microbiology. Macmillan Publishers.
3. Pelczar MJ, Chan ECS and Krieg NR (1998): Microbiology Tata McGraw Hill, New Delhi, India.
4. Davis BD, Dulbecco R, Eisen HN, Ginsberg HS (1994): Microbiology, 3rd Edition, Hoeber Medical Division.
5. RM Atlas Principles of Microbiology (1997) WCB PUBLISHER.

SEMESTER – IV

COURSE CODE: U16NMBT1

PART – IV: BIOPROCESS TECHNOLOGY

HOURS: 2

CREDITS: 2

UNIT I:

Introduction to White Biotechnology: Isolation and screening of industrially important microbes. Strain improvement, Media/substrates for industrial fermentation. Media formulation. Preservation of industrially important microorganisms.

UNIT II:

Fermentation and Fermentor/Bioreactor: Concepts of basic modes of fermentation – Batch, Fed batch and Continuous fermentation. Sterilization of Fermentor/Bioreactor - air and media sterilization.

UNIT III:

Types of Fermentors / Bioreactors: Mechanical - Stirred tank bioreactors, pneumatic - Airlift fermentors, solid state fermentors, Fermentor/Bioreactor design and operations - basic function, design, components and body construction.

UNIT IV:

Downstream Processing: Objectives and criteria - foam separation - precipitation methods. Filtration - filtration devices and filter aids. Centrifugation and cell disruption. Ultra filtration.

UNIT V:

Bioprocess Economics and Industrial Production: Production of enzymes-amylases and proteases. Ethanol (ABE) fermentation. Antibiotic production. Organic acid production - citric acid. Cell and enzyme immobilization.

TEXTBOOKS

1. Glazer, A N. and Nikaldo, H.1995 Microbial Biotechnology -W H Freeman and company network.
2. Prescott, L M., Harley, J P and Klein, D A.1999. Microbiology 4th edition Mc Graw Hill.
3. Stainer, R Y, Ingrtham, J L., Wheels, M.L and Painter P.R.1987 - General Microbiology. Maomillan.
4. Flickinger M.C., Drew S.W. (1999) Encyclopedia of Bioprocess Technology – 5 Volumes, John Wiley & Sons.
5. Arnold L. demain & Julian E. Davis. (2004) Industrial Microbiology & Biotechnology ASM Press.
6. Emt.el - Mansi & CFA. Bryce (2004). Fermentation Microbiology & Biotechnology Taylor & Francis Ltd.
7. Stanbury P.F., A. Whitaker & S.J. Hall (1997) - Principles of fermentation technology Oxford.

SEMESTER – V

COURSE CODE: U16BT7

PART – III: IMMUNOLOGY

HOURS: 5

CREDITS: 5

UNIT I:

Basics of Immune System: Historical perspectives and overview of immune system – introduction to immune system – Immune responses - innate immune response, adaptive immune response, overlap of innate and adaptive immunity - Cells of immune system – lymphoid organs – structure, functions - Antigens – types, structure and properties – Antigenicity and immunogenicity

UNIT II:

Components of Immune System: Antibodies- structure – types – function of immunoglobulins - Antigen presenting cells – Major histocompatibility complex – Class 1 & 2 - Cytokine and cytokine receptors - Complement – structure - properties – functions of complement components and pathways.

UNIT III:

Antigen-Antibody Interactions: Antigen-antibody reactions – types – In vitro methods – agglutination – precipitation – ELISA – RIA – IF – HA & HI – CFT – blood grouping and Rh typing – In vivo methods – Skin tests- immune complex tissue demonstrations.

UNIT IV:

Response of Immune system: Immunity to infection – immunity to different organisms, pathogen defense strategies, avoidance of recognition, inactivation of host-immune effector mechanisms - Hypersensitivity – IgE mediated – antibody mediated – immune complex mediated and delayed type hypersensitivity - Tumor immunology – tumor associated antigens. Immune response to tumor - Transplantation immunology – Graft rejection

UNIT V:

Advancements of Immunology: Hybridoma technology – monoclonal antibodies production – significance and applications - Vaccines – Immunization types – Vaccine types – live attenuated vaccines, killed vaccines, purified polysaccharide vaccines – toxoid vaccines – recombinant vaccines and DNA vaccines - Production and isolation of various bacterial and viral antigen – purification of antigen – Adjuvants and haptens – Toxins – toxoids – antitoxin production and purification of antitoxins and toxoids.

TEXTBOOKS

1. Roitt, I.M., J. Brostoff and D.K. Male. Immunology (1993) Gower medical publishing, London.
2. J. Kuby Immunology (1991) W. H. Freeman and Co.
3. E. Benzamini, G. Sunshine and Leskowitz, Immunology – A short course by Willy – Liss 1996.
4. Gabriel Virella Introduction to medical Immunology by, Marcel Dekker 1993.
5. Donald M. Weir, John Stewart, 1993. Immunology VII edition. ELBS, London.
6. Richard M. Hyde. 1995. Immunology III edition. National Medical Series, Williams and Wilkins. Harvard Publishing Co.

SEMESTER – V

COURSE CODE: U16BT8

PART – III: MOLECULAR BIOLOGY

HOURS: 5

CREDITS: 5

UNIT I:

Genome Organization: Prokaryotic and Eukaryotic; Chromosome structure and function, chromatin; Chloroplast DNA; Mitochondrial DNA; Gene families; Gene Clusters

UNIT II:

Central Dogma: Prokaryotic and Eukaryotic DNA replication, Transcription, Translation and regulation mechanisms – Post transcriptional modification and splicing mechanism – Post translational modifications - Ribosomes, protein biosynthesis and transportation- Different mechanisms of Signal transduction.

UNIT III:

DNA repair mechanisms; Mutagenesis, Mutations, and Mutants-Types of Mutations, Biochemical Basis of Mutants, Mutagenesis, Mutational Hot Spots, Reversion.; Transposable elements (Insertion Sequence and transposons, Integrons and Antibiotic Resistance Cassettes; Bacterial Genetics (Conjugation, Transformation, Generalized transduction, Specialized Transduction)

UNIT IV:

Gene Regulation mechanisms: General aspects of Regulation, The lactose system and the operon model, The Galactose operon, The Tryptophan operon, Relative positions of Promoters and Operators, Feedback Inhibition.

UNIT V:

Chromosomal Variations and Mapping: Chromosomal variation in Number & Structure – Euploidy, Non-disjunction & Aneuploidy, Polyploidy, Position Effect, and Centromeric & Non-centromeric breaks in chromosomes, chromosomal rearrangements, Chromosomal aberrations & evolution. Chromosome Mapping - Haploid mapping, Diploid mapping - Oncogenesis:Development and causes of cancer, Types of cancer, Oncogenes: Retro viral, proto, tumour suppressor gene.

TEXTBOOKS

1. Sharma N.S. 2005, Molecular Cell Biology, International Book distributors, Dehradun
2. Verma P.S. and Agarwal V.K. 1986, Cell Biology and Molecular Biology. S. Chand and Company, New Delhi
3. Power C.B., 1984, Cell Biology, Himalaya Publishing Co. Mumbai
4. De. Robertis and De Robertis, 1998, Cell and Molecular Biology, K.M. Verghese and Company
5. Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation Blackwell Science, London

SEMESTER – V

COURSE CODE: U16BT9E

PART – III: PLANT ANATOMY, EMBRYOLOGY AND PLANT PHYSIOLOGY

HOURS: 5

CREDITS: 4

UNIT I:

Anatomy- Meristems, definition, Classification of meristems- Various Concepts of apical meristem theories, apical cell theory, Tunica – Carpus and Histogen theory – Tissues: simple - Parenchyma, Collenchyma and Sclerenchyma, Laticifers. Epidermal tissue system, stomatal types. Complex permanent tissue: Xylem – Components, Phloem – Components – Primary and Secondary structure of root, stem and leaf in dicots and monocots.

UNIT II:

Embryology- Development of anther;. Microsporogenesis; Microgametogenesis; Ultrastructure of pollen wall-structure and development of ovule, megasporogenesis, Megagametogenesis (Polygonum-type of embryo-sac development), Fertilization. Endosperm-Nuclear, cellular and helobial and Ruminant types. Development of embryo – dicot and Monocot. Basic concepts of apomixis, apospory, Polyembryony and Parthenogenesis.

UNIT III:

Water relation: 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 IV:

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, energetics of respiration.

UNIT V:

Plant Growth: regulatory substances; auxins, kinins, gibberellins, abscisic acid and their function. Role of hormones in flowering, senescence and abscission- Photoperiodism, phytochrome-vernalization.

TEXTBOOKS

1. Vasishta, P.C. (1977): A Text Book of Plant Anatomy S. Nagin & Co., Jullunder & New Delhi.
2. Cutter, E.G. (1978): Plant Anatomy Part:I: Cells & Tissues(2nd Edn.,) Plant Anatomy Part II: Experiments & Interpretations Edward Arnold, London.
3. Eames, A.J., & Mc Daniels, L.H. (1979) : An Introduction to Plant anatomy Tata-McGraw-Hill Publishing Co., (P)Ltd., Bombay, New Delhi.
4. Esau. K. (1980): Plant Anatomy, (2nd Edition) Wiley Eastern Ltd., New Delhi, Bangalore, Bombay, Calcutta, Madras, Hyderabad.
5. Krishnamurthy,K.V. (1980): Wood Tetrahedron Publications, Trichy, India.

6. Pandey, B.P. (1989) : Plant anatomy S. Chand & Co., New Delhi.
7. Fahh, A. (1997) : Plant Anatomy Pergamon Press, Oxford.
8. Swamy. B.G.L. & Krishnamoorthy. K.V. (1980) : From flower to fruit Tata McGraw Hill Publishing Co., Ltd., New Delhi.
9. Johri, B.M. (1982) : Experimental Embryology of vascular Plants Springer –Verlag, Heidelberg & Narosa Publishing House, New Delhi.
10. Maheswari, P. (1985) : An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co.,Ltd., New Delhi.
11. Raghavan, V. (1986) : Embryogenesis in Angiosperms (A developmental and experimental study) Cambridge University Press, Cambridge, London, N.Y.
12. Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House(P)Ltd., UBS Publisher's Distributors, New Delhi.
13. Devlin, R.M. (1969) : Plant Physiology Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi.
14. Noggle, R. & Fritz (1989) : Introductory Plant Physiology Prentice Hall of India.
15. Srivastava, H.N. (1986) : Plant Physiology Pradeep Publications, Jalandhar, India.
16. Jain, V.K. (1990) : Fundamentals of Plant Physiology S. Chand & Co., New Delhi.
17. Pandey, S.N. (1991) : Plant Physiology Vikas Publishing House (P) Ltd., New Delhi India.
18. Mukherjee, S. A.K. Ghosh (1998) : Plant Physiology Tata McGraw Hill Publishers(P) Ltd., New Delhi.
19. Verma, S.K. (1999): A Text –Book of Plant Physiology S. Chand & Co.,New Delhi.
20. Salisbury, F.B &C.W. Ross (1999): Plant Physiology CBS Publishers and Printers, New Delhi.
21. Gill, P.S. (2000): Plant Physiology. S. Chand & Co., New Delhi.
22. Verma, V. (2001): A Text Book of Plant Physiology Emkay Publications, New Delhi.

SEMESTER – V

COURSE CODE: U16BT10E

PART – III: MICROBIAL BIOTECHNOLOGY

HOURS: 5

CREDITS: 4

UNIT I:

Microbial Biotechnology: Scope and applications -horizons of Microbial Technology. Microbes: Living factories for macromolecules-Production of proteins in Bacteria and yeast; recombinant and synthetic vaccines; microbial enzymes- application in starch processing, textile designing, detergents, cheese making, polysaccharides and polyesters. – Immobilization of cells and enzymes.

UNIT II:

Microorganisms in fermentation-Ethanol from feed stocks to fermentable sugars, from sugars to alcohols, Clostridial fermentation, lactic acid fermentation, acetic acid production and industrial production of various milk products.

UNIT III:

Metabolites from microorganisms-amino acids; antibiotics-antibacterial agents (lactams, tetracyclines, peptides, amino glycosides), antifungal agents, anti-tumor antibodies; Biotechnological potential of micro algae – food – fuel production – pharmaceutically valuable compounds of micro algae. SCP, Mycoprotein.

UNIT IV:

Biopesticides: Definition –types (Bioinsecticides and Biofungicides) – Insect viruses and entomopathogenic fungi – their characteristics, physiology, mechanism of action and application – protein antipest like *Bacillus thuringiensis*, *B.spaerinus*, *B.papilliae* – mechanism of action and application of *B. thuringensis* – Baculo Viruses – advantages of biopesticides and commercialization – Development of biopesticides - genetically engineered microorganisms.

UNIT V:

Bioremediation, Biosorption, Environmental clean-up by Microbes: Application of Microbial Biotechnology in Sewage and Wastewater treatment, Degradation of Xenobiotics, mineral recovery, removal of heavy metals from aqueous effluents. Public concerns about the Microbial Biotechnology and Economics of Microbial Biotechnology.

TEXTBOOKS

1. Glick, B.R. and Pasternack, J.J. 1994. Molecular Biotechnology. ASM Press, Washington, D.C.
2. Desmond, S.T., Nicholl. 1994. An Introduction to Genetic Engineering. Cambridge Univ. Press, Cambridge.
3. Old R.W. and Primrose S.B. 1994. Principles of Gene Manipulation. 4th edition. Blackwell Scientific Publication, London.
4. Cresswell RC. Ress TAV and Stah, H 1989. Algal and Cyanobacterial Biotechnology. Longman Scientific and Technical, NewYork.

5. Prave, P., Faust, U. Sitting, W. Suktasch D. A. 1987. Fundamentals of Biotechnology. VCH verlasgetell Schafor MBH, Weinhkeim, Germany.
6. Glazer, A.N. and Nikaido, H. 1995. Microbial Biotechnology. W.H.Freeman & Co.,New York
7. Stanbury, P.F. Whittaker, A, Hall, S.J. 1995. Principles of Fermentation Technology. Butterworth Heinemann, London.

SEMESTER – V & VI

COURSE CODE: U16BT11P

**PART – III: LAB IN IMMUNOLOGY, ANIMAL BIOTECHNOLOGY, BIOSTATISTICS AND
BIOINFORMATICS**

HOURS: 6

CREDITS: 5

Immunology

1. Blood grouping
2. Routes of inoculation
3. Preparation of Antigen - Protocol of immunization
4. Methods of bleeding
5. Preparation of serum components
6. Radial immunodiffusion test
7. Double immunodiffusion test (titre and pattern)

Animal Biotechnology

8. Laboratory Design, Class 100 and Class 10,000 Clean rooms
9. Primary Culture (Demonstration)
10. Trypsinization (Demonstration)
11. Cell Counting

Biostatistics and Bioinformatics

12. Data Collection, Tabulation and Graphical Representation
13. Calculation of Mean, Median and Mode
14. Calculation of Standard deviation and Variance
15. ANOVA
16. Student T test
17. Retrieving nucleotide sequence data from NCBI/EMBL/DDBJ
18. Retrieving aminoacid sequence data from UniProt
19. Accessing genome/proteome databases.
20. Retrieving structural data from PDB database
21. Performing BLASTn and BLASTp analysis
22. Performing Multiple Alignment using ClustalW tool
23. Visualizing PDB file using Rasmol/SPDBV

SEMESTER – V & VI

COURSE CODE: U16BT12P

PART – III: LAB IN MOLECULAR BIOLOGY, rDNA TECHNOLOGY, BIOETHICS, PLANT MORPHOLOGY, TAXONOMY AND PLANT BIOTECHNOLOGY

HOURS: 6

CREDITS: 6

1. Single Cell Colony Isolation - Checking for Genetic Markers
2. Induced Mutagenesis (UV and NTG)
3. Isolation of antibiotic resistant and auxotrophic mutants
4. Bacterial Transformation and Conjugation
5. Preparation of plasmid DNA from *E.coli*.
6. Isolation of genomic DNA from *E.coli*
7. Preparation of genomic DNA from animals/ human/plant.
8. Agarose gel electrophoresis of plasmid and genomic DNA.
9. Crude Preparation of RNA from animal/plant cells
10. Purification of Protein from cells by chromatography and electrophoresis
11. Vectors – Plasmids – Pictorial Representation
12. GUS expression – Pictorial Representation
13. PCR technique (demonstration)
14. Blotting technique (demonstration)
15. Transgenic Plants - Pictorial Representation

SEMESTER – V

COURSE CODE: U16NMBT2

PART – IV: BASIC BIOINFORMATICS

HOURS: 2

CREDITS: 2

UNIT I:

Internet and Introduction to Bioinformatics: Internet Basic concepts, World Wide Web (WWW), Web browsers: Google Chrome, Internet Explorer, Mozilla Firefox, Netscape Navigator, software packages - Bioinformatics Definition, Origin, history and scope - related fields including genomics, proteomics, transcriptomics, metabolomics - common terms employed in bioinformatics – Online bioinformatics webportals and resources (servers, websites and other related resources).

UNIT II:

Biological Databases: Definition, types and their retrieval systems (Entrez of NCBI) – Literature/Bibliographic Databases: PubMed – Sequence Databases: Nucleic acid (GenBank, EMBL, DDBJ), Protein (PIR, SwissProt, TrEMBL) - Structure Databases: Nucleic acid (NDB), Protein (PDB) and other related databases (CATH, SCOP) – Overview on Specialized Databases: Colibase, SGD, ACeDB, KEGG.

UNIT III:

Pairwise Sequence Alignment and Tools: Sequence Alignment: definition, significance and types, Pairwise alignment: global and local alignment - protein vs DNA alignments, Dotplots – Heuristic alignment – Overview on BLAST and FASTA and their types.

UNIT IV:

Multiple Sequence Alignment and Molecular Phylogeny: Multiple sequence alignment – Definition – progressive and iterative methods – ClustalW Tool – consensus sequence – patterns and profiles - Phylogenetic tree and its importance, common terminologies used in phylogeny – Overview on tree construction methods: phenetics and cladistics methods.

UNIT V:

Basic Bioinformatics Tools for Nucleic Acid and Protein Analysis: Nucleic Acid Composition, Gene/ORF Prediction (ORF finder) - Restriction site analysis – RNA secondary structure prediction – Protein Composition - Levels of Protein Structure - Protein Secondary structure prediction – GOR, Chau-Fasman method - Molecular Visualization Tool (Rasmol) – Overview on Protein Tertiary Structure Prediction Methods.

TEXTBOOKS

1. Lesk AM, (2003): Introduction to Bioinformatics, Oxford University press, New Delhi.
2. Baxevanis A and B.F. Ouellete, (2005): Bioinformatics: A practical Guide to the Analysis of Genes and proteins, 3rd edition, Wiley –Interscience (Wiley Student Edition).
3. Mount DW, (2005): Bioinformatics – Sequence and Genome Analysis, Second edition, CBS Publishers, New Delhi.

4. Higgins D and W. Taylor (Eds), (2000): Bioinformatics - Sequence, Structure and Databanks, Oxford University Press, New Delhi.
5. Campbell AM & LG Heyer, (2003): Discovering Genomics, Proteomics & Bioinformatics, Pearson Education ,New Delhi.

SEMESTER – V

COURSE CODE: U16NMBT2

PART – IV: GEOMICROBIOLOGY

HOURS: 2

CREDITS: 2

UNIT I:

Microbial World: Evolution of life – Classification of living things – Kingdom concepts - microbial diversity - Archaeobacteria.

UNIT II:

Microbes in Soil: Soil microorganisms – role of microbes in soil formation; Biogeochemical activity of microbes - decomposition.

UNIT III:

Microbes in Mining: Biomining - Microbial assimilation of metals – Bioleaching - Copper – Gold – Uranium.

UNIT IV:

Microbes and Energy: Recovery of petroleum – Production of fuels – Ethanol – methane – Hydrogen and other hydrocarbons.

UNIT V:

Geobiotechnology: Biotechnological concepts for Geologists – metagenomic analysis - Future of scientific drilling; Case study – Bacterial proxies for paleo-sea level reconstruction.

TEXTBOOKS

1. Prescott, LM, Harley, JP and Klein, DA. (2003): Microbiology 5th Edition Mc Graw Hill.
2. Stainer, R Y, Ingrtham, J L., Wheels, M.L and Painter P.R. (1987): General Microbiology. Macmillan Publishers.
3. Pelczar MJ, Chan ECS and Krieg NR (1998): Microbiology Tata McGraw Hill, New Delhi, India.
4. Davis BD, Dulbecco R, Eisen HN, Ginsberg HS (1994): Microbiology, 3rd Edition, Hoeber Medical Division.
5. RM Atlas Principles of Microbiology (1997) WCB PUBLISHER.

SEMESTER – V

COURSE CODE: U16NMBT2

PART – IV: ANIMAL CELL CULTURE TECHNOLOGY

HOURS: 2

CREDITS: 2

UNIT I:

Laboratory Requirements for Animal Cell Culture: Sterile handling area. Sterilization of different materials used in animal cell culture, Aseptic concepts. Instrumentation and equipments for animal cell culture. History of cell culture. Primary and secondary cell culture.

UNIT II:

Media and Reagents: Types of cell culture media, Ingredients of media - Physiochemical properties, Antibiotics, growth supplements, Foetal bovine serum; Serum free media, Trypsin solution, Preparation and sterilization of cell culture media and serum.

UNIT III:

Cell Culture: Different types of cell cultures, Trypsinization, Cell separation, Continuous cell lines, Suspension culture. Development of cell lines, Characterization and maintenance of cell lines, stem cells, Cryopreservation.

UNIT IV:

Methods of Cell Quantitation: Cell counting, determination of the cell viability by differential staining, flow cytometry. Stem cell research: Current status and application in medicine. Application of animal cell culture for *in vitro* testing of drugs.

UNIT V:

Hybridoma Technology: The basis of hybridoma technology, Storage of hybridoma cells, Monoclonal antibodies and their commercial production and their use for mankind. Production of transgenic animals
Animal cloning: Techniques, relevance and ethical issues.

TEXTBOOKS

1. Masters J. R. W. (2000): Animal cell culture. Oxford University Press, Oxford
2. Butler M (2004): Animal cell culture & technology, Bios Scientific Publishers, London New York
3. Freshney R. I. (2000): Culture of animal cells: A manual of basic technique. Willey-Lys, J. Willey & Sons. New York.

SEMESTER – VI

COURSE CODE: U16BT13

PART – III: rDNA TECHNOLOGY AND BIOETHICS

HOURS: 6

CREDITS: 6

UNIT I:

Outline process of genetic engineering and recombinant DNA technology, Isolation of genes, exonuclease & endonuclease, Concept of restriction and modification - Restriction endonucleases, DNA modifying enzymes, Ligases. Different Kinds of Vectors - Plasmids, Phage vectors, Cosmids, Phagemids, Virus vectors, Shuttle vectors and expression vectors- YAC, BAC- *S. cerevisiae* system as a model.

UNIT II:

Host-vector system - Cloning vectors for *E. coli.*, Cloning vectors for Eukaryotes- Methods of Transformation - Cloning strategies, Construction of Genomic Libraries and cDNA Libraries. Probe construction, Recombinant Selection and Screening, Molecular cloning.

UNIT III:

Analysis of expression. Analysis of recombinant DNA (Selection methods – antibiotics, expression basis, GUS expression), sequencing (chemical degradation; chain termination and automated sequence). mutagenesis, altered expression and engineering genes. Site-directed mutagenesis.

DNA amplification using polymerase chain reaction (PCR): Key Concepts, Analysis of Amplified Products. Southern blot, Northern blot and Western blot Applications of PCR. RFLP, RAPD, DNA Finger printing.

UNIT IV:

Application of rDNA Technology in plants: Transgenic plants with reference to virus and pest resistances, herbicide tolerance and stress tolerance (cold, heat and salt); cytoplasmic male sterility; delay of fruit ripening; resistance to fungi and bacteria, Bio-pharmaceuticals and secondary metabolite production. Application of rDNA Technology in animals: Transgenic animals –pharmaceutical production; insulin production. farm animal protection; Gene therapy – haemopoietic cells, genetically engineered bone marrow cells, skin fibroblasts, hepatocytes, myoblast and genetically modified lymphocytes – Recombinant Technology in the production of vaccines.

UNIT V:

Bioethics: Introduction to ethics/bioethics – framework for ethical decision making; biotechnology and ethics –benefits and risks of genetic engineering – ethical aspects of genetic testing – ethical aspects relating to use of genetic information – genetic engineering and biowarfare; Ethical implications of cloning: Reproductive cloning , therapeutic cloning ; Ethical, legal and socioeconomic aspects of gene therapy, germ line, somatic, embryonic and adult stem cell research-GM crops and GMO's – biotechnology and biopiracy – Ethical implications of human genome project.

TEXTBOOKS

1. Old, R.W and S.B. Primrose. 1996. Principles of Gene Manipulation: An Introduction to Genetic Engineering. Blackwell Scientific Publications, Oxford.
2. Glover, DM. and BD. Hames .1995. DNA Cloning: A Practical Approach.. IRL Press, Oxford.

3. Innis, M.A., D.H. Gelfand and J.J. Sninsky .1995. PCR Strategies.. Academic Press, San Diego.
4. Persing, D.H., K T.F Smith, F.C. Teower and T.J.While. 1993. Diagnostic Molecular Microbiology. ASM Press, Washington D.C.
5. Watson J.D.,Gilman M., Witkowski,J., and Zoller M. 1992. Recombinant DNA. Scientific American Books, New York.
6. Tvan R.S. 1997. Recombinant Gene Expression Protocols. Humana Press Inc., Tokowa.
7. Glick, B.R and J.J Pasternak Molecular Biotechnology - Principles and Applications of recombinant DNA, , 2002. Panima Publishing Co-operations.
8. Ethics in engineering, Martin. M.W. and Schinzinger.R. III Edition, Tata McGraw-Hill, New Delhi. 2003.
9. BAREACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007
10. Senthil Kumar Sadhasivam and Mohammed, Jaabir. 2008. IPR, Biosafety and Biotechnology Management. Jasen Publications, Tiruchirapalli, India.

SEMESTER – VI

COURSE CODE: U16BT14

PART – III: ANIMAL BIOTECHNOLOGY

HOURS: 6

CREDITS: 6

UNIT I:

Embryology: Gametogenesis and fertilization in animals, Molecular events during fertilization, genetic regulations in embryonic development - Invitro felitizations and embryo transfer, Collection and preservation of embryo, culture of embryos, culture of embryonic stem cells and its applications.

UNIT II:

Animal cell culture: Fundamentals. Facilities and Applications. Media for Animal cells.Types of cell culture: Primary cell culture, secondary culture, cell transformation, cell lines, Insect cell lines,stem cell cultures, cell viability and cytotoxicity. Biology of cultured cells, measurement of growth, cell synchronization, senescence and apoptosis Organ culture. Cryopreservation.

UNIT III:

Genetic engineering in animals: methods of DNA transfer into animal cells- calcium phosphate co precipitation, micro-injection, electroporation, Liposome encapsulation, Biological vectors. Hybridoma technology, Vaccine production.

UNIT IV:

Gene therapy, mapping of human genome. RFLP and applications. DNA finger printing and Forensic Science. Molecular diagnosis of Genetic disorders.

UNIT V:

Transgenics: Transgenic animals. Production and recovery of products from animal tissue cultures: cytokines, Plasminogen activators, Blood clotting factors, Growth hormones.- Transgenic animals – Merits and demerits -Ethical issues in animal biotechnology.

TEXTBOOKS

1. Freshney, E. D. 2000. Animal Cell Culture: A practical approach. John Wiley Pub.,New York.
2. Mather, J.P. and Barnes, D. (Eds.). 1998. Animal Cell Culture Methods (Methods in Cell Biology. VOL. 57). Academic Press, London.
3. Butler, M. (Ed.). 1990. Mammalian Cell Biotechnology- A Practical Approach. Oxford Univ. Press, Oxford.
4. Singer, M. and P. Berg. (Ed.). 1997. Exploring Genetic Mechanisms. University Science Books, Sausalito, CA, USA.
5. E.J. Murray (Ed) .1991. Gene Transfer and Expression Protocols – Methods in Molecular Biology Vol.7. Humana Press,Totowa, NJ.
6. Watson, J.D., N.H.Hopkins, T.W.Roberts, J.A.Steitz and A.M. Weiner.1987. Molecular Biology of Gene. Benjamin Cummins, San Francsisco.

7. Watson, J.D., M. Gilman, J. Witkouski and M.Zoller.1992. Recombinant DNA. Scientific American Books, New York
8. Puller, A. (Ed) .1993. Genetic Engineering of Animals. VCH Publishers, New York.

SEMESTER – VI

COURSE CODE: U16BT15

PART – III: PLANT MORPHOLOGY, TAXONOMY & PLANT BIOTECHNOLOGY

HOURS: 6

CREDITS: 6

UNIT I:

Morphology - Inflorescence - types- racemose, cymose, mixed and special types. Descriptive terminology of flower and floral parts. Fruit-classification. Details of simple , fleshy,dry dehiscent and dry indehiscent, aggregate and multiple fruits.

UNIT II:

Taxonomy: Binomial nomenclature, citation of authors, Principles of priority. Systems of classification- Sexual system and Natural System by Linnaeus - Bentham & Hooker Merits and Demerits of their systems. Herbarium Techniques, Flora and its uses.

UNIT III:

Study of the following families and their economic importance: Annonaceae, Capparidaceae, Tiliaceae, Rubiceae, Apocyanaceae, Amarantaceae, Euphorbiaceae and Poaceae

UNIT IV:

Plant Tissue Culture – Introduction, laboratory requirements – Sterilization, composition of media (Whites, MS), Media Preparation – Callus culture, Organogenesis on meristem culture and anther culture.

UNIT V:

Micropropagation – organogenesis – Somatic embryogenesis – Synthetic Seeds, Protoplast isolation, Culture-Cybrid Production, Cell Culture – Production of Secondary Metabolites.

TEXTBOOKS

1. Porter, C.L. Taxonomy of flowering Plants Eurasia Publishing House, New Delhi.
2. Lawrence, G.H.M. (1953) : Taxonomy of Vascular Plants Oxford & IBH Publishers, New Delhi, Calcutta.
3. Ramaswami, S.N., S.Lakshminarayana & V.Venkateswaralu (1976) : Taxonomy (Systematic Botany) for degree course Maruthi Book Depot, Guntur, Hyderabad.
4. Narayanaswamy, R.V. & Rao, K.N. (1976): Outlines of botany S. Viswanathan Printers & Publishers, Chennai.
5. Singh, V. & D.K. Singh (1983) : Taxonomy of angiosperms Rastogi Publications, Meerut.
6. Sivarajan V.V. (1993) : Introduction to the Principles of Plant Taxonomy (2nd Edn.,) N.K.P. Robson(Ed.,) Oxford & IBH publishing Co., New Delhi.
7. Pandey, B.P. (1997) : Taxonomy of Angiosperms S. Chand & Co., (P)Ltd., New Delhi.
8. Vashista, P.C. (1997) : Taxonomy of Angiosperms S. Chand & Co., New Delhi, Jullunder.
9. Grierson, D., and S.N. Covey. 1988. Plant Molecular Biology. Blackie & Sons. Ltd. Glasgow.
10. Lycett, G.W. and D. Grierson (Eds) .1990. Genetic Engineering of Crop Plants. Heinemann, London.

11. Chrispeeds, M.J. and D.F. Sadava .1994. Plants, Genes and Agriculture.. Jones and Bartlett, Boston.
12. Mantel. S. H, Mathews. J. A, Mickee. R.A. 1985. An Introduction to Genetic Engineering in Plants. Blackwell Scientific Publishers, London.
13. Marks. J.L. (Ed.). 1989. A Revolution on Biotechnology. Cambridge Univ. Press, Cambridge.
14. Dodds J.H. 1985. Plant Genetic Engineering. Cambridge Univ. Press, Cambridge.
15. Glick BR and J.J. Pasternak. 2002. Molecular Biotechnology, Principle and Applications of Recombinant DNA. ASM Press, Washington, D.C.
16. Monica A. Hughes. 1996. Plant Molecular Genetics. Addison Wesley Longman, Harlow, England.

SEMESTER – VI

COURSE CODE: U16BT16E

PART – III: BIOSTATISTICS AND BIOINFORMATICS

HOURS: 5

CREDITS: 4

UNIT I:

Bio-Statistics: Concepts of statistics-types of data, methods of collection of data. sampling design – essentials of sampling – census methods - sampling methods – statistical laws – statistical error – test of reliability of sample. Experimental designs. Classification and tabulation of data. Diagrammatic and graphical representation of data.

UNIT II:

Measures of central tendency – mean, median and mode. Measures of dispersion: Mean deviations, standard deviation. Correlation analysis (Karl Pearson's and Spearman's Rank) Regression analysis – simple linear.

UNIT III:

Tests of significance - 't'-test, Chi-square and goodness of fit, 'F' test - Analysis of variance (ANOVA): One-way. & Two-way.

UNIT IV:

Biological Databases: Sequence databases – Nucleic Acid sequence Databases: Genbank ;Protein Sequence Databases: UniProt; Searching Sequence Databases – Non-redundant Databases – Low Annotation Databases – Specialized sequence Databases – Structural Databases – Motif Databases – Genome Databases – Proteome Databases.

UNIT V:

Pairwise Sequence Analysis Tools: BLAST– Steps involved in using BLAST – Interpreting BLAST results; FASTA – Alignment Scores -Multiple Alignment — ClustalW – Phylogenetic Tree – Sequence Analysis using EMBOSS. Protein Structure Prediction: Secondary structure Prediction –PDB-FSSP-SCOP-CATH-Chou-Fasman – Jpred – Q3 – Transmembrane protein prediction – Tertiary structure prediction – Comparative Modelling – Fold recognition – *Ab initio* prediction – modeler – RASMOL – Emerging areas of bioinformatics.

TEXTBOOKS

1. Sokal, R.R. and F.J. Rohlf. 1981. Biometry. W.K. Freeman. San Francisco.
2. Zar, J.H. 2003. Biostatistical Analysis. Pearson Education (Singapore) Pvt. Ltd., Indian Branch, New Delhi.
3. Harshawardhan, P. (2005) Bioinformatics principles and application. Tata Mc Graw Hill Publishers. New Delhi.
4. Manikand Vijayaraj, 2002. Bioinformatics for beginners, Kalaikathir Achchagam, Coimbatore
5. Mount, D.W. 2005. Bioinformatics Sequence and genome analysis (II edition) CBS Publishers. New Delhi

6. Sundarajan. S. and R. Balaji. (2005), Introduction of Bioinformatics, Himalaya Publishing house, Mumbai.

Westhead, D.R, H.J. Parish and R.M. Twyman. (2003) Bioinformatics Viva books Private Ltd. New Delhi.

PART – IV: COMPUTER APPLICATIONS – I - OFFICE AUTOMATION**HOURS: 2****CREDITS: 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 objectsBookmark – 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.

TEXTBOOKS

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.

SEMESTER – III

COURSE CODE: U16SBE2

PART – IV: COMPUTER APPLICATIONS - II - DESKTOP PUBLISHING

HOURS: 2

CREDITS: 2

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.

TEXTBOOKS

1. CorelDraw IN Simple Steps – Shalini Gupta Corel DRAW Bible - DEBORAH MILLER
2. Teach Yourself Adobe Photoshop – Rose Carla Adobe Photoshop Cs Classroom in a Book by Adobe Press.
3. Using Microsoft Word - Asmita Bhatt Pagemaker In Easy Steps - Scott Basham Ctoa Material By Genesis.

SEMESTER – III

COURSE CODE: U16SBE3P

PART – IV: COMPUTER APPLICATIONS – II PRACTICAL (DTP LAB)

HOURS: 2

CREDITS: 2

OFFICE AUTOMATION & DESKTOP PUBLISHING LAB

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.

SEMESTER – I

COURSE CODE: U16ES

PART – IV: ENVIRONMENTAL STUDIES

HOURS: 2

CREDITS: 2

UNIT I:

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 II:

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 III:

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 IV:

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 V:

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.

TEXTBOOKS

1. Ekambaranatha Ayyar.M. and T.N. Ananthkrishnan, 1992. Manual of Zoology Vol. 1 [Invertebrata], parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Pubi. Ltd. Bikaner.
3. Sharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad.
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico PubI. House, Mumbai,
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press.
10. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
11. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press
12. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi.
13. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition.
14. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
15. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
16. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.
17. Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Pubi. Co. Pvt. Ltd.
18. Sharma B.K., 2001. Environmental Chemistry. Geol Pubi. House, Meerut
19. Survey of the Environment, The Hindu (M)
20. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
21. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
22. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co.Philadelphia, USA (M) Magazine (R) Reference (TB) Textbook

SEMESTER – IV

COURSE CODE: U16VE

PART – IV: VALUE EDUCATION

HOURS: 1

CREDITS: 2

UNIT I:

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 II:

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 III:

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 IV:

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 V:

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.

TEXTBOOKS

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 (for All Units)

SEMESTER – V

COURSE CODE: U16SS

PART – IV: SOFT SKILLS

HOURS: 2

CREDITS: 2

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

1. 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)
2. 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

1. Developing the leader within you John C Maxwell
2. Good to Great by Jim Collins
3. The Seven habits of highly effective people Stephen Covey
4. Emotional Intelligence Daniel Goleman
5. You can Win Shive Khera

Principle centred leadership Stephen Covey

SEMESTER – VI

COURSE CODE: U16GS

PART – V: GENDER STUDIES

HOURS: 1

CREDITS: 1

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.

TEXTBOOKS

1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited 2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited, 2004
3. Bhasin Kamala, What is Patriarchy? : Gender Basics, New Delhi: Women Unlimited, 1993
4. Pernau Margrit Ahmad Imtiaz, Reifeld Hermut (ed.,) Family and Gender: Changing Values in Germany and India, New Delhi: Sage Publications, 2003
5. Agarwal Bina, Humphries Jane and Robeyns Ingrid (ed.,)
6. Capabilities, Freedom, and Equality: Amartya Sen's Work from a Gender Perspective, New Delhi: Oxford University Press, 2006
7. Rajadurai.S.V, Geetha.V, Themes in Caste Gender and Religion, Tiruchirappalli: Bharathidasan University, 2007 Misra Geetanjali, Chandiramani Radhika (ed.,)
8. Sexuality, Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi: Sage Publication, 2005 Rao Anupama (ed.,)
9. Gender &Caste: Issues in Contemporary Indian Feminism, New Delhi: Kali for Women, 2003

10. Saha Chandana, Gender Equity and Gender Equality: Study of Girl Child in Rajasthan, Jaipur: Rawat Publications, 2003
11. Krishna Sumi,(ed.,) Livelihood and Gender Equity in Community Resource Management New Delhi: Sage Publication, 2004
12. Wharton .S Amy, The Sociology of Gender: An Introduction to Theory and Research, USA: Blackwell Publishing, 2005.
13. Mohanty Manoranjan (ed.,) Class, Caste, Gender: Readings in Indian Government and Politics- 5, New Delhi: Sage Publications, 2004.
14. Arya Sadhna, Women, Gender Equality and the State, New Delhi: Deep & Deep Publications, 2000.