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श्रद्धा हि परमागतिः

THE NATIONAL COLLEGE BASAVANAGUDI, BENGALURU- 560 004

[AUTONOMOUS] Website: www.ncbgudi.com

NAAC Accredited 'B++' Grade

BSC Course Matrix – NEP -2020

BSC Semester I

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS1-xx-CT1	Discipline Core-1 Theory 1	4	-	-	60	40	100	4
	BS1-xx-CT1	Discipline Core -2 Theory 2	4	-	-	60	40	100	4
	BS1-xx-CP1	Discipline Core-1 Practical 1	-	-	4	25	25	50	2
	BS1-xx-CP1	Discipline Core-2 Practical 2	-	-	4	25	25	50	2
Part-2	GE1-CS1	Open Elective for other Discipline	3	-	-	60	40	100	3
Part-3	BC1-LK1	Kannada-I	3	1	-	60	40	100	3
	BC1-Lx1	English-I/Hindi-I/Sanskrit-I	3	1	-	60	40	100	3
	-	Ability Enhancement Compulsory	-	-	-	-	-	-	-
Part-4	SB1-DF	Digital Fluency	1	-	2	25	25	50	2
	VB2-HW	Health & Wellness	-	-	2	-	25	25	1
	VB2-XX-1	NCC-1/ NSS-1/ R & R-1/ Cultural-1	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			18	2	14	375	325	700	25

BSC Semester II

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS2-xx-CT2	Discipline Core Major Theory 1	4	-	-	60	40	100	4
	BS2-xx-CT2	Discipline Core Minor Theory 2	4	-	-	60	40	100	4
	BS2-xx-CP2	Discipline Core Major Practical 1	-	-	4	25	25	50	2
	BS2-xx-CP2	Discipline Core Minor Practical 2	-	-	4	25	25	50	2
Part-2	GE2-CS2	Open Elective for other Discipline	3	-	-	60	40	100	3
Part-3	BC2-LK2	Kannada-II	3	1	-	60	40	100	3
	BC2-Lx2	English-II/Hindi-II/Sanskrit-II	3	1	-	60	40	100	3
	AE1-ES	Environmental Studies	2	-	-	30	20	50	2
Part-4	-	Skill Enhancement Courses - Skill	-	-	-	-	-	-	-
	VB1-YO	Yoga	-	-	2	-	25	25	1
	VB1-SP-1	Sports-1	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			19	2	12	380	320	700	25

BSC Semester III

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS3-xx-CT3	Discipline Core Major Theory 1	4	-	-	60	40	100	4
	BS3-xx-CT3	Discipline Core Minor Theory 2	4	-	-	60	40	100	4
	BS3-xx-CP3	Discipline Core Major Practical 1	-	-	4	25	25	50	2
	BS3-xx-CP3	Discipline Core Minor Practical 2	-	-	4	25	25	50	2
Part-2	GE3-CS3	Open Elective for other Discipline	3	-	-	60	40	100	3
Part-3	BC3-LK3	Kannada-III	3	1	-	60	40	100	3
	BC3-Lx3	English-III/Hindi-III/Sanskrit-III	3	1	-	60	40	100	3
	-	Ability Enhancement Compulsory	-	-	-	-	-	-	-
Part-4	SB2-AI	Artificial Intelligence	1	-	2	25	25	50	2
	VB1-SP-2	Sports-2	-	-	2	-	25	25	1
	VB2-XX-2	NCC-2/ NSS-2/ R & R-2/ Cultural-2	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			18	2	14	375	325	700	25

BSC Semester IV

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS4-xx-CT4	Discipline Core Major Theory 1	4	-	-	60	40	100	4
	BS4-xx-CT4	Discipline Core Minor Theory 2	4	-	-	60	40	100	4
	BS4-xx-CP4	Discipline Core Major Practical 1	-	-	4	25	25	50	2
	BS4-xx-CP4	Discipline Core Minor Practical 2	-	-	4	25	25	50	2
Part-2	GE4-CS4	Open Elective for other Discipline	3	-	-	60	40	100	3
Part-3	BC4-LK4	Kannada-IV	3	1	-	60	40	100	3
	BC4-Lx4	English-IV/Hindi-IV/Sanskrit-IV	3	1	-	60	40	100	3
	AE2-IC	Constitution of India	2	-	-	30	20	50	2
Part-4	-	Skill Enhancement Courses - Skill	-	-	-	-	-	-	-
	VB1-SP-3	Sports-3	-	-	2	-	25	25	1
	VB2-XX-3	NCC-3/ NSS-3/ R & R-3/ Cultural-3	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			19	2	12	380	320	700	25

BSC Semester V

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS5-xx-CT5	Discipline Core Major - Theory 1	3	-	-	60	40	100	3
	BS5-xx-CT6	Discipline Core Major - Theory 2	3	-	-	60	40	100	3
	BS5-xx-CT5	Discipline Core Minor - Theory 3	3	-	-	60	40	100	3
	BS5-xx-CP5	Discipline Core Major - Practical 1	-	-	4	25	25	50	2
	BS5-xx-CP6	Discipline Core Major - Practical 2	-	-	4	25	25	50	2
	BS5-xx-CP5	Discipline Core Minor - Practical 3	-	-	4	25	25	50	2
Part-2	VC1-xx1	Vocational Course Theory	3	-	-	60	40	100	3
Part-4	SB2-CY	Cyber Security	1	-	2	25	25	50	2
	VB1-SP-4	Sports-4	-	-	2	-	25	25	1
	VB2-XX-4	NCC-4/ NSS-4/ R & R-4/ Cultural-4	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			13	-	20	340	335	675	23

BSC Semester VI

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS6-xx-CT7	Discipline Core Major - Theory 1	3	-	-	60	40	100	3
	BS6-xx-CT8	Discipline Core Major - Theory 2	3	-	-	60	40	100	3
	BS6-xx-CT6	Discipline Core Minor - Theory 3	3	-	-	60	40	100	3
	BS6-xx-CP7	Discipline Core Major - Practical 1	-	-	4	25	25	50	2
	BS6-xx-CP8	Discipline Core Major - Practical 2	-	-	4	25	25	50	2
	BS6-xx-CP6	Discipline Core Minor - Practical 3	-	-	4	25	25	50	2
Part-2	VC1-xx2	Vocational Course Theory	3	-	-	60	40	100	3
	IS-1	Internship	4 Weeks			25	25	50	2
Part-4	SB4-PC	Professional Communication	1	-	2	25	25	50	2
	VB1-SP-5	Sports-5	-	-	2	-	25	25	1
	VB2-XX-5	NCC-5/ NSS-5/ R & R-5/ Cultural-5	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			13	-	18	365	335	700	24

BSC Semester VII

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS7-xx-CT9	Discipline Core Major Theory 1	3	-	-	60	40	100	3
	BS7-xx-CT10	Discipline Core Major Theory 2	3	-	-	60	40	100	3
	BS7-xx-CT11	Discipline Core Major Theory 3	3	-	-	60	40	100	3
	BS7-xx-CP9	Discipline Core Major Practical 1	-	-	4	25	25	50	2
	BS7-xx-CP10	Discipline Core Major Practical 2	-	-	4	25	25	50	2
Part-2	BS7-xx-E1/E2	Elective 1	3	-	-	60	40	100	3
	BS7-xx-E3/E4	Elective 2	3	-	-	60	40	100	3
	BS7-XX-RM	Research Methodology	3	-	-	60	40	100	3
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			18	-	8	410	290	700	22

BSC Semester VIII

Part	Code	Course(Subject)	Hours / Week			Marks			Credits
			L	T	P	Exam	IA	Total	
Part-1	BS8-xx-CT12	Discipline Core Major Theory 1	3	-	-	60	40	100	3
	BS8-xx-CT13	Discipline Core Major Theory 2	3	-	-	60	40	100	3
	BS8-xx-CT14	Discipline Core Major Theory 3	3	-	-	60	40	100	3
	BS8-xx-CP11	Discipline Core Major Practical 1	-	-	4	25	25	50	2
Part-2	BS8-xx-E5/E6	Elective 3	3	-	-	60	40	100	3
	BS8-XX-RP	Project	-	-	12	140	60	200	6
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			12	-	16	405	245	650	20

BSC - SEMWISE CREDITS

Year	Sem	Credits	Min. Credits	Total Credits
Year 1	SEM I	25	-	-
	SEM II	25	48	50
Year 2	SEM III	25	-	-
	SEM IV	25	96	100
Year 3	SEM V	23	-	-
	SEM VI	24	140	147
Year 4	SEM VII	22	-	-
	SEM VIII	20	180	189

Code	Course
AEC-1	Environmental Studies
AEC-2	Constitution of India
SES-1	Digital Fluency
SES-2	Artificial Intelligence
SES-3	Cyber Security
SES-4	Professional Communication
SEV1-1	Yoga
SEV2-1	Health & Wellness
SEV1-2	Sports-1
SEV2-2	NCC-1/ NSS-1/ Ranger and Rovers-1/ Redcross-1/ Cultural-1
SEV1-3	Sports-2
SEV2-3	NCC-2/ NSS-2/ Ranger and Rovers-2/ Redcross-2/ Cultural-2
SEV1-4	Sports-3
SEV2-4	NCC-3/ NSS-3/ Ranger and Rovers-3/ Redcross-3/ Cultural-3
SEV1-5	Sports-4
SEV2-5	NCC-1/ NSS-4/ Ranger and Rovers-4/ Redcross-4/ Cultural-4
SEV1-6	Sports-5
SEV2-6	NCC-5/ NSS-5/ Ranger and Rovers-5/ Redcross-5/ Cultural-5
OE-XXX-1T	Open Elective other Disciplineother Discipline
OE- XXX-2T	Open Elective other Disciplineother Discipline
OE- XXX-3T	Open Elective other Disciplineother Discipline
OE- XXX-4T	Open Elective other Disciplineother Discipline
VC-XXX-1T	Vocational Course for Same Discipline
VC-XXX-2T	Vocational Course for Same Discipline
VC-XXX-3T	Vocational Course for Same Discipline
VC-XXX-4T	Vocational Course for Same Discipline
XXX-IS1	Internship / Entrepreneurship 3 to 4 Weeks
XXX-XXX-1E	Elective Same Discipline
XXX-XXX-2E	Elective Same Discipline
XXX-XXX-3E	Elective Same Discipline
XXX-XXX-4E	Elective Same Discipline

Ability & Skill Enhancement Compulsory Papers

Code-M	Subject - Major	Code-N	Subject - Minor
XXX-CS1M-1T	Discipline Core Major-1	XXX-CS1N-1T	Discipline Core Minor-1
XXX- CS1M-1P	Discipline Core Major-Lab 1	XXX- CS1N-1P	Discipline Core Minor -Lab 1
XXX-CS2M-2T	Discipline Core Major-2	XXX-CS2N-2T	Discipline Core Minor -2
XXX- CS2M-2P	Discipline Core Major-Lab 2	XXX- CS2N-2P	Discipline Core Minor -Lab 2
XXX-CS3M-3T	Discipline Core Major-3	XXX-CS3N-3T	Discipline Core Minor -3
XXX- CS3M-3P	Discipline Core Major-Lab 3	XXX- CS3N-3P	Discipline Core Minor -Lab 3
XXX-CS4M-4T	Discipline Core Major-4	XXX-CS4N-4T	Discipline Core Minor -4
XXX- CS4M-4P	Discipline Core Major-Lab 4	XXX- CS4N-4P	Discipline Core Minor -Lab 4
XXX-CS5M-5T	Discipline Core Major-5	XXX-CS5N-5T	Discipline Core Minor -5
XXX- CS5M-5P	Discipline Core Major-Lab 5	XXX- CS5N-5P	Discipline Core Minor -Lab 5
XXX-CS6M-6T	Discipline Core Major-6	XXX-CS6N-6T	Discipline Core Minor -6
XXX- CS6M-6P	Discipline Core Major-Lab 6	XXX- CS6N-6P	Discipline Core Minor -Lab 6
XXX-CS7M-7T	Discipline Core Major-7	XXX-CS7N-7T	Discipline Core Minor -7
XXX- CS7M-7P	Discipline Core Major-Lab 7	XXX- CS7N-7P	Discipline Core Minor -Lab 7
XXX-CS8M-8T	Discipline Core Major-8	OE-XXX-1T	Open Elective for other Discipline
XXX- CS8M-8P	Discipline Core Major-Lab 8	OE- XXX-2T	Open Elective for other Discipline
XXX-CS9M-9T	Discipline Core Major-9	OE- XXX-3T	Open Elective for other Discipline
XXX- CS9M-9P	Discipline Core Major-Lab 9	OE- XXX-4T	Open Elective for other Discipline
XXX-CS10M-10T	Discipline Core Major-10	VC-XXX-1T	Vocational Course 1
XXX- CS10M-10P	Discipline Core Major-Lab 10	VC-XXX-2T	Vocational Course 2
XXX-CS11M-11T	Discipline Core Major-11	VC-XXX-3T	Vocational Course 3
XXX- CS11M-11P	Discipline Core Major-Lab 11	VC-XXX-4T	Vocational Course 4
XXX-CS12M-12T	Discipline Core Major-12	XXX-XXX-1E	Elective Same Discipline
XXX- CS12M-12P	Discipline Core Major-Lab 12	XXX-XXX-2E	Elective Same Discipline
XXX-CS13M-13T	Discipline Core Major-13	XXX-XXX-3E	Elective Same Discipline
XXX- CS13M-13P	Discipline Core Major-Lab 13	XXX-XXX-4E	Elective Same Discipline
XXX-CS14M-14T	Discipline Core Major-14		
XXX- CS14M-14P	Discipline Core Major-Lab 14		
XXX-CS15M-15T	Discipline Core Major-15		
XXX- CS15M-15P	Discipline Core Major-Lab 15		

Discipline Specific Major & Minor Subjects

Department	Code	Department	
Botany	BT	Economics	EC
Chemistry	CH	Sociology	SO
Computer Science	CS	Journalism	JO
Electronics	EL	Optional Kannada	OK
Mathematics	MT	Optional English	OE
Physics	PH	Kannada	LK
Zoology	ZO	English	LE
Sanskrit	LS	Hindi	LH
BCOM	BM	BCA	BC
BSC	BS	BA	BA

B.Sc Syllabus
for
I Semester under NEP-2020

Sl. No.	Subject	Title of the Paper	Page No.
1	Kannada-I	ಹೊಸಗನ್ನಡ ಕಾವ್ಯ ಮತ್ತು ಕತೆಗಳು	10
2	Hindi-I	Kathasagar	11
3	Sanskrit-I	Mahakavya	12
4	English-I	ABILITY ENHANCEMENT COMPULSORY COURSE LANGUAGE (AECC) - L2 - GENERIC ENGLISH	13-14
5	Botany-I	Microbial diversity and Technology	15-17
6	Zoology-I	Cytology, Genetics and Infectious Diseases	18-20
7	Chemistry-I	Chemistry analytical	21-24
8	Electronics-I	ELECTRONIC DEVICES AND CIRCUITS	25-27
9	Computer science-I	Programming in C	28-29
10	Mathematics-I	Algebra - I and Calculus - I	30-32
11	Physics-I	Mechanics and Properties of Matter	33-34
12	Botany-lab	Diversity of non-flowering plants	35-36
13	Zoology -lab	Cell Biology & Cytogenetics Lab	37-38
14	Chemistry- lab	Chemistry practical -titrimetric	39-41
15	Electronics- lab	ELECTRONIC DEVICES AND CIRCUITS- LAB	42-43
16	Computer science-lab	Programming in C Lab	44
16	Mathematics- lab	Practicals	45
17	Physics- lab	Practicals mechanics	46

Course BS1-KT1 **Subject KANNADA**

Title : ಹೊಸಗನ್ನಡ ಕಾವ್ಯ ಮತ್ತು ಕತೆಗಳು

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**
Internal Marks : 40 **Exam Marks : 60** **Credits: 2**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Objectives:

ಹೊಸಗನ್ನಡ, ನಡುಗನ್ನಡ, ಪ್ರಬಂಧ ಹಾಗೂ ಕಥಾ ಸಾಹಿತ್ಯವನ್ನು ವಿಶ್ಲೇಷಿಸುವುದರೊಂದಿಗೆ, ಅವರಲ್ಲಿ ಸೃಜನಶೀಲ ಬರವಣಿಗೆಗಳಾದ ಕಥೆ, ಕವನ, ಲೇಖನ ಮುಂತಾದ ಸೃಜನಶೀಲ ಬರವಣಿಗೆಗೆ ಪೂರಕವಾಗಿ ಬೋಧಿಸುವುದು. ಇದರ ಮೂಲಕ ಭಾಷೆಯ ಪ್ರಕಾರ ಮತ್ತು ವೈವಿಧ್ಯತೆಯ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.

Course Outcomes (Cos):

ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಪ್ರಸ್ತುತ ವ್ಯವಸ್ಥೆಯನ್ನು ಅರಿಯುವುದರ ಜೊತೆಗೆ ಸ್ವಾತಂತ್ರ್ಯ, ಸಮಾನತೆ, ಪರಸ್ಪರ ಸಹಕಾರ ಸಹಾನುಭೂತಿಯಂತಹ ಸಾಮಾಜಿಕ ಮೌಲ್ಯಗಳನ್ನು ಹಾಗೂ ಸಮಾಜಮುಖಿ ಕಳಕಳಿಯನ್ನು ಮೂಡಿಸುವುದು. ಸಾಹಿತ್ಯದ ವಿವಿಧ ವಲಯಗಳಲ್ಲಿ ಅಂದರೆ, ಬರವಣಿಗೆಯ ಕೌಶಲ್ಯ, ಓದುವ ಕೌಶಲ್ಯ, ಮಾತನಾಡುವ ಕೌಶಲ್ಯಗಳಿಗೆ ಸಂಬಂಧಿಸಿದ ವಲಯಗಳಲ್ಲಿ ವೃತ್ತಿಯನ್ನು ಹೊಂದಲು ಸಹಕಾರಿಯಾಗಿದೆ.

Unit-I: ಪದ್ಯಗಳು — 30 Hours

1. ಭೂಮಿತಾಯಿಯ ಚೊಚ್ಚಿಲ ಮಗ-ದ.ರಾ.ಬೇಂದ್ರೆ
2. ಬಳೆಗಾರನ ಹಾಡು- ಕೆ.ಎಸ್.ನರಸಿಂಹಸ್ವಾಮಿ
3. ಅಂಬೇಡಕರ ಭೀಮರಾಯರಿಗೆ -ಗೋಪಾಲಕೃಷ್ಣ ಅಡಿಗರು
4. ಹಾಲು-ಗಂಗಾಧರ ಚಿತ್ತಾಲ
5. ರಕ್ತಾಕ್ಷಿ- ಚನ್ನವೀರ ಕಣವಿ
6. ಅಕ್ಕ ಸೀತಾ ನಿನ್ನಂತೆ ನಾನೂ ಶಂಕಿತ-ಪೀರ್ ಬಾಷಾ
7. ಜೀವವಾಗೊ ಬಯಕೆಯಲಿ...-ದು.ಸರಸ್ವತಿ
8. ಹೊಸ ನದಿಯ ಹುಡುಕಿ-ವಿನಯಾ ಒಕ್ಕುಂದ
9. ಹಡದಿ ಹಾಸುವ ಅಗಸರ ಹಾಡು-ವೀರಣ್ಣ ಮಡಿವಾಳ
10. ಟ್ರಯಲ್ ರೂಮಿನ ಅಪ್ಸರೆಯರು-ಭುವನ ಹಿರೇಮಠ್

Unit-II: — 12 Hours

1. ಅವನತಿ- ಕೆ.ಪಿ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ
2. ಮೂಡಲ ಸೀಮೇಲಿ ಕೊಲೆಗಿಲೆ ಮುಂತಾಗಿ-ದೇವನೂರು ಮಹದೇವಾ
3. ಕಕರನ ಯುಗಾದಿ-ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ
4. ಬೀಗ ಮತ್ತು ಬೀಗದ ಕೈ-ಯಶವಂತ ಚಿತ್ತಾಲ
5. ಸನ್ ಆಫ್ ಸಿದ್ದಪ್ಪಾಜಿ-ಮಂಜುನಾಥ್ ಲತಾ

Text Books/Reference:

1. ಅವನತಿ- ಕೆ.ಪಿ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ
2. ಮೂಡಲ ಸೀಮೇಲಿ ಕೊಲೆಗಿಲೆ ಮುಂತಾಗಿ-ದೇವನೂರು ಮಹದೇವಾ
3. ಕಕರನ ಯುಗಾದಿ-ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ
4. ಬೀಗ ಮತ್ತು ಬೀಗದ ಕೈ-ಯಶವಂತ ಚಿತ್ತಾಲ
5. ಸನ್ ಆಫ್ ಸಿದ್ದಪ್ಪಾಜಿ-ಮಂಜುನಾಥ್ ಲತಾ

Course – BS1-LH-CT1 **Subject – Hindi-1**

Title : Kathasagar

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Group discussion, Seminar, Assignments, Participatory Learning and Specimen submission.

Course Objectives:

Understand the importance and value of the Hindi language. Explanation about prose & poem with the features.

Course Outcomes (Cos):

Get the idea about moral values & utilizing them properly. Understand the importance of studying Hindi language.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	x								
CO2	x								
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding programoutcomeswhoseattainmentisattemptedinthiscourse.Mark=X'intheintersectioncellifacourse outcome addresses particular program outcome.

Unit-I: **14 Hours**

Hindi Kahani Sahitya : "Katha Sagar" Edited by : Dr. Shakira Khanum
Dr. Sulochana H I
(Printed and Published by Prasarang,Bengaluru City University.Bengaluru).

Unit-II: **14 Hours**

Grammer : 1) Upasarg 2) Pratyuaya

Unit-III: **14 Hours**

Sankshepan

Reference:

1) Sugam Hindi Vyakarn : Prof. Vanshidhar and DharmapalShastri
2) shiksharthi Hindi Vyakaran : Dr. Nagappa

Course BS1-LS-CT1 **Subject Sanskrit**

Title : Mahakavya

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 2**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Objectives:

The main objective of the course is to impart knowledge in classical language through literature. The study trains learner in appreciating aesthetics. The study of Sanskrit poetry helps the student in sharpening creative abilities in all disciplines

Course Outcomes (Cos):

CO1: Understanding learners in appreciating aesthetics in classical language.

CO2: Understanding Mahakavya and Khandakavya and its characteristics

CO3: Able to understand the present societal issues.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO1	x								
CO2	x								
CO3			x						
CO4					x				
CO5									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: **13 Hours**

Introduction of Kavya, its division, Drishya Kavya and Shravya kavya, Gadhya, Padhya, Champu, Drishya kavya and its division, Shravya kavya and its division, Katha and Akhyayika, Maha kavya and Kanda kavya

Unit-II: **13 Hours**

Detailed text, Maha kavya – 14th Canto of Raghuvamsha of Khalidasa, a great poet, Khalidas's date, life and works, his significance in Sanskrit literature

Unit-III: **13 Hours**

Slokas explanation, translation of the Slokas, important annotations

Unit-IV: **13 Hours**

Translation of unseen passages / comprehension , Grammar

Text Books:

Raghuvamsha of Kalidasa by C. Ramanathan

Course Code : BS1-LE-CT1 **Subject:ENGLISH-1**

Title :ABILITY ENHANCEMENT COMPULSORY COURSE LANGUAGE (AECC) - L2 - GENERIC ENGLISH

Total No. of Teaching Hours: 52/60 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The course is designed for one semester. The syllabus keeps in mind that the learner has to be equipped with technological skills related to the usage of language. It is also designed according to the learner's domain specific requirements. It equips the learner to enhance their creativity and become critical readers thereby helping them to express themselves better.

Course Objectives:

1. **To Acquire Listening, Speaking, Reading and Writing Skills.**
2. **To acquire skills of creativity to express oneself.**
3. **To develop their ability to become critical readers.**
4. **To become aware of different literary devices and genres.**
5. **To become socially aware.**

Course Outcomes (Cos):

1. Acquire the LSRW (Listening, Speaking, Reading, Writing) skills

2. Obtain the knowledge of literary devices and genres

3. Acquire the skills of creativity to express one's experiences

4. Know how to use digital learning tools

5. Be aware of their social responsibilities

6. Develop their ability as critical readers and writers

PART I-WORK BOOK- *IMPRINTS-I* **13 Hours**

Unit-I: Receptive Skills: Reading Skills and Listening Skills

Chapter 1: Comprehension passages (Skimming and Scanning)

Chapter 2: Data Interpretation – Bar Graph, Pie Chart, Tree Diagram

Chapter 3: Listening vs. hearing

Types of Listening

Chapter 4: Listening Activities - listening to pre-recorded audios on interviews

and conversations.

(Classroom Participation Activity)

Unit-II: Productive Skills: Speaking Skills and Writing Skills **21 Hours**

Chapter 5: Introducing oneself, Introducing others, Making Requests, Offering help, Congratulating, Making Enquiries and Seeking permission

Chapter 6: Giving instructions to do a task and to use a device, Giving Directions

Chapter 7: Question Forms, Question Tags

Chapter 8: Subject -Verb Agreement, Derivatives

Part 2 – Course Book –*IMPRINTS -1* **18 Hours**

Chapter 9: *When Free Speech is Truly Free* - Sundar Sarukkai

Chapter 10: *Democracy*: Langston Hughes

Chapter 11: *Farewell Address at Chicago* - Barack Obama

Chapter 12: *The Unknown Citizen* - W. H. Auden

Chapter 13: *The Golden Dream* - Poorna Chandra Tejaswi

Chapter 14: *From a German War Primer* - Bertolt Brecht

Course: BS1-BT-CT1	Subject: BOTANY	
Title: Microbial diversity and Technology		
Total No. of Teaching Hours: 52	No. of Hours per Week : 4	
Internal Marks : 40	Exam Marks : 60	Credits: 4

Pedagogy: Classrooms lecture, Practical, Field and laboratory visits, Participatory learning , Group discussion, Seminar & Assignments and specimen submission.

Course Description: Microbial diversity, History and developments of microbiology, Microscopy, Culture media for microbes, sterilization methods, Microbial growth, Microbial cultures and preservation, viruses, Bacteria, Fungi and Lichens.

Course Objectives:

To understand the microbial diversity, knowledge of viral, bacterial and fungi diseases. Awareness of sterilization methods, microbial growth and culture media of microbes. Economic importance of bacteria, fungus and lichens.

Course Outcomes (Cos):

Understanding the fascinating diversity, evolution and significance of micro organisms.

Comprehend the systematic position, structure, physiology and life cycles of microbes and their impact on human and environment.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	x	x							
CO2									
CO3									
CO4									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding programoutcomeswhoseattainmentisattemptedinthiscourse.Mark=X'intheintersectioncellifacourseoutcome addressesa particular programoutcome.

Unit-I:	13 Hours

Chapter No. 1: Microbial diversity-Introduction to microbial diversity; Methodsof estimation; Hierarchical organization and positions of microbes in the living world. Whittaker's five-kingdom system and Carl Richard Woese's three-domain system. Distribution of microbes in soil, air, food and water. Significance of microbial diversity innature.

Chapter No. 2 History and developments of microbiology-Microbiologists and theircontributions(Leeuwenhoek,LouisPasteur,RobertKoch,JosephLister,Dmitri Iwanowski, SergiusWinogradsky and M W Beijerinck and PaulEhrlich).

Chapter No. 3 Microscopy-Working principle and applications of light, dark field, phase contrast and electron microscopes (SEM and TEM). Microbiological stains (acidic, basic and special) and Principles of staining. Simple, Gram's anddifferential staining.

Unit-II:	13 Hours

Chapter No. 4. Culture media for Microbes-Natural and synthetic media, Routine media -basal media, enriched media, selective media, indicator media, transport media, and storage media.

Chapter No. 5. Sterilization methods -Principle of disinfection, antiseptic, tyndallisation and Pasteurization, Sterilization-Sterilization by dry heat, moist heat, UV light, ionization radiation, filtration. Chemical methods of sterilization-phenolic compounds, anionic and cationic detergents.

Chapter No. 6. Microbial Growth-Microbial growth and measurement. Nutritional types of Microbes- autotrophs and heterotrophs, phototrophs and chemotrophs; lithotrophs and organotrophs.

Unit-III:	13 Hours

Chapter No. 7 Microbial cultures and preservation-Microbial cultures. Pure culture and axenic cultures, subculturing, Preservation methods-overlaying cultures with mineral oils, lyophilisation. Microbial culture collections and their importance. A brief account on ITCC, MTCC and ATCC.

Chapter No. 8. Viruses- General structure and classification of Viruses; ICTV system of classification. Structure and multiplication of TMV, SARS-COV-2, and Bacteriophage (T2). Cultivation of viruses. Vaccines and types.

Chapter No. 9. Viroids- general characteristics and structure of Potato SpindleTuber Viroid (PSTVd); Prions - general characters and Prion diseases. Economic importance of viruses.

Unit-IV:	13 Hours

ChapterNo.10.Bacteria-Generalcharacteristicsandclassification.Archaebacteria and Eubacteria. Ultrastructure of Bacteria; Bacterial growth and nutrition. Reproduction in bacteria- asexual and sexual methods. Study of *Rhizobium* and its applications.AbriefaccountofActinomycetesandCyanobacteria.Mycoplasmasand Phytoplasmas-General characteristics and diseases. Economic importance of Bacteria.

Chapter No. 11. Fungi-General characteristics and classification. Thallus organization and nutrition in fungi. Reproduction in fungi (asexual and sexual). Heterothallism and parasexuality. Type study of *Albugo, Neurospora, Puccinia, Penicillium and Trichoderma*.

Chapter No. 12. Lichens – Structure and reproduction. VAM Fungi and their significance. Fungal diseases-Late Blight of Potato, Black stem rust of wheat; DownyMildewofBajra,GrainsmutofSorghum, SandalSpike,CitrusCanker,Root Knot Disease of Mulberry. Economic importance ofFungi.

Text Books:

Ananthnarayan R and Panikar JCK. 1986. Text book of Microbiology. Orient Longman ltd. NewDelhi.
Arora DR. 2004. Textbook of Microbiology, CBS,NewDelhi.

William CG. 1989. Understanding microbes. A laboratory text book for Microbiology. W.H. Freeman and Company. NewYork.

Dubey RC and Maheshwari DK. 2007. A textbook of Microbiology, S. Chand and Company,NewDelhi.
Dubey RC and Maheshwari DK. 2002. A Text book of Microbiology, S.C.Chand and Company, Ltd. Ramnagar, NewDelhi.
Sharma R. 2006. Text book of Microbiology. Mittal Publications. New Delhi.305pp.

Sharma PD. 1999. Microbiology and Plant Pathology. Rastogi publications. Meerut, India.
Vasanthkumari R. 2007. A textbook of Microbiology, BI Publications Pvt. Ltd., New Delhi.

Reference:

Alexepoulos CJ and Mims CW. 1989. Introductory Mycology, Wiley Eastern Ltd., NewDelhi.
Allas RM. 1988. Microbiology: Fundamentals and Applications, Macmillan publishing co. NewYork.
Brook TD, Smith DW and Madigan MT. 1984. Biology of Microorganisms, 4th ed. Eaglewood Cliffts. N.J.Prentice- Hall. NewDelhi.
Burnell JH and Trinci APJ. 1979. Fungal walls and hyphal growth, Cambridge UniversityPress.Cambridge.
Jayaraman J. 1985. LaboratoryManual of Biochemistry, Wiley Eastern Limited. New Delhi.
Ketchum PA. 1988. Microbiology, concepts and applications. John Wiley and Sons. NewYork.
MichelJ,PelczarJr.ECandKriegCR.2005.Microbiology,Mc.Graw-Hill,NewDelhi.

Powar CB and Daginawala. 1991. General Microbiology, Vol – I and Vol – II Himalaya publishinghouse,Bombay.
Reddy S and Ram. 2007. Microbial Physiology. Scientific Publishers, Jodhpur, 385pp.
Sullia SB and Shantharam S. 1998. General Microbiology. Oxford and IBH publishing Co.Pvt.Ltd. NewDelhi.
Schlegel HG. 1986. General Microbiology. Cambridge. UniversityPress. London, 587pp.
Roger S, Ingrahan Y, Wheelis JL, Mark L and Page PR. 1990. Microbial World 5th edition. Prentice-Hall India, Pvt. Ltd. NewDelhi.
Sullia SB. and Shantharam S. 2005. General Microbiology, Oxford and IBH, NewDelhi.

Course: BS1-ZO-CT1 **Subject:** Zoology

Title : Cytology, Genetics and Infectious Diseases

Total No. of Teaching Hours: 56 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honors) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

Course Objectives:

The Programme offers both classical as well as modern concepts of Zoology in higher education.

It enables the students to study animal diversity in both local and global environments.

To make the study of animals more interesting and relevant to human studies more emphasis is given to branches like behavioral biology, evolutionary biology and economic Zoology.

More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, genetic engineering and bioinformatics have also been included.

Equal importance is given to practical learning and presentation skills of students.

The lab courses provide the students necessary skills required for their employability.

Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skills of students.

The global practices in terms of academic standards and evaluation strategies.

Provides opportunity for the mobility of the student both within and across the world.

The uniform grading system will benefit the students to move across institutions within India to begin with and across countries.

It will also enable potential employers in assessing the performance of the candidates across the world.

Course Outcomes (Cos):

The structure and function of the cell organelles.

The chromatin structure and its location.

The basic principle of life, how a cell divides leading to the growth of an Organism and also reproduces to form a new organism.

How a cell communicates with its neighboring cells?

The principles of inheritance, Mendel ‘s laws and the deviations.

How environment plays an important role by interacting with genetic factors.

Detect chromosomal aberrations in humans and study of pedigree analysis.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9
CO1	I Core competency	II Critical thinking	III Analytical reasoning	IV Research skills	V Team work				
CO2	X	X	X	X	X				
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: **14 Hours**

Chapter 1. Ultra structure and Function of Cell Organelles I in Animal Cell

Plasma membrane: Chemical composition—Fluid mosaic model

Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis, types of cell junctions.

Chapter 2. Structure and Function of Cell Organelles II in Animal Cell

Cytoskeleton: microtubules, microfilaments, intermediate filaments
Mitochondria: Structure, oxidative phosphorylation; electron transport system.
Endoplasmic reticulum: Structure, and function.
Peroxisome and Ribosome: structure and function.

Unit-II: **14 Hours**

Chapter 3. Nucleus and Chromatin Structure

Structure and function of nucleus in eukaryotes
Chemical structure and base composition of DNA and RNA
Ultra structure of eukaryotic chromosome, Chromatin Organization-Nucleosome model.
Types of DNA and RNA (any three types).

Chapter 4. Cell cycle, Cell Division and Cell Signalling

Cell division: mitosis and meiosis
Introduction to Cell cycle and its regulation, apoptosis
Signal transduction: intracellular signalling and cell surface receptors, via G-protein linked receptors.
Cell-cell interaction: - autocrine, paracrine and endocrine types.

Unit-III: **14 Hours**

Chapter 5. Mendelism and Sex Determination

Basic principles of heredity: Mendel 's laws- monohybrid cross and Dihybrid cross

Incomplete Dominance. Prefer animal examples.
Genetic Sex-Determining Systems, Environmental Sex Determination with two examples.
Chromosomal Sex Determination and mechanism in *Drosophila melanogaster.*
Sex-linked characteristics in humans and dosage compensation.

Chapter 6. Extensions of Mendelism, Genes and Environment
Extensions of Mendelism: Multiple Alleles, Gene Interaction-inheritance of comb pattern in fowl.
The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics
Cytoplasmic Inheritance- Kappa particles in Paramecium, Genetic Maternal Effects.

Unit-IV: **14 Hours**

Chapter 7. Human Chromosomes and Patterns of Inheritance
Patterns of inheritance: autosomal dominance, autosomal recessive, X-linked recessive, X-linked dominant.
Chromosomal anomalies: Numerical aberrations with two examples (Klinfelter's and Down's syndrome).
Pedigree analysis with two examples.

Chapter 8. Infectious Diseases
. Introduction to human pathogenic organisms- viruses, bacteria, fungi, protozoa and Helminthes worms.
Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: *Giardia.*

Reference:

. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
. Alberts et al: Molecular Biology of the Cell: Garland (2002).
. Cooper: Cell: A Molecular Approach: ASM Press (2000).
. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
. Lewin B. Genes VIII. Pearson (2004).
. Watson et al. Molecular Biology of the Gene. Pearson (2004).
. Thomas J. Kindt, Richard A. Golds by, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell (2017).
. Principles of Genetics by B. D. Singh
0. Cell-Biology by C. B. Pawar, Kalyani Publications
1. Economic Zoology by Shukla and Upadhyaya

Course :BS1-CH-CT1 **CHEMISTRY-CT1**

Title :DSC-1

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy:Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The concept of chemical analysis .accuracy, precision and stastical data treatment.
Shapes of different atomic orbitals
Study of periodic properties.
Able to draw the energy profile diagrams.

Course Objectives:

To develop analytical skills of determination of analyte through titrimetric and gravimetric experiments.
Quantum numbers and their necessity in explaining the atomic structure.
Historical development of periodic table.
To impart skills of preparation of reagents to develop the ability to set up apparatus to collect data.
To introduce the basic concepts of organic chemistry.

Course Outcomes (Cos):

1. Explain basic laboratory practice like caliberation of glass ware, sampling, handling acids.

2. Prepare the solutions after calculating the required quantity of salts in preparing the reagents /solutions and dilution of stock solution

3. Describe the limitations of classical mechanics with necessitated the developments of quantum mechanics.

4. Solve the Schrödinger's equation to obtain wave function for a basic type of potential in one dimension.

5. To justify the need for quantum mechanical structure of atoms.

6. Describe the periodicity in physical and chemical properties.

7. Explain the nature of bonding in organic compounds using concepts.

8. Learn methods of synthesis of alkenes, alkanes, alkynes along with their reactions.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9
CO1	X	X							
CO2	X	X		X					
CO3	X					X			
CO4	X	X	X						
CO5	X			X					
CO6	X							X	
CO7	X						X		
CO8	X							X	

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: **13 Hours**

Basic laboratory practices, calibration of glassware (pipette, burette and volumetric flask), Sampling (solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents.

Language of analytical chemistry: Definitions of analysis, determination, measurement, techniques and methods. Significant figures, Classification of analytical techniques.

Choice of an analytical method.

Errors and treatment of analytical data: Limitations of analytical methods – Errors: Determinate and indeterminate errors, some important terms replicate, outlier, Accuracy, precision, ways of expressing accuracy, absolute error, relative error, minimization of errors. Statistical treatment of random errors, mean, median, range, standard deviation and variance. External standard calibration. Numerical problems.

Titrimetric analysis: Basic principle of titrimetric analysis. Classification, preparation and dilution of reagents/solutions. Equivalent masses of compounds Normality, Molarity and Mole fraction. Use of N1V1= N2V2 formula, preparation of ppm level solutions from source materials (salts), conversion factors. Numerical problems.

Acid-basetitrimetry: Titration curves for strong acid vs. strong base, weak acid vs. strong base and weak base vs. strong acid titrations. Titration curves, quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity.

Unit-II: **13 Hours**

Limitations of classical mechanics. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance. Quantum Mechanics-..Schrödinger's wave equation, derivation (time independent) significance of ψ and $\psi 2$. Eigen values and functions Applications of Schrödinger's wave equation - Particle in one-dimension box .
Quantum numbers and their significance. Quantum mechanical operators- (i) Hamiltonian operator; (ii) Laplacean operator Normalized and orthogonal wave functions. Sign of wave functions. Postulates of quantum mechanics Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.
Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements (Z=1-30), effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic Table.

Unit-III: 13 Hours

S, p, d and f-block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s and p-block elements:
(a) Atomic radii (van der Waals) (b) Ionic and crystal radii. (c) Covalent radii (d) Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy
(e) Electron gain enthalpy; trends of electron gain enthalpy.
(f) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.
Trends in the chemistry of the compounds of groups 13 to 17 (hydrides, carbides, oxides and halides) are to be discussed.

Unit-IV: 13 Hours

Classification and nomenclature of organic compounds, hybridization, shapes of organic molecules, influence of hybridization on bond properties.
Nature of bonding in Organic molecules
Formation of covalent bond, types of chemical bonding, localized and delocalized, conjugation and cross conjugation, with examples. Concept of resonance.
Electronic displacements: Inductive effect, electrometric effect, resonance and hyper conjugation, aromaticity, Huckel rule, anti-aromaticity explanation with examples.
Strengths of organic acid and bases: Comparative study with emphasis on factors effecting pK values. Relative strength of aliphatic and aromatic carboxylic acids- acetic acid and chloroacetic acid, acetic acid and propionic acid, acetic acid and benzoic acid. Steric effect-relative stability of trans and cis-2-butene.
Types of bond cleavages- homolytic and heterolytic cleavages. Types of reagents-electrophiles, nucleophiles, nucleophilicity and basicity. Types of organic reactions-substitution, addition, elimination, and rearrangement explanation with examples.
Chemistry of Aliphatic hydrocarbons, carbon- carbon sigma bonds
Formation of alkanes: Wurtz reaction, free radical substitution, halogenation
Carbon-carbon pi bonds: Formation of alkenes and alkynes by elimination reaction. Mechanism of E1, E2, reactions. Saytzeff and Hofmann eliminations. Addition of HBr to propene, free radical addition of HBr to propene. Addition of halogens to alkenes-carbocation and halonium ion mechanism. Ozonolysis - ozonolysis of propene,hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples, addition of hydrogen halides to alkynes.
Conjugated Dienes- 1,2 and 1,4- addition reactions in conjugated dienes. Diels-Alder reaction.

Text Books:

1.University chemistry -I

2.College chemistry-I

Reference:

Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
Fundamentals of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
Basic Inorganic Chemistry, F A Cotton, G Wilkinson and P. L. Gaus, 3rd Edition. Wiley. India December 1994
Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
Douglas, B.E; Mc Daniel, D.H. & Alexander, J.J. Concepts & Models of Inorganic Chemistry 3rd Ed., John Wiley Sons, N.Y. 1994.
Cotton, F.A. & Wilkinson, G. Advanced Inorganic Chemistry, Wiley, VCH, 1999.
Concise Inorganic Chemistry: J D Lee, 4thEdn, Wiley, (2021)
Fundamentals Concepts of Inorganic Chemistry, Vol 1 and 2, 2nd Edition, Asim K Das, CBS Publishers and Distributors, (2013)
Inorganic Chemistry, 2ndEdn. Catherine E. Housecroft and A.G. Sharpe, Pearson Prentice Hall (2005)
Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)(2010)
Organic Reaction mechanism by V. K. AhIuwalia and K. Parashar Oxford, U.K. : Alpha Science International, 2011.
Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor. New agepublishersPublication Date.2 February 2017
A Guide book to mechanism in Organic Chemistry by Peter Sykes. Pearson.(January 2003)
Pine S. H. Organic Chemistry, Fifth Edition, McGraw Hill, (2007)
F. A. Carey, Organic Chemistry, Seventh Edition, Tata McGraw Hill (2008).
J. Clayden, N. Greeves, S. Warren, Organic Chemistry, 2nd Ed., (2012), Oxford University

Course Code: BS1-EL-CT1 **Subject:** ELECTRONICS -CT1

Title :ELECTRONIC DEVICES AND CIRCUITS

Total No. of Teaching Hours: 52 **No. of Hours per Week :**4

Internal Marks : 40 **Exam Marks :** 60 **Credits:** 4

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Seminar and ICT

Course Description:

Electronic Devices and Circuits (EDC) is a fundamental course for Electronics Students. Electronic Devices play a very important role in our day-to-day life.

Course Objectives:

The aim of this is to help the student to attain the industry identified competency through various teaching learning experience

- To introduce basic semiconductor devices, their characteristics and application
- To understand analysis and design of simple diode circuit
- To learn to analyse the PN junction behaviour at the circuit level and its role in the operation of diodes and active device.

Course Outcomes (Cos):

At the end of the course the student should be able to:

1. Analyse PN junctions in semiconductor devices under various conditions.
2. design and analyse simple rectifiers and voltage regulators using diodes and different ICs.
3. describe the behaviour of special semiconductor diodes and devices.
4. design and analyse simple BJT circuits.
5. Do the conversion between different number system.
6. Simplify the Boolean expressions and design simple logic circuits.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X								
CO2									
CO3									
CO4									
CO5	X								
CO6									
CO7									
CO8									

Courses having focus on Employability/ Entrepreneurship/ Skill Development: This course is having focus on Skill Development.

Unit-I: 13 Hours

Electronic Components: Electronic passive and active components, types and their properties, Concept of Voltage and Current Sources, electric energy and power (Qualitative only).

Network Theorems: Review of KCL & KVL, Superposition, Thevenin's, Norton's, Maximum Power Transfer, and Reciprocity Theorems. DC and AC analysis of RC and RL circuits, RLC series and parallel Resonant Circuits.

PN junction diode: Ideal and practical diodes, Formation of Depletion Layer, Diode

Equation and I-V characteristics. Idea of static and dynamic resistance, Zener diode, Reverse saturation current, Zener and avalanche breakdown.
Rectifiers: Half wave and Full wave (centre tap and bridge) rectifiers, expressions for output voltage, ripple factor and efficiency (mention only), Shunt capacitor filter.
Numerical examples wherever applicable.

Unit-II: **13 Hours**

Special Purpose Diodes: Varactor diode, Schottky diode, Tunneldiode - construction, characteristics, working, symbol, and applications for each.
Voltage regulator: Block diagram of regulated power supply, Line and Load regulation, Zener diode as voltage regulator – circuit diagram, load and line regulation, disadvantages. Fixed and Variable IC Voltage Regulators (78xx, 79xx, LM317), Clippers (shunt type) and clampers (Qualitative analysis only), Voltage Multipliers.
Bipolar Junction Transistor: Construction, types, CE, CB and CC configurations (mention only), I-V characteristics of a transistor in CE mode, Regions of operation (active, cut off and saturation), leakage currents (mention only), Current gains α, β and γ and their inter-relations.
Numerical examples wherever applicable.

Unit-III: **13 Hours**

Transistor biasing and Stabilization circuits:dc load line and Q point. Applications of transistor as switch - circuit and working. Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor. Transistor as a two-port network, h-parameter equivalent circuit for CE.
Amplifier: Small signal analysis of single stage CE amplifier using re- model. Input and Output impedances, Current and Voltage gains. Advantages of CC amplifier. Types of coupling, two stage RC Coupled Amplifier – circuit, working and its Frequency Response, loading effect, GBW product, Darlington transistor, Current gain.
{SELF STUDY: Special semiconductor devices-LED, LCD and solar cell – construction, operation and applications, 7-segment display, concept of common anode and common cathode types}. Numerical problems, wherever applicable.

Unit-IV: **13 Hours**

Number System: Decimal, Binary, Octal and Hexadecimal number systems, base conversions. Representation of signed and unsigned numbers, Binary arithmetic; addition, subtraction by 1's and 2's complement method, BCD code (8421, 2421, Excess-3), Self-complementing property of Excess-3 and 2421 codes, Gray code, error checking and correction codes (Only parity check). ASCII and EBCDIC codes.
Boolean Algebra: Constants, variables, operators, Positive and negative logic, basic logic gates- AND, OR, NOT gate. Derived logic gates (NAND, NOR, XOR & XNOR). Boolean laws, Duality Theorem, De Morgan's Theorems, simplification of Boolean expressions. Universal property of NOR and NAND gates.
Numerical examples wherever applicable.

Text Books:

1. B Basavaraj, "Fundamentals of Electronics", Omkar Publications
2. Floyd, "Digital Fundamentals", 3rd Edition, Universal Book Stall, Delhi.
3. R S Sedha, "A Text book of Applied Electronics", 7th edition., S. Chand and Company Ltd. 2011.

Reference:

1. Robert L Boylestad, "Introductory circuit analysis", 5th edition., Universal Book 2003.
2. A.P. Malvino, "Principles of Electronics", 7th edition, TMH, 2011.
3. Electronic devices and circuit theory by Boylestad, Robert Nashelsky, 11th edn., Pearson,

2013
4. David A. Bell “Electronic Devices and Circuits”, 5th edition, Oxford University Press, 2015
5. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia, (1994)
6. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Edn., TMH, 2011.
7. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, PHI Learning Pvt. Ltd. 2009
8. Digital Circuits and Systems, K R Venugopal and K Shyla, Tata McGraw Hill, 2011
9. Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer,PHI Learning, 2001
10. M. Nahvi& J. Edminister, “Electrical Circuits”, Schaum’s Outline Series, TMH, 2005
11. S. A. Nasar,” Electrical Circuits”, Schaum’s outline series, Tata McGraw Hill, 2004
12. J. Millman and C. C. Halkias, “Integrated Electronics”, Tata McGraw Hill, 2001
13. A.S. Sedra, K.C. Smith, A.N. Chandorkar “Microelectronic circuits”, 6th Edn., Oxford University Press, 2014
14. J. J. Cathey, “2000 Solved Problems in Electronics”, Schaum’s outline Series, TMG, 1991

Course Code : BS1-CS-CT1 **Discipline Core 1 Theory**

Title : Programming in C

Lecture Hrs : 52 **Internal Marks : 40** **Exam Marks : 60** **Credits: 3**

Course Description: The course provides students to study of C programming language. The course lectures stress the strengths of C, which provides the outcome of writing efficient, maintainable and portable code. Course includes few lab exercises to make sure
the student has not only gained the knowledge but can also apply and execute it.

Course Objectives:

To study about algorithms, flowcharts and programs. To solve problems through logical thinking.

Course Outcomes (Cos):

After completing this course satisfactorily, a student will be able to:

1. Confidently operate Desktop Computers to carry out computational tasks
2. Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
3. Read, understand and trace the execution of programs written in C language
4. Write the C code for a given problem
5. Perform input and output operations using programs in C
6. Write programs that perform operations on arrays

Unit-I: **13 Hours**

Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.
C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.
Input and output with C: Formatted I/O functions - *printf* and *scanf,* control stings and escape sequences, output specifications with *printf* functions; Unformatted I/O functions to read and display single character and a string - *getchar, putchar, gets* and *puts* functions.

Unit-II: **13 Hours**

C Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion.
Control Structures: Decision making Statements - *Simple if, if_else, nested if_else, else_if ladder, Switch Case, goto, break* & *continue* statements; Looping
Statements - Entry controlled and exit controlled statements, *while, do-while, for* loops, Nested loops.

Unit-III: **13 Hours**

Derived data types in C: Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.
Strings: Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc.

Unit-IV: **13 Hours**

Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers.

User Defined Functions: Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.

User defined data types: Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.

C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.

Files - File modes, File functions, and File operations, Text and Binary files, Command Line arguments.

Text Books:

1. C: The Complete Reference, By Herbert Schildt.
2. C Programming Language, By Brain W. Kernighan
3. Kernighan & Ritchie: The C Programming Language (PHI)

Reference:

1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)
2. E. Balaguruswamy: Programming in ANSI C (TMH)
3. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
4. V. Rajaraman: Programming in C (PHI – EEE)
5. S. Byron Gottfried: Programming with C (TMH)
6. Yashwant Kanitkar: Let us C
7. P.B. Kottur: Programming in C (Sapna Book House)

Course Code : BS1-MT-CT1 MATHEMATICS-CT1

Title : Algebra - I and Calculus - I

Total No. of Teaching Hours: 52 No. of Hours per Week : 4

Internal Marks : 40 Exam Marks : 60 Credits: 4

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Objectives:

To introduce basic tools of Matrices. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of mathematical nature as well as practical problems. More precisely, main target of this course is to explore the different tools for higher order derivatives.

Course Outcomes (Cos): This course will enable the students to

Learn to find rank of a matrix.

- Solve the system of homogeneous and non-homogeneous linear system of ' m' equations in' n' variables by using concept of rank of matrix, finding eigenvalues and eigen vectors.

Be familiar with the techniques of finding nth derivatives of some standard functions.

Identify and apply the intermediate value theorems and L'Hospital's rule.

Learn partial differentiation, Jacobians and related properties.

Learn expansion of Taylor's and Maclaurin's series of functions of 2 variables and and minima of functions of 2 variables.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

PO 1	Disciplinary Knowledge: Bachelor degree in Mathematics is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas.
PO 2	Communication Skills: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will lead to the proficiency in analytical reasoning which can be used for modeling and solving of real life problems.
PO 3	Critical thinking and analytical reasoning: The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.
PO 4	Problem Solving: The Mathematical knowledge gained by the students through this programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students overall development
PO 5	Research related skills: The completing this programme develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.
PO 6	Information/digital Literacy: The completion of this programme will enable the learner to use appropriate softwares to solve system of algebraic equations and differential equations.
PO 7	Self – directed learning: The student completing this program will develop an ability of working independently and to make an in-depthstudy of various notions of Mathematics.

PO 8	Moral and ethical awareness/reasoning: The student completing this program will develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and Mathematical studies in general.
PO 9	Lifelong learning: This programme provides self directed learning andlifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real world problems.
PO 10	Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X	X	X						
CO2									
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Unit-I: **13 Hours**

Matrices: Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction to Echelon form. Rank of a matrix; Finding rank of a matrix by reducing to row reduced echelon form and normal form; Solution of systemof linear equations; Criteria for existence of non-trivial solutions of homogeneous systemof linear equations. Solution of non-homogeneous system of linear equations. Eigenvalues and Eigenvectors of square matrices, standard properties; Cayley- Hamilton theorem(WithProof), inverse of matrices by Cayley- Hamilton theorem, finding A^2, A^3,A^{-1}, A^{-2}

Unit-II: **13 Hours**

Limits, Continuity, Differentiability and properties, Properties of continuous functions. n^{th} Derivatives of Standard functions e^{ax+3b} ,$(ax+b)^n$, log(ax+b), sin(ax+b), cos(ax+b), $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$. Leibnitz theorem and its applications.

Unit-III: **13 Hours**

Mean Value Theorems: Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L'Hospital's rule.

Unit-IV: **13 Hours**

Partial Differentiation: Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions - Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima-Minima of functions of two variables.

Reference Books:

1. **University Algebra -N.S. Gopala Krishnan, New Age International (P) Limited**
2. **Theory of Matrices - B S Vatsa, New Age InternationalPublishers.**
3. **Matrices - A R Vasista, Krishna PrakashanaMandir.**

4. **Differential Calculus - Shanti Narayan, S. Chand & Company, NewDelhi.**
5. **Applications of Calculus, DebasishSengupta, Books and Allied (P) Ltd.,2019.**
6. **Calculus – LipmanBers, Holt, Rinehart &Winston.**
7. **Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. ViswanathanPvt.Ltd., vol. I &II.**
8. **Schaum's Outline of Calculus - Frank Ayres and ElliottMendelson, 5th ed.USA: Mc. Graw.**

Course BS1-PH1-CT1 **Subject: Physics**

Title: Mechanics and Properties of Matter

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

This course, provides an introduction to the basic concepts of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension Introduces students to understanding concepts of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension using mathematical tools.

Course Objectives:

To understand the different physical processes of nature in terms of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension.

Course Outcomes (Cos):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Understanding the difference between simple and tensional pendulum and their use in the determination of various physical parameters.
5. Knowledge of how various elastic moduli can be determined.
6. Measuring surface tension and viscosity and appreciate the methods adopted.
7. Hands on experience of different equipment's.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X								
CO2		X							
CO3	X								
CO4					X				
CO5	X								
CO6	X								
CO7	X								
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding programe out comes whose attainment is attempted in this course. Mark=X'I n the intersectioncel lif a course outcome addresses a particular program outcome.

Unit-I: **13 Hours**

Chapter No. 1 : Units and measurements

System of units (CGS and SI),measurement of length, mass and time, dimensions of physical quantities, dimensional formulae, errors, Mean deviation

Chapter No. 2 :Momentum and Energy

Work and energy, Conservation of linear momentum, Conservation of energy with examples, Motion of rockets.

Chapter No. 3: Special Theory of Relativity, Constancy of speed of light, Postulates of the Special Theory of Relativity. Length contraction and Time dilation. Relativistic addition of velocities.

Unit-II: **13 Hours**

Chapter No. 4 : Laws of Motion

Newton's Laws of motion, Dynamics of single particle and a system of particles, Centre of mass

Chapter No. 5 : Dynamics of Rigid bodies

Rotational motion about an axis, Relation between torque and angular momentum, Rotational energy, Moment of inertia (MI): Laws of MI, MI of a rectangular lamina and solid cylinder, Flywheel.

Chapter No. 6 : Gravitation

Law of Gravitation, Motion of a particle in a central force field (motion in a plane, conservation of angular momentum, constancy of areal velocity is constant). Kepler's laws (statements). Satellite in a circular orbit

Unit-III: **13 Hours**

Hooke'slaw,Stress-strain diagram,elasticmoduli,relation between elastic constants, Poisson's ratio, expression for Poisson's ratio in terms of elastic constants.Work done in stretching and work done in twisting a wire, twisting couple on a cylinder. Beams, bending of beams, expression for bending moment, theory of single cantilever.

Torsional pendulum, expression for time period of torsionaloscillations, determination of rigidity modulus (static and dynamic methods) and moment of inertia, determination of q, $\eta$and $\sigma$by Searle's double bar with necessary theory.

Unit-IV: **13 Hours**

Chapter No. 8 : Surface tension

Definition of surface tension, angle of contact, surface energy, relation between surface tension and surface energy, pressure difference across a curved surface (with example), excess pressure inside a spherical liquid drop.

Chapter No. 9 : Viscosity

Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poisulle's method, Stoke's method.

Text Books:

Sl.No	Title of the Book	Author(s)	Publisher	Year of Publications
1	Mechanics	D.S.Mathur	S.Chand &Co.	2000
2	Mechanics & Relativity (3rd Edition)	Vidwan Singh Soni	PHI Learning Pvt.Ltd.	2013
3	Mechanics (in S I units) Berkley Physics Course Vol.1	Charle's Kittel Walter knight,et al	Tata McGaw-Hill	2007
4	Properties of Matter	Brijlal&Subramanyam	S. Chand &Co.	2002

Reference:

Sl.No	Title of the Book	Author(s)	Publisher	Year of Publication
1	Principles of Physics	David Halliday, Jearl Walker & Robert Resnick	Wiley India Pvt Ltd.	2010
2	Physics (8th Edition)	David Halliday, & Robert Resnick	Wiley India Pvt Ltd.	2008

Course Code:BS1-BT-CP1	Subject: Botany	
Title: Diversity of non-flowering plants		
Total No. of Teaching Hours: 42	No. of Hours per Week : 4	
Internal Marks : 25	Exam Marks : 25	Credits: 2

Pedagogy: Classrooms lectures, Practical, Field and laboratory visits, participatory learning Group discussion, Seminar & field work etc.,

Course Description:

Cyanobacteria type study, Algae general characters and diversity, algal cultivation, Bryophytes, Pteridophytes, Gymnosperms their general characters and type study. Origin and evolution of plants. Paleobotany and study of fossils.

Course Objectives:

Cultivation of algae, economic importance of algae, bryophytes, pteridophytes and gymnosperms. Evolution of plants and study of fossils.

Course Outcomes (Cos):

Understand the diversity and affinities among algae, Bryophytes, Pteridophytes and Gymnosperms.

Understand the morphology, anatomy and reproduction and life cycle of algae, bryophyte, pteridophytes and gymnosperms.

Obtain laboratory skills and explore for their commercial applications.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	x	x							
CO2									
CO3									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding programoutcomeswhoseattainmentisattemptedinthiscourse.Mark=X'intheintersectioncellifacourseoutcome addressesa particular programoutcome.

List of Experiments

Practical-1: Study of morphology, classification, reproduction and lifecycle of Nostoc/Oscillatoria.

Practical-2: Study of morphology, classification, reproduction and life-cycle of Oedogonium &Chara,Sargassum, Batrachospermum/ Polysiphonia.

Practical-3: Study of morphology, classification, reproduction and life-cycle of Riccia & Anthoceros.

Practical-4: Study of morphology, classification, anatomy, reproduction and life-cycle of Selaginella and Equisetum.

Practical -5: Study of morphology, classification, anatomy, reproduction and life-cycle of Pteris, Azolla..

Practical -6: Study of morphology, classification, anatomy and reproduction in Cycas.

Practical -7: Study of morphology, classification & anatomy, reproduction in Pinus.

Practical -8: Study of morphology, classification & anatomy, reproduction in Gnetum.

Practical -9: Study of imporratnt blue green algae causing water blooms in the lakes.

Practical -10: Study of different methods of cultivation of ferns in a nursery.

Practical -11: Preparation of natural media and cultivation of Azolla in artificial ponds.

Practical -12: Media preparation and cultivation of Spirulina.

Practical -13: Study different algal products and fossils impressions and slides.

Practical-14: Visit to algal cultivation units/lakes with algal blooms/Fern house/ Nurseries/Geology museum/lab to study plantfossils.
(Note: Botanical study tour to a floristic rich area for 1-2 days and submission of study report is compulsory)

Course Code: BS1-ZO-CT1	Subject: Zoology	
Title : Cell Biology & Cytogenetics Lab		
Total No. of Teaching Hours: 42	No. of Hours per Week : 4	
Internal Marks : 25	Exam Marks : 25	Credits: 2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honors) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

Course Objectives:

At the end of the course the student should be able to:

1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3. To be familiar with the basic principle of life, how a cell divides leading to the growth ofan organism and also reproduces to form new organisms.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families. The antigen-antibody reaction.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9
CO1	I Core competency	II Critical thinking	III Analytical reasoning	IV Research skills	V Team work				
CO2	X								
CO3	X								
CO4	X								
CO5	X								
CO6	X								
CO7	X								
CO8	X								

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

List of Experiments

1. **Understanding ofsimple and compound microscopes.**
2. **To study different cell types such as buccal epithelial cells, striated muscle cells using Methylene blue/any suitable stain (virtual/ slide/slaughtered tissue).**
3. **To study the different stages of Mitosis in root tip of *Allium cepa*.**
4. **To study the different stages of Meiosis in grasshopper testis (virtual/ slides).**
5. **To check the permeability of cells using salt solution of different concentrations.**
6. **Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent micro slides.**
7. **To learn the procedures of preparation of temporary slides (fish scale) and permanent slides, with available mounting material (sex comb of Drosophila/ insect mouth parts).**
8. **Study of life cycles of *Drosophila* sp. (from Cultures or Photographs).**
9. **Preparation of Polytene chromosomes (Chironomus larva or Drosophila larva)/sex comb/ Drosophila mutants.**
10. **Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional).**
11. **To prepare family pedigrees.**

Reference:

1. **Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).**
2. **Alberts et al: Molecular Biology of the Cell:Garland (2002).**
3. **Cooper: Cell: A Molecular Approach: ASM Press (2000).**
4. **Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).**
5. **Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).**
6. **Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, New Delhi.**

Course Code: BS1-CH-CP1	Subject :CHEMISTRY	
Title :Practicals		
Total No. of Teaching Hours: 42	No. of Hours per Week : 4	
Internal Marks : 25	Exam Marks : 25	Credits: 2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents
The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis.
The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation
The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents
The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis.
The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation

Course Objectives:

1.To prepare the standard/working solutions from source materials
2.To standardize the reagents and determination of analytes
3.To familiarize the student about filtration, drying, incineration and ignition of the precipitates
4. To get training on how to plan and execute single step synthesis of small organic molecules.
5. To learn and to get trained on how to how to purify a compound and to learn the crystallization techniques.
6.To learn how to calculate percentage yield and to record physical constant
7.To understand the mechanism involved in the transformation

Course Outcomes (Cos):

At the end of this course, student should be able to:
Calibrate common laboratory glassware like pipette, burette and volumetric flask.
Conduct a variety of volumetric estimations such as acid-base, redox and iodometric titrations.
Purify/crystallize organic compounds by proper selection of suitable solvents.
Synthesize different organic compounds such as *p*-nitro acetanilide, *m*-nitrobenzoic acid, tribromophenol, divenzalacetone, etc., using conventional/green methods.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X		X		X	X	X	X	
CO2	X							X	
CO3	X				X		X		
CO4	X	X		X		X			
CO5	X								
CO6	X			X	X		X	X	
CO7	X					X			
CO8	X								

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

List of Experiments

PART-A Analytical Chemistry 4 hrs/batch

List of Experiments:

1. **Calibration of glassware, pipette, burette and volumetric flask.**
2. **Estimation of sodium carbonate and sodium bicarbonate in a mixture.**
3. **Estimation of alkali present in soaps/detergents.**
4. **Estimation of iron (II) using potassium dichromate.**
5. **Estimation of oxalic acid using potassium permanganate solution.**
6. **Estimation of chlorine in bleaching powder using iodometric method.**
7. **Estimation of alkali content in antacids.**
8. **Standardization of silver nitrate and determination of chloride in a water sample.**

PART-B Organic Chemistry 4 hrs/batch

List of Experiments:

1. **Selection of suitable solvents for purification/crystallization of organic compounds.**
2. **Preparation of acetanilide from aniline using Zn/acetic acid (green method).**
3. **Synthesis of p-nitro acetanilide from acetanilide using nitrating mixture.**
4. **Bromination of acetanilide (i) Conventional method and/or (ii) With ceric ammonium nitrate and potassium bromide (green method).**
5. **Preparation of methyl m-nitro benzoate from methyl benzoate by nitration method.**
6. **Hydrolysis of methyl m-nitro benzoate to m-nitro benzoic acid (conventional method).**
7. **Bromination - preparation of tribromophenol from phenol.**
8. **Preparation of dibenzalacetone (green method).**

Reference books

Mendham, J., A. I. Vogel's Quantitative Chemical Analysis Sixth Edition, Pearson, 2009.
Svehala G. and Sivasankar I. B, Vogel's Qualitative Inorganic Analysis, Pearson, India, 2012.
Practical Volumetric Analysis, Peter A C McPherson, Royal Society of Chemistry, Cambridge, UK (2015).
Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

Course Code: BS1-EL-CP1 **Subject:**ELECTRONICS -CP1

Title :ELECTRONIC DEVICES AND CIRCUITS- LAB

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Pedagogy: Problem Solving , Case studies, Seminar and using simulation tools

Course Description:

It is aimed to provide the basics of device operation and the characteristics for various devices along with the basic designing parameters for various circuits

Course Objectives:

- To understand the characteristics of various devices.
- To understand the characteristics of amplifiers
- To gain understanding about the Frequency response.
- To understand the design aspects of oscillator circuits

Course Outcomes (Cos):

At the end of the course the student should be able to:

- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.

Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.,

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X								
CO2									
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

List of Experiments

ELE-CP1:ELECTRONICDEVICESANDCIRCUITS–Lab

(HardwareimplementationandAnalysisofCircuitusingSimulationSoftware)

DemonstrationExperiments:

1. HandsonExperimentalSkillsandFamiliarizationwith
2. Electroniccomponents
3. Resistanceinseries,parallelandseries-parallel
4. Capacitorsandinductorsinseriesandparallel
5. MultimeterandLCRmeter –checkingofcomponents/measurements.
6. Voltagesourcesinseries,parallelandseries-parallel

Voltageandcurrentdividers

1. MeasurementofAmplitude,Frequency&Phasedifference usingOscilloscope
2. (Any TEN Experiments)
3. VerificationofThevenin's andMaximumPowerTransferTheorem.
4. VerificationofSuperpositionTheorem.

5. StudyoftheI-VCharacteristicsof(a)P-n junctiondiode,and (b)Zenerdiode.
6. StudyoftheI-VCharacteristicsofLEDs oftwodifferentcolours and7-segmentdisplay.
7. StudyofHalfwaverectifierwithoutandwithshuntcapacitorfilter– ripplefactorfordifferentvaluesoffiltercapacitors.
8. Studyoffullwavebridgerectifierwithoutandwithshuntcapacitorfilter– ripplefactorfordifferentvaluesoffiltercapacitors.
9. StudyofZenerdiodeasaVoltageRegulatorusingbridgerectifierwithshuntcapacitorfilter[Loadandline regulation].
10. StudyofClipping,ClampingandVoltageMultipliercircuits.
11. Designingandtestingoffixedpositiveandnegativevoltageregulatorsusing78xxand79xxseriesICs(Using bridge rectifierand shuntcapacitorfilter).
12. DesigningandtestingofvariablevoltageregulatorusingICLM317(Usingbridgerectifierandshuntcapacitorfilter).
13. StudyofTransistorcharacteristicsinCEconfiguration–determinationofh-parameters.
14. Studyof FixedBiasandVoltagedividerbiascircuits– comparisonfordifferent βvalues.
15. StudyofsinglestageCEamplifier(frequencyresponse,inputandoutputimpedancesinmid-band
16. Studyoftwo-stageRC-coupledCEamplifier(AV1,AV2,AV)atmid-bandfrequency.
17. StudyofSeriesandParallelResonancecircuits– determinationofits Resonant frequency Impedance at resonance Bandwidth QualityFactor
18. VerificationoftruthtablesofOR,AND,NOT,NAND,NOR,XORandXNORgatesusingrespectiveICs. Realization ofXORandXNORusing basic gates.
19. UniversalpropertyofNANDandNOR gates.
20. BinarytoGrayandGrayto Binarycodeconversionandparitycheckerusing XORgatesIC7486

Course Code : BS1-CS-CP1 **Discipline Core 1 Practical**

Title : Programming in C Lab

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Course Description:

The course is designed to provide a practical exposure to the students. To solve problems through C Programs.

Course Outcomes (Cos):

Students acquire the knowledge to build the logic and develop a solution for a problem statement.

List of Programs

Write and execute C program for the following:

1. **To read radius of a circle and to find area and circumference**
2. **To read three numbers and find the biggest of three**
3. **to check whether the number is prime or not**
4. **to read a number, find the sum of the digits, reverse the number and check it for palindrome**
5. **to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers**
6. **to read percentage of marks and to display appropriate message (Demonstration of else-if ladder**
7. **to find the roots of quadratic equation**
8. **to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)**
9. **to remove Duplicate Element in a single dimensional Array**
10. **to perform addition and subtraction of Matrices**
11. **to find factorial of a number**
12. **to generate Fibonacci series**
13. **to remove Duplicate Element in a single dimensional Array**
14. **to find the length of a string without using built in function**
15. **to demonstrate string functions**
16. **to read, display and add two m x n matrices using functions**
17. **to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.**
18. **to Swap Two Numbers using Pointers**
19. **to demonstrate student structure to read & display records of nstudents**
20. **to demonstrate the difference between structure & union.**

Course Code : BS1-MT-CP1 MATHEMATICS-CP1

Title :Practicals

Total No. of Teaching Hours: 42 No. of Hours per Week : 4

Internal Marks : 25 Exam Marks : 25 Credits: 2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Outcomes (Cos):This course will enable the students to

- **Learn Free and Open Source Software (FOSS) tools for computer programming Solve problem on algebra and calculus theory studied in MATDSCT 1.1 by usingFOSS.**
- **Solve problem on algebra and calculus theory studied in MATDSCT 1.1 by usingFOSS soft wares.**
- **Acquire knowledge of applications of algebra and calculus through FOSSPractical/Lab Work to be performed in Computer Lab (FOSS)**

List of Experiments

Practical -I

1. **Basics of software with simple examples.**
2. **Basics of software with simple examples.**
3. **Matrices –Algebra of Matrices with problems.**
4. **Computation of rank of a matrix by row reduced and normal forms.**
5. **Solving the system of homogeneous and non- homogeneous linear equations.**
6. **Computation of inverse of a matrix using Cayley-Hamilton theorem.**
7. **Finding the nth derivatives of functions without Leibnitz theorem.**
8. **Finding the nth derivatives of functions with Leibnitz's theorem.**
9. **Partial Differentiation of some standard functions and Jacobians.**
10. **Verification of Euler's theorem with examples.**
11. **Finding the Taylor's and Maclaurin's expansion of the given function.**
12. **Indeterminate forms and evaluation of limits using L-Hospital's rule.**
13. **Verification of Mean Value Theorem (Rolle's, Lagranges and cauchy's)**
14. **Program to find the Maxima-Minima of functions of two variables.**

Note: Each problem given in the Lab-manual has to be solved manually.

Suggested Software's: Maxima/Scilab/Maple/MatLab/Mathematica/Python/R. Introduction tothe software and commands related to the topic.

Course Code BS1-PH-CP1

Title: I Semester B.Sc., Physics Practicals

Total No. of Teaching Hours: 42

Internal Marks : 25

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

This course, provides an introduction to the basic concepts of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension Introduces students to understanding concepts of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension using mathematical tools.

Course Objectives:

To conduct and analyze the results form experimental data of the different physical processes of nature in terms of Units and measurements Momentum and Energy Laws of Motion Dynamics of Rigid bodies Gravitation Surface tension.

Course Outcomes (Cos):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Measuring surface tension and viscosity and appreciate the methods adopted.
5. Hands on experience of different equipment's.

List of Experiments

1. Determination of g using bar pendulum (L versus T and L versus LT^2 graphs)
2. Determination of moment of inertia of a Fly Wheel.
3. Determination of rigidity modulus using torsional pendulum
4. Verification of parallel and perpendicular axis theorems.
5. Determine the Young's Modulus of a bar by uniform bending method
6. Determination of elastic constants of a wire by Searle's double bar method
7. Young's modulus by Koenig's method
8. Modulus of rigidity of a rod —Static torsion method
9. Viscosity by Stoke's method
10. Verification of Hooke's law,
11. Determination of surface tension of a liquid and the interfacial tension between two liquids using drop weight method.
12. Critical pressure for stream line flow
13. Determine the Young's Modulus a bar by single cantilever method.
14. Study of motion of a spring and to calculate spring constant, g and mass of the spring.

Note: Minimum of EIGHT experiments to be carried out

B.Sc Syllabus
for
II Semester under NEP-2020

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Course Code : BS2-LK-C2-T	Kannada language-CT2

Title : Kannada Language

Total No. of Teaching Hours: 52	No. of Hours per Week : 4	
Internal Marks : 40	Exam Marks : 60	Credits: 4

Pedagogy: Classrooms lecture, Problem Solving , Group discussion, Seminar & field work etc.,

Course Description:

ಕನ್ನಡವನ್ನು ಒಂದು ಬಾಷೆಯಾಗಿ ಕಲಿಸುವುದರ ಜೊತೆಗೆ, ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳಾದ ಹೊಸಗನ್ನಡ ಹಾಗೂ ನಡುಗನ್ನಡ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. ಇದರ ಮೂಲಕ ಭಾಷೆಯಲ್ಲಿ ಪರಿಣಿತಿಯನ್ನು ಸಾಧಿಸುವುದು.

Course Objectives:

ಹೊಸಗನ್ನಡ, ನಡುಗನ್ನಡ, ಪ್ರಬಂಧ ಹಾಗೂ ಕಥಾ ಸಾಹಿತ್ಯವನ್ನು ವಿಶ್ಲೇಷಿಸುವುದರೊಂದಿಗೆ, ಅವರಲ್ಲಿ ಸೃಜನಶೀಲ ಬರವಣಿಗೆಗಳಾದ ಕಥೆ, ಕವನ, ಲೇಖನ ಮುಂತಾದ ಸೃಜನಶೀಲ ಬರವಣಿಗೆಗೆ ಪೂರಕವಾಗಿ ಬೋಧಿಸುವುದು. ಇದರ ಮೂಲಕ ಭಾಷೆಯ ಪ್ರಕಾರ ಮತ್ತು ವೈವಿಧ್ಯತೆಯ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.

Course Outcomes (Cos):

ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಪ್ರಸ್ತುತ ವ್ಯವಸ್ಥೆಯನ್ನು ಅರಿಯುವುದರ ಜೊತೆಗೆ ಸ್ವಾತಂತ್ರ್ಯ, ಸಮಾನತೆ, ಪರಸ್ಪರ ಸಹಕಾರ ಸಹಾನುಭೂತಿಯಂತಹ ಸಾಮಾಜಿಕ ಮೌಲ್ಯಗಳನ್ನು ಹಾಗೂ ಸಮಾಜಮುಖಿ ಕಳಕಳಿಯನ್ನು ಮೂಡಿಸುವುದು. ಸಾಹಿತ್ಯದ ವಿವಿಧ ವಲಯಗಳಲ್ಲಿ ಅಂದರೆ, ಬರವಣಿಗೆಯ ಕೌಶಲ್ಯ, ಓದುವ ಕೌಶಲ್ಯ, ಮಾತನಾಡುವ ಕೌಶಲ್ಯಗಳಿಗೆ ಸಂಬಂಧಿಸಿದ ವಲಯಗಳಲ್ಲಿ ವೃತ್ತಿಯನ್ನು ಹೊಂದಲು ಸಹಕಾರಿಯಾಗಿದೆ.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X	X							
CO2	X	X		X					
CO3	X					X			
CO4	X		X						
CO5	X			X					
CO6	X							X	
CO7	X						X		
CO8	X							X	

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: Poems	**40 Hours**

1. ಸರ್ವಜ್ಞನ ವಚನಗಳು - ವಚನಗಳು
2. ಕೆರೆಗೆ ಹಾರ - ಜಾನಪದ
3. ಮಲ್ಲಿಕಾರ್ಜುನ ದರ್ಶನ - ರಾಘವಾಂಕ
4. ಕರ್ಣಪರ್ವ - ಕುಮಾರವ್ಯಾಸ
5. ಬಸವದೇವರಾಜ ರಗಳೆ - ಹರಿಹರ
6. ಸಂಕಮ್ಮನ ಸಾಲು - ಮಲೆಮಾದೇಶ್ವರಕಾವ್ಯದ ಆಯ್ದ ಭಾಗ

Unit-II: Prose	**12 Hours**

1. ಇನ್ನೊಂದು ದಿವಸ ಕಾದರೆ ನಷ್ಟವೇ - ಕೆ.ರಂ. ನಾಗರಾಜ್
2. ಮಹಿಳೆ ಮತ್ತು ವಿಜ್ಞಾನ - ನೇಮಿಚಂದ್ರ
3. ಉನ್ಮತ್ತ ಕುರುಕ್ಷೇತ್ರವೂ ಬೃಂದಾವನದ ಕೊಳಲೂ - ಫಾತಿಯಾ ರಲಿಯಾ
4. ಸಮಾನತೆಯ ಕನಸನ್ನು ಮತ್ತೆ ಕಾಣುತ್ತಾ - ದೇವನೂರು ಮಹಾದೇವ

II Semester B.A ,B.SC ,BCA and B.COM Language under Ability Enhancement Compulsory course (AECC) for the Academic years 2021-2024

LANGUAGE HINDI

1. Hindi Kavita : **"Kavya Smriti"** Edited by : Prof Shekhar
   Dr. Prabhu Upase
   Dr. Sharmila Biswas
   (Printed and Published by Prasarang,Bengaluru City University.Bengaluru)

2. **Anuvad :** Paribhasha, Prakar,Anuvad ki Lakshana.

3. **Translation (passage)**

Reference Books : 1) Prayojan Mulak Hindi ki Nayi Bhumika : Kailash Nath Ponday
2) Anuvad Vignan : Dr. Bholananth Tiwari

Course Code: LBAS-C2/LBSS-C2/LBCS-C2/LBMS-C2 **Subject:Sanskrit**

Title : Kadambhari of Bana

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

Prose

Course Objectives:

The main objective of the course is to impart knowledge in classical language through literature. The study trains learner in appreciating aesthetics. The study of Sanskrit prose helps the student in sharpening creative abilities in all disciplines

Course Outcomes (Cos):

CO1: Understanding type of kavya which is bit difficult.

CO2: Able to learns prose work and will improve learners proficiency.

CO3: Understanding learning process and the nature, structure of the Sanskrit language .

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	x								
CO2		x							
CO3			x						
CO4				x					
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I:	**13 Hours**
Introduction of Kavya in brief, Drishya kavya, Shravya kavya, Prose, poetry, Champu, division of Gadya – katha and Akhyayika	
Unit-II:	**13 Hours**
Origin and development of prose, tracing of prose, passages from veda, Upanishads, purana and inscription, Gadya kavya and its division, katha and Akhyayika, difference between katha and akhyayika, author's (Bana's) life, date, works, his popularity	
Unit-III:	**13 Hours**
Detailed text – prose, Kadhambari of Bana, description of king Shudraka, Chandalakanya varnanam, description of door keeper, description of the king as seen by Chanadala maid and vice versa, description of parrot	
Unit-IV:	**13 Hours**
Translation of unseen passages / comprehension, Grammar	

Text Books: 1. Kadambhari of Bana by M. K Surya Narayana

2. Kadambhari of Bana by Bannaje Govinda Acharya (Kannada Translation)

Course Code : BS2-LE-C2-T	ENGLISH-CT2

Title : Course Title-- ABILITY ENHANCEMENT COMPULSORY COURSE LANGUAGE (AECC) - L2 - GENERIC ENGLISH

Total No. of Teaching Hours: 52/60	No. of Hours per Week : 4	
Internal Marks : 40	Exam Marks : 60	Credits: 4

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The course is designed for one semester. The syllabus keeps in mind that the learner has to be equipped with technological skills related to the usage of language. It is also designed according to the learner's domain specific requirements. It equips the learner to enhance their creativity and become critical readers thereby helping them to express themselves better.

Course Objectives:

1. **To Acquire Listening, Speaking, Reading and Writing Skills.**
2. **To acquire skills of creativity to express oneself.**
3. **To develop their ability to become critical readers.**
4. **To become aware of different literary devices and genres.**
5. **To become socially aware.**

Course Outcomes (Cos):

1. Acquire the LSRW (Listening, Speaking, Reading, Writing) skills

2. Obtain the knowledge of literary devices and genres

3. Acquire the skills of creativity to express one's experiences

4. Know how to use digital learning tools

5. Be aware of their social responsibilities

6. Develop their ability as critical readers and writers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

BSc:

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9
CO1									
CO2									
CO3									
CO4									
CO5					x				
CO6									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

PART I- WORK BOOK- *IMPRINTS-II*

16 Hours

Unit-I: Unit 1: Receptive Skills: Reading Skills and Listening Skills

Chapter 1: Reading Skills - Types of Comprehension, Global, Factual and Inferential

Read the passage, Identify the theme and suggest a title

Chapter 2: Vocabulary Building - Synonyms, antonyms, prefixes, suffixes, homonym, homophones and collocations.

Chapter 3: Cloze Test

(Articles, Preposition, Linkers, Verbs, Adverbs)

Chapter 4: Listening Skills – types of Listening

Unit-II: Productive Skills: Speaking Skills and Writing Skills

15 Hours

Chapter 5: Reported speech.

Chapter 6: Dialogue writing

Chapter 7: Verbal and non-verbal communication.

Chapter 8: Introduction to Science writings.

Chapter 9: Introducing the Guest, Welcome speech, Vote of thanks

Part 2 – Course Book –*IMPRINTS -II*

21 Hours

Chapter 10*: **Britain Does Owe Reparations*** - Dr. Shashi Tharoor

Chapter 11: *Celebrity* - Brad Paisley

Chapter 12: *A Question of English* - Ramachandra Guha

Chapter 13: *Except Richer* - Ogden Nash

Chapter 14*: **A Midsummer Night's Dream*** - William Shakespeare Excerpts

Chapter 15: *Hayavadana*-An Excerpt - Girish Karnad

Course – BS2-BT-C2-T **BOTANY-CT2**

Title : Diversity of Non- Flowering Plants.

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Group discussion, Seminar, Assignments, Participatory Learning and Specimen submission.

Course Description:

Microbial diversity and technology, Diversity of non flowering plants, Identification and classification of plants and microbes.

Course Objectives:

Proper Identification of botanical terms and naming of pants and microbes

Proper knowledge of the structure and life cycle of plants and microbes

Course Outcomes (Cos):

Gains laboratory skills such as staining, microbial cultures, preservation of microbes and their applications in research and industries.

Impact of microbes on human and environment

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	Skill development of the description usind botanical terms, identification, naming and classification of life forms such as microbes and plants.	Acqisition of knowledge on structure, life cycle and life processes that exist among microbial diversity and plants.							
CO2	Understand the diversity and affinities among cryptogans.	Understanding of various interactions that exists among microbes and plants.							
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: **13 Hours**

Algae –Introduction and historical development in algology. General characteristics and

classification of algae, Diversity- habitat, thallus organization, pigments, reserve food, flagella types, life-cycle and alternation of generation in Algae. Distribution of Algae.

General characteristics of Cyanobacteria, Morphology and reproduction and life-cycles of Nostoc, *Oedogonium, Chara, Sargassum and Polysiphonia.* Diatoms and their importance. Blue-green algae-A general account. Algalblooms and toxins.

Algal cultivation- Cultivation of microalgae-*Spirulina;*

Algal cultivation methods in India. Algal products- Food and Nutraceuticals, Feed stocks, food colorants; fertilizers, aquaculture feed; therapeutics and cosmetics;

medicines; dietary fibres from algae and uses.

Unit-II: **13 Hours**

Bryophytes – General characteristics and classification of Bryophytes, Diversity-habitat, thallus structure, Gametophytes and sporophytes.

Distribution, morphology, anatomy, reproduction and life-cycles of *Riccia, Anthoceros*, and *Funaria.* Ecological and economic importance of Bryophytes.

Pteridophytes- General characteristics and classification; Structure of sporophytes and life-cycles. Distribution, morphology, anatomy, reproduction and life- cycles in *Selaginella*, *Equisetum* and *Pteris*

Unit-III: **13 Hours**

A brief account of heterospory and seed habit. Stelar evolution in Pterodophytes. Affinities and evolutionary significance of Pteridophytes. Ecological and economic importance.

Gymnosperms- General characteristics. Distribution and classification of Gymnosperms. Study of the habitat, distribution, habit, anatomy, reproduction and life-cycles in Cycas, Pinus and Gnetum.

Affinities and evolutionary significance of Gymnosperms. Economic importance of Gymnosperms - food, timber, industrial uses and medicines.

Unit-IV: **13 Hours**

Origin and evolution of plants through Geological Time scale.

Paleobotanical records, plant fossils, Preservation of plant fossils - impressions, compressions, petrification's, moulds and casts, pith casts.

Fossil taxa- *Rhynia, Lepidodendron, Lepidocarpon,Lyginopteris and Cycadeoidea*. Exploration of fossil fuels. Birbal Sahni Institute of Paleosciences.

Text Books:

1) Chopra, G.L. A text book of Algae. Rastogi & Co., Meerut, Co., New Delhi, Depot. Allahabad.
2) Johri, Lata anf Tyagi, 2012, A Text Book of, Vedam e Books, New Delhi.
3) Sharma, O.P. 1990. Text Book of Pteridophyta. McMillan India Ltd. New Delhi.
4) Sharma, O.P. 1992. Text Book of Thallophytes. McGraw Hill Publishing Co. New Delhi.
5) Sharma, O.P., 2017, Algae Singh-Pande-Jain 2004-05.
6) A Text Book of Botany. Rastogi Publication, Meerut.

Reference:

1. Sambamurty, A.V.S.S.. A Text Book of Algae. I.K. International Private Ltd., New Delhi.
2. Agashe, S.N. 1995. Paleobotany. Plants of the past, their evolution, paleoenvironment and Allied plants. Hutchinson & Co., Ltd., London.
3. Anderson R.A. 2005, Algal cultural Techniques, Elsievier, London.
4. Publication, Application in exploration of fossil fuels. Oxford & IBH., New Delhi.
5. Eams, A.J., (1974) Morphology of vascular plants - Lower groups. Tata Mc Grew- Hill Publishing Co. New Delhi, Freeman & Co., New York.
6. Fritze, R.E. 1977. Structure and reproduction of Algae. Cambridge University Press.
7. Goffinet B and Shaw A.J. 2009, Bryophyte Biology, 2nd ed. Cambridge Unversity Press, Cambridge.Gymnosperms.
8. Srivastava, H N, 2003. Algae Pradeep Publication, Jalandhar, India.
9. Kakkar, R.K. and B.R.Kakkar (1995) The Gymnosperms (Fossils and Living) Central Publishing House, Allahabad.
10. Kumar H. D., 1999, Introductory Phycology, Affiliated East-West Press, Delhi.
11. Lee, R.E., 2008, Phycology, Cambridge Unversity Press, Cambridge. 4th edition.McGraw Hill Publishing Co., New Delhi.
12. Parihar, N.S. 1970. An Introduction to Embryophyta. Vol. I. Bryophyta. Central Book, Allhabad.

13. Parihar, N.S. (1976) An Introduction to Pteridophytes, Central Book Depot, Allhabad.

14. Parihar, N.S. 1977.The Morphology of Pteridophytes Central Book Depot., Allahabad.Press, Cambridge.

15. Rashid, A.1998.An Introduction to Pteridophyta.II ed., Vikas Publishing House, New Delhi.

16. Smith, G.M. 1971. Cryptogamic Botany. Vol. II. Bryophytes & Pteridophytes. Tata Tata McGraw Hill Publishing, New Delhi.

17. Smith, G.M. 1971. Cryptogamic Botny. Vol.I Algae & Fungi. Tata McGraw Hill Publishing. New Delhi.

18. Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson & Co., Ltd., London.

19. Stewart, W.M. 1983. Paleobotany and the Evolution of Plants, Cambridge University Cambridge.

20. Sundarajan, S. 1997. College Botany Vol. I. S Chand & Co. Ltd., New Delhi.

21. Vanderpoorten, A. and Goffinet, B. 2009, Introduction to Bryophytes, Cambridge Unversity Press, Cambridge.

22. Vashista, B.R. 1978. Bryophytes. S Chand & Co. Ltd., New Delhi.

Course Code : BS2-ZO-C2-T ZOOLOGY-CT2

Title : Biochemistry and Physiology

Total No. of Teaching Hours: 56 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honors) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

Course Objectives:

- The Programme offers both classical as well as modern concepts of Zoology in higher education.
- It enables the students to study animal diversity in both local and global environments.
- To make the study of animals more interesting and relevant to human studies more emphasis is given to branches like behavioral biology, evolutionary biology and economic Zoology.
- More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, genetic engineering and bioinformatics have also been included.
- Equal importance is given to practical learning and presentation skills of students.
- The lab courses provide the students necessary skills required for their employability.
- Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skills of students.
- The global practices in terms of academic standards and evaluation strategies.
- Provides opportunity for the mobility of the student both within and across the world.
- The uniform grading system will benefit the students to move across institutions within India to begin with and across countries.
- It will also enable potential employers in assessing the performance of the candidates across the world.

Course Outcomes (Cos):

The student at the completion of the course will learn:

9. To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.
10. How simple molecules together form complex macromolecules.
11. To understand the thermodynamics of enzyme catalyzed reactions.
12. Mechanisms of energy production at cellular and molecular levels.
13. To understand various functional components of an organism.
14. To explore the complex network of these functional components.
15. To comprehend the regulatory mechanisms for maintenance of function in the body.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1- I Core competency		X							
CO2- II Critical thinking		X							
CO3 -III Analytical reasoning		X							
CO4 -IV Research skills		X							
CO5- V Team work		X							
CO6		X							
CO7		X							
CO8		X							
Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.									

Unit-I: **14 Hours**

Chapter 1. Structure and Function of Biomolecules:

- Structure (except ring structure) and Biological importance of carbohydrates (Monosaccharaides, Disaccharides, Polysaccharides and Glycoconjugates).
- Lipids (saturated and unsaturated Fatty acids, Tri-acyl glycerol's, Phospho- lipids, Glycolipids and Steroids)
- Structure, Classification and General Properties of alpha-amino acids; Essential and non-essential amino acids, Levels of organization in proteins; Simple and conjugate proteins.

Chapter 2. Enzyme Action and Regulation

- Nomenclature and classification of enzymes; Cofactors; Specificity of enzyme action.
- Lysozymes; Mechanism of enzyme action. Clinical use of lysozymes.
- Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Equation of Michaelis-Menten, Concept of Km and V max, Enzyme inhibition.
- Allosteric enzymes and their kinetics; Regulation of enzyme action.

Unit-II: **14 Hours**

Chapter 3. Metabolism of Carbohydrates and Lipids

- Metabolism of Carbohydrates: glycolysis, citric acid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis Lipids- Biosynthesis of palmitic acid; Ketogenesis,

β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon-atoms

Chapter 4. Metabolism of Proteins and Nucleotides

- Catabolism of amino acids: Transamination, Deamination, Urea cycle, Nucleotides and vitamins
- Peptide linkages

Unit-III: **14 Hours**

Chapter 5. Digestion and Respiration in humans

- Structural organization and functions of gastrointestinal tract and associated glands.

- Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Physiology of trachea and Lung.
- Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood, Respiratory pigments, Dissociation curves and the factors influencing it;

Control of respiration.

Chapter 6. Circulation and Excretion in humans

- Components of blood and their functions; haemopoesis
- Blood clotting: Blood clotting system (any two theories), Blood groups: Rh-factor, ABO and MN.
- Structure of mammalian heart
- Cardiac cycle; Cardiac output and its regulation, Electrocardiogram, Blood pressure and its regulation
- Structure of kidney and its functional unit; Mechanism of urine formation

Unit-IV: **14 Hours**

Chapter 7. Nervous System and Endocrinology in humans

- Structure of neuron, resting membrane potential(RMP)
- Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapse
- Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them.

Classification of hormone (based on function is excluded); Mechanism of Hormone action.

Chapter 8. Muscular System in humans

Histology of different types of muscle (excluding histological types); Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus

Reference:

1. Nelson & Cox: Leininger ‘s Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet & Voet: Biochemistry Vols l & 2: Wiley (2004)
4. Murray et al: Harper ‘s Illustrated Biochemistry: McGraw Hill (2003).
5. Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
6. Guyton, A.C & Hall, J.E. Textbook of Medical Physiology, Xl Ed. W.B.Saunders Co. (2006).
7. Tortora, G.J. &Grabowski, S. Principles of Anatomy & Physiology. XI Ed. John Wiley & sons (2006).
8. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Ed. Pearson Education (2016).
9. Hill, Richard W., et al. Anima l physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
10. Chatterjee CC Human Physiology Volume l & 2, 11th edition, CBS Publishers (20 I6).

Course Code : BS2-CH-C2-T CHEMISTRY-CT2

Title:Chemistry-II

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The concept of volumetric and gravimetric analysis and deducing the conversion factor for determination.

Handling of toxic chemicals, concentrated acids and organic solvents and practice safety procedures.

Course Objectives: To make him familiarize with various states of matter.

1. To learn the calculation of lattice parameters.
2. To learn various theories of physical chemistry.
3. To understand how liquid state and its physical properties are related to temperature and pressure variation.
4. To develop the concept of solids, lattice parameters – its calculation, application of symmetry and solid characteristics of simple salts.
5. Understand the mechanism of nucleophilic, electrophilic reactions.
6. To understand the concept of aromaticity and Huckel rule.

To familiarize the student with nucleophilic and electrophilic substitution reactions in aliphatic and aromatic compounds

7. To understand the concept of aromaticity and Huckel rule.

To familiarize the student with nucleophilic and electrophilic substitution reactions in aliphatic and aromatic compounds.

Course Outcomes (Cos): On completion of the course the students will learn and able to explain

1. The concept of volumetric and gravimetric analysis and deducing the conversion factor for determination.
2. Handling of toxic chemicals, concentrated acids and organic solvents and practice safety procedures.
3. The concepts of organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming.
4. .Various theories of gases and their significance.
5. The concept of surface tension, viscosity, refraction and its significance.
6. Different types of liquid crystals and their applications.

The concept of unit cell, symmetry elements, Nernst distribution law.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X	X							
CO2	X	X		X					
CO3	X					X			
CO4	X		X						
CO5	X			X					
CO6	X							X	
CO7	X						X		
CO8	X							X	

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Unit-I: **13 Hours**

Complexometrictitrimetry: Indicators for EDTA titrations - theory of metal ion indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application-determination of hardness of water.

Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences.

Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, factors influencing precipitation, co-precipitation, post-precipitation.Advantages of organic reagents over inorganic reagents, reagents used in gravimetry :8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG).. .

Unit-II: **13 Hours**

Nucleophilic substitution at saturated carbon. Mechanism of SN1 and SN2 reactions with suitable examples. Energy profile diagrams, stereochemistry and factors effecting SN1 and SN2 reactions.

Aromatic electrophilic substitution reactions, mechanisms, σ and π complexes, halogenation, nitration, sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, *ortho-para* ratio (Cl,NO2,CH3, NH2, OH)

Aromatic nucleophilic substitution reaction: SNArmechanism, *ipso* substitution. Example -- conversion of 2,4-dinitrochlorobenzene to 2,4-dinitrophenyl hydrazine. Introduction to benzyne. Stability based on Huckel rule of aromaticity. Generation of benzyne with mechanism.

Unit-III: **13 Hours**

Gaseous state:Molecular velocity, collision frequency, collision diameter, collision cross section, collision number and mean free path and coefficient of viscosity, calculation of σ and η, variation of viscosity with temperature and pressure.

Maxwell-Boltzmann distribution law of molecular velocities (most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (mathematical derivation not required), law of equipartition of energy.

Behaviour of real gases: Deviation from ideal gas behaviour. Compressibility factor (Z) and

its variation with pressure for different gases. Causes of deviation from ideal behaviour, vander Waals equation of stat (No derivation) and application in explaining real gas behaviour. Critical phenomena - Andrews isotherms of CO_2, critical constants and their derivation from van der Waals equation, Experimental determination of critical constants.Continuity of states, Law of corresponding states. Joule Thomson effect. Inversion temperature, application of J-T effect, liquification of air by Linde's process. Numerical problem

Liquid state

Surface tension: Definition and its determination using stalagmometer, effect of temperature and solute on surface tension.

Viscosity: Definition, coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces.

Refraction: Specific and molar refraction- definition and advantages. Determination of refractive index by Abbes Refractometer. Additive and constitutive properties.

Parachor: Definition, atomic and structure parachor, elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and chemical constitution.Numerical problems

Unit-IV: **13 Hours**

Dilute solutions. Review of colligative properties.

Experimental determination of molar mass of solute by:1.Berkely-Hertely method 2. Beckmann method 3. Landsberger method and Numerical problems

Distribution Law: Nernst distribution law - Statement. Distribution coefficient, factors affecting distribution coefficient, validity of distribution law, modification of distribution law when molecules undergo a) association b) dissociation. Application of distribution law in Solvent extraction. Derivation for simple and multiple extractions. Principles of distribution law in Parke's process of desilverisation of lead. Numerical problems.

Solids:Forms of solids: Unit cell and space lattice, anisotropy of crystals, size and shape of crystals.

Laws of Crystallography: Law of constancy of interfacial angles, law of rational indices, law of symmetry (symmetry elements), crystal systems, Bravais lattice types and identification of lattice planes.

Miller indices and its calculation, X–Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems

Text Books:

1.University chemistry –II

2.College chemistry-II

Reference:

1. Fundamentals of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
2. Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
3. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
4. Physical Chemistry by Samuel Glasstone, ELBS (1982).
5. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
6. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
7. A Text book of Physical Chemistry, A S Negi& S C Anand, New Age International Publishers (2007).
8. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co.
9. A Text Book of Physical Chemistry P.L.Soni , O.P. Dharmarhaand and U.N.Dash, Sultan Chand and Sons.
10. Advanced Physical Chemistry, Gurdeep Raj, Goel Publishing House (2018)

11. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)Finar, I. L. Organic Chemistry (Volume I), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)

Course Code: BS2-EL-C2-T **Subject:** ELECTRONICS –CT2

Title : ELECTRONIC DEVICES AND CIRCUITS

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Seminar and ICT

Course Description:

- This paper is divided into two parts: analog electronics and digital electronics.
- Following a brief review of basic components, op-amp circuits are studied, dealing with the effects of feedback to produce different mathematical operations, and some applications such as amplifiers and filters.
- The digital logic section starts with binary arithmetic and Boolean algebra, and then continues with, gates, latches, flip-flops, counters, shift registers, and digital-to-analog converters (DAC) and analog-to-digital converters (ADC). Finally, there is a brief look at memory, as used in electronic circuits and computers.

Course Objectives:

- The objective of this course is to give students an introduction to basic analog and digital electronics, as a prelude to further courses in the general electronics area, to courses using applied electronics, or to applications in your future careers as engineers.

Course Outcomes (Cos):

At the end of the course the student should be able to:

1. Describe and explain the semiconductor electronics, diodes and characteristic of diodes.
2. Describe and explain the fundamental operation of the operation amplifiers.
3. Analyze the essentials of digital logic systems that include binary quantities, logic gates, Boolean algebra, combinational logic, latches and flip-flops.
4. Analyze circuits using diodes.
5. Derive the expressions (output voltage and gain) for the operation amplifiers.
6. Design combinational circuits from truth table specification and optimize combinational logic with Karnaugh maps.
7. Apply/Investigate the diodes as rectifiers, Op-Amp, and logic gates.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	x								
CO2	x								
CO3	x								
CO4	x								
CO5	x								
CO6	x								
CO7	x								
CO8									

Courses having focus on Employability/ Entrepreneurship/ Skill Development: This course is having focus on Skill Development.

Unit-I: **13 Hours**

JFET–Types - p-channel and n-channel, working and I-V characteristics - n-channel JFET,

parameters and their relationships, JFET CS amplifier. Comparison of BJT and JFET.

MOSFET: E–MOSFET, D–MOSFET – n-channel and p-channel, Construction, working, symbols, biasing, drain and transfer characteristics, VMOS, UMOS Power MOSFETs, handling, MOS logic, symbols and switching action of MOS, NMOS inverter, CMOS logic, CMOS – inverter, circuit and working, CMOS characteristics, IGBT construction and working.

UJT: Construction, working, equivalent circuit and I-V characteristics, intrinsic stand-off ratio, Relaxation oscillator.

SCR: Construction, VI characteristics, working, symbol, and applications – HWR and FWR.

Diac and Triac: Construction, working, characteristics, applications.

Numerical examples wherever applicable.

Unit-II: **13 Hours**

Op-Amp: Differential Amplifier, Block diagram of Op-Amp, Characteristics of an Ideal and Practical Op-Amp, Open and closed loop configuration, Frequency Response, CMRR, Slew Rate and concept of Virtual Ground.

Applications of op-amps: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative Study). Inverting and non- inverting amplifiers, Summing and Difference Amplifier, Differentiator, Integrator, Comparator and Zero-crossing detector.

Filters: First and Second order active Low pass, High pass and Band pass Butterworth filters.

Oscillators: Barkhausen criterion for sustained oscillations, Colpitt's oscillator and crystal oscillators using transistor, Phase Shift oscillator, Wien-bridge oscillator – (no derivation for each)

IC 555Timer: Introduction, Block diagram, Astable and Monostable multivibrator circuits. (Numerical Examples wherever applicable).

Unit-III: **13 Hours**

Logic Families: Pulse characteristics, Logic Families-classification of digital ICs. Characteristics of logic families, circuit description of TTL NAND gate with totem pole and open collector. TTL IC terminology. CMOS NAND, Comparison of TTL and CMOS families.

Combinational Logic Circuits: SOP and POS, Minterm, Maxterm, SSOP, SPOS, Simplification of Boolean expressions using K-Map for 3 and 4 variables. Half Adder, Full Adder, Half Subtractor, Full Subtractor. 4-bit parallel binary adder, 2-bit and 4-bit magnitude comparator. Encoder, decimal to BCD priority encoder. Decoder, 2:4 decoder using AND gates, 3:8 decoder using NAND gates, BCD to decimal decoder, BCD to 7-Segment decoder, Multiplexer - 4:1 and 8:1 multiplexer, Demultiplexer - 1:4 and 1:8 demultiplexer (logic diagram and truth table of each), Realization of Full adder and Full Subtractor using Mux and Decoder.

Digital to Analog Converter: DAC with binary weighted resistor and R-2R resistor ladder

Unit-IV: **13 Hours**

Sequential Logic Circuits: Flip-Flops - SR Latch, Level and Edge Triggered concept, Clocked RS, D, JK and T Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master- Slave JK Flip-Flops. Applications of Flip-Flops in semiconductor memories, RAM, ROM and types.

Registers and Counters: Types of Shift Registers (up to 4-bits), its applications. Ring counter, Johnson counter applications. Asynchronous Counters: Logic diagram, Truth table

and timing diagrams of 4-bit ripple counter, modulo-n counters, 4-bit Up-Down counter, Synchronous Counter: 4-bit counter, Design of Mod 3, Mod 5 and decade Counters using K-maps.

A to D Converters: Characteristics, Successive approximation method, IC ADC 0804

Text Books:

1. R S Sedha, "A Text book of Applied Electronics", 7th edn., S Chand and Company Ltd., 2011
2. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia, 1994
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edn., Prentice Hall., 2000

Reference:

1. Robert L Boylestad, "Introductory circuit analysis", 5th edition., Universal Book 2003.
2. Electronic Devices Conventional Current Version by Thomas L. Floyd, 10th edition, Pearson, 2018
3. David A. Bell "Electronic Devices and Circuits", 5th Edition, Oxford Univesity Press, 2015
4. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, Oxford University Press. 2011,
5. Digital Principles and Applications, A.P. Malvino, D P Leach and Saha, 7th Edition, TMH, 2011.
6. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, PHI Learning Pvt. Ltd. 2009
7. Digital Circuits and Systems, K R Venugopal and K Shyla, Tata McGraw Hill, 2011
8. Digital Circuits and systems, Venugopal, Tata McGraw Hill. 2011
9. Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, PHI Learning. 2001
10. Digital Principles, Schaum's Outline Series, R. L. Tokheim, TMH., 1994
11. Digital Electronics, S.K. Mandal, 1st Edition, McGraw Hill., 2010.

Course Code : BS2-CS-CT2 Discipline Core 2 Theory

Title : DATA STRUCTURES

Lecture Hours : 52 Internal Marks : 40 Exam Marks : 60 Credits: 3

Course Description: Data Structure is one of the fundamentalunderstanding of programming and application development. Student is expected to worktowards a sound theoretical understanding of Data Structures and also compliment the same with hands on implementing experience.

Course Objectives: To be able to practically implement the data structures like stack, queue, array etc. Tounderstand and implement different searching and sorting techniques.

Course Outcomes (Cos): Understand the need for Data Structures when building application. Appreciate the need foroptimized algorithm. Able to walk through insert and delete for different dat structures. Ability to calculate and measure efficiency of code .Improve programming skills.

Unit-I: 13Hours

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matricesand Sparse matrices

Unit-III: 13Hours

Linked list: Definition, Representation of Singly Linked List in memory,Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list. Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack.

Queues: Definition, Array representation of queue, Linked list representation of queues. Types of queue: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues.

Unit-III: 13Hours

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, Lexicographic Search Trees: Tries, External Searching: B-Trees, Applications of Trees. Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, TopologicalSorting

Unit-IV: 13Hours

Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, Divide And Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: Sparse Tables, Choosing a Hash function, Collision Resolution with Open Addressing, Collision Resolution by Chaining.

Text Books:

1. Seymour Lipschutz, “Data Structures with C”, Schaum’soutLines, Tata McGraw Hill, 2011.
2. Robert Kruse, C.L.Tondo, Bruce Leung,ShashiMogalla,“Data Structures and Program

Course Code : BS2-MT-CT2 MATHEMATICS-CT2

Title : Algebra - II and Calculus - II

Total No. of Teaching Hours: 52 **No. of Hours per Week : 4**

Internal Marks : 40 **Exam Marks : 60** **Credits: 4**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Objectives:

To evaluate the area, volume using the techniques of integration. To introduce students to basic concepts of group theory and examples of group and their properties. To understand and use the terms homomorphism and isomorphism, definition and properties of cosets and normal subgroup

Course Outcomes (Cos): This course will enable the students to

- Recognize the mathematical objects called Groups.
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Explain the significance of the notions of cosets, normal subgroups and factor groups.
- Learn the quotient groups, concepts of homomorphism, isomorphism and propertiesrelated to isomorphism.
- Learn solve problems related to angle between radius vector and tangent, angle betweentwo curves.
- Learn expressing the curves in pedal form, derivative of an arc
- Learn the center of curvature, asymptotes, evolutes and envelops of the given curve
- Learn the reduction formulae
- Learn to find length of an arc, area of plane curves and surface area, volume ofrevolution

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

PO 1	Disciplinary Knowledge: Bachelor degree in Mathematics is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas.
PO 2	Communication Skills: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in thisprogram will lead to the proficiency in analytical reasoning whichcan be used for modeling and solving of real life problems.
PO 3	Critical thinking and analytical reasoning: The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.
PO 4	Problem Solving: The Mathematical knowledge gained by the students through this programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students overall development
PO 5	Research related skills: The completing this programme develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.
PO 6	Information/digital Literacy: The completion of this programme will enable the learner to use appropriate softwares to solve system of algebraic equations and differential equations.
PO 7	Self – directed learning: The student completing this program will develop an ability of working independently and to make an in-depthstudy of various notions of Mathematics.

PO 8	Moral and ethical awareness/reasoning: The student completing this program will develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and Mathematical studies in general.
PO 9	Lifelong learning: This programme provides self directed learning andlifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real world problems.
PO 10	Ability to peruse advanced studies and research in pure andapplied Mathematical sciences.

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X	X	X					X	
CO2									
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Unit-I: 13 Hours

Groups-I-Definition o f a group with examples and properties, congruence, problems. Subgroups, center of groups, order of an element of a groupand its related theorems, cyclic groups, Coset decomposition, Factor groups, Lagrange's theorem and itsconsequences. Fermat's theorem and Euler's ϕ function.

Unit-II: 13 Hours

Groups-II-Normal Subgroups-Examples & Problems –Quotient group- Homomorphism & Isomorphism of groups – kernel & image of a homomorphism – Normality of the kernel –Fundamental theorem of homomorphism – Properties related to isomorphism – Permutation group – Cayley's Theorem.

Unit-III: 13 Hours

Polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polarforms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature, asymptotes, evolutes and envelopes

Unit-IV: 13 Hours

Integral Calculus: Recapitulation of definite integrals and its properties. Reduction formulae- $\int sin^n x\,dx$, $\int cos^n x\,dx$, $\int sin^m x\,cos^n x\,dx$ $\int_0^{\frac{\pi}{2}} sin^n x\,dx$, $\int_0^{\frac{\pi}{2}} cos^n x\,dx$, $\int_0^{\frac{\pi}{2}} sin^n x\,cos^n x\,dx$ problems, computation of length of an arc , Area of plane curves, surface area and volume of revolution inCartesian and polar forms.

Reference Books:

1. Elements of Number Theory; I. M. Vinogradov.
2. Differential Calculus, Shanti Narayan, S. Chand & Company, NewDelhi.
3. Integral Calculus, Shanti Narayan and PK Mittal, S. Chand and Co. Pvt. Ltd.,
4. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA:Mc. Graw Hill.,2008.
5. Mathematical Analysis, S C Malik, WileyEastern
6. A Course in Abstract Algebra, Vijay K Khanna andS K Bhambri,Vikas Publications.

Course BS2-PHY-CT2	Subject: Physics-CT2	
Title: Electricity and Magnetism		
Total No. of Teaching Hours: 52	No. of Hours per Week : 4	
Internal Marks : 40	Exam Marks : 60	Credits: 4

Pedagogy: Classrooms lecture, Problem Solving, Case studies, Group discussion, Seminar & field work etc.,

Course Description:

This course, provides an introduction to the basic concepts of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials.
introduces students to understanding concepts of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials using mathematical tools.

Course Objectives:

To understand the different physical processes of nature in terms of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials

Course Outcomes (Cos):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Understanding the difference between simple and tensional pendulum and their use in the determination of various physical parameters.
5. Knowledge of how various elastic moduli can be determined.
6. Measuring surface tension and viscosity and appreciate the methods adopted.
7. Hands on experience of different equipment's.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X								
CO2		X							
CO3	X								
CO4					X				
CO5	X								
CO6	X								
CO7	X								
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding programe out comes whose attainment is attempted in this course. Mark=X'I n the intersectioncel lif a course outcome addresses a particular program outcome.

Unit-I:	**13 Hours**

Chapter No. 1 : Electric charge and field
Coulomb's law, electric field strength, electric field lines, point charge in an electric field and electric dipole, work done by a charge (derivation of the expression for potential energy)
Chapter No. 2 : Gauss law Gauss's law and its applications - electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge3 hr

Chapter No. 3: Electrostatic potential Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and distribution of charges (Examples: potential associated with a spherical charge distribution, infinite line charge distribution, infinite plane sheet of charges). Constant potential surfaces, Potential due to a dipole and electric quadrupole.

Unit-II:	**13 Hours**

Chapter No. 4: Conductors in electrostatic field
Conductors and insulators, conductors in electric field -Capacitance and capacitors, expression for capacitance in a parallel plate capacitor, parallel plate capacitor with dielectric, Dielectrics: an atomic view. Energy stored in a capacitor, Dielectric and Gauss's law.
Chapter No. 5: DC currents Electric currents and current density. Electrical conductivity and Ohm's law (Review). Network theorems (Thevenin's theorem, Superposition theorem and the maximum power transfer theorem), Transient currents inRC, LR and LCR circuits.

Unit-III: 13 Hours

Chapter No.6 : Magnetism definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor, Lorentz force, Hall effect in a conductor.
Electromagnetic induction, Faradays laws of induction, Lenz's law, expression for self-inductance and energy stored in a magnetic field. Mutual inductance. conducting rod moving in a magnetic field.
Chapter No .7: AC circuits RMS and average value of AC, Response of series RL, RC, LCR circuits using j-operator method, Quality factor, admittance and impedance, power and energy in AC circuits

Unit-IV: 13 Hours

Chapter No. 8: Electromagnetic waves equation of continuity, Maxwell's equations, displacement current, equation for propagation of electromagnetic wave, transverse nature of electromagnetic wave, energy transported by electromagnetic waves. Poynting vector, magnetic moment of a point charge moving in a circular loop, electric current in atoms, electron spin and magnetic moment.

Chapter No. 9 : Magnetic materials magnetic intensity and magnetic induction, Intensity of magnetization, Susceptibility, Permeability, Types of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials. Classical Langevin's theory of diamagnetism, B-H hysteresis curves, Hard and soft magnetic materials.

Text Books:

Sl.No	Title of the Book	Author(s)	Publisher	Year of Publications
1	Physics-Part-II,	David Halliday and Robert Resnick	Wiley Eastern Limited	2001
2	Berkeley Physics Course, Vol-2, Electricity and Magnetism, Special Edition	Edward M Purcell	Tata Mc Graw-Hill Publishing Company Ltd, New Delhi	2008

Reference:

Sl.No	Title of the Book	Author(s)	Publisher	Year of Publication
1	Principles of Physics	David Halliday, Jearl Walker & Robert Resnick	Wiley India Pvt Ltd.	2010
2	Physics (8th Edition)	David Halliday, & Robert Resnick	Wiley India Pvt Ltd.	2008

Course – BS2-BT-C2-P **BOTANY-CP2**

Title : Diversity of non-flowering plants

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Pedagogy: Classrooms lecture, participatory learning, Assignments, Field and laboratory visit, Group discussion, Seminar & Specimen collection.

Course Description: Study of Cyanobacteria, Algae and Algal cultivation. General study of cryptogams distribution, morphology, Anatomy and Reproduction.

Course Objectives:

Study of economic importance of Algae & Gymnosperms. Knowledge about fossil studies through geological time scale.

Course Outcomes (Cos):

Awareness about the economic importance of Cyanobacteria, Algae and Gymnosperms

Importance of Pteridophytes and evolution of angiosperm plants.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	Identification of lower forms, economic importance of algae & gymnosperms	Distribution of lower forms, fossil members and evolution of angiosperms							
CO2	Cultivation of microbial algae & its importance	Importance of types of fossils and geological time scale							
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

List of Experiments

Practical-1: Study of morphology, classification, reproduction and lifecycle of

Nostoc/Oscillatoria.

Practical-2: Study of morphology, classification, reproduction and life-cycle of

*Oedogonium & Chara,*Sargassum, *Batrachospermum/ Polysiphonia*.

Practical-3: Study of morphology, classification, reproduction and life-

cycle of *Riccia & Anthoceros.*

Practical-4: Study of morphology, classification, anatomy, reproduction and life-cycle of *Selaginella and Equisetum.*

Practical -5: Study of morphology, classification, anatomy, reproduction and life-cycle of *Pteris, Azolla..*

Practical -6: Study of morphology, classification, anatomy and reproduction in *Cycas*. **Practical -7:** Study of morphology, classification & anatomy, reproduction in *Pinus*. **Practical -8:** Study of morphology, classification & anatomy, reproduction in *Gnetum*. **Practical -9:** Study of imporratnt blue green algae causing water blooms in the lakes.

Practical -10: Study of different methods of cultivation of ferns in a nursery.

Practical -11: Preparation of natural media and cultivation of *Azolla* in artificial ponds.

Practical -12: Media preparation and cultivation of *Spirulina*.

Practical -13: Study different algal products and fossils impressions and slides.

Practical-14: Visit to algal cultivation units/lakes with algal blooms/Fern house/ Nurseries/Geology museum/lab to study plantfossils.

(Note: Botanical study tour to a floristic rich area for 1-2 days and submission of study report is compulsory

Course Code : BS2-ZO-C2-P ZOOLOGY-CP2

Title : Biochemistry and Physiology

Total No. of Teaching Hours: 56 No. of Hours per Week : 4

Internal Marks : 25 Exam Marks : 25 Credits: 2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honors) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

Course Objectives:

At the end of the course the student should be able to understand:

- Basic structure of biomolecules through model making.
- Develop the skills to identify different types of blood cells.
- Enhance basic laboratory skill like keen observation, analysis and discussion. Learn the functional attributes of biomolecules in animal body.
- Know uniqueness of enzymes in animal body and their importance through enzyme kinetics.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	I Core competency	II Critical thinking	III Analytical reasoning	IV Research skills	V Team work				
CO2	X	X	X	X	X				
CO3									
CO4									
CO5									
CO6									
CO7									
CO8									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

List of Experiments

List of experiments to be conducted	Hours
1. Preparation of models of nitrogenous bases- nucleosides and nucleotides. 2. Preparation of models of amino acids and dipeptides. 3. Preparation of models of DNA and RNA. 4. Qualitative analysis of Carbohydrates, Proteins and Lipids. 5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid. 6. Separation of amino acids or proteins by paper chromatography.	20
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of Km and V max. 8. Determination of the activity of enzyme (Urease) - Effect of temperature and time. 9. Action of salivary amylase under optimum conditions. 10. Quantitative estimation of Oxygen consumption by fresh water Crab/fish. 11. Quantitative estimation of salt gain and salt loss by fresh watercrab/fish.	15
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.	15
13. Counting of RBC in blood using Hemocytometer. 14. Counting of WBC in blood using Hemocytometer. 15. Differential staining of human blood corpuscles using Leishman stain. 16. Recording of blood glucose level by using glucometer.	
Virtual Labs (Suggestive sites) https://www.vlab.co.in https://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlab www.onlinelabs.inwww.powershow.com https://vlab.amrita.edu https://sites.dartmouth.edu	06

Course Code : BS2-CH-C2-P CHEMISTRY-CP2

Title :Practical-II

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

To prepare standard solutions.
Techniques like precipitation, filtration, drying and ignition.
Various titrimetric techniques and gravimetric methods.
Calculation on basis of mole concept and stoichiometry.
Course Objectives:

1. **To strengthen the concepts of mole and stoichiometry.**
2. **To develop analytical skills of determination through titrimetry and Gravimetry.**
3. **To learn various techniques for the measurement of viscosity, surface tension and refractive index**
4. **To study the effect of concentration on viscosity and surface tension**
5. **To determine the composition of a liquid mixture by Refractometry**
6. **To calibrate and operate Abbe's Refractometer**
7. **To understand the concept of distribution coefficient and Nernst Distribution law**

Course Outcomes (Cos):

1. **Determine the density of liquids**
2. **Understand how viscosity and surface tension of liquids vary with concentrations**
3. **Determine the percentage composition of liquid mixtures using Abbe's Refractometer.**
4. **Explain the concept of distribution coefficient, and dissociation in a layer.**
5. **Describe the conditions required for liquefaction of gases**
6. **Understand cooling effect of gas on adiabatic expansion**
7. **Explain properties of liquids in terms of intermolecular attraction**

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	X		X		X	X			
CO2	X							X	
CO3	X		x		X		x		
CO4	X	X							
CO5	X								
CO6	X			X			X	X	
CO7	X					X			
CO8	X								

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

List of Experiments

PART-A Analytical Chemistry 4 hrs/batch

List of Experiments:

TITRIMETRY

Estimation of carbonate and hydroxide present in a mixture.

Estimation of oxalic acid and sodium oxalate in a given mixture using standard KMnO4/NaOH solution.

Standardization of potassium permanganate solution and estimation of nitrite in a water sample.

Standardization of EDTA solution and estimation of hardness of water.

GRAVIMETRY

Determination of Ba2+ as BaSO4.

Estimation of Ni2+ as Ni(DMG)2 complex.

Determination of Cu2+ as CuSCN.

Estimation of Fe2+ as Fe2O3.

PART - B Physical Chemistry

Safety practices in the chemistry laboratory, knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glasswares.

Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (ethyl acetate, toluene, chlorobenzene or any other non-hazardous liquids).

Study of the variation of viscosity of sucrose solution with the concentration of a solute

Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (ethyl acetate, toluene, chlorobenzene or any other non-hazardous liquids).

Determination of molar mass of non-electrolyte by Walker-Lumsden method.

Determination of specific and molar refraction by Abbes Refractometer (ethyl acetate, methyl acetate, ethylene chloride).

Determination of the composition of liquid mixture by refractometry (toluene & alcohol, water & sucrose).

Determination of partition/distribution coefficient - i) Acetic acid in water and cyclohexane. ii) Acetic acid in water and butanol iii) Benzoic acid in water and toluene.

Reference books

1. **Mendham, J., A. I. Vogel's Quantitative Chemical Analysis Sixth Edition, Pearson, 2009.**
2. **Svehala G. and Sivasankar I. B, Vogel's Qualitative Inorganic Analysis, Pearson, India, 2012.**
3. **Practical Volumetric Analysis, Peter A C McPherson, Royal Society of Chemistry, Cambridge, UK (2015).**
4. **Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).**
5. **Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).**
6. **Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).**
7. **Athawale V. D. amd Mathur P. Experimental Physical Chemistry, New Age International (2001)**

Course Code: BS2-EL-C2-P **Subject:** ELECTRONICS –CP2

Title : ANALOG AND DIGITAL ELECTRONICS - Lab

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**

Internal Marks : 25 **Exam Marks : 25** **Credits: 2**

Pedagogy: Problem Solving , Case studies, Seminar and using simulation tools

Course Description:

- Theory regarding Analog and Digital electronic Circuit

Course Objectives:

- To illustrate the students different electronic circuit and their application in practice.
- To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
- To evaluate the use of computer-based analysis tools to review performance of semiconductor device circuit.

Course Outcomes (Cos):

At the end of the course the student should be able to:

- Identify relevant information to supplement to the Analog Electronic Circuit.
- Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.
- Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions.
- Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.
- Practice different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.
- Prepare professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data analysis and synthesis methods, Mathematical software and word-processing tools.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

Course Outcomes (COs)	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1									
CO2	x								
CO3	x								
CO4									
CO5	x								
CO6									
CO7									
CO8									

List of Experiments

BS2-EL-CP2- ANALOG AND DIGITAL ELECTRONICS – Lab

(Hardware implementation and Analysis of Circuit using Simulation Software)

(Any TEN Experiments)

1. Study of JFET/MOSFET characteristics – determination of parameters.

2. Study of single stage JFET amplifier. (Frequency response and band width)
3. UJT characteristics and relaxation oscillator
4. SCR characteristics – determination of I_H and firing voltage for different gate currents.
5. Design of inverting and non-inverting amplifier using Op-amp & study of frequencyresponse.
6. Op-amp inverting and non-inverting adder, subtractor and averaging amplifier.
7. Study of the zero-crossing detector and comparator.
8. Design and study of differentiator and integrator using op-amp for different inputwaveforms.
9. Design and study of Wien bridge and RC phase shift oscillator using op-amp.
10. Design and study of first order high-pass and low-pass filters using op-amp.
11. Study of Colpitt's and crystal oscillator using transistor.
12. Astable multivibrator using IC - 555 timer.
13. Monostable multivibrator using IC-555 timer.
14. Half Adder and Full Adder using (a) logic gates (b) using only NAND gates.
15. Half Subtractor and Full Subtractor (a) logic gates (b) using only NAND gates.
16. 4-bit parallel binary adder and Subtractor using IC7485.
17. Study of BCD to decimal decoder using IC7447
18. Study of the Encoders and priority encoders.
19. Study of Multiplexer and Demultiplexer using ICs.
20. Study of 2-bit and 4-bit magnitude comparators.
21. Study of Clocked RS, D and JK Flip-Flops using NAND gates.
22. Study of 4-bit asynchronous counter using JK Flip-Flop IC7476, modify to decade counter and study their timing diagrams.
23. Study of 4-bit Shift Register – SISO, modification to ring counter using IC 7495.
24. Digital to Analog converter using binary weighted resistor method, determination ofresolution, accuracy and linearity error.

Course Code : BS2-CS-CP2 **Discipline Core 2 PRACTICAL**

Total No. of Teaching Hours: 42 **No. of Hours per Week : 4**
Internal Marks : 25 **Exam Marks : 25**

Course Objectives/Course Description

The course is designed to provide a practical exposure to the students.

Learning Outcome

Upon completion of the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.

NOTE: For all the programs write the output, flowchart and number of basicoperations performed.

1. Given {4,7,3,2,1,7,9,0} find the location of 7 using Linear and Binary search and alsodisplay its first occurrence.
2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Bubble Sort Algorithm
3. Perform the Insertion and Selection Sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order.
4. Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
5. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from the list. Display your list after each insertion and deletion.
6. Write a program to insert the elements {61,16,8,27} into circular queue and delete4 elements from the list. Display your list after each insertion and deletion.
7. Write a program to insert the elements {61,16,8,27} into ordered singly linked list and delete 8,61,27from the list. Display your list after each insertion and deletion.
8. Write a program to add 6x3+10x2+0x+5 and 4x2+2x+1 using linked list.
9. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers.
10. Write a recursive program to find GCD of 4,6,8.
11. Write a program to inert the elements {5,7,0,6,3,9} into circular queue anddelete 6,9&5 from it(using linked list implementation).
12. Write a program to convert an infix expression x^y/(5*z)+2 to its postfix expression
13. Write a program to evaluate a postfix expression 5 3+8 2 - *.
14. Write a program to create a binary tree with the elements {18,15,40,50,30,17,41} after creation insert 45and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation
15. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform in order, preorder and post order traversal.
16. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}
17. Given S1={“Flowers”} ; S2={“are beautiful”} I. Find the length of S1 II. Concatenate S1 and S2 III.Extract the substring “low” from S1 IV. Find “are” in S2and replace it with “is

Course Code : BS2-MT-CP2 MATHEMATICS-CP2

Title : Algebra - II and Calculus - II

Total No. of Teaching Hours: 42 No. of Hours per Week : 4

Internal Marks : 25 Exam Marks : 25 Credits: 2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Outcomes (Cos): This course will enable the students to

- Learn Free and Open Source Software (FOSS) tools for computer programming
- Solve problems on algebra and calculus by using FOSS.
- Acquire knowledge of applications of algebra and calculusthrough FOSSPractical/Lab Work to performed in Computer Lab.

List of Experiments

Practicals-II

1. Program to construct Cayley's table and test commutatively for a given finite set.
2. Program to find all possible cosets of the given finite group.
3. Program to find generators and corresponding possible subgroups of a cyclic group.
4. Program to verify Lagrange's theorem with suitable examples.
5. Program to verify Euler's ϕ Function for a given finite group.
6. Program to verify the given function is homomorphism and isomorphism.
7. Finding the angle between the radius vector and tangent.
8. Finding the angle between two curves.
9. Finding the radius of curvature of the given curve.
10. Program to solve problems using reduction formulae.
11. Program to compute surface area.
12. Program to compute volume of revolution.

Course Code BS1-PH-CP2	Subject (Physics Practicals)	
Title: II Semester B.Sc.		
Total No. of Teaching Hours: 42	No. of Hours per Week : 4	
Internal Marks : 25	Exam Marks : 25	Credits:2

Pedagogy: Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:

This course, provides an introduction to the basic concepts of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials.

introduces students to understanding concepts of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials using mathematical tools.

Course Objectives:

To conduct and analyze the results form experimental data of Electric charge and field, Magnetism, Electromagnetic waves and Magnetic materials

Course Outcomes (Cos):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Measuring surface tension and viscosity and appreciate the methods adopted.
5. Hands on experience of different equipment's.

List of Experiments

Verification of Superposition theorem.
Verification of Maximum power transfer theorem
Verification of Thevenin's theorem
Determination of L and C by equal voltage method
Determination of high resistance by leakage method using BG
Determination of mutual inductance using a Ballistic galvanometer.
Charging and discharging of a capacitor (energy dissipated during charging and time constant measurement).
Frequency response of LCR Series resonance circuit
Frequency response of LCR Parallel resonance circuit
Impedance of series RC circuits - determination of frequency of AC.
Identification and measurement of L, C and R elements in a black box
Determination of self-inductance of a coil using Anderson's bridge
Verification of laws of combination of capacitances using de-Sauty's bridge
Determination of inductance using Maxwell's impedance bridge
Determination of B_H using Helmholtz double coil galvanometer.

Note: Minimum of EIGHT experiments to be carried out

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