

THE NATIONAL COLLEGE BASAVANAGUDI, BENGALURU- 04 AUTONOMOUS Website: www.ncbgudi.com

E-Mail: nationalbgudiautonomous@gmail.com

Bachelor of Science B.Sc Regulations, Scheme & Syllabi

Semesters I to VI

Revised w.e.f.

Academic Year 2019-2020 and onwards

NCB - B.Sc(CBZ/PCM/PME/PMCs) Syllabus

1. Eligibility:

A candidate who has passed the two year Pre-University Examination conducted by the Karnataka Pre-University Education Board or any other examination considered as equivalent thereto or JODC / Three years Diploma in Engineering of Government of Karnataka or any other examination considered as equivalent thereto shall be eligible for admission.

2. Maximum period for completion of the programmes:

The candidate shall complete the programme within the period as prescribed in the regulation governing the maximum period for completing various degree programmes from the date of admission. It is generally twice the number of years of the programme. The term completing the programme means passing all the prescribed examinations of the programme to become eligible for the degree.

3. Medium of instruction:

The medium of instruction and examination shall be English.

4. Attendance:

A candidate shall be considered to have satisfied the requirement of attendance for a semester if she **attends not less than 75%** of the number of classes actually held up to the end of the semester in each of the subjects. If a candidate represents the Institution/State/Nation in sports/N.S.S./N.C.C./cultural or any officially sponsored activities he/she may be permitted to claim attendance for actual number of days participated, based on the recommendation of the Principal.

5. Continuous Internal Assessment (CIA):

(i) Core Course (Subjects with Practicals):

The break-up of marks for subjects is as follows:

Theory End Semester Examination of duration3 hours = 70 marks

Theory CIA =30 marks

Theory CIA of 30 marks comprises of **one test conducted for 1 ½ hours for 30 marks, scaled down to 15 marks, assignment or project = 10 marks, attendance = 5 marks.**

Practical End Semester Examination, duration **3 hours = 35 marks**

Practical CIA =15 marks(tests or pre-final = 10 marks, and attendance = 5 marks)

Practical ESE and CIA marking scheme will be decided by the respective Departments and approved by the Board of Studies.

(ii) <u>Marks for attendance:</u>

96 % and above = 5 marks , 91 – 95% = 4 marks , 86 – 90 % = 3 marks 81 – 85 % = 2 marks , 76 – 80% = 1 mark

- A candidate with 75% attendance is permitted to take up the End Semester Examination, but will not be given any marks for attendance.
- The marks of the Continuous Internal Assessment shall be published in the notice board/student portal of the college for information of the students.
- The Continuous Internal Assessment marks shall be communicated to the Controller of Examinations at least 10 days before the commencement of the End Semester Examinations and the Controller shall have access to the records of such periodical assessments.
- Continuous Internal Assessment marks shall be shown separately in the marks card. A candidate who has failed in a particular Semester shall retain the original marks.

6. End Semester Examination:

Notification for the End Semester Examination will be issued 30 days before the commencement of the examination.

Students are required to pay the prescribed fee and submit the application form at the office of the Controller of Examinations (COE) within the dates notified.

Students, who do not pay the prescribed end semester examination fee for any semester, shall repeat the semester.

A student who has failed in a subject can attempt the same 3 times.

Practical examination will be conducted before the commencement of the theory examination.

7. Results:

Provisional Results of each semester will be announced within Ten days after the completion of the examinations.

Semester Marks Cards will be issued within 15 days of the announcement of results.

Request for Re-valuation should be made within 5 days from the date of declaration of result along with the fee notified by the Controller of Examinations.

8. Declaration of Results:

Minimum to pass overall 40%:

Theory:24/70Internal Assessment: 11/30Practicals:13/35Internal Assessment 5/15

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

B.Sc Programme Specífíc Outcome

The B.Sc CBZ Programme enables students to:

- 1. Explain basic concepts of Thermodynamics, quantum mechanics, chemical bonding.
- 2. Explain concepts related to cell biology, biochemistry, taxonomy, immunology, parasitology, genetics, physiology, biotechnology and ecology.
- 3. Perform procedures as per laboratory standards in the important areas of Chemistry, Botany & Zoology.
- 4. Add value to the research base in the Life Sciences.
- 5. Understand the value of the environment and become green ambassadors.

The B.Sc. PCM Programme enables students to:

- 1. Demonstrate an understanding of core theories and principles of Physics Chemistry, Mathematics.
- 2. Engage in current discussions of advanced topics in Physical and Applied Sciences.
- 3. Discuss the importance of a research based Mathematical programme.
- 4. Take up higher education and become researchers as well as teachers of Science which is the need of the country today.
- 5. Contribute to the knowledge base of Science by being innovative having been exposed to the recent developments in the field of science.
- 6. Exhibit a scientific temperament which is the chief objective of this institution.

The B.Sc. PMCs programme enables students to:

- 1. Demonstrate an understanding of core theories and principles of Physics , Mathematics, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.
- 2. Engage in current discussions of advanced topics in Physical and Applied Sciences. Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.
- 3. Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.
- 4. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the

public health and safety, and the cultural, societal, and environmental considerations.

5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The B.Sc. PME Programme enables students to:

- 1. Understanding the working of basictopics like transistors, FETs, Power Devices, Op-amp, digital circuits and Signals and systems.
- 2. Understanding various communication Systems like analog, digital, pulse, microwave, optical fibers, Cellular communication and satellite communication system.
- 3. Understanding research topics like MEMS technology and Thin Film technology.
- 4. Analyze of the applications of microcontroller, PLD's, CPLD and FPGA.
- 5. Analyze the programming languages like Assembly, C, embedded C, Verilog and MATLab.
- 6. Perform procedures as per laboratory standards in the areas like Basic devices, digital circuits, microcontroller, analog communication systems, digital and pulse communication systems, microwave and optical fiber communication systems.
- 7. Programs based on various languages using tools like Turbo C++, Keil, Xilinx, MATLab are performed as per the laboratory standards.
- 8. Understanding the applications of electronics in the field of Agriculture, Avionics, biomedical instrumentation, Control systems, DSP, image processing, Hardware designing, VLSI, MEMS, thin film, Nano and NEMS technology.

The National College, Autonomous, Basavanagudi, Bengaluru-)4
--	----

B.SC LOURSE MATRIX													
	First Semester B.Sc												
Dout	Codo	Course(Euclideat)	Hours		Marks		Credite						
Part	Code	Course(Subject)	Hours	IA	Exam	Total	creatts						
	LBSK-C1	Kannada-I											
	LBSH-C1	Hindi-I	4	20	70	100	2						
Part-1	LBSS-C1	Sanskrit-I	4	30 /(30	30	30 7	30	30	30	70	100	2
	LBSA-C1	Additional English-I											
	LBSE-C1	English-I	4	30	70	100	2						
	BOT-C1	Botany-I	4	30	70	100	4						
	Z00-C1	Zoology-I	4	30	70	100	4						
	CHE-C1	Chemistry-I											
	ELE-C1	Electronics-I	4	30	70	100	4						
	CS-C1	Computer Science-I											
	MAT-C1	Mathematics-I	4	30	70	100	4						
	PHY-C1	Physics-I	4	30	70	100	4						
Part-2	BOT-P1	Botany Lab -I	3	15	35	50	1						
	Z00-P1	Zoology Lab -I	3	15	35	50	1						
	CHE-P1	Chemistry Lab -I			35								
	ELE-P1	Electronics Lab -I	3	15		50	1						
	CS-P1	Computer Science Lab -I											
	MAT-P1	Mathematics Lab -I	3	15	35	50	1						
	PHY-P1	Physics Lab –I	3	15	35	50	1						
Part-3	BSMC-C1	Computer Applications & Information Technology	4	30	70	100	2						
	BSMC-P1	Computer Applications & Information Technology - LAB	3	15	35	50	1						
		Total Marks & Credits		240	560	800	22						
	P	art-1 and Part-3 are commo	n for all	combi	inations								
		Part-2 Program c	ombinat	ion									
CB	Z Chemis	stry-I , Botany-I , Zoology-I											
	Chemis	try Lab-I , Botany Lab -I , Zo	ology La	b -I ,									
PCN	1 Physics	s-I , Chemistry-I , Mathemati	cs-I										
	Physics	s Lab -I , Chemistry Lab -I , M	athemat	tics Lab	- I,								
PM	E Physics	s-I , Mathematics-I , Electron	ics-I										
	Physics	Lab -I , Mathematics Lab -I	, Electro	nics La	b-I,								
PMC	S Physics	s-I, Mathematics-I, Comput	er Scien	ce-I									
	Physics	Physics Lab -I, Mathematics Lab -I, Computer Science Lab -I.											

The National College, Autonomous, Basavanagudi,Bengaluru-04								
	Second Semester B.Sc							
Dort	Codo	Course (Subject)	Hours		Marks		Cradita	
Part	Code	Course(Subject)	Hours	IA	Exam	Total	creatts	
	LBSK-C2	Kannada-II						
	LBSH-C2	Hindi-II	4	20	70	100	2	
Part-1	LBSS-C2	Sanskrit-II	4	30	70	100	Z	
	LBSA-C2	Additional English-II						
	LBSE-C2	English-II	4	30	70	100	2	
	BOT-C2	Botany-II	4	30	70	100	4	
	Z00-C2	Zoology-II	4	30	70	100	4	
	CHE-C2	Chemistry-II						
	ELE-C2	Electronics-II	4	30	70	100	4	
	CS-C2	Computer Science-II						
	MAT-C2	Mathematics-II	4	30	70	100	4	
Dout 2	PHY-C2	Physics-II	4	30	70	100	4	
rart-2	BOT-P2	Botany Lab -II	3	15	35	50	1	
	ZOO-P2	Zoology Lab -II	3	15	35	50	1	
	CHE-P2	Chemistry Lab -II						
	ELE-P2	Electronics Lab -II	3	15	35	50	1	
	CS-P2	Computer Science Lab -II						
	MAT-P2	Mathematics Lab -II	3	15	35	50	1	
	PHY-P2	Physics Lab –II	3	15	35	50	1	
Part-3	BSMC2	Indian Constitution &	4	30	70	100	2	
Ture 5	Human Rights 70 100 2							
Total Marks & Credits 225 525 750 26								
	Pa	Irt-1 and Part-3 are common	IOF all	combii	lations			
CD7	Chamistary	Part-2 Program col	moinatio	on				
CDZ	Chemistry	II, Dotally-II, 20010gy-II Lab-II, Botany Lab-II, Zoolo	ov I ah -	п				
РСМ	Physics-II	Chemistry-II Mathematics-	II					
I CIVI	Physics Lal	o -II . Chemistry Lab -II . Mat	nematics	s Lab -I	I			
РМЕ	Physics-II.	Mathematics-II . Electronics	-II					
	Physics Lab	-II , Mathematics Lab -II , El	ectronic	s Lab -	II			
PMCS	Physics-II,	Mathematics-II, Computer	Science-	II				
	Physics Lab	o -II , Mathematics Lab -II , C	ompute	r Scien	ce Lab -I	I		

C3	Third SemesteCourse(Subject)Kannada-IIIHindi-IIIHindi-IIISanskrit-IIISanskrit-IIIAdditional English-IIIEnglish-IIIBotany-IIIZoology-IIIChemistry-IIIElectronics-IIIComputer Science-IIIMathematics-IIIPhysics-IIIBotany Lab -IIIZoology Lab -III	er B.Sc Hours 4 4 4 4 4 4 4 4 4 4 4 2	IA 30 30 30 30 30 30 30	Marks Exam 70 70 70 70 70 70 70	Total 100 100 100 100 100	Credits 2 2 4 4 4
de a C3 a C3 a C3 a -C3 a -C3 a C3 a P3 a P3 a P3 a	Course(Subject) Kannada-III Hindi-III Sanskrit-III Additional English-III English-III Botany-III Coology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	Hours 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	IA 30 30 30 30 30 30 30 30 30 30 30 30 30	Marks Exam 70 70 70 70 70 70 70	Total 100 100 100 100 100 100 100	Credits 2 2 4 4 4
-C3 -C3 -C3 -C3 -C3 C3 C3 C3 C3 C3 C3 C3 C3 C3	Kannada-III Hindi-III Sanskrit-III Additional English-III English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 4 2	IA 30 30 30 30 30 30 30	Exam 70 70 70 70 70	Total 100 100 100 100 100 100 100	2 2 4 4 4
-C3 -C3 -C3 -C3 -C3 -C3 C3 P3 P3 P3 P3	Kannada-III Hindi-III Sanskrit-III Additional English-III English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 2	30 30 30 30 30 30	70 70 70 70 70	100 100 100 100 100	2 2 4 4 4
-C3 - -C3 - -C3 - C3 - P3 - P3 - P3 -	Hindi-III Sanskrit-III Additional English-III English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 4 2	30 30 30 30 30 30	70 70 70 70 70	100 100 100 100	2 2 4 4 4
-C3 -C3 C3 C3 C3 C3 C3 C3 P3 P3	Sanskrit-III Additional English-III English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 2	30 30 30 30 30 30	70 70 70 70	100 100 100 100	2 4 4 4
-C3 -C3 C3 C3 C3 C3 C3 C3 C3 C3 P3 P3 P3 P3 P3 P3 P3 P3 P3 P	Additional English-III English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 2	30 30 30 30 30 30	70 70 70 70	100 100 100 100	2 4 4 4
-C3 C3 C3 C3 C3 C3 C3 C3 C3 C3 P3 P3 P3 P3 P3 P3 P3 P3	English-III Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 4 3	30 30 30 30 30 30	70 70 70 70	100 100 100 100 100	2 4 4 4
C3 C	Botany-III Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 4 4 2	30 30 30 30 30	70 70 70	100 100 100	4 4 4
C3 C	Zoology-III Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 4 2	30 30 30	70 70	100 100	4
C3 C3 C3 C3 P3 P3 P3 P3 P3 P3 P3	Chemistry-III Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 3	30 30	70	100	4
C3 -C3 C3 P3 P3 P3 P3 P3	Electronics-III Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 4 3	30 30	70	100	4
3 -C3 C3 P3 P3 P3 P3 P3	Computer Science-III Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 3	30			
-C3 C3 P3 P3 P3 P3 P3	Mathematics-III Physics-III Botany Lab -III Zoology Lab -III	4 4 2	30			
C3 P3 P3 P3 P3 P3	Physics-III Botany Lab -III Zoology Lab -III	4		70	100	4
P3 P3 P3 P3	Botany Lab -III Zoology Lab -III	2	30	70	100	4
P3 P3 P3	Zoology Lab -III	3	15	35	50	1
P3 P3		3	15	35	50	1
P3	Chemistry Lab -III	3	15		50	
	Electronics Lab -III			35		1
3	Computer Science Lab -III					
- P3	Mathematics Lab -III	3	15	35	50	1
P3	Physics Lab –III	3	15	35	50	1
C-C3	Human Resource Management	2	15	35	50	1
2-C1	Open Elective	2	15	35	50	1
	Total Marks & Credits		235	515	750	21
Par	t-1 and Part-3 are common	for all	combin	ations		
	Part-2 Program con	mbinatio	on			
istry-II	I, Botany-III, Zoology-III					
nistry La	ab-III , Botany Lab -III , Zoo	logy Lab	-111			
ICS-III , (Chemistry-III, Mathematics	S-III thomati	aa Lab			
	-III, Chemistry Lab -III, Ma	themati	cs lad	-111		
ics Lab	III Mathematics I ab all	CS-III Floctron	ice Lab	-111		
ics-III	Mathematics_III Compute	r Scione	o-III	-111		
ics Lab	-III Mathematics Lab -III	Comput	e-III er Scie	nce Lah	-111	
	-C1 Par iistry-II iistry La cs-III , (cs-III ,) cs-III ,) cs-III ,) cs-III ,) cs-III ,)	Total Marks & Credits Total Marks & Credits Part-1 and Part-3 are common Part-2 Program con Description of the part-2 Program con Distry-III , Botany-III , Zoology-III Distry Lab-III , Botany Lab -III , Zoo cs-III , Chemistry-III , Mathematics Cs Lab -III , Chemistry Lab -III , Mathematics cs Lab -III , Mathematics Lab -II	-C1 Open Elective 2 Total Marks & Credits Part-1 and Part-3 are common for all of Part-2 Program combination Image: Part-2 Program combination istry-III , Botany-III , Zoology-III istry Lab-III , Botany Lab -III , Zoology Lab cs-III , Chemistry-III , Mathematics-III cs Lab -III , Chemistry Lab -III , Mathematics-III cs Lab -III , Mathematics-III , Electronics-III cs Lab -III , Mathematics-III , Electronics-III cs Lab -III , Mathematics-III , Computer Science cs Lab -III , Mathematics-III , Computer Science cs Lab -III , Mathematics-III , Computer Science	-C1 Open Elective 2 15 Total Marks & Credits 235 Part-1 and Part-3 are common for all combin Part-2 Program combination Distry-III and Part-2 Program combination Distry-III , Botany-III , Zoology-III Distry Lab-III , Botany Lab -III , Zoology Lab -III cs-III , Chemistry-III , Mathematics-III cs-III , Chemistry Lab -III , Mathematics Lab cs-III , Mathematics-III , Chemistry Lab -III , Mathematics Lab cs-III , Mathematics-III , Electronics-III cs-III , Mathematics-III , Electronics Lab cs-III , Mathematics-III , Computer Science-III cs Lab -III , Mathematics Lab -III , Computer Science-III cs Lab -III , Mathematics Lab -III , Computer Science-III	-C1Open Elective21535Total Marks & Credits235515Part-1 and Part-3 are common for all combinations Part-2 Program combinationPart-2 Program combinationdistry-III , Botany-III , Zoology-IIIdistry Lab-III , Botany Lab -III , Zoology Lab -IIIcs-III , Chemistry-III , Mathematics-IIIcs-III , Chemistry Lab -III , Mathematics Lab -IIIcs-III , Mathematics-III , Electronics-IIIcs-III , Mathematics Lab -III , Electronics Lab -IIIcs-III , Mathematics Lab -III , Computer Science-IIIcs-III , Mathematics Lab -III , Computer Science Lab	-C1Open Elective2153550Total Marks & Credits235515750Part-1 and Part-3 are common for all combinationsPart-2 Program combinationDistry-III , Botany-III , Zoology-IIIdistry Lab-III , Botany Lab -III , Zoology Lab -IIIcs-III , Chemistry-III , Mathematics-IIIcs-III , Chemistry Lab -III , Mathematics Lab -IIIcs-III , Chemistry Lab -III , Mathematics Lab -IIIcs-III , Mathematics-III , Electronics Lab -IIIcs-III , Mathematics Lab -III , Electronics Lab -IIIcs-III , Mathematics Lab -III , Computer Science-IIIcs Lab -III , Mathematics Lab -III , Computer Science Lab -III

Fourth Semester B.Sc								
Dout	Codo	Course (Subject)	Hours		Marks		Cradita	
Part	Code	Course(Subject)	Hours	IA	Exam	Total	creatts	
	LBSK-C4	Kannada-IV						
	LBSH-C4	Hindi-IV	4	20	70	100	n	
Part-1	LBSS-C4	Sanskrit-IV	4	30	70	70	100	2
	LBSA-C4	Additional English-IV						
	LBSE-C4	English-IV	4	30	70	100	2	
	BOT-C4	Botany-IV	4	30	70	100	4	
	ZOO-C4	Zoology-IV	4	30	70	100	4	
	CHE-C4	Chemistry-IV						
	ELE-C4	Electronics-IV	4	30	70	100	4	
	CS-C4	Computer Science-IV						
	MAT-C4	Mathematics-IV	4	30	70	100	4	
D	PHY-C4	Physics-IV	4	30	70	100	4	
Part-2	BOT-P4	Botany Lab -IV	3	15	35	50	1	
	ZOO-P4	Zoology Lab -IV	3	15	35	50	1	
	CHE-P4	Chemistry Lab -IV						
	ELE-P4	Electronics Lab -IV	3	15	5 35	50	1	
	CS-P4	Computer Science Lab -IV						
	MAT-P4	Mathematics Lab -IV	3	15	35	50	1	
	PHY-P4	Physics Lab –IV	3	15	35	50	1	
D : 0	BSMC-C4	Human Resource Management	2	15	35	50	1	
Part-3	BSSD-C4	Skill Development	-	-	-	-	1	
		Total Marks & Credits		220	480	700	21	
	Ра	art-1 and Part-3 are commor	ı for all	combi	nations	U		
		Part-2 Program co	mbinati	on				
CBZ	Chemistry-	IV , Botany-IV , Zoology-IV						
	Chemistry	Lab-IV , Botany Lab -IV , Zool	logy Lab	-IV				
PCM	Physics-IV	Chemistry-IV , Mathematics	S-IV					
	Physics Lab	-IV , Chemistry Lab -IV , Mat	thematio	cs Lab	-IV			
PME	Physics-IV	Mathematics-IV , Electronic	s-IV					
	Physics Lab	-IV , Mathematics Lab -IV , H	Electron	ics Lab	-IV			
PMC	Physics-IV	Mathematics-IV, Computer	r Science	e-IV				
S	Physics Lab	-IV , Mathematics Lab -IV ,	Compute	er Scie	nce Lab	-IV		

			_	-			
	Fifth Semester B.Sc						
					Marks		a 11.
Part	Code	Course(Subject)	Hours	IA	Exam	Total	Credits
	BOT-C5.5	Botany-V	3	30	70	100	4
	BOT-C5.6	Botany-VI	3	30	70	100	4
	ZOO-C5.5	Zoology-V	3	30	70	100	4
	ZOO-C5.6	Zoology-VI	3	30	70	100	4
	CHE-C5.5	Chemistry-V					
	ELE-C5.5	Electronics-V	3	30	70	100	4
	CS-C5.5	Computer Science-V					
	CHE-C5.6	Chemistry-VI					
	ELE-C5.6	Electronics-VI	3	30	70	100	4
	CS-C5.6	Computer Science-VI					
	MAT-C5.5	Mathematics-V	3	30	70	100	4
	MAT-C5.6	Mathematics-VI	3	30	70	100	4
	PHY-C5.5	Physics-V	3	30	70	100	4
Death 2	PHY-C5.6	Physics-VI	3	30	70	100	4
Part-2	BOT-P5.5	Botany Lab -V	3	15	35	50	1
	BOT-P5.6	Botany Lab -VI	3	15	35	50	1
	ZOO-P5.5	Zoology Lab -V	3	15	35	50	1
	ZOO-P5.6	Zoology Lab -VI	3	15	35	50	1
	CHE-P5.5	Chemistry Lab -V					
	ELE-P5.5	Electronics Lab -V	3	15	35	50	1
	CS-P5.5	Computer Science Lab -V					
	CHE-P5.6	Chemistry Lab -VI					
	ELE-P5.6	Electronics Lab -VI	3	15	35	50	1
	CS-P5.6	Computer Science Lab -VI					
	MAT-P5.5	Mathematics Lab -V	3	15	35	50	1
	MAT-P5.6	Mathematics Lab -VI	3	15	35	50	1
	PHY-P5.5	Physics Lab –V	3	15	35	50	1
	PHY-P5.6	Physics Lab –VI	3	15	35	50	1
	BSCE-1	Communicative Skill	2	15	35	50	1
Part-3	BSS-1	Seminar-I	-	-	-	50	1
	BSS-2	Seminar-II	-	-	-	50	1
		Total Marks & Credits		300	700	1100	34
	Pa	art-2 Program combination	- Theor	y & Pra	actical		
CBZ	Chemistry,	, Botany , Zoology (V & VI)					
PCM	Physics, Ch	emistry , Mathematics (V a	& VI)				
PME	Physics, Ma	athematics , Electronics (V &	& VI)				
PMCS	PMCS Physics , Mathematics , Computer Science (V & VI)						

	Sixth Semester B.Sc						
					Marks		a 11.
Part	Lode	Course(Subject)	Hours	IA	Exam	Total	Credits
	BOT-C6.7	Botany-VII	3	30	70	100	4
	BOT-C6.8	Botany-VIII	3	30	70	100	4
	ZOO-C6.7	Zoology-VII	3	30	70	100	4
	Z00-C6.8	Zoology-VIII	3	30	70	100	4
	CHE-C6.7	Chemistry-VII					
	ELE-C6.7	Electronics-VII	3	30	70	100	4
	CS-C6.7	Computer Science-VII					
	CHE-C6.8	Chemistry-VIII					
	ELE-C6.8	Electronics-VIII	3	30	70	100	4
	CS-C6.8	Computer Science-VIII					
	MAT-C6.7	Mathematics-VII	3	30	70	100	4
	MAT-C6.8	Mathematics-VIII	3	30	70	100	4
	PHY-C6.7	Physics-VII	3	30	70	100	4
	PHY-C6.8	Physics-VIII	3	30	70	100	4
Part-2	BOT-P6.7	Botany Lab -VII	3	15	35	50	1
	BOT-P6.8	Botany Lab -VIII	3	15	35	50	1
	ZOO-P6.7	Zoology Lab -VII	3	15	35	50	1
	ZOO-P6.8	Zoology Lab -VIII	3	15	35	50	1
	CHE-P6.7	Chemistry Lab -VII					
	ELE-P6.7	Electronics Lab -VII	3	15	35	50	1
	CS-P6.7	Computer Science Lab -VII	-				
	CHE-P6.8	Chemistry Lab -VIII					
	ELE-P6.8	Electronics Lab -VIII	3	15	35		1
	CS-P6.8	Computer Science Lab -VIII	Ũ				-
	MAT-P6.7	Mathematics Lab -VII	3	15	35	50	1
	MAT-P6.8	Mathematics Lab -VIII	3	15	35	50	1
	PHY-P6.7	Physics Lab -VII	3	15	35	50	1
	PHY-P6.8	Physics Lab -VIII	3	15	35	50	1
	BSEVS-1	Environment Science	2	15	35	50	1
Part-3	BSPRO-1	Project	-	-	-	50	1
		Total Marks & Credits		300	700	1050	33
	Pa	art-2 Program combination	- Theor	y & Pra	actical		
CBZ	CBZ Chemistry, Botany, Zoology (VII & VIII)						
РСМ	Physics , Ch	emistry, Mathematics (VI	I & VIII)				
PME	Physics, Ma	athematics , Electronics (VI	I & VIII)				
PMCS	Physics , Mathematics , Computer Science (VII & VIII)						

First Semester

First Semester B.Sc									
D .					Marks				
Part	Lode	Course(Subject)	Hours	IA	Exam	Total	Credits		
	LBSK-C1	Kannada-I							
	LBSH-C1	Hindi-I	4	20	70	100	2		
Part-1	LBSS-C1	Sanskrit-I	4	30	30	30	70	100	Z
	LBSA-C1	Additional English-I							
	LBSE-C1	English-I	4	30	70	100	2		
	BOT-C1	Botany-I	4	30	70	100	4		
	Z00-C1	Zoology-I	4	30	70	100	4		
	CHE-C1	Chemistry-I							
	ELE-C1	Electronics-I	4	30	70	100	4		
	CS-C1	Computer Science-I							
	MAT-C1	Mathematics-I	4	30	70	100	4		
	PHY-C1	Physics-I	4	30	70	100	4		
Part-2	BOT-P1	Botany Lab -I	3	15	35	50	1		
	ZOO-P1	Zoology Lab -I	3	15	35	50	1		
	CHE-P1	Chemistry Lab -I							
	ELE-P1	Electronics Lab -I	3	15	35	50	1		
	CS-P1	Computer Science Lab -I							
	MAT-P1	Mathematics Lab -I	3	15	35	50	1		
	PHY-P1	Physics Lab –I	3	15	35	50	1		
Part-3	BSMC-C1	Computer Applications & Information Technology	4	30	70	100	2		
	BSMC-P1	Computer Applications &	3	15	35	50	1		
		Information Lechnology - LAB		240	F (0)	000	22		
	n	I Utal Mal KS & Cleuits	n for all	240	500	000			
	ſ	Part-2 Program of	ombinat	ion					
CR'	7 Chomic	stry-I Botany-I Zoology-I	omoniat						
CDA	Chemis	stry Lab-I , Botany Lab -I , Zo	ology La	b -I ,					
PCN	1 Physics	s-I , Chemistry-I , Mathemati	cs-I						
	Physics	<u>s Lab -I , Chemistry Lab -I , M</u>	athemat	ics Lab	-I ,				
PM	E Physics	s-I , Mathematics-I , Electron	ics-I						
	Physics	s Lab -I , Mathematics Lab -I ,	, Electro	nics La	b-I,				
PMC	S Physics	s-I , Mathematics-I , Comput	er Scien	ce-I					
	Physics	Lab -I , Mathematics Lab -I	, Compu	ter Sci	ence Lab	-I ,			

LBSK-C1 : ಕನ್ನಡ 1- Kannada I

Lecture Hrs: 54 **Internal Marks: 30** Exam Marks : 70 **Objectives:** ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುವುದರೊಂದಿಗೆ, ಸ್ಪಷ್ಟ ಓದು ಮತ್ತು ಬರಹದೊಂದಿಗೆ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷೆಯನ್ನು ಕಲಿಸುವುದು. ಹಾಗೂ ಕನ್ನಡ ಭಾಷೆಯಲ್ಲಿ ಪರಿಣಿತಿ ಸಾಧಿಸಿಕೊಳ್ಳುವಂತೆ ಪೇರಿಪಿಸುವುದು. **Course Outcomes:** ಹಿಂಸೆ ಎಂಬ ಪರಿಕಲ್ಪನೆಯ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಮಾನವ ಪ್ರೇಮವನ್ನು ಕಟ್ಟಿಕೊಡುವ ಪ್ರಯತ್ನವನ್ನು ಮಾಡುವುದು. ಪರಿಸರ ಎಂಬ ಪರಿಕಲ್ಪನೆಯ ಮೂಲಕ ಪರಿಸರದ ಬಗೆಗೆ ಅರಿವುವನ್ನುಂಟು ಮಾಡುವುದು ಮತ್ತು ಅದನ್ನು ಬೆಳೆಸಲು ಪ್ರೋತ್ಪಾಹಿಸುವುದು. ಆಧುನಿಕ ಪರಿಕಲ್ಪನೆಗಳು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಜೀವನ ಮೌಲ್ಯಗಳನ್ನು ರೂಪಿಸುವಂತೆ ಬೋಧಿಸುವುದು. ವ್ಯವಸ್ಥೆಯಲ್ಲಿನ ಸಾಮಾಜಿಕ ತಾರತಮ್ಮಗಳ ಬಗೆಗೆ ಅರಿವನ್ನುಂಟುಮಾಡಿ ಸಾಮಾಜಿಕ ಸಮಾನತೆಗಾಗಿ ಪ್ರೇರೇಪಿಸುವುದು. ವಿಜ್ಞಾನ ಲೇಖನಗಳ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳೀಗೆ ವೈಜ್ಞಾನಿಕ ಆಲೋಚನೆಯನ್ನು ಉಂಟುಮಾಡುವುದು. Title:ಹಿಂಸೆ ಧೀರರಕಟಕುಮಾರರ್–ಜನ್ಸ 7 ಪುಟ್ಟವಿಧವೆ-ದ.ರಾ.ಬೇಂದ್ರೆ 5 5 ಧನ್ವಂತರಿಯ ಚಿಕಿತ್ಸೆ–ಕುವೆಂಪು ನಡುರಾತ್ರಿಯಲ್ಲಿ ಕೇಳಿಸಿದ ಹೆಣ್ಣೊಬ್ಬಳ ಅಳು–ಪ್ರತಿಭಾ ನಂದಕುಮಾರ್ 6 ಅಹಿಂಸೆ ಶೂರರ ಸದ್ದುಣ–ಮಹಾತ್ಮಗಾಂಧಿ 5 Title:ಪರಿಸರ 5 ಮಷ್ಟೋದ್ಯಾನ-ಪಂಪ ಏರೋಪ್ಲೇನ್ ಚಿಟ್ಟೆ ಮತ್ತು ಇತರ ಕಥೆಗಳು-ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ 6 ಮಲ್ಲಿಗೆ-ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ 5 ಮಿಲ್ಲು ಮತ್ತು ಹಕ್ಕಿ-ವೈದೇಹಿ 5 5 ಕಾಡುವ ಜೋಗಿ–ಎಸ್.ಜಿ.ಸಿದ್ದರಾಮಯ್ಯ ಪರಾಮರ್ಶನ ಗಂಥಗಳು 1. ಜನ್ನನ ಯಶೋಧರ ಚರಿತೆ ಪ್ರವೇಶ–ಅಕ್ಷರ ಪ್ರಕಾಶನ, ಹೆಗ್ರೋಡು. 2. ವಿನಯ-ದ.ರಾ.ಬೇಂದ್ರೆಯವರ ಆಯ್ದ ಕವನಗಳ ಸಂಕಲನ. ಪ್ರಕಾಶನ-ಶ್ರೀಮಾತಾ ಪ್ರಕಾಶನ ಹುಬ್ಬಳ್ಳಿ. ನನ್ನದೇವರು ಮತ್ತು ಇತರ ಕತೆಗಳು– ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ನಿರ್ದೇಶನಾಲಯ ಬೆಂಗಳೂರು. 4. ಅವರು ಮರಾವೆಗಳನ್ನು ಕೇಳುತ್ತಾರೆ-ಪ್ರತಿಭಾನಂದಕುಮಾರ್, ಮಹಿಳಾ ಸಾಹಿತ್ಯಕ ನವನಗರ ಹುಬ್ಬಳ್ಳಿ. 5. ಅನುವಾದ –ಖಾದ್ರಿಶಾಮಣ್ಣ–ಚಿಂತನಾ ದೀಪ್ತಿ ಪ್ರಕಾಶನ ಬೆಂಗಳೂರು. 6. ಪ್ರಾಚೀನ ಕಾವ್ಯಮಾರ್ಗ 4-ಸಂ.ಪ್ರೊ.ಶಿವರಾಮಯ್ಯ ಮತ್ತು ಡಿ.ಲಿಂಗಯ್ಯ, ಪ್ರಸಾರಾಂಗ ಬೆಂ.ವಿ.ವಿ. 7. ಸಾಹಿತ್ಯ ಸಂವಾದ 1-ಸಂಪಾದನೆ-ಬಸವರಾಜ ಕಲ್ಗುಡಿ-ಪ್ರಸಾರಾಂಗ ಬೆಂ.ವಿ.ವಿ.

LBSH-C1 Hindi : ''गद्यामृत''Lecturer Hrs: 54Internal Marks : 30Exam Marks : 70Course Objective:Understand the importance & value of the Hindi language.Explanation about prose, poem& novel with the features. Get the idea about moral values& utilizing them properly. Understand the importance of studying Hindi language.uglec - f : सती।9 Hoursलेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र, एकमहाराष्टरीदूसरीपंजाबीऔरतीसरीमादलसाओंकापरिचय।कथाकाविवरण।9 Hoursयुनिट - f : सती।9 Hoursलेखकडॉ. ए.9 Hoursअविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय।युनिट - 3 : मदरतेरेसा।9 Hoursलेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय।युनिट - 4 : खुशामदा।9 Hoursलेखिकमहेश्वरावताबुबेकापरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय।युनिट - 5 : रखना।9 Hoursलेखकमहेश्वरादयालदुबेकापरिचय।बुशामदकेतरीकोपत्वयग्यात्मकविवरण।युनिट - 5 : खुशामदा9 Hoursलेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपत्वयंग्यात्मकविवरण।युनिट - 6 : रचना।9 Hoursतेतानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण।9 Hoursयुनिट - 7 : खुशामदा9 Hoursलेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपत्वयंग्यात्मकविवरण।युनिट - 7 : खुशामदा9 Hoursतेतानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण।प्रातिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण।प्रातिकशब्दावालीऔरअनुच्छेदलेखनकाविवरण।एन संजला।प्रकाशक्तरेत्रा एस.सीहिरेमठऔरडॉ.एन संजला।प्रकाशक्तरेत्रा एस.सीहिरेमठऔरडॉ.एन संजला।प्रकाशक्तरेत्रा एस.सीहिरेमठऔरडॉ.		
Lecturer Hrs: 54Internal Marks : 30Exam Marks : 70Course Objective:Understand the importance & value of the Hindi language.Explanation about prose, poem& novel with the features. Get the idea about moral values& utilizing them properly. Understand the importance of studying Hindi language. युनिट - f : सती। 9 Hoursलेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र,9 Hoursलेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र,9 Hoursयुनिट-२ : कवितासबसेसुंदरसपनाहै।9 Hoursलेखकडाँ. ए.9 Hoursअविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय।युनिट-३ : मदरतेरेसा।9 Hoursलेखिकाओशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय।युनिट-५ : खादांमंउअरताइंन्द्रप्रस्थ।9 Hoursलेखकमहेश्वरदयालदुबेकापरिचय।बईदिल्लीकेइतिहासकाविवरण।युनिट-५ : खुशामद।9 Hoursलेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण।युनिट - ६ : रचना।9 Hoursतेजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण।Text Book	LBSH-C1 Hindi : ''गद्यामृत''	
Course Objective:Understand the importance & value of the Hindi language.Explanation about prose, poem& novel with the features. Get the idea about moral values& utilizing them properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Understand the importance of studying Hindi language. \mathbf{y} field - f : traft properly. Traft properly. \mathbf{y} field - f : traft properly. <th>Lecturer Hrs: 54Internal Marks : 30Exam Marks</th> <th>;:70</th>	Lecturer Hrs: 54Internal Marks : 30Exam Marks	;:70
युनिट - १ : सती। 9 Hours लेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र, एकमहाराष्ट्रीदूसरीपंजाबीऔरतीसरीमादलसाओंकापरिचय।कथाकाविवरण। युनिट - २ : कवितासबसेसुंदरसपनाहै। 9 Hours लेखकडॉ. ए. अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours लेखिकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट - ६ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours देजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours तेजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours तेजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours तेजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours तेजानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours तेजानिकशब्दावलीऔरसटकडॉ. एस.सीहिरेमठऔरडॉ. 9 मानठ।	Course Objective: Understand the importance & value of the Hindi lange Explanation about prose, poem& novel with the features. Get the idea about revalues& utilizing them properly. Understand the importance of studying H language.	uage. noral Hindi
लेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र, एकमहाराष्टीदूसरीपंजाबीऔरतीसरीमादलसाओंकापरिचय।कथाकाविवरण। युनिट-२: कवितासबसेसुंदरसपनाहै। 9 Hours लेखकडाँ. ए. अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। 9 Hours युनिट-3: मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours लेखिकमहेश्वरदयालदुबेकापरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५: खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट - ६: रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours 1. ''गद्यामृत'' संपादकडाँ. एस.सीहिरेमठऔरडाँ. जंतला।प्रकाशक्रीतवहवाल्य बंेगलरु।	युनिट - १ : सती। 9 Hours	
एकमहाराष्टीदूसरीपंजाबीऔरतीसरीमादलसाओंकापरिचय।कथाकाविवरण। युनिट-२ : कवितासबसेसुंदरसपनाहै। 9 Hours लेखकडॉ. ए. अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। युनिट-३ : मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमटकःप्रमारंगबेंगलरुविवदयाल्य बंोगलरु।	लेखिकाशिवानीबाकीतीनमहिलाओंकाचरित्र,	
युनिट-२ : कवितासबसेसुंदरसपनाहै। 9 Hours लेखकडॉ. ए. अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। युनिट-३ : मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours युनिट-४ : यादोंमें उभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन संजला।प्रकाशकऔरसत्वरं.एस.सीहिरेमठऔरडॉ. जंोलका।	एकमहाराष्टीदूसरीपंजाबीऔरतीसरीमादलसाओंकापरिचय।कथाकाविवरण।	
लेखकडाँ. ए. अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। युनिट-३ : मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 1. ''गद्यामृत'' संपादकडाँ. एस.सीहिरेमठऔरडाँ. एन मंत्रला।प्रकाशकऔरमदक:प्रसारंगबेंगलठविश्वविदयाल्य बंेगलठ।	युनिट-२ : कवितासबसेसुंदरसपनाहै। 9 Hours	
अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय। युनिट-३ : मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदक:प्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु।	लेखकडॉ. ए.	
युनिट-३ : मदरतेरेसा। 9 Hours लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। 9 Hours युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५ : खुशामद। 9 Hours लेखकप्रक्षेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५ : खुशामद। 9 Hours लेखकप्रक्षाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट -६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंज्ञला।प्रकाशकऔरमदक:प्रसारंगबेंगलघ्वविदयाल्य बंेगलघ।	अविन्दाक्षनकापरिचय।कवितानिर्माणहोनेकेसाहित्यकऔरविवरणात्मकपरिचय।	
लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय। युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट -६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रमारंगबेंगलरुविविदयालय बंेगलरु।	युनिट-३ : मदरतेरेसा। 9 Hours	
युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। 9 Hours युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। 9 Hours युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। 9 Hours 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन संजला।प्रकाशकऔरमदक:प्रसारंगबेंगलरुविश्वविदयाल्य बंंगलरु।	लेखिकाआशारानीव्होराकीपरिचय।मदरतेरेसाकेजीवनवृत्तांतकापरिचय।	
लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण। युनिट-५ : खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट -६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविध्वविदयाल्य बंेगलरु।	युनिट-४ : यादोंमेंउभरताइंन्द्रप्रस्थ। 9 Hours	
युनिट-५: खुशामद। 9 Hours लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट -६: रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु।	लेखकमहेश्वरदयालदुबेकापरिचय।नईदिल्लीकेइतिहासकाविवरण।	
लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण। युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगढेंगलरुविश्वविदयाल्य ढंेगलरु।	युनिट-५ : खुशामद। 9 Hours	
युनिट - ६ : रचना। 9 Hours वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु।	लेखकप्रभाकरमाचवेकापरिचय।खुशामदकेतरीकोपरव्यंग्यात्मकविवरण।	
वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण। Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु।	युनिट - ६ : रचना। 9 Hours	
Text Book 1. ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु।	वैज्ञानिकशब्दावलीऔरअनुच्छेदलेखनकाविवरण।	
 ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. एन मंजला।प्रकाशकऔरमदकःप्रसारंगबेंगलरुविश्वविदयाल्य बंेगलरु। 	Text Book	
एन मंजला।प्रकाशकऔरमटकःप्रसारंगबेंगलुरुविश्वविदयालय बंेगलुरु।	 ''गद्यामृत'' संपादकडॉ. एस.सीहिरेमठऔरडॉ. 	
	एन.मंजुला।प्रकाशकऔरमुद्रकःप्रसारंगबेंगलूरुविश्वविद्याल्य, बंेगलूरु।	
Reference Book	Reference Book	
 हिन्दव्यिकरणप्रबाधएवरचना।सपादकःडा. विजयपालासह।प्रकाशकआरमुद्रकः 	1. ।हन्दव्यिकरणप्रबाधएवरचना।सपादक :डा. विजयपालासह।प्रकशिकआरमुद्रक	:

LBCS-C1 Sanskrit I

Lecture Hrs : 54	Internal Marks : 30	Exam Marks : 70
Course Objective :The ma	in objective of the course is to	o impart knowledge in classical
language through literature.	The study trains learner in ap	preciating aesthetics. The study
of Sanskrit poetry helps the s	student in sharpening creative a	bilities in all disciplines.
Unit-I: Introduction of K	avya, its division, Drishya	Kavya and Shravya 16
kavya, Gadhya, Padhya, C	Champu, Drishya kavya and	its division, Shravya Hours
kavyaand its division, Kath	a and Akhyayika, Maha kavya	a and Kanda kavya

Unit - II : Selected portions of veda, its division, its evolution, Upanishad, it16is last part of vedic literature and also called Vedanta, important upanishadsHours

Unit-III : Maha kavya, five Maha kavyas. Characteristics of Maha kavya,16puranas and classical poetry, Champu, the characteristics of ChampuHoursliterature, Panchathantra and HithopadeshaHours

Unit – IV: Translation of unseen passages and comprehension

6 Hours

Text Book :

History of Sanskrit Literature by Vidhwan Ananthachar & by Pandit Ranganathan

LBCA Additional English I

Lecture Hrs: 54	Internal Marks: 30	Exam Marks: 70
Literature		27 Hours
 The Rogue - Atulanan The Unpalatable Offe The Letter - G G J Dh The Taxi Driver - K S Nila - Vijay Nambisa Our Casuarina Tree - Moonrise - Savithri R Why I Want a Wife - 	nda Goswamy ring - Vasudhendra numketu 5 Duggal n Toru Dutt ajeevan Judy Brady	
Language		27 Hours
1. Comprehension Passa	ge	

Comprehension Fassage
 Paragraph Writing
 Communicative Skills

The National	The National College, Autonomous, Basavanagudi, Bengaluru-04					
	LBSA-C1: Additional English-I					
Lecture Hrs: 54	Internal Marks: 30	Exam Marks : 70				
Literature		27 Hours				
 The Rogue - Att The Unpalatable The Letter - G C The Taxi Driver Nila - Vijay Nat Our Casuarina T Moonrise - Savi Why I Want a V 	ulananda Goswamy e Offering - Vasudhendra G J Dhumketu - K S Duggal nbisan Free - Toru Dutt thri Rajeevan Vife - Judy Brady					
Language		27 Hours				
1. Comprehension	Passage					

- Paragraph Writing
 Communicative Skills

LBSE-C1:English-I

Lecture Hrs: 54	Internal Marks: 30	Exam Marks : 70	
 Course Description: The course is designed to equip learners with competency in LSRW in the English Language. Thus, Grammar and Literature are introductory to acquire language competency. Course Objectives: To enable learners with English Language Competency Course Outcome: To enable students with reading and writing skills with a focus on skill acquisition in the following skills i. reading skills ii. Writing Skills iii. To make precis iv. fluency in speaking in English to express thoughts and opinions in writing. To help enjoy students literature and varied perspectives presented by literary texts. 			
Unit-I: Poetry		12 Hours	
 Sonnet 18- William Sl Leech Gatherer-Willia Buying and Selling-K To a Student-Kamala 	hakespeare am Wordsworth halil Gibran Wijeratne		
Unit -II :Prose		20 Hours	
 Professions for Women Respect for the Individ War-Luigi Pirandello Chameleon-Anton Ch 	n-Virginia Woolf dual-Bertrand Russell ekhov		
Unit-III. Grammar and	l Writing Skills	22 Hours	
 Tense forms Active and Passive Vo Direct and Indirect Sp Expansion of passages 	bice eech S		

BOT-C1-Botany

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Objectives

- To educate students with scientific temperament & transferable skills
- To impart the knowledge of basic principles of Virology, bacteriology & phycology.

Course Outcome :

- Food & Industrial microbiologist.
- Clinical & Veterinary Microbiologist
- Research Assistant.

Unit-I: MICROBIOLOGY & VIROLOGY:

Introduction, History & Scope (Anton Von Leeuwenhook, Louis Pasteur, Robert Koch, Alexander Fleming & F.W Twort). Application of Microbiology – Agriculture, Medicine & industry. General characteristics, Classification & Transmission of Viruses. Structure & Multiplication of T4 phage, TMV & Gemini virus. Structure & Multiplication of Nipha virus, H1N1 & Ebola virus. Viroids & Prions.

Unit – II: CELLULAR PROKARYOTES – I

BACTERIA – Introduction & General characteristics. Bacterial cell ultrastructure – outer envelope, cell wall, cell membrane, composition of cytoplasm, nucleoid, plasmids, flagella & pili, difference between Gram +ve& -ve. Morphology (E. coli) locomotion, nutrition, reproduction, sporulation (Bacillus subtilis) & sexuality in bacteria. Economic importance of bacteria in agriculture, medicine & industry

Unit – III: CELLULAR PROKARYOTES – II CYANOBACTERIA: 15 Hours

Morphology, general characteristics, classification & affinity with bacteria.

Cyanobacterial cell structure (with emphasis on thylakoid systems, storage granules, heterocyst &akinetes).Study of thallus & life cycle in Gloeocapsa, Spirulina, Scytonema& Anabaena. Importance of cyanobacteria as bio-fertilizers & food (spirulina).

Role in water pollution. Mycoplasma: Structure, nature & diseases.

Unit-IV: PHYCOLOGY

Introduction to algae. General characteristics- pigmentation, thallus organization & reproduction. Classification of algae (Prescott). Study of structure & life cycle of Chlamydomonas, Oedogonium, Ectocarpus, Diatoms & Polysiphonia. Economic Importance of algae in industry, agriculture & medicine.

REFERENCE BOOKS

- College Botany volume 1, Dr S Sundara Rajan
- A Text Book of Botany, Singh, Pande & Jain
- Diversity of Microbes & Cryptogams, Singh, Pande & Jain
- Botany for Degree students , Dr B P Pandey
- Botany for Degree students Algae, B R Vashishta, Dr AK Sinha & Dr Adarsh Kumar

12 Hours

12 Hours

ZOO-C1-Zoology-I NON-CHORDATA PART-I

The National College, Autonomous, Basavanagudi, Bengaluru-04

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Objectives:

Introduces the concepts of Taxonomy, life cycles and importance of non-chordates. Describe general taxonomic rules on animal classification, examples of pathogenic nematodes their parasitic adaptations and preventive measures.

Course Outcome :

On completion of the course, students gain knowledge regarding various Invertebrate species belonging to the phyla from protozoa to Annelida and regulatory processes to safeguard them.. They understand the applications of biological sciences in vermiculture, vermicomposting, economic values, parasitology, affinities of Ctenophora and Nematoda.

Unit-I: PHYLUM PROTOZOA

Nutrition in protozoa: a brief account of autotrophic, holozoic, holophytic and saprophytic nutrition.Locomotion in protozoa: amoeboid, sol-gel theory. Ciliary and flagellar movement. Reproduction: A sexual reproduction- Binary fission in Amoeba, Euglena, Paramecium, Multiple fission with suitable examples. An account of autogamy, Endomixis and conjugation. Economic importance of protozoans with special reference to :Water and soil protozoa.Radiolarian and Foraminiferan ooze.

Unit – II: PHYLUM PORIFERA

General characters of phylum and classification up to classes with suitable examples Histology of Sycon.Canal system, evolution and its significance- asconoid, syconoid, Leuconoid and Rhagonoid type Skeleton of sponges: Types of spicules and spongin fibres.Reproduction: Asexual reproduction -External and Internal buds. Sexual reproduction. Development of Amphiblastula and its metamorphosis.

Regeneration in sponges and sponge culture.

Unit – III: METAZOAN

Unique features of mesozoa with an example.

Origin of metazoa: Blastea and Gastrea and Hadzi's theory.

Unit-IV: PHYLUM COELENTERATA

General classification of the phylum and classification up to classes with suitable examples. Polymorphism in siphonophora with reference to Halistemma.Structure and life cycle of Aurelia. Corals: General organization of a coral polyp, types: soft and stony corals, solitary and colonial forms with suitable examples. Theories on coral reef formation and economic importance of corals .General account of ctenophora and their affinities.

Unit-V: HELMINTHES

General characters of the phylum and classification up to classes with suitable examples. Regeneration in planaria: Polarity and Child's axial gradient theory. Aschelminthes-General cheracters, Examples.

Unit-VI: PHYLUM ANNILIDA

9 Hours

9 Hours

2 Hours

12 Hours

11 Hours

General characters of the phylum and classification up to classes with suitable examples. Neries: Externals of Neries with special emphasis on the head parapodium. Trochophore larva and its significance. Externals of leech: digestive and reproductive systems. Parasitic adaptations of leech, with morphological and physiological. Vermiculture and Role of earthworm in soil fertility. Significance of coelom and metamerism.

Unit-VII: ECOLOGICA ADAPTATIONS

Ecological adaptations and diversity in a. Arcella, b. Trichonympha and sea anemone on hermit crab. Ecological adaptations and diversity in Cliona and spongilla

Unit-VIII: PARASITOLOGY

Protozoans parasites : Occurrence, disease caused, mode of transmission and preventive measures of the following formsEntamoeba histolytica,

Trypanosoma gambiense.Lieshmania donovoni. Study of life history of Plasmodium – vivax.Parasitic flat worms: Occurrence, disease caused, mode of transmission and preventive measures of the following forms

- Fasciola hepatica
- Schistosoma hematobium
- Taenia solium- life history

Parasitic Nematodes : Occurrence, disease caused, mode of transmission and preventive measures of the following forms

- Enterobium vermicularis
- Wuchereria bancrofti

Dracunculus medinensis.

Reference Books

- Barnes R.D., 1980. Invertebrate Zoology, Hault Saunders, International Edition, Philadelphia, 4th Edition.
- Hymann L H 1940-67. The Invertebrate, Volume I-Iv. Mc Grow-Hill, New York.
- Barrington E.J.W., 1969 Invertebrate Structure And Function, Thomas Nelson & Sons Ltd, Barrington, 1st Edition.
- Chapman R.F. 1971. The Insects: Structure And Function, English Universities Press Ltd, London.
- Dhami P.K. & Dhami J.K. 1994. Invertebrate Zoology, R Chand & Co, New Delhi.
- Ekambernath Iyer M And Ananthakrishnan T.N, 1986. Outlines Of Zoology: Invertebrate: Vol. 1, S Vishwanathan Printers And Publishers Pvt Ltd.
- Hegner R.W And Stiles K.A., 1959. College Zoology, The Macmillan Company, New York, 7th Edition.
- A Manual Of Practical Zoology, Invertebrates, By Dr.P.S Verma, S.Chand & Company, New Delhi.

2 Hours

B. Sc., - I Semester CHE-CI-CHEMISTRY - I

Lecture Hrs:54

Internal Marks:30

Exam Marks:70

Course Description: Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. Solve the problem and also think methodically, independently anddraw a logical conclusion.. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.. Find out the green route for chemical reaction for sustainable development.To inculcate the scientific temperament in the students and outside the scientific community.

Objectives of the course are: Gain the knowledge of Chemistry through theory and practicals. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions. Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Understand good laboratory practices and safety.. Develop research oriented skills, make aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields aswell as in laboratory.

Unit-I:Mathematical concepts in chemistry and Analytical chemistry9 HoursExponential functions, trignometric functions.

Differentiation, partial differentiation, maxima and minima, integration, probability.

Application of Statistics in Chemistry- interpretation of observations/experimental data statistically – mean, data in range, median, variation and standard deviation, reliability of results-Q test

Graphical representation of experimental data: Linear graphs and slopes, curve sketching, line and bar graphs.

Units and Measurements in Chemistry: SI units, distinction between mass and weight, atomic mass units and mole, millimoles.

Analytical chemistry:Errors: Classification, accuracy and precision. Significant figures and uncertainty: significant figures in calculations, rounding up of results from chemical computation.

Concentration of solutions: normality, molarity, molality, mole fraction, weight by volume, ppm and ppb.

Unit-II: Quantum Mechanics and Atomic Structure

8 Hours

Quantum Mechanics: Sinusoidal wave equation. Schrodinger wave equationinterpretation of the terms: i) Hamiltonian operator ii) eigen function Ψ (significance of Ψ and Ψ^2) iii) eigen values.

Application of Schrodinger equation: i) to particle in one dimensional box (derivation required) ii) to the hydrogen atom (detailed solution not required, give only eigen function and eigen values). Expressing the solution as a product of $\Psi_{n,l,m}$ (r,θ,Φ)= $\Psi_{n,l,(r)}$ $\Psi_{l,m(\theta,\Phi)}$. Explanation of quantum numbers (only qualitative). Radial probability distribution and angular probability distribution. Orbitals- shapes of *s*,*p*, and *d* orbitals. Pauli's exclusion principle, Hund's multiplicity rule, Aufbau principle, electronic configuration of elements (upto atomic number 30).

Unit-III: Periodic Table and Periodic properties and Oxidation numbers 9 Hours

Review of the modern periodic table (with respect to classification of elements based on outer electronic configuration)

Periodic properties: Atomic and ionic radii, ionisation energy, electron affinity and electronegativity. Trends in the periodic properties. Applications in predicting and explaining chemical behaviour. Factors affecting the values of ionisation energy. Diagonal relationship between beryllium and aluminium.

Comparitive study of elements of alkali and alkalline earth metals, chalcogens and halogens with respect to electronic configuration, atomic and ionic radii, ionisation energy, and elecronegativity. Halides, Sulphates, oxides and carbonates of alkali and alkalline earth metals. Hydrides of chalcogens and halogens.

Oxidation numbers: Definition, difference between valency and oxidation number, computation of oxidation number, balancing of red-ox reactions by ion-electron method, calculations of equivalent weight of oxidizing and reducing agents. Identification of red-ox reactions and disproportion reaction by calculation of oxidation number.

Applications: Balancing red-ox reaction by oxidation method and ion-electron method with examples in acidic and basic medium.

Calculation of Equivalent Mass of oxidizing and reducing agent.

Calculation of Equivalent Mass of KMnO4 (acidic, basic and neutral medium).

Unit-IV : Non-aqueous solvents

Review of Lewis Acid-Base concept

HSAB concept-explanation of the terms hard and soft acids and bases with examples. Theories of hardness and softness (electronic and π bonding theories), applications of HSAB concept -stability of complexes, occurrence of minerals, poisoning of metal catalysts, rate of chemical reactions, limitations of HSAB.

Non-aqueous solvents:

Introduction, characteristic properties of solvents (melting and boiling points, heat of fusion and vaporization, dielectric constant, viscosity) Classification. (protonic and aprotonic, ionizing and non ionizing).

Liquid ammonia: Characteristics, autoionization, reactions with one example each (acid base reaction, precipitation reactions of ammono acids, reactions of ammono bases, ammonolysis and complex formation), applications of liquid ammonia as a solvent, advantages and disadvantages of liquid ammonia as a solvent.

Liquid SO₂: Characteristics, autoionization, chemical reactions with one example each (acid base reaction, precipitation, solvolytic reactions, complex formation, reaction with organic compounds).

Unit-V: Liquids and solutions

Review of various types of solutions - solid in liquid, solid in solid, liquid in liquid. **Completely miscible liquids** - Vapour pressure composition and boiling point composition curves of completely miscible binary solutions, Fractional distillation of binary liquid solutions of type I, II, III.

Partially miscible liquids – Concept of upper and lower CST. Phenol – water, triethylamine- water, nicotine – water systems. Effect of addition of impurity (soluble in one liquid, soluble in both liquids) on the CST of partially miscible binary liquid mixtures.

Completely immiscible liquid mixtures - Nernst Distribution law - statement, expression (no derivation), limitations, applications. I₂ in water and CCl₄; Benzoic acid in

5Hours

benzene and water. Deviation due to association, dissociation and complex ion formation.

Unit-VI: Basic concepts in organic chemistry& Alkanes and 15Hours cycloalkanes:

Heterolytic and homolytic cleavage, electron delocalization ,inductive, electromeric, resonance (comparison of acidity and basicity with examples) and hyperconjugation effects.

Reactive intermediates:-

Carbocations - generation, stability, reactions with nucleophiles, detection,

Carbanions - generation, stability, reactions with electrophiles, detection,

Carbenes - generation by pyrolysis of diazo compounds and base-induced α -elimination, stability,

Free radicals - generation, stability, reactions – abstraction, disproportionation, addition to multiple bonds.

Role of free radical reactions in biological systems (add four specific Examples).

Thermodynamics and kinetics of organic reactions, energy profile diagram, transition state.

Types of organic reactions – substitution, addition, elimination, isomerization, condensation, rearrangement and pericyclic reactions (with one illustration each).

Alkanesandcycloalkanes:Nomenclature of alkanes including branched alkanes and cycloalkanes.

Preparation of alkanes by Wurtz and Corey-House synthesis. Physical and chemical properties - combustion; heat of combustion as a measure of relative stabilities of hydrocarbons, halogenation–mechanism of halogenation and energy profile diagram. Relative reactivity and selectivity of alkanes towards halogenation taking Cl_2 and Br_2 as examples.

Conformations and conformational analysis. Conformations of n-butane – Newman projection formulae, staggered and eclipsed, torsional strain, variation in energy of the conformations due to rotation about $C_2 - C_3$ bond including potential energy diagram.

Conformations of cyclohexane, theory of strainless rings, chair and boat conformations and their relative stabilities (potential energy diagram not included).

Carcinogenecity and toxicity of hydrocarbons.

TEXT BOOKS :

1.College chemistry-I: L.Indira and Chatwal

2.Comprehensible chemistry-I: Vinod kumar B. and M.Aswathanarayanappa REFERENCE BOOKS:

1.General and Inorganic chemistry-R.Sarkar-volume-II-2012

2.Advanced general chemistry-sachin kumar ghosh-vol-II-2009

ELE-C1-ELECTRONICS-I

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

15 Hours

Objective: To strengthen the basics of Electronics

Outcome: After studying this paper the students will be able to analyze the circuits usingNetworktheorems,analysetheSeriesandparallelresonantcircuits,analyse theBJTandFET circuits, analyse

theBJTandFETAmplifiercircuits, importance of digital electronics.

ofdigitalelectronics.

Unit-I: Analysis of DC and AC circuits Network Analysis: 15 Hours Convention for describing a network: Network equations: mesh analysis, nodal analysis, Problems.Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, problems on all the theorems. Transient phenomenon: Charging and discharging of capacitor through R, Growth and Decay of current in an Inductor through R, problemsAC Circuits: RL series and RC series circuits: problems.Series and parallel Resonance circuits: condition for resonance, resonant frequency, half power frequencies, BW, quality factor (loaded and unloaded Q), comparison and applications, Problems.

Unit – II: Transistor and Biasing:

BJT: Transistor symbol, NPN/PNP- working, CB, CE and CC modes, current Gain, input and output characteristics of CB and CE Configuration, Darlington Pair.

Leakage current, relation between α , $\beta \& \gamma$, base spreading resistance. Biasing: Need for biasing, load line, operating point, thermal runaway.

Voltage divider bias: design, bias stability factor (no derivation), advantages of voltage divider bias, Problems.

Field Effect Transistor (FET):

Construction and working of JFET, drain characteristics, Transconductance characteristics, FET parameters, FET approximations-Shockley's equation, comparison of FET with BJT, FET- Biasing techniques: types, self biasing design, advantages.

MOSFET-workingofDepletionandEnhancementtypes, CMOS – Construction and working,Problems.

Small Signal Amplifiers:

Small signal voltage amplifier: Classification of amplifiers, concept of amplification.

CE Amplifier: working, re-model, expression for the voltage gain, input and output impedance, frequency response.

Swamped amplifier, CC amplifier (Emitter follower), impedance matching, FET CS-amplifier and Problems.

Unit – III: Multistage Amplifiers:

Cascaded stages, direct coupled amplifier, two stage RC coupled amplifier- working, analysis, distortions in amplifier, Problems

Large Signal amplifiers:

Classification of large signal amplifier, ac load line,

class A single ended power amplifier- working, power dissipation, output power calculation, efficiency.

Class B push pull (transformer coupled) amplifier- working, harmonic distortion, output power calculation, efficiency.

Complementary-symmetry class B push-pull amplifier- working, crossover distortion and heat sinks.

Tuned amplifier: Class C power amplifier- single tuned double tuned amplifier-resonant load- frequency response- power relations, efficiency-application in communication circuits, Problems

Unit-IV : Digital Electronics:

12 Hours

[Decimal,Binary,OctalandHexadecimal-theirinterconversion.

BCDnumbers(8421),Gray,Excess3,ASCIIandEBCDICcodes Error detecting and correctingcodes.

Arithmetic operations in Binary, Hexadecimal. BCD addition and Excess 3 addition.

Sign magnitude convention, 1's and 2's Complements-2's Complement Subtraction, signed number arithmetic-addition.] bridge course

Positive and Negative Logic, Basic Logic gates-AND, OR and NOT gates (Logic symbols and Truthtables),Booleanalgebra-

LawsandTheorems,NANDandNORgates(Logicsymbolsand Truth tables), De Morgan's theorems, NAND and NOR asUniversal gates.

Simplification of Logic Expressions using Boolean algebra, SOP and POS expressions. Karnaugh maps-K-Map techniques to solve 3 variable and 4 variable expressions. Combinational Logic Circuits:

Arithmetic logic circuits-Half adder, Full adder, 4-bit parallel binary adder, Half and full subtractor.

Two bit comparator, Four bit comparator, IC 7485, Decimal to BCD priority encoder-IC 74147, BCD to decimal decoder-IC 7442. BCD to seven segment decoder-IC 7446 and IC 7447 – logic diagrams of each IC.

Multiplexers- 4:1, 8:1, and 16:1 Multiplexers- IC 74150., application.

Demultiplexer- 1:4, 1:8 and 1:16 Demultiplexers – IC 74154, decoder. Parity Generators.

TEXT BOOKS:

- Fundamentals of Electronics, B. Basavaraj-revised, OnkarPublications.
- ElectronicDevicesandcircuittheory,RobertBoylsteadandLouisNashelsky-PHI
- Digital Fundamentals: Floyd-UBSpublishers
- Digital Principle- Molvino andLeech.

REFERENCE BOOKS:

- Basic Electronics and Linear circuits, N.N. Bhargava, D.C Kulshresta and D.C. Gupta- TMH.
- Network Analysis by Hayte and Kimmerly.
- Applied electronics, R.S.Sedha S. Chand & Companylimited.
- Network Analysis byGodse

CS-C1: Computer Organization and Programming in C

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

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.

Objectives of the course are:

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

Learning Outcome :

To clearly understand the logic of the problem. To analyze the given problem and write the algorithm, flowchart. To write structured C programs, this is the foundation of any programming language.

Unit-I Number systems, Boolean algebra and Logic gates 9 Hours Binary, Octal, Hexadecimal number systems, base conversions, signed binary numbers, binary arithmetic, subtraction using 1's complement and 2's complement, binary codes, ASCII codes, fundamental concepts of Boolean algebra, AND ,OR,NOT gate using transistor. NAND and NOR as universal gates, X-OR,X-NOR gates.

Unit – II: Computer organization and memory

Introduction to format, addressing modes, instruction set, Adders and Subtractors, Multiplexer, De-multiplexer, Encoder, Decoder, Flip-Flops and Counters: Synchronous and Asynchronous

Unit - III: Introduction to Programming Concepts

Software, Classification of Software, Modular Structured Programming, Programming, Algorithms and Flowcharts with examples. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants, Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions. Formatted and Unformatted I/O Functions

Unit-IV: Condition and Branching Statements

Decision making, branching and looping: Decision Making Statements - if Statement, if-else statement, nesting of if-else statements, else-if ladder, switch statement, ?: operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements.

Unit-V: Arrays and Functions

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Strings: Declaring and Initializing strings, Operations on strings, Storage Classes - Automatic, External, Static and Register Variables.

Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.

9 Hours

9 Hours

9 Hours

Unit-VI: Structures and Files

9 Hours

Structures-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions.

Files - File modes, File functions, and File operations, Command Line arguments. C Preprocessor directives, Macros – Definition, types of Macros.

TEXT BOOKS

1 E. Balaguruswamy, "Programming In ANSI C", 4th edition, TMH Publications, 2007

2. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education, 2006.

3. Computer architecture by John. 5thedition ; publisher Morgan Kaufmann, 2011.

REFERENCES BOOKS:

- 1. Ashok N. Kamthane et. al., "Computer Programming and IT", Pearson Education, 2011
- 2. Mahapatra, "Thinking In C", PHI Publications, 1998.
- 3. Yashwant Kanetkar, "Let Us C", 13th Edition, PHP, 2013.
- 4. Basic Digital Electronics by Alvis.J.Evans; publisher master publishing ,1996.

MAT-C1 MATHEMATICS-I

Internal Marks : 30

Objective: 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. To introduce students to basic concepts of group theory and examples of group and their properties.

Learning Outcomes: After completing the course, students are expected to get an idea on concept and examples of Groups and their properties, able to use Leibnitz's rule to evaluate derivatives of higher order, able to study the geometry of various types of functions.

Unit-I: ALGEBRA-I

Lecture Hrs : 54

Group Theory: Binary operation, algebraic structure-problems on finding identity and inverse. Definition of semigroup and group, abelian group-problems on finite and infinite groups. Properties of group with proof-standard problems on groups- a finite semigroup-Cancellation laws of a group- Any group of order less than five is abelian-permutation groups.

Subgroups- theorems on subgroups(with proof)-problems.

Unit - II : CALCULUS-I

a) Differential Calculus: Successive Differentiation- n^{th} derivatives of the functions: e^{ax} , $(ax + b)^n$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$,

 $e^{ax} \sin(bx + c), e^{ax} \cos(bx + c)$ -Problems. Leibnitz theorem (with proof) and its applications.

Partial differentiation-Function of two and three variables-First and higher order derivatives-Differentiation of Homogeneous functions -Euler's theorem and its extension(with proof)-Total derivative and differential-Differentiation of implicit functions and composite functions-Problems- Jacobians- Properties of Jacobians problems.

b) Integral Calculus-Reduction formulae for $\int sin^n x dx$, $\int cos^n x dx$, **10 Hours** $\int tan^n x dx$, $\int cot^n x dx$, $\int sec^n x dx$, $\int cosec^n x dx$, $\int sin^m x cos^n x dx$ with

definite limit. Differentiation under integral sign by Leibnitz rule.

Unit-III : GEOMETRY

Analytical Geometry Of Three Dimensions: Recapitulation of elements of three dimensional geometry- Different forms of equations of straight line and plane (Vector and Cartesian form).

Angle between two planes- Line of intersection of two planes-Plane coaxial with given planes-Planes bisecting the angle between two planes-Angle between a line and a plane-Coplanarity of two lines-Shortest distance between two lines.

Equation of the sphere in general and standard forms-equation of a sphere with given ends of a diameter. Tangent plane to a sphere, orthogonality of spheres.

Standard equations of right circular cone and right circular cylinder.

Text Books

- 1. Herstein I n Topics in Algebra, 4thed. New Delhi, India: Vikas Publishing House Pvt Ltd, 1991.
- 2. Shanthi Narayan and P K Mittal, Differential calculus , Reprint. New Delhi: S Chand and Co. Pvt.Ltd., 2014.

14 Hours

16Hours



- 3. Shanthi Narayan and P K Mittal, Integral calculus, Reprint. New Delhi: S Chand and Co. Pvt.Ltd., 2013.
- 4. Shanthi Narayan and P K Mittal, Analytical solid geometry . New Delhi: S Chand and Co. Pvt.Ltd., 2014..

Reference Book

- 1. Michael Artin, Algebra, 2nded.New Delhi, India:PHI Learning Pvt. Ltd.,2011.
- 2. Vashista, A First Course in Modern Algebra, 11th ed.:, Krishna Prakashana Mandir,1980..
- 3. John B Fraleigh, A First Course in abstract Algebra, 3rd ed.: Narosa Publishing House., 1990.
- 4. R Balakrishan and N. Ramabadran, A Textbook of Modern Algebra, 1st ed. New Delhi, India: Vikas Publishing house pvt ltd., 1991.
- 5. G B Thomas and R L Finney, Calculus and analytical geometry, Addison Wesley, 1995.
- 6. J Edwards, An elementary on the differential calculus: with applications and measures example, Reprint. Charleston, USA: BiblioBazaar, 2010.
- 7. N. P. Bali, Differential Calculus, India: Laxmi Publications (P) Ltd., 2010.
- 8. S Narayanan and T. K. ManicavachogamPillay, Calculus.: S. Viswanathan Pvt. Ltd., vol. I & II 1996.
- Frank Ayres and Elliott Mendelson, Schaum's Outline of Calculus, 5th ed. USA: Mc. Graw Hill., 2008.
- 10. S. P. Mahajan& Ajay Aggarwal, Comprehensive solid Geometry, 1st ed.: Anmol Publications, 2000.

Useful web links:

- 1. <u>http://www.cs.columbia.edu/~zeph/3203s04/lectures.html</u>
- 2. <u>http://home.scarlet.be/math/matr.htm</u>
- 3. <u>http://www.themathpage.com/</u>
- 4. http://www.abstractmath.org/
- 5. http://ocw.mit.edu/courses/mathematics/
- 6. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
- 7. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
- 8. http://mathworld.wolfram.com?Calculus.html
- 9. http://ocw.mit.edu/courses/mathematics/
- 10. http://www.univie.ac.at/future.media/moe/galerie.html
- 11. http://mathworld.wolfram.com/AnalyticGeometry.html

PHY-C1- PHYSICS I

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Description: This course, provides an introduction to the basic concepts of Mechanics, Heat, Thermodynamics, Properties of matter, Waves and Oscillations

Introduces students to the use of mechanics and develops problem solving skills with both theoretical and practical problems.

Objectives of the course are: To understand the different physical processes taking place in our surroundings.

Unit-I

Review of vector algebra: Cartesian and Polar co-ordinates. Radial and transverse components of velocity and acceleration in plane polar co-ordinates. Application of these to circular motion and areal velocity. Problems

Instantaneous velocity and acceleration, motion with uniform and non uniform acceleration. Derivations of equations for velocity and displacement for a body moving in a resistive medium (Force proportional to velocity). Expression for the displacement of a body falling under gravity in a resistive medium. – Concept of terminal velocity-**Graphical** representation.

Force and motion: Review of Newtonian Mechanics [Newton's I law of motionconcept of force and inertia. Newton's II law of motion and its limitations. Impulse. Newton's III law of motion] – central and non central forces with examples. Frictional forces- Static, kinetic and rolling friction-Laws of friction- the drag force, Gravitational force (weight of a body), Normal force-Motion along an inclined plane with friction. Problems illustrating concept of free body diagram.

Unit-II:

Thermodynamics: The zeroth law. Explanation of thermodynamic variables-extensive and intensive. Equation of state-various thermodynamic processes. P-V diagram. The I law of thermodynamics. Sign convention of heat and work. work done by isothermal process for an ideal gas. Internal energy as a state function. Application of I law to: i) cyclic process, ii)Isolated system iii)Adiabatic process, iv)Isochoric process, v)Isobaric process, vi)Isothermal process. Adiabatic process for an ideal gas-relation among temperature, volume and pressure. work done during adiabatic process. Reversible and irreversible process. Problems.

The II law of thermodynamics: Heat engines. Carnot's cycle and its efficiency with derivation.Practical cycles used in internal combustion engines- Otto and Diesel engines(qualitative).Methodsof maximizing efficiency. Refrigerator, coefficient of performance. Problems. II law of thermodynamics and entropy, principle of increase of entropy. Change in entropy in reversible i) adiabatic process, ii) isothermal process iii)cyclic process, iv)isobaric process. , III law of thermodynamics (Nernst heat theorem). Problems.

Unit – III:

13 Hours

Thermal physics: Review of gas laws. Degrees of freedom and principle of equipartition of Energy based on kinetic theory of gases. Atomicity of gases. Expression for internal energy (no derivation), mean free path. transport phenomena : viscosity and the thermal conductivity of gas. Real gases. Andrews' experiment on CO_2 . Andrew's isotherms-critical constants. Van der Waal's equation of state, Problems

14 Hours

Surface tension: Surface tension and surface energy, molecular interpretation of surface Tension, angle of contact and wetting. Pressure difference across a curved liquid surface. Capillary ascent. Interfacial surface tension - drop-weight method with necessary theory. Force between two plates separated by a thin layer of liquid. Factors affecting Surface tension - temperature, impurity and surfactant, Problems.

Unit-IV :

13 Hours

Oscillations: Simple Harmonic motion- SHM as the projection of uniform circular motion- (Qualitative), differential equation of SHM. Expression for velocity, displacement, acceleration and energy of a particle executing SHM- compound pendulum –Expression for the period-Interchangeability of point of suspension and center of oscillation- Composition of Lissajou's figures in case of (1)two SHM's of equal period at right angle (2)two SHM's of period in the ratio 1:2 at right angle (figure of eight) Problems.

Wave motion-Introduction to wave motion-Transverse and longitudinal waves-Differential equation of wave-Different forms of a progressive wave- Particle velocity, group velocity and phase velocity- wave dispersion, Energy carried by a wave, intensity or power (qualitative) - principle of superposition: interference, beats and stationary waves.

Fourier analysis: Concept of Fourier analysis, mention of Fourier co-efficients. Application to a rectangular wave (qualitative). Mention of examples in Image processing, digital signal process communication -Problems

Reference books:

- College physics for I B.Sc-N.Sundarajan, George Thomas, Syed Azeez; United Publications
- Fundamentals of Physics-Halliday, Resnik and Walker; Wiley
- A text book on Oscillations, Waves & Acoustics-M.Ghosh, D.Bhattacharya S.Chand& Co.
- College Physics Young ,Fredman
- Waves and oscillation Brijlal ,Subramanyam
- Mechanics- Berkely series
- Understanding Physics-SarmistaSahu and Kala.N; Subhas Stores

BOT-P1- Botany Lab-I

Lab Hrs. : 44 hrs

Exam Marks: 35

Experiment

Internal Marks: 15

- Elementary microscopy study & uses of basic maintenance of microscopes.
- Basic procedures in micro-preparations whole mounts, sections, stains, mounting media, semi-permanent & permanent slides; use of 10x, 40x & oil immersion objectives in microscope.
- Viruses study of TEM & SEM photographs of the following viruses; TMV, Nipha recognition & study of symptoms of bean mosaic. Study of the symptoms of viroid disease (PSTV or any other common example).
- Bacteria Study of TEM & SEM photographs of common bacteria like E. coli & Agrobacterium tumefaciens. Study of important bacterial diseases of plants Crown gall & Citrus canker.
- Gram staining of bacteria from curd & root nodules (demonstration).
- Cyanobacteri–Study of Gloeocapsa, Spriulina&Scytonema.
- Phycology- I: Study of Chlamydomonas & Volvox.
- Phycology II: Study of Oedogonium.
- Phycology III: Study of Ectocarpus& Diatoms.
- Phycology IV: Study of Polysiphonia.
- (Activity experiment) visit to an aquatic ecosystem to study algae.

ZOO-PI- ZOOLOGY LAB-I			
Lab Hrs. : 44 hrs	Internal Marks: 15	Exam Marks: 35	
Experiment Name	Sub Name	Title of the experiment	
Protozoa	Culture	Observation of water samples and Protozoan culture	
Protozoa	Slides observation	Permanent slides observation of Elphedium, Euglena, Noctiluca, and vorticella Conjugation in paramoecium	
Porifera	Slides observation	Leucosolenia, Euplectella, Hyalonema, Spongilla and Demospongia, Gemmule and spicules.	
Coelenterata	Slides and specimens	Obelia, Medusa, Physalia, Porpita, Aurelia, Ephyra larva.	
Coelenterata	Slides and specimens	Sea Anemone, T.S of Sea anemone through stomodium, Astraea, Meandrina, Gorgonium and fungia.	
Platyhelminthes	Specimens	Planaria, Liver fluke, Tapeworm, male and female round worms.	
Platyhelminthes	Slides	T.S of Planaria, T.S of Liver fluke, T. S of male and female round worms.	
Annelda	Specimens	Neries, Heteroneries, Aphrodite, Sabella Arenicola	
Annelida	Specimens and slides	Chaetopterus, Trochophore larva, T.S of earthworm through intestine	
Earthworm Dissection	Demo or film show	Digestive system, Nervous system and Mounting of setae and ovary.	
Dissection Of Leech:	Demo or film show	Display of digestive system and jaw mounting	
Economic Zoology	Examples of different phyla	Protozoa to annelida including parasitology	

700 D1 700LOCVIAD I

CHE-P1- – CHEMISTRY LAB-I

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Practical - 1 (General Chemistry)Experiment

- Calibration of glass wares: (i) Pipette (ii) Burette (iii) Volumetric flask
- Estimation of potassium permanganate using standard sodium oxalate solution.
- Estimation of Potassium permanganate using standard ferrous ammonium sulphate solution.
- Estimation of ferrous ammonium sulphate using standard potassium dichromate solution with diphenyl amine as an internal indicator.(Change to ferroin indicator)
- Estimation of potassium dichromate using standard sodium thiosulphate solution.
- Estimation of iodine using sodium thiosulphate and standard potassium dichromate solution.
- Determination of the percentage of available chlorine in the given sample of bleaching powder.
- Determination of percentage of manganese dioxide from pyrolusite ore.
- Estimation of chloride by Mohr's method.
- (Using potassium chromate as an adsorption indicator).
- Estimation of chloride by Volhard's method.
- Estimation of ferrous and ferric iron in a given mixture using standard potassium dichromate solution.
- Estimation of nitrogen in an ammonium salt using sodium hydroxide solution and standard oxalic acid.
- Estimation of carbonate and bicarbonate in a given mixture.

Note: Standard solutions to be prepared for experiments 2 to 6.

ELE-P1- BASIC ELECTRONICS LAB-1

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Practical - 1 (General Chemistry)Experiment

- Verification of KCL and KVL for D.Cnetwork.
- Verification of Thevenin'stheorem.
- Verification of Maximum power transfertheorem.
- Series and Parallel resonance circuit-determination of resonant frequency, Bandwidth and Q-factor.
- CECharacteristics.
- CEamplifier.
- CCamplifier.
- CSamplifier.
- TunedAmplifier.
- Multistage RC coupled Amplifier(Demoexperiment)
- IC 7400-Realization of AND, OR, NOT, NOR AND X-OR gates and IC 7402-Realization of AND, OR, NOT, NAND and X-NORgates.
- Construction of Half Adder and Half subtractor and Construction of Full Adder using IC 7486, 7402 and IC7432.
- Binary to Gray code and vice versa usingIC 7486.
- Decimal to BCD Priority encoder and BCD to DecimalDecoder.
CS-P1 – COMUPUTER SCIENCE LAB-1

Lab Hrs. : 44 hrs

Internal Marks: 15 Programming in C Lab Exam Marks: 35

Course Objectives/Course Description:

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

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

SECTION: A

- 1 Printing the reverse of an integer.
- 2 Generate first N prime numbers.
- 3 Get a string and convert the lowercase to uppercase and vice-versa without using library functions.
- 4 Find the occurrence of a particular character in a string.
- 5 Input a string and find the number of each of the vowels which appear in the string.
- 6 Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
- 7 Print the reverse of a string.
- 8 Find the first N terms of Fibonacci series using arrays.
- 9 Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
- 10 Program to demonstrate structure and union.
- 11 Recursive program to find the factorial of an integer.
- 12 Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.

SECTION: B

- 11 Arranging N numbers in ascending and in descending order using bubble sort.
- 12 Checking whether the given matrix is an identity matrix or not.
- 13 Addition and subtraction of two matrices.
- 15 Multiplication of two matrices.
- 14 Convert a hexadecimal number into its binary equivalent.
- 16 Check whether the given string is a palindrome or not.
- 17 Demonstration of bitwise operations.
- 18 Applying linear search to a set of N numbers by using a function.
- 19 Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.
- 20 Arrange N names in alphabetical order.
- 21 Arranging N numbers in ascending and in descending order using bubble sort.
- 22 Checking whether the given matrix is an identity matrix or not.

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

ſ

PHY-P1-Physics Lab-1

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Course Objectives/Course Description:

The course is designed to provide a practical exposure to the students. **LearningOutcome:** Students acquire the knowledge to build the logic and develop a solution for a problem statement.

- Verification of principle of conservation of energy.
- Verification of conservation of linear momentum.
- To determine the spring constant, effective mass of the spring and hence calculate 'g'.
- Bar pendulum-'g' by graphical method.
- Helmholtz resonator.
- Study of stationary waves on a stretched string.
- Surface tension and interfacial tension by drop-weight method.
- Thermal conductivity by Lee's and Charlton's method.
- Determination of coefficients of static and kinetic friction.
- Newton's law of cooling.
- Lissajou's figures.
- Stoke's law to determine co-efficient of viscosity.

MC-2 : Computer Applications and Information TechnologyLecture Hrs : 54Internal Marks : 30Exam Marks : 70

Course Objectives:

This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design, basic structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic. The emphasis is on studying and analyzing fundamental issues in architecture design and their impact on performance

Course Outcomes:

The students will be able to understand the basics of computer hardware and how software interacts with computer hardware. Analyze and evaluate computer performance. Understand how computers represent and manipulate data. Understand computer arithmetic and convert between different number system.

Unit-I: Introduction to Computers

Definition, Characteristics and limitations of computers- Hardware and software Data and Information: Types of data, Simple Model of computer

Computer applications- data processing, information processing, commercial, office Automation, industry and engineering, healthcare, education, graphics and multimedia.

Unit - II :Network of computers

Types of networks. LAN, intranet and Internet, Internet applications, E-mail browsing and searching, Search engines, Multimedia applications.

Unit - III :Internet and Internet application

Introduction, Internet evolution, Working of Internet, Use of Internet, Overview of World Wide Web (Web Server and Client),Introduction to Search engine and Searching the Web, Downloading files, Introduction to Web Browsers, Working with E-mail (creation and use of the same).

Unit-IV : Business Information systems

Introduction, Types of Information needed by Organizations, Uses of computers, Management Structure and their Information needs, Design of an operational information system, System life Cycle, Computer System for Transaction Processing

Unit-V : Electronic Commerce

9 Hours

9 Hours

9 Hours

9 Hours

9 Hours

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

Page 40

Introduction, Business to Customer E-Commerce, Business to Business E-Commerce, Customer to Customer E-Commerce, Advantages and disadvantages of E-Commerce,E-Commerce System Architecture, Digital Signature, Payment schemes in E-Commerce,Electronic clearing service, Cash Transactions, Payment in C2C, Electronic data interchange.

Unit-VI: Societal Impacts of Information Technology

9 Hours

Introduction, Social uses of World Wide Web, Privacy, Security and Integrity of Information, Disaster Recovery, Intellectual Property rights, Career in Information Technology.

TEXT BOOKS

1. Fundamentals of Computers, Rajaraman .V , 6^{th} Edtion , PHI Publisher, 2015

2. Introduction to Information Technology, second edition, V.Rajaraman, 2013

REFERENCES BOOKS

1. BASIC OF COMPUTER AND INFORMATION TECHNOLOGY , Ashok Arora, Vikas Publishing, 2015

2. Computer Fundamentals - 6th Edition By Pradeep K. Sinha, Priti Sinha, BPB Publications,2017

I	MP-1: Computer	Applications	and	Info	rmation	Techno	ology	/ Lal	b
				_				_	

Lecture Hrs : 44Internal Marks : 15Exam Marks : 35

Course Objectives:The course is designed to provide different types computer applications hands-on exposure to the students.

Learning Outcome : Students will gain practice in using key applications such as word processors, spreadsheets, and presentation software, as well as understanding social and ethical issues around the Internet, information, and security. Manipulate and control the Windows desktop, files and disks.

Using MS-Word write the steps and execute the following

1) Create a resume using appropriate formatting option available in MS Word.

2)Create the Mail Merge document for college day function to invite Five of your friends

3) Create a cover page of a project report. Assign a password for the document to protect it from unauthorized access. Demonstrate the use of Hyperlink Option.

Using MS-Excel spread sheet write the steps and execute the following

1) Create worksheet called "shopping Bill" for a grocery shop.

- a) Enter address, bill no, date,
- b) Enter item no, item name, quantity, rate
- **C**) Calculate Price for each item purchased.

Calculate the Discount (10% of Price if the Price is greater than 1000rs).

Using MS-Excel spread sheet write the steps and execute the following

1) Create worksheet called "Employee pay roll generation".

- a) Enter Employee code, Name , designation, department, and Basic salary.
- b) Calculate DA (55% of Basic salary).
- c) Calculate HRA (15% of Basic salary).
- d) Calculate TA (10% of Basic salary).
- e) Calculate CCA(5% of Basic salary)
- f) Calculate Total Salary (Basic salary + DA + HRA + TA+CCA).
- g) Calculate P.F (Deduction) (10% of Total salary).
- h) Calculate Net Salary (Total Salary P.F). Plot a graph.

Using MS-Excel spread sheet write the steps and execute the following

1) Create worksheet called "Student marks card".

- a) Enter student Roll no, Name, class.
- b) Calculate total ,grand total ,
- c) Calculate percentage.
- **d)** Calculate Result using if nested if condition. Plot a graph.

Using MS-PowerPoint write the steps and execute the following

1) Prepare presentation slides about your college withTitles, Subtitles And different slide layouts.

Use Design templates for background

Using MS-PowerPoint write the steps and execute the following

1) Prepare presentation slide to display Organization chart.

Second Semester

Second Semester B.Sc							
	Code Course(Subject)		Marks				
Part		Course(Subject)	Hours	IA	Exam	Total	Credits
	LBSK-C2	Kannada-II		30	70		
	LBSH-C2	Hindi-II	4			100	2
Part-1	LBSS-C2	Sanskrit-II					Z
	LBSA-C2	Additional English-II					
	LBSE-C2	English-II	4	30	70	100	2
	BOT-C2	Botany-II	4	30	70	100	4
	ZOO-C2	Zoology-II	4	30	70	100	4
	CHE-C2	Chemistry-II		30	70	100	
	ELE-C2	Electronics-II	4				4
	CS-C2	Computer Science-II					
	MAT-C2	Mathematics-II	4	30	70	100	4
Dout 2	PHY-C2	Physics-II	4	30	70	100	4
Part-2	BOT-P2	Botany Lab -II	3	15	35	50	1
	ZOO-P2	Zoology Lab -II	3	15	35	50	1
	CHE-P2	Chemistry Lab -II		15	35	50	
	ELE-P2	Electronics Lab -II	3				1
	CS-P2	Computer Science Lab -II					
	MAT-P2	Mathematics Lab -II	3	15	35	50	1
	PHY-P2	Physics Lab –II	3	15	35	50	1
Part-3	BSMC2	Indian Constitution &	4	30	70	100	2
		Human Rights		225	FOF	750	26
	Da	rt 1 and Dart 2 are common	for all	223 combin	525 ations	750	20
	<u> </u>	Part-2 Program con	mbinati	<u>combii</u> on			
CB7	CP7 Chemistry II. Poteny II. Zoology II						
CDL	LICHEMISTRY-II, BOTANY-II, 20010gy-II Chemistry Lab-II, Botany Lab-II, Zoology Lab-II						
РСМ	Physics-II Chemistry-II Mathematics-II						
1 01-1	Physics Lab -II , Chemistry Lab -II , Mathematics Lab -II						
PME	E Physics-II , Mathematics-II , Electronics-II						
	Physics Lab -II , Mathematics Lab -II , Electronics Lab -II						
PMCS	Physics-II , Mathematics-II , Computer Science-II						
	Physics Lab -II , Mathematics Lab -II , Computer Science Lab -II						

The National College, Autonomous, Basavanagudi, Bengaluru-04					
LBSK-C2: ಕನ್ನಡ 2 – Kannada II					
Lecture Hrs: 54Internal Marks: 30Exam Ma	arks : 70				
Objectives: ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುವುದರೊಂದಿಗೆ, ಸ್ಪಷ್ಟ ಓದು ಮತ್ತು ಬರಹದೊಂದಿಗೆ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷೆಯನ್ನು ಕಲಿಸುವುದು. ಹಾಗೂ ಕನ್ನಡ ಭಾಷೆಯ ಪರಿಣಿತಿ ಸಾಧಿಸಿಕೊಳ್ಳುವಂತೆ ಪ್ರೇರಿಪಿಸುವುದು.	సిల్లి				
Course Outcomes: ವೈಜ್ಞಾನಿಕ ಮನೋಧರ್ಮಗಳನ್ನು ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಮೂಡಿಸಲು ಪ್ರಯತ್ನಿಸುವುದು. ಎಂಬ ಪರಿಕಲ್ಪನೆಗಳ ಮೂಲಕ ಮನುಷ್ಯ ಸಂಬಂಧಗಳ ಮಹತ್ವವನ್ನು ಕಟ್ಟಿಕೊಡುವುದು. ಪರಿಕಲ್ಪನೆಗಳು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಜೀವನ ಮೌಲ್ಯಗಳನ್ನು ರೂಪಿಸುವಂತೆ ಬೋಧ ವೈಚಾರಿಕ ಲೇಖನಗಳ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ವೈಚಾರಿಕ ಹಾಗೂ ವೈಜ್ಞಾನಿಕ ಆಲೋಚಿಸುವಂತೆ ಮಡುವುದು.	ಸಂಬಂಧ ಆಧುನಿಕ ಶಿಸುವುದು. ನೆಲೆಯಲ್ಲಿ				
Title: ಸಂಬಂಧಗಳು					
ರಾಧೇಯನಂ ಒಳ್ಪಿಂದೆ ಆಧೇಯನಾಗಿರ್ದಂ–ಪಂಪ	7				
ಅವ್ವ–ಪಿ.ಲಂಕೇಶ್	5				
ಸಂಕಮ್ಮನ ಸಾಲು–ಜನಪದ 6					
ತುಂಗಭದ್ರೆ–ಕೆ.ಎಸ್.ನರಸಿಂಹಸ್ವಾಮಿ 5					
ಕಳ್ಳುಬಳ್ಳಿ –ಬಿ.ಟಿ.ಜಾಹ್ನವಿ 5					
Title: ವೈಜ್ಞಾನಿಕ ಮನೋಧರ್ಮ					
ವೈಜ್ಞಾನಿಕ ಮನೋಧರ್ಮ–ಎಚ್.ನರಸಿಂಹಯ್ಯ	6				
ಪ್ರತ್ನೆ ಸ್ಥೆ ವಿಜ್ಞಾನ–(ಮೂಲ–ಜವಹರ್ ಲಾಲ್ ನೆಹರು), ಅನ–	5				
ಸರೋಜ ಹಾಲಂಬಿ					
ಲೇಡೀಸ್ ವೆಹಿಕಲ್–ಡಾ.ಎಚ್.ಎಸ್.ಅನುಪಮ	5				
ಬಿದಿರಿನ ಮನೆ–ಶಿವ ವಿಶನಾಥನ್	5				
್ಷ . ಗಾಂದೀಜಿ ಬಗೆ ಐನ್ ಸೀನ್-ಕೆ.ಎಸ್.ನಾರಾಯಣ ಸಾಮಿ	5				
ಪರಾಮರ್ಶನ ಗಂಡಗಳು	-				
1. ಸರಳ ಪಮಪ ಬಾರತ–ಎಲ್. ಬಸವರಾಜು–ಪುಸಕಾಲಯ ಪಕಾಶನ, ಮೆಸೂರು					
2 ತೆರದಮನ–ಎಚ್. ನರಸಿಂಹಯ.					
4. ಮಲೆಮಾದೇಶರ ಕಾವ್ಸ–ಸಂ–ಪಿ.ಕೆ.ರಾಜಶೇಖರ್.					
······································					

The National College, Autonomous, Basavanagudi,Bengaluru-04					
LBSH-C2 : HINDI-II''काव्यांजलि''					
Lecturer Hrs: 54	Internal Marks : 30	Exam Marks : 70			
युनिट -१ : तुलसीकेदोहेऔ	रविजयरथ।	9 Hours			
कवितुलसीदासकेपरिचय।प्र	गस्तुतदोहावलीकीपरिचय।रामनामक	ामहत्ताऔरमनुष्योंकेगुणका			
विवरण।राम- रावणयुद्धप्रसं	ग।				
युनिट - २: बिहारीकेदोहे।		9 Hours			
कविबिहारीकेपरिचयबिहारी	निछोटेछोटेदोहोमेंबडेबडेभावयानेसाग	।रमेंगागरभरनेकाविवरण।			
युनिट-३ : दानवीर।		9 Hours			
कविरामधारीसिंहदिनकरक	गपरिचय।कर्णकादानगुणपरिचय।				
युनिट-४ : वाण्िा।		9 Hours			
कविसुमित्रानंदपंतकापरिच	य।वाण्िाकीमहत्वकापरिच य				
युनिट-५: पक्षधर।		9 Hours			
कविआज्ञेयकापरिचय।मान	।वजीवनकेसंघर्षपरविवरण।				
युनिट-६ : पेडगिराऔररचन	πι	9 Hours			
कविडॉ. टी.डीप्रभाकरशंकर	'प्रेमी'				
कापरिचय।दैनिकघटनाकीमहानतथ्यकाप्रस्ताव।प्रशासनिकशब्दावलीऔरकहानीलेखन।					
Text Book					
'कांव्यांजली' संपादकबि. उ	जयलक्ष्मी, एस.एम. मुमताजबेगम।प्र	प्रकाश्कऔरमुद्रकःप्रसारंग,			
बेंगलूरुविश्वविद्याल	नय, बेंगलूरु।				
Reference Book					
व्यवहारिकहिन्दव्यिकरणअनुवादतथारचना।सपादक : डा. एच्. परमेश्वरन।प्रकाशकाएवमुद्रक					
: समग्रविकासप्रका	शनइलाहबाद।				

LBSS-C2 : Sanskrit II

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Objective :

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

Course outcome :

- The Sanskrit course is use to general public, at every age and at all levels of formal and non formal education.
- It will improve the learners proficiency in the Sanskrit language. It will impart ethical and moral values of life in students that will evaluate or lead them towards right path.

Unit-I: Introduction of Kavya, its division, Drishya Kavya and Shravya kavya in brief, prose and poetry, its evolution

Unit - II : Prose literature, difference between katha and akhyayika,
tracing of prose work from vedic literature, authors date, life and works12Hours

Unit – IV: Translation of unseen passages and comprehension

6

6

Hours

Hours

Text Books : Kadhambari of Bana by prof. M. K Surya Narayana Rao, Subhash Publications and Bannanje Govidacharya

LBSA-C2: Additional English-II

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Literature

27 Hours

- 1. The Jamun Tree Krishan Chander
- 2. Lalu Saratchandra Chattopadhyay
- 3. Politics of Living Indraganti Janakibala
- 4. The Curse Kabitha Sinha
- 5. The Carpenter and the Beggar Bharathidasan
- 6. The Spear Temsula Ao
- 7. Manipur, Why Shouldn't I Love Your Hills? Thangjam Ibopishak
- 8. This is the Jungle Kenneth Anderson

Language

27 Hours

- 1. Conversation Skills
- 2. Picture Composition
- 3. Advertisement Writing
- 4. Close Test

LBSE C2: Language English-II

Lecture Hrs: 54	Internal Marks: 30	Exam Marks: 70			
 Course Description: The course enables the learners with intermediate-level skills of Language Competency. The literary texts are chosen to address ideological issues and arguments. Course Outcome: THe learners identify contemporary ideological issues and concerns. They gain competency to express themselves fluently about the concerns. Course Objectives: i. to equip students with intermediate-level reading skills ii. to equip the students with important grammar skills iii. to make precis iv. To help enjoy students literature and the varied perspective presented by literary texts. 					
Unit-I: Poetry		12 Hours			
 1.For Father on the Shell 2.Purdah - Imtiaz Dhark 3.Australia-A.D.Hope 4.The Unknown Citizen 	f- Melanie Silgardo er - W.H. Auden.				
Unit -II:Novella		10 Hours			
Breaking Ties- Sara Abo	oobacker				
Unit - III: Drama		10 Hours			
 A scene from The T Mrichchakatika- Su 	' empest -William Shakespeare Idraka				
Unit-III: Reading & W	riting Skills	22 Hours			
 1.Skim and Scan 2.Note Making 3.Precis writing 4.Comprehension(prose))				

BOT-C2-BOTANY-II

Internal Marks : 30

Exam Marks: 70

Course Objectives:

Lecture Hrs: 54

- To develop an aptitude towards science & nature.
- To impart quality education in mycology, cell biology & plant pathology

Course Outcome:

- Food & Fermenting industries.
- Research Scientist.

Unit-I: CELL BIOLOGY

Ultrastructure of a Plant cell. Chromosomes - Morphology, Ultra structure, shape, number; study of Polytene & Lampbrush chromosomes. Cell cycle & Mitosis. Meiosis & Sexual Cycle.

Unit – II: MYCOLOGY

Introduction to fungi. General characteristics - thallus organization, classification (Alexopoulos& Mims) and nutrition. Study of Albugo, Lycoperdon, Peziza & Puccinia. A brief study of lichens.

Fungi as model organisms: Structure, life cycle and genetics of yeasts. (Haplodiplobiontic [Saccharomyces cerevisiae &ShizosaccharomycesPome). life cycle) Economic Importance of fungi in Medicine, Agriculture & Industry.

Unit – III: PLANT PATHOLOGY

Symptomatology & Etiology of plant diseases. Study of symptoms, pathogen, etiology, mode of infextion& control measures of the following diseases: Tikka disease, Koleroga of Arecanut, Blast disease of Paddy, Coffee Rust, Smut of Sorghum and Red rot of Sugarcane.

Fungicides & their importance with emphasis on their impact on environment & health. Biopesticides – general account.

Unit-IV: BRYOPHYTA

General account & Classification (Smith). Structure, Reproduction and life cycle of Marchantia, Anthoceros, Funaria. Phylogenetic considerations & importance.

REFERENCE BOOKS

- Cell Biology, C B Powar 3rd edition
- Botany for Degree Students Bryophyta , B R Vashista, Dr AK Sinha & Dr Adarsh Kumar
- Botany for Degree students Fungi, B R Vashista, Dr AK Sinha & Dr Adarsh Kumar
- College Botany Volume 2, Dr S Sundara Rajan 3rd edition

15 Hours

12 Hours

12 Hours

15 Hours

ZOO-C1-Zoology-II

Internal Marks : 30

Exam Marks : 70

Objectives:

Lecture Hrs : 54

Course description/objective: Introduces the concepts of taxonomy, life cycles and importance of non-chordates. Describe general taxonomic rules on animal classification, examples of economically important species, perform procedures in the areas of Taxonomy and economic zoology.

Course Outcome :

During this semester, students acquire the knowledge about the phyla from Arthropoda to Echinodermata with taxonomic keys,minor phyla and regulatory processes to safeguard them.. They understand the applications of biological sciences in apiculture, prawn culture, pearl culture, sericulture and economic values. Pest management, affinities of Rotifera.

Unit-I: PHYLUM ARTHROPODA -1:

General characters of the phylum and classification up to classes with suitable examples. Peripatus: study of unique features and systematic position.

Prawn: Penaeus species, externals, appendages and life history.

A brief account of cephalization, structure of integument and its significance.

Trophi of Insects: Cockroach, Honey bee, mosquito, Housefly, and butterfly.

Unit – II: PHYLUM ARTHROPODA -2:

Respiratory organs of Arthropoda: Gills, Book lungs, Trachea, and book gills Sense organs of Arthropoda: structure of simple eye, compound eye, gustatory and tactile organs.

An account f metamorphosis in insects. Neuro –endocrine control of metamorphosis in Bombyx mori.

Social organization in insects' ex. Termites and Honey bee

A brief account of economic importance of Arthropoda. Role of insects in agricultural practice (biological control)

a) Apiculture (rearing and collection of honey)

Prawn culture and rearing.

Unit – III: PHYLUM MOLLUSCA

General character's and classification up to classes with suitable examples

Type study of unio – Externals, internals of shell, histology of shell.Digestive, circulatory, respiratory, reproductive systems and life history of unio.

Modification of foot – chiton, Dentalium, pila, Aplysia, Mytilus, Sepia and octopus.

Economic importance of Mollusca- Pearl culture, chank and lime industries

Structure and systematic position of Neopilina galathea.

Unit-IV: PHYLUM ECHINODERMATA

General characters and classification of the phylum up to classes with suitable examples. Type study of starfish: Externals -Oral and Aboral, pedicellaria

Digestive system, Water vascular system and life history.

Structure and significance of the following larvae - Bipinnaria, Ophiopleutus, Echinopleutus and Auricularia.

Unit-V: MINOR PHYLA

12 Hours

4 Hours

12 Hours

15 Hours

11 Hours

Introduction to minor phyla. Salient features and biological significance of Rotifers.

REFERENCE BOOKS

- Volumes from Protozoa to Echinodermata, By KOTPAL R L,
- NIGAM. H.C. 1991. BIOLOGY OF NON CHORDATES, NAGINCHAND S.L. and CO., Jallandar,
- SHUKLA G.S AND UPADHYAY V.B, Reprint 2002. ECONOMIC ZOOLOGY, Rastogi Publications, Meerut, 4th Ed.
- Economic zoology by Reena and Mattur.
- A biology of Lower Invertebrates, by Russel-Hunter, w.D1969, Macmillan Co. New York.
- A biology of Higher Invertebrates, by Russel-Hunter, w.D1969, Macmillan Co. New York.
- A hand book on Economic Zoology by Jawaid Ahsan and Subhas Prasad Sinha.
- Parker and Haswel Vol. I

NCB - B.Sc(CBZ/PCM/PME/PMCs) Syllabus

CHE-C2-CHEMISTRY-II

Internal Marks:30

Lecture Hrs:54

Course Description: Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. Solve the problem and also think methodically, independently anddraw a logical conclusion.. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions.

Objectives of the course are:

To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.. Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Develop research oriented skills...make aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields as well as in laboratory.

Unit-I: **Chemical bonding**

Ionic bond: Lattice energy, Born-Haber cycle, Born-Lande equation (derivation not

required, problems on Born-Lande expression to be worked out). Calculation of lattice energies of KI, CaCl₂ and MgO, effect of lattice energy on solubility of ionic compounds. **Covalent bond:**

Valence bond approach: hybridization and directional characteristics of sp, sp², sp³, sp²d, sp³d². Shapes of BeCl₂, BF₃, SiCl₄, PCl₅, SF₆.

VSEPR theory: shapes of CH_4 , NH_3 , NH_4^+ , H_2O , BrF_3 , ICl^{2-} .

Molecular orbital theory: H_2 , He^{2+} , Be_2 , N_2 , O_2 , O_2^- , O_2^+ and CO (bond order, stability and magnetic properties to be discussed using energy profile diagram).

Polarization concept: Fazan's rule, bond length, bond angle and bond energy, polar and non-polar molecules, dipole moment.

Weak interactions:

Hydrogen bond: Intra molecular and Intermolecular types, anomalous properties of HF, H₂O, NH₃, alcohols, carboxylic acids, nitro phenols and bio molecules.

Van der Waal's forces: Noble gases and molecular crystals (dry ice, Iodine and solid SO_2)

Metallic bond: Band theory, electrical properties of metals, semiconductors and insulators.

Unit:II General study of d and f block elements

Transition elements: electronic configuration, atomic and ionic radii, ionisation energy, oxidation states, redox potentials, spectral and magnetic properties, catalytic activity, interstitial compound formation.

Lanthanides and Actinides: Electronic configuration, atomic and ionic sizes, lanthanide contraction and its consequences. Oxidation states, spectral and magnetic properties, comparison of oxidation states, complex formation and magnetic properties of d and f block elements.

Ion exchange method for separation of Lanthanides.

Unit:III Polymer chemistry and Silicates

8 Hours

13Hours

Page 52

8 hours

Exam Marks:70

Introduction - general properties of inorganic polymers, glass transition temperature, molecular weight of polymers-number average and weight average molecular weight, experimental determination by viscosity method, numericals based on molecular weight.

Commercially Important polymers:-

(i) Silicones, its preparation (one method) for linear, cross linked and cyclic silicones, properties – chemical and thermal stability, bond cleavage (using Grignard reagent), silicone fluids, oils, elastomers, resins, uses of silicone polymers (including conducting property)

(ii) Polyphosphazenes, introduction, cyclic trimer, cyclic tetramer, preparation, (schematic representation), reactions-action of heat, hydrolysis and uses.

(iii) Conducting and semiconducting polymers.

Silicates- Structure of SiO_4^{4-} , classification of silicates (based on structure), Zeolites- their structure and applications (Adsorption of gases, purification of hard water, Molecular sieves)

Unit:IV Thermodynamics

10 Hours

Need for second law, Statements of Second law of thermodynamics, concept of entropy-Carnot's cycle and efficiency-derivation (in terms of entropy only), numericals based on efficiency equation.

Free energy, work function and chemical potential. physical significance, criteria for equilibrium and spontaneous process, numericals, variation of free energy with temperature and pressure, Van't Hoff isotherm, numericals based on this equation, Gibbs – Helmholtz equation. Van'thoffisochore, numericals

Clausius – Clapeyron equation, applications for evaluation of molal elevation constant and molal depression constant (no derivation) numericals only on the Clausius – Clapeyron equation.

Qualitative treatment of Nernst heat theorem, Third law of thermodynamics (statement only), concept of residual entropy.

Unit:V Alkenes and Alkynes

8 Hours

Alkenes: Nomenclature, preparation by dehydration of alcohols and dehydrohalogenation of alkyl halides. Mechanism of elimination reactions – E_1 and E_2 , Saytzeff rule, Hofmann elimination. Stability – heat of hydrogenation.

Chemical properties - review of addition reactions and ozonolysis, addition of hydrogen halides – Markownikoff's rule (electrophilic addition mechanism), peroxide effect-addition of HBr in presence of peroxide (free radical mechanism).

Dienes:

Nomenclature and classification – isolated, cumulated and conjugated dienes. Structure of butadiene, preparation of butadiene from (i) 1, 3-butanediol (ii) ethanol and acetaldehyde. Reactions of butadiene (i) 1, 2 addition (ii) 1, 4 addition (iii) Diels -Alder reaction.

Rubber Polymers:

Polyisoprene, Polyisobutylene, Polybutadiene, Polychloropropene, Polystyrene-(butadiene-styrene) or SBS Polymers.

Alkynes:

Nomenclature, preparation of higher alkynes from ethyne. Distinction of terminal alkynes from non-terminal alkynes-acidity of alkynes. Chemical properties-addition of water and HCN to ethyne, polymerization-conversion of ethyne to benzene, isomerization –

conversion of but-1-yne to but-2-yne, significance of the above reactions to be mentioned.

Unit:VI Aromatic hydrocarbons

7 Hours

Nomenclature of benzene derivatives.

Aromaticity, Huckel's rule and applications of Huckel's rule to aromatic and antiaromatic compounds and ions- cyclopropenylcation, cyclopropenyl anion, cycloheptatriene, benzene, cyclopentadienyl anion, naphthalene, anthracene and octatetraene.

Structure of benzene – molecular orbital picture.

Electrophilic substitution, general pattern of mechanism with energy profile diagram.

Activating and de-activating substituents. Orienting influence of -OH, - CH_3 and - NO_2 groups. Naphthalene - structure and resonance forms. Reactions of naphthalene-oxidation, sulphonation.

Anthracene – structure and resonance forms, oxidation reactions.

Comparison of stability of benzene, naphthalene and anthracene in terms of resonance energy.

TEXT BOOKS :

1.College chemistry-II: L.Indira and Chatwal

2.Comprehensible chemistry-II: Vinod kumar B. and M.Aswathanarayanappa REFERENCE BOOKS:

1.General and Inorganic chemistry-R.Sarkar-volume-III-2013

2.Advanced general chemistry-sachin kumar ghosh-vol-III-2010

ELE-C2: BASIC ELECTRONICS-II

Lecture Hrs:54Internal Marks:30Exam Marks:70

Objective: To strengthen the basics of Electronics

Outcome: After studying this paper the students will be able to analyze the feedback amplifier circuits, to analyze the oscillator circuits, to analyze the Power amplifier circuits, to analyze the UJTandSCRcircuits,to recognize the different types of sensors and transducers and able to find their application in different areas.

Unit-I: Differential amplifier:

14 Hours

Dual input balanced and unbalanced output dc and ac analysis, input impedance, output impedance, common mode gain, differential gain, Current mirror. Problems. Operational Amplifier: Block diagram, Equivalent circuit, characteristics of ideal and practical Op Amp, pin configuration of IC 741, electrical parameters-input bias current, input offset voltage, output offset voltage, CMRR, Slew rate, SVRR, thermal drift, frequency compensation. Open loop gain, differential gain, limitations. Problems.

Feedback in amplifiers:Feedbackprinciples,typesoffeedbackpositiveandnegative,typesofnegativefeedback-voltage series, voltage shunt, current series and current shunt (block diagram representation for each). Expression for voltage gain of an amplifier with feedback (derivation).Problems.

Advantages of negative feedback: Stability, increase in input impedance, increase in bandwidth, decrease in output impedance (derivation for all), disadvantage of negative feedback. Problems. Non inverting (voltage series feedback) amplifier - gain, input and output impedances, band width, total output offset voltage with feedback, voltage follower. Problems.

Inverting (Voltage shunt feedback) amplifier-virtual ground, gain, input and output impedances, bandwidth, total output offset voltage, current to voltage converter. Problems.

Unit:II Applications of Operational amplifier:

12 Hours

Adder, Sign Changer, Scale changer, summing amplifier and Subtractor (difference amplifier, Integrator, Differentiator. Problems.

Comparators: Basic comparator, comparator characteristics, Schmitt trigger. Problems.

Active filters: Importance of active filter, first order Butterworth low pass, high pass, band pass and band elimination filters, all pass filter. Problems.

Oscillators: Basic principle of oscillator, tank circuit, Barkhausen criteria, LC oscillators-Hartley and Colpitt's using op-amp, RC oscillators-phase shift oscillator, Wein bridge oscillator. Problems.

Multivibrators: Types of multivibrators-Block diagrams of astable, monostable and bistable multivibrators-Monostable and Astable Multivibrators using IC 555. Problems.

Unit:III Introduction to Power Electronics:

12 hours

Introduction: Power Semiconductor Devices and types of Power Electronic Converters, applications, advantages and disadvantages of Power Electronics converters.

Power Semiconductor Diodes and Transistors:

Types of Power diodes, Switching Characteristics of Power diodes, Power BJTs, Power MOSFETS and Insulated Gate Bipolar Transistors (IGBT).

Thyristors:Introduction, Principle of operation, anode-cathode characteristics, two transistor model, switching characteristics (turn-on and turn-off).

UJT: Construction, working and Characteristics of UJT.

Gate Turn Off(G.T.O.) thyristor, TRIAC, DIAC, MOS controlled thyristor(MCT). Introduction to smart power devices.

Unit:IV Transducers and Sensors:

Transducers: Definition, Classification of transducers, Selecting a transducers, Construction, Principle of working and application of: Strain Gages (uniaxial strain gage), Displacement transducer (capacitive, inductive, piezoelectric), Temperature transducer (thermocouple, thermistor) and photosensitive devices (Photovoltaiccells).

Sensors: Definition, Classification of sensor, characteristics: Electrical, chemical, mechanical and optical characteristics.

Construction, Principle of working of: Radiation sensors (Photo transistors, photovoltaic, fiber optic sensors), smart sensors

Application of sensors in: Home appliance, automotive, aerospace, medical diagnostics, environmental monitoring.

TEXT BOOKS :

- 1. Operational amplifiers and Linear Integrated circuits, Ramakanth Gayakwad-PHI5th edition.
- 2. Power Electronics by Bhimra
- 3. Sensors and transducers by D. Patranabis

REFERENCE BOOKS:

- 1. A Simplified approach by Anand Murthy and Nattarasu.
- 2. Basic Electronics and Linear circuits, N.N. Bhargava, D.C Kulshresta and D.C. Gupta- TMH.
- 3. ModernelectronicInstrumentationandmeasurementtechniquebyHelfrick andCooper.

Unit-IV Introduction to Operating Systems

NCB - B.Sc(CBZ/PCM/PME/PMCs) Syllabus

CS-C2: Data Structures using C and Operating System

Internal Marks : 30

Lecture Hrs : 54

Course Description:

Data Structure is one of the fundamental understanding of programming and application development. Student is expected to work towards a sound theoretical understanding of Data Structures and also compliment the same with hands on implementing experience.

Objectives of the course are

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

Learning Outcome

Understand the need for Data Structures when building application. Appreciate the need for optimized algorithm. Able to walk through insert and delete for different data structures. Ability to calculate and measure efficiency of code . Improve programming skills.

Unit-I

Introduction to data structures

Classification of data structures, Operations on data structures,

Introduction to Time and space Complexity.

Primitive Data structures

Integer, Character. Float. and String-memory representation and primitive operations. String Manipulation using pointers

Arravs

Storage Representation for 1D and 2D arrays, Insertion and deletion on 1D arrays, advantages and disadvantages of arrays.

Unit - II

Linked Lists

Pointers. Dynamic Memory Allocation Singly Linked lists, Operations on linked Lists insertion and Deletion of a Node, Introduction to Circularly linked list and. doubly linked lists.

Stacks

Concepts, operations, sequential and linked implementation, Application of stacks-recursion-Towers of Hanoi-Infix to postfix conversion, Evaluation of Postfix Expressions.

Unit - III

Queues

Concepts, operations, sequential and linked implementation, Circular queues. Priority queues and Dequeues (Introductory concepts)-Application of queues

Trees

Definition, and Binary Trees. concepts-Binary trees. Sequential and Linked Representation of Insertion and Deletion and binary trees, Binary Tree Traversal.

9 Hours

9 Hours

Page 57

9 Hours

9 Hours

Definition.

Exam Marks: 70

What is an Operating System (OS)? History of OS- Simple Batch Systems. Multiprogramming Batched systems. Time-Sharing Systems, Personal Computer Systems. Distributed Systems And Real-Time Systems. Operating System Structures-Command Interpreter System, Operating System Services. System Calls, System Programs.

Unit-V

Process Management

Process Control Block. Process Scheduling CPU Scheduling-Basic Concepts, Scheduling Criteria. Scheduling Algorithms- FIFO, RR, SJF.

Storage Management

Basic Concepts. Logical and Physical Address Space. Swapping. Contiguous Allocation. Paging Segmentation. Virtual Memory- Demand Paging, page Replacement, page Replacement Algorithms, Thrashing and Demand segmentation.

Unit-VI

9 Hours

File System

File Concepts, Access Methods, Directory Structure. Protection. File System Structure. Allocation Methods, Free-Space Management.

I/O Systems

Overview of I/O Systems, I/O Interface Secondary Storage Structure-Disk Structure. Disk Scheduling.

TEXT BOOKS

1. Seymour Lipschutz, "Data Structures with C", Schaum'soutL*ines*, Tata McGraw-Hill, 2011.

REFERENCE BOOKS

1. Data structures through C In Depth - 2nd Edition by S.K. Srivastava, Deepali Srivastava Sep 29, 2017

2. Data Structures Through C in Depth (English, Srivastava S. K.)published in 2011 by BPB Publications.

3. Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles – 2016by Narasimha Karumanchi (Author)

9 Hours

Process Concept.

Internal Marks:30

MAT-C2: MATHEMATICS-II

Lecture Hrs:54

Objective: To introduce basic tools of Matrices, to explore the different tools for higher order derivatives, to plot the various curves and to solve the problems associated with differentiation and integration, to familiarize the students with various methods of solving differential equations and to have a qualitative applications through models.

Learning Outcome: This course will enable the students to find eigenvalues and corresponding eigenvectors for a square matrix, to evaluate the area, volume using the techniques of integration and is able to model problems in nature using Ordinary differential Equations.

Unit-I: ALGEBRA-II

Matrices: Elementary row and column transformations(operations), equivalent matrices, theorems on it. Row-reduced echelon form, Normal form of a matrix, rank of a matrix, Problems.

Homogeneous and Non-Homogeneous systems of m linear equations in n unknowns consistency criterion-criterion for uniqueness of solutions. Solution of the same by elimination method.

Eigen values and Eigen vectors of a square matrix of order 2 and 3, standard properties, Cayley-Hamilton theorem (with proof). Finding A^{-1} , A^{-2} and A^{2} , A^{3} , A^{4}

Unit:II CALCULUS-II

a. Differential Calculus-Part-I

Polar coordinates- Angle between the radius vector and the tangent- Angle of intersection of curves(polar form) polar subtangent and polar sub normal-perpendicular from the pole on the tangent-Pedal equations. Derivative of an arc in Cartesian, parametric and polar forms.

Curvature of plane curves-Formula for radius of curvature in Cartesian, parametric, polar and pedal forms-centre of curvature-Evolutes.

- b. Differential Calculus-Part-II Singular points-Asymptotes-envelopes- General rules for tracing of curves.
- c. Integral Calculus-Applications of integral calculus: computation of length of arc, plane area and surface area and volume of solids of revolutions for standard curves in Cartesian and polar forms.

Unit:III DIFFERENTIAL EQUATIONS-I

Solutions of ordinary differential equations of first order and first degree:

- i. Linear equations, Bernoulli equations and problems reducible to these forms.
- ii. Exact equations(excluding reducible to exact)

Equation of first order higher degree-non linear first order , higher degree- (mention) solvable for p-solvable for y-solvable for x-Clairaut's equation-singular solutions-Geometric meaning. Orthogonal trajectories in Cartesian and polar forms.

TEXT BOOKS :

1. Shanti Narayan and P K Mittal, Text book of Matrices, 5th edition, New Delhi, S. Chand and Co.Pvt.Ltd.,2013.

Exam Marks:70

28 Hours

14 Hours

Page 59

12 hours

- 2. Shanthi Narayan and P K Mittal, Differential calculus , Reprint. New Delhi: S Chand and Co. Pvt.Ltd., 2014.
- 3. Shanthi Narayan and P K Mittal, Integral calculus, Reprint. New Delhi: S Chand and Co. Pvt.Ltd., 2013.
- 4. M D Raisinghania, Ordinary and partial differential equations, S Chand and Co. Pvt. Ltd., 2014.

REFERENCE BOOKS:

- 1. B S Vatssa, Theory of Matrices, New Delhi: New Age International Publishers, 2005.
- 2. A R Vashista, Matrices, Krishna Prakashana Mandir, 2003.
- 3. G B Thomas and R L Finney, Calculus and analytical geometry, Addison Wesley, 1995.
- 4. J Edwards, An elementary treatise on the differential calculus: with applications and numerous example, reprint. Charleston, USA: BiblioBazaar, 2010.
- 5. N. P. Bali, Differential Calculus, India: Laxmi Publications (P) Ltd., 2010.
- 6. S Narayanan and T. K. ManicavachogamPillay, Calculus.: S. Viswanathan Pvt. Ltd., vol. I & II 1996.
- Frank Ayres and Elliott Mendelson, Schaum's Outline of Calculus, 5th ed. USA: Mc. Graw Hill., 2008.
- 8. E Spiegel, Schaum's Outline of advanced Calculus, 5th ed. USA: McGrawHill., 2009
- 9. M D Raisinghania, Advanced Differential equations, S Chand and Co. Pvt. Ltd., 2013.
- 10. F Ayres, Schaum's outline of theory and problems of differential equations, 1st ed. USA: McGraw-Hill, 2010.
- 11. S Narayanan and T K ManicavachogamPillay, Differential Equations.: S V Publishers Private Ltd., 1981.
- 12. G F simmons, Differential equation with Apllications and historical notes, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.

PHY-C2- PHYSICS-II

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Description: This course, provides an introduction to the basic concepts of Mechanics, Heat, Thermodynamics, Properties of matter, Gravitation and viscosity Introduces students to the use of mechanics and develops problem solving skills with

both theoretical and practical problems.

Objectives of the course are: To understand the different physical processes taking place in our surroundings.

Unit-I

14 Hours

Frames of reference: Inertial and non- inertial frames. Two frames of reference moving with uniform relative velocity (Galilean transformation). Accelerated frame. Concept of pseudo force Examples-moving lift, centrifugal force. Rotating frames-Coriolis force (qualitative) and its applications to trade winds, cyclones, erosion of river banks. Problems.

Dynamics of rotation-angular velocity and acceleration-Kinetic energy of rotation, concept of center of mass. Moment of inertia, theorem of parallel and perpendicular axes with proof- Calculation of M.I in case of (1) ring (2) disc (3) rod (4) rectangular plate (5) spherical shell and (6) solid sphere. Angular momentum, Toque, relation between Theory of Fly wheel. K.E them. of a body rolling down an inclined plane. Conservation of angular momentum - Examples. Problems.

Unit-II:

Thermodynamic Potentials: Internal energy, enthalpy, Helmholtz free energy, Gibb's free energy and their significance, I and II order phase transition. Derivation of Maxwell's thermodynamic relations using thermodynamic potentials significance. applications- ClausiusClapeyron equation, variation of internal energy with volume, difference between the heat capacities for ideal gases and real gases. Problems.

Low temperature physics: Joule Kelvin porous plug experiment (Thomson effect). Working and discussion of results. Expression for Joule-Kelvin coefficient. Joule-Kelvin heating and cooling for real gas. Temperature of inversion, its relation with critical temperature. Difference between adiabatic expansion and Joule-Kelvin effect. ii)Adiabatic demagnetization (thermo magnetic effect)-production of low temperature by adiabatic demagnetization-working. Methods adopted for liquefying gases regenerative process coupled with Joule- Thomson cooling. Linde's air liquefier, measurement of low temperature – platinum resistance thermometer. Problems. **13 Hours**

Unit – III:

Elasticity: Review of elastic behavior of solids in general, origin of elastic forces, stressstrain diagram, discussion with respect to metals and non metals. Elastic limit and Hooke's law, Modulii of elasticity and Poisson's Ratio, Derivation of relation connecting elastic constants. bounds of Poisson's ratio. Work done (energy stored) in stretching a wire.

Bending of beams. Expression for bending moment, single cantilever with theory. Isection girders. Couple per unit twist, torsional oscillations.M I of an irregular body. Rigidity modulus of a material by static method and dynamic method with theory. -**Problems**

14 Hours

Kinematics of moving fluids: Review of equation of continuity, Euler's equation of motion,

Bernoulli's theorem and applications: (1)the speed of efflux (Torricelli theorem(2)the Venturimeter and applications (Flow meter) (3)the curved flight path of a spinning ball (Magnus effect)(4)the lift on an aircraft wing (*All Qualitative*)

Unit-IV :

Newton's universal law of Gravitation: Newton's law in vector form,Gravitational potential and field intensity due to spherical distribution of matter (solid sphere only). Derivation of Kepler's laws of planetary motionfromNewton's law of gravitation (vector method), Determination of G by Boy's method. - **Problems**

Elements of satellite motion –Expression for escape velocity, orbital velocity and time period.

Geostationary orbits, weightlessness and artificial gravity, **Problems**

Viscosity: Coefficient of viscosity, stream line and turbulent flow, critical velocity. Derivation of

Poiseuille's formula for the flow of a viscous fluid through a narrow tube. Motion of a body in a

viscous medium. Stokes' law derivation. Expression for terminal velocity. Factors affecting

viscosity. Problems

Reference books:

- College physics for I B.Sc-N.Sundarajan, George Thomas, Syed Azeez; United Publications
- Properties of Matter-BrijLal and Subramanayam; S.Chand&Co.
- Heat & Thermodynamics- BrijLal and Subramanayam; S.Chand& Co.
- Elements of properties of matter-D.S. Mathur; ShamLal Charitable Trust, Delhi, 1996
- Understanding Physics-SarmistaSahu and Kala.N; Subhas Stores

13 Hours

BOT-P2- BOTANY LAB-II

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Experiment

- Study of Phycomycetes Albugo
- Study of Ascomycetes Lycoperdon& Peziza
- Study of Basidiomycetes Puccinia
- Studies of Lichens Crustose, Foliose, Fruticose types & lichen apothecia
- Bryophyta I Study of Marchantia.
- Bryophyta II Study of Anthoceros.
- Bryophyta III Study of Funaria [or any easily available mass].
- Plant pathology Tikka disease, Smut of Sorghum & Red ort of Sugarcane.

• Study of yeasts as model micro – organism – counting of yeast cells in a culture using haemocytometer; study of effect temperature, aeration and glucose concentration of rate of growth of culture [Growing a Baker's yeast culture]

• Field visit to study pathogen – host interaction.

ZOO-P1-ZOOLOGY LAB-II

Lab Hrs. : 44 hrsInternal Marks: 15Exam Marks: 35

Title of the experiment

- Arthropoda -Peripatus, Centipede, Crustacean larvae- Nauplius, Zoea, Mysis.
- Arthropoda- Limulus, Spider, Praying mantis, Termite- Queen, Worker and Soldier
- Arthropoda- Mouth parts of Honey bee, Mosquito, Butter fly, and House fly.
- Arthropoda Prawn : Appendages
- Arthropoda -Nervous system of cockroach and Salivary glands
- Mollusca -Chiton, Mytilus, Sepia, Aplysia, Oyster and Glochidium larva.
- Mollusca Unio, Ostrea, Patella and Nautilus
- Mollusca -Study of shell pattern in Cyprea, Murex, Dentalium, and Cuttle bone.
- Mollusca -Freshwater mussel Alimentary canal System and Pedal ganglia
- Echinodermata -Star fish, Brittle star, Sea Urchin, Cake Urchin and Heart urchin.
- Echinodermata -Sea cucumber, Sea lily, Bipinnaria and Echinopleutus larvae and Pedicellaria
- Economic Zoology Arthropoda, Mollusca and Echinodermata

CHE-P2-CHEMISTRY LAB-II

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Course Objectives/Course Description:

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

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

- Determination of the density and viscosity of a liquid (by time of flow method) using Ostwald's viscometer.
- Determination of percentage composition of a binary liquid mixture by viscosity method.
- Determination of molar mass of polymer by viscosity method.
- Determination of the density and surface tension of a liquid (by number of drops) using Stalagmometer.
- Determination of molar mass of a non-electrolyte by Walker-Lumsden method.
- Determination of degree of dissociation of an electrolyte by ebullioscopic method.
- Determination of distribution coefficient of iodine between water and carbon tetrachloride.
- Determination of distribution coefficient of acetic acid between water and butanol.
- Determination of distribution coefficient of benzoic acid between water and carbon tetrachloride or toluene.
- Effect of surfactants on the surface tension of water (Stock solution to be given).

ELE-P2-ELECTRONICS LAB-II

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

- 1. Non-inverting and inverting operational amplifier-acresponse.
- 2. Inverting summer, Non-inverting summer and subtractor.
- 3. First order Active Low-Pass and High-Pass filters using OP-AMP Frequencyresponse.
- 4. First order Active Band-Pass (narrow band) and Band Elimination (notch) filters using OP-AMP-Frequencyresponse.
- 5. Phase shift oscillator/Wein bridgeoscillator.
- 6. Colpitt's /Hartely oscillator.(Op- ampbased)
- 7. SCRcharacteristics.
- 8. TRIACCharacteristics.
- 9. MOSFETCharacteristics.

CS-P2-Computer Science LAB-II

Paper: IICSC-P Title: Data Structures Lab using C

Lab Hrs. : 44

Internal Marks: 15

Exam Marks: 35

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.

SECTION: A

- 1. Use a recursive function to find the Fibonacci series.
- 2. Use pointers to find the length of a string and to concatenate two strings.
- 3. Use pointers to copy a string and to extract a substring from a given a string.
- 4. Use a recursive function for the towers of hanoi with three discs.
- 5. Insert an integer into a given position in an array.
- 6. Deleting an integer from an array.
- 7. Write a program to create a linked list and to display it.
- 8. Write a program to sort N numbers using insertion sort.
- 9. Write a program to sort N numbers using selection sort.
- 10. Use a recursive function to find the Fibonacci series.
- 11. Use pointers to find the length of a string and to concatenate two strings.

SECTION: B

- 12. Inserting a node into a singly linked list.
- 13. Deleting a node from a singly linked list.
- 14. Inserting a node into a doubly linked list.
- 15. Deleting a node into a doubly linked list.
- 16. Pointer implementation of stacks.
- 17. Pointer implementation of queues.
- 18. Creating a binary search tree and traversing it using in order, preorder and post order.
- 19. Sort N numbers using merge sort.

MAT-P2-MATHEMATICS LAB-II

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

- Introduction to Scilab and commands connected with matrices.
- Operation on matrices.
- Row reduced echelon form and normal form.
- Establishing consistency or otherwise and solving system of linear equations.
- Plotting of standard Cartesian curves using Scilab/Maxima.
- Plotting of standard Cartesian curves using Scilab/Maxima.
- Plotting of standard Polar curves using Scilab/Maxima
- Plotting of standard parametric curves using Scilab/Maxima.
- Scilab/Maxima programs for area and volume.
- Solution of Linear Differential equation using Scilab/Maxima
- Solution of Bernoulli's Differential equation using Scilab/Maxima
- Solution of Exact Differential equation using Scilab/Maxima
- Solution of Differential equation using Scilab/Maxima
 - Solvable for p.
 - o Clairaut's form.
- **Open sources materials**
 - 1. <u>www.scilab.org</u>.
 - 2. <u>www.maxima.sourceforge.net</u>
 - 3. www.geogebra.org

PHY-P2-Physics Lab-II

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

Course Objectives/Course Description:

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

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

- Young's modulus by single cantilever
- Young's modulus by stretching
- Young's modulus by uniform bending
- Rigidity modulus by dynamic method
- Rigidity modulus by static method
- Elastic constants by Searle's double bar
- MI of a fly wheel
- Verification of perpendicular axes theorem.
- Verification of parallel and perpendicular axes theorems
- MI of irregular body'
- Torsional pendulum
- Damping of a rigid pendulum
- Experiment on low temperature physics
- Experiment on Bernoulli's principle

BSMC2: INDIAN CONSTITUTION AND HUMAN RIGHTS

Lecture Hrs : 54	Internal Marks : 30	Exam Marks : 70
Course objective :Thesyl pursue his/her career in 1 necessary. No matter wh service sectors. It will equi	labus covers all the basic concept Politics and Public sector s/he wat course a student pursues, IC is p them for competitive exams like	ts of IC. If a student decides to vill have the knowledge that is is essential for all business and KAS and IAS
Unit-I: Introduction		14 Hours
 Salient Features of Ind Preamble Fundamental Rights ar Directive Principles of Amendment of the Control Unit - II :: The Legislatu Lok Sabha and Rajya Law-making Process President - Election Prise State Governor – Powe Prime Minister and Cht Unit - III :: The Judiciary The Supreme Court - Figh Court - Composition Judicial Activism and Fight Party System in India Election Commission - Fight 	ian Constitution Ind Fundamental Duties State Policy Institution re and Executive Sabha – Composition, Powers and rocedure, Powers and Functions ers and Functions lief Minister– Powers & Functions Composition, Powers and Functions Composition, Powers and Functions Public Interest Litigation nd Electoral Process – Powers and Functions	14 Hours 12 Hours 1 Functions 10 Hours ns 8 Hours
Electoral Reforms		
Unit - V:Human Rights a	nd Accountability	10 Hours
 Meaning, Scope and I Protection of Human Commissions, Non-G Accountability in pub Right to Information A Reference Books : 	mportance Rights:National Human Rights Co overnmental Organizations lic life Act, 2005	mmission, State Human Rights
 Durga Das Basu; Introdu Ltd., New Delhi M.V. Pylee; Indian Cons Durga Das Basu; Humar New Delhi K.K.Ghai; Indian Consti Granville Austen; Work 	ction to the Constitution of India, I stitution n Rights in Constitutional Law, Pre tution, Kalyani Publishers king of the Indian Constitution	Prentice – Hall of India Pvt. entice – Hall of India Pvt. Ltd.,

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

Third Semester

Third Semester B.Sc							
	Code	Course(Subject)	Hours	Marks			
Part				IA	Exam	Total	Credits
	LBSK-C3	Kannada-III	4	30	70		2
	LBSH-C3	Hindi-III				100	
Part-1	LBSS-C3	Sanskrit-III					Z
	LBSA-C3	Additional English-III					
	LBSE-C3	English-III	4	30	70	100	2
	BOT-C3	Botany-III	4	30	70	100	4
	Z00-C3	Zoology-III	4	30	70	100	4
	CHE-C3	Chemistry-III		30	70	100	
	ELE-C3	Electronics-III	4				4
	CS-C3	Computer Science-III					
	MAT-C3	Mathematics-III	4	30	70	100	4
Devet 2	PHY-C3	Physics-III	4	30	70	100	4
Part-2	BOT-P3	Botany Lab -III	3	15	35	50	1
	ZOO-P3	Zoology Lab -III	3	15	35	50	1
	CHE-P3	Chemistry Lab -III	3	15	35	50	
	ELE-P3	Electronics Lab -III					1
	CS-P3	Computer Science Lab -III					
	MAT-P3	Mathematics Lab -III	3	15	35	50	1
	PHY-P3	Physics Lab –III	3	15	35	50	1
Part-3	BSMC-C3	Human Resource Management	2	15	35	50	1
	BSOE-C1	Open Elective	2	15	35	50	1
	-	Total Marks & Credits		235	515	750	21
	Pa	rt-1 and Part-3 are common	for all	combir	nations		=
		Part-2 Program co	mbinatio	on			
CBZ	3Z Chemistry-III , Botany-III , Zoology-III						
Chemistry Lab-III , Botany Lab -III , Zoology Lab -IIIPCMPhysics-III , Chemistry-III , Mathematics-III							
Physics Lab -III , Chemistry Lab -III , Mathematics Lab -III					-III		
PME Physics-III, Mathematics-III, Electronics-III							
	Physics Lab	-III , Mathematics Lab -III ,	Electron	ics Lab	- 111		
PMCS	PMCS Physics-III, Mathematics-III, Computer Science-III						
	Physics Lab -III , Mathematics Lab -III , Computer Science Lab -III						

LBSK-C3: Kannada-III	
Lecture Hrs : 54Internal Marks : 30	Exam Marks : 70
	7 Hours
ವೃಶಂಪಾಯನ ಗಳಯ ಪ್ರಸಂಗ–ನಾಗವರ್ಮ	
Unit - II ಕುರುಕುಲಾರ್ಕನುಮರ್ಕನುಮಸ್ತಮೆಯ್ದಿದರ್–ರನ್ನ	5 Hours
Unit - III	5 Hours
Unit-IV ಮಾಯೆಯತಿರಸ್ಸಾರ–ಚಾಮರಸ	6 Hours
Unit-V	5 Hours
ಸಿರಿಮುಡಿಗೆ ಕೈಯಿಕ್ಕಿದನ್– ಕುಮಾರವ್ಯಾಸ	
Unit-VI ಕುಲಕುಲವೆನ್ನುತ್ತಿಹರು_ಕನಕರಾಸ	5 Hours
ಹಲಹಲವನ್ನುತಹದ-1ನಗದಗಳ	
Title:ವಿಚಾರ ಸಾಹಿತ್ಯ	
1. ವಿಚಾರಕ್ರಾಂತಿಗೆಆಹ್ವಾನ– ಕುವೆಂಪು	5 Hours
2. ರಾಮ ಕೃಷ್ಣ ಶಿವ–ಲೋಹಿಯ. ಸಂ. ಕೆ.ವಿ.ಸುಬ್ಬಣ್ಣ	6 Hours
3. ಮಹಿಳೆ ಮತ್ತು ವಿಜ್ಞಾನ-ನೇಮಿಚಂದ್ರ	5 Hours
4. ಸಾಮಾಜಿಕಕ್ರಾಂತಿಯ ಸ್ವರೂಪ–ಎಂ.ಡಿ ನಂಜುಂಡಸ್ವಾಮಿ	5 Hours
ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು	
1. ಪ್ರಾಚೀನ ಕಾವ್ಯ ಸೌರಭ–ಸಂ.ನರಹಳ್ಳಿ ಬಾಲಸುಬ್ರಮಣ್ಯಂ–ಪ್ರಸಾರಾಂಗ	ಗ ಬೆಂ.ವಿ.ವಿ.
2. ಹರಿಹರನ ರಗಳೆಗಳು	
3. ರನ್ನ ಕವಿ ಗದಾಯುದ್ಧ ಸಂಗ್ರಹಂ–ಸಂ–ತೀ.ನಂ.ಶ್ರೀಕಂಠಯ್ಯ	
4. ರಾಮ ಕೃಷ್ಣ ಶಿವ–ಸಂ–ಕೆ.ವಿ.ಸುಬ್ಬಣ್ಣ	
LBSH-C3: Hindi-III

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

45 Hours

9 Hours

Unit-I

''दौड'' ।

उपन्यासदौडकाउपन्यासकममताकालियाकापरिचय।आजकेनवयुवकोंकाजीवनचित्रण।

Unit - II

रचना।

पत्रलेखनकापरिचय।सारलेखनकापरिचय।

TEXT BOOKS

''दौड'' संपादक : ममताकालिया।संपादकऔरमुद्रक : वानिप्रकाशननईदिल्ली।

REFERENCE BOOKS

सुबोधव्यवहारिकहिन्दी।संपादक : डॉ. कुलदीपगुप्त। संपादकऔरमुद्रकःअनिलपुसककेन्द्र, बेंगलूरु।

LBSS-C3 Sanskrit III

Lecture Hrs : 54

Internal Marks : 30

Exam Marks: 70

Unit-I: Introduction of Kavya and its division in brief , Champu **10 Hours** literature and its characteristics, kinds of Champu literature, Nilakhanta vijaya champu, Champu Ramayana, History of Sanskrit literature

Unit - II : Detailed text – Champu Ramayana of Bhoja, authors date, life **8 Hours** and works

Unit-III : Champu Ramyana of Bhoja, Slokas, translation and **30 Hours** explanation and its general significance and characters of the text

Unit - IV: Translation of unseen passages and comprehension6 HoursText Book : Champu Ramayana of Bhoja by V. R Tripura

The National College, Autonomous, Basavanagudi, Bengaluru-04					
LBSA-C3: Additional English-III					
Lecture Hrs : 54	Internal Marks : 30	Exam Marks : 70			
Literature		27 Hours			
1. The Doll's House	- Katherine Mansfield				
 A work of Art - Anton Chekov What I Require from Life - JBS Haldane Non Violence - Aldous Huxley 					
5. Everest: My Journ	ney to the Top - Bachendri Pal				
Language		27 Hours			
 Essay Writing Short Story Writing 	ıg				

LBSE-C3: English-III

Lecture Hrs: 54

Internal Marks : 30

Exam Marks : 70

18 Hours

10 Hours

26 Hours

Course Description: The course addresses the contemporary concerns of today. Texts are chosen from Indian languages in translation and Indian English. The learners are introduced to current literary trends. The Language section is designed to equip learners with employability skills in the English language.

Course Objectives: To familiarise learners with current literary trends and equip them with employability skills.

Course Outcomes:

- 1. To introduce learners to Indian literatures
- 2. To respond to varied perspectives presented by the literary texts
- 3. Advanced reading and writing skills
- 4. To familiarise the learner with short official communication

Unit-I - Literature

Play: Tughalaq by Girish Karnad

Unit - II

- **1.** Gateman's Gift R K Narayan
- **2.** In the Mothers Garden—Volga
- **3.** Measurements—Navakanta Barua
- 4. Lalitha Effect Shiv Vishvanathan
- **5.** I am not your data—Abhay Xaxa

Unit - III: Language Skills

- 1. Writing Paragraphs
- 2. Photo-journalistic writing
- 3. Comprehension of Poems
- 4. Short Writing Skills: Circular, Notices and Memo

BOT-C3: Botany-III

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Objectives of the course:

- 1. To study the structural, developmental & economical aspects of Pteridophytes & Gymnosperms.
- 2. To sensitize the students towards the need for keeping the environment clean and conserve our natural resources, conservation of wildlife & combating pollution.

Course Outcome :

- 1. Nursery Manager, Forest Ranger & Ecologist
- 2. Plant Explore Farming Consultant.
- 3. Job opportunity in Pollution Board Control.

Unit-I: PTERIDOPHYTA

- 1. Introduction and classification (as per K.R. Sporne).
- 2. Type study-Morphology, anatomy and life cycle of the following genera in detail Psilotum, Selaginella, Equisetum, MarsileaGeneral Stelar evolution in pteridophytes; heterospory and seed habit.

Unit – II: PLANT ANATOMY

- 1. A brief review of plant tissues Meristems, simple, complex and secretory tissues.
- 2. A brief account on theories on Meristems.
- 3. Anatomy primary structures of root, stem & leaf Monocot & Dicot.
- 4. Transition zone.
- 5. Normal Secondary growth in dicot stem.
- 6. Anomalous secondary growth in Boerhaavia and Dracaena stem.

Unit – III: CLASSICAL ECOLOGY

- 1. Introduction- Definition and scope of Ecology.
- 2. Ecosystem concepts, aquatic & grassland ecosystems.
- 3. Environmental factors climatic, edaphic and biotic factors.
- 4. Ecological succession Hydrosere and Xerosere.
- 5. Ecological adaptations Hydrophytes, xerophytes, halophytes& epiphytes.
- 6. Biogeochemical cycles Nitrogen & Carbon cycle.

Unit-IV : EMBRYOLOGY OF ANGIOSPERM PART – I

- I 15 Hours
- 1. Introduction to embryology contributions of B.G.L Swamy & P Maheshwari.
- 2. A brief review of floral morphology& flower as a modified shoot.
- 3. Microsporophyll T.S Anther, microsporogenesis, development of male gametophyte, Pollen morphology and pollen wall architecture.
- 4. Ovule Structure & types of ovules.
- 5. Megasporogenesis&Development of female gametophytes Monosporic.
- 6. Pollination, Types and significances of cross pollination. pollen pistil interactions and its significance.
- 7. Fertilization in angiosperms.

12 Hours

12 Hours

The National College, Autonomous, Basavanagudi, Bengaluru-04

REFERENCE BOOKS

- 1. College Botany Vol 3, Dr S Sundara Rajan 3 edition
- 2. Botany for Degree students Pteridophytes, B R Vashishta, Dr AK Sinha & Dr Adarsh Kumar
- 3. Plant Ecology ,R S Shukla & P S Chande

Zoo-C3: Zoology-III

Internal Marks : 30

Exam Marks : 70

Course Objective: Introduces the concepts of taxonomy of Chordates, adaptions and economic importance of vertebrates like fishes, concepts of fisheries, aquaculture systems, economic importance and adaptive radiation in reptiles, birds and mammals.

Learning outcome: Students acquire the knowledge about origin of Protochordates to Mammalia, general characters, taxonomical positions, adaptations, parental care, metamorphosis, osteology, migration, remote sensing, dentition in mammals, salient features of mammals, snake bite and first aid and economic importance and complex vertebrate interactions.Course provides comprehensive understanding about various economical important fishes and piscicu;ture which can provide employment opurtunity, as it is a small apple industry. They can be comprised to reaction of targets and tar

it is a small scale industry. They can be compitant in research and teaching fields as well.

Unit-I: PROTOCHORDATA

Lecture Hrs : 54

Origin of Chordata. Salient features & Classification

Tornaria larva – structure and significance

Balanoglossus – Externals&modification of coelom in three divisions of the body.

Amphioxus- Externals, feeding, circulatory, nervous, respiratory and excretory system.

Ascidia – Externals, Retrogressive metamorphosis.

Agnatha – General characters, Classification up to classes with examples, Significance of Ammocoete larva. Petromyzon-externals and buccal cavity bronchial tract.

Unit - II : PISCES

General characters, classification upto orders with examples. Differences between cartilaginous and bony fishes.

Sense organs in fishes -Ampulla of Lorenzini and lateral line system.

Interesting features and affinities of Dipnoi.

Study of Latimeria as a living fossil.

Accessory respiratory organs- Anabas, Clarias and Heteroneustes.

Migration – Anadromous and Catadromous migration with suitable examples.

Pisciculture – culture of fishes (inland, estuarine and marine fisheries) Types of pond culture practices.

Fish processing and preservation.

Economic importance of fishes.

Detailed account on Swim bladder in fishes

Unit - III : AMPHIBIA

Origin of Amphibians.

General characters and classification up to orders of living Amphibians with suitable examples.

Neuroendocrine control of metamorphosis.

Parental care in Amphibia : Pipa, Gastrothecus, Alytes and Ichthyophis.

Neoteny and Paedogenesis in Amphibia with reference to Urodela.

Adaptations in Amphibia with respect to aquatic, terrestrial and arboreal adaptations with examples.

12 Hours

Unit-IV: REPTILIA

General characters and classification up to orders of living Reptiles with examples. Terrestrial adaptations in Reptiles. Adaptive radiation in extinct and extant Reptiles.

Differences between venomous and non-venomous snakes, Poison apparatus, venom types, its effects, chemical composition Antivenin and first Aid.

Interesting features of Sphenodon and its affinities.

Economic importance of Reptiles.

Brief account of Mesozoic Reptiles.

Unit-V: AVES

General characters, differences between Ratitae and Carinatae.

Interesting features of Archaeopteryx and its affinities.

Flight adaptations in Ave-Morphological, Physiological.

Migration in birds- Types and theories (North ancestral and south ancestral theories).

Migration-Ringing and radio collaring techniques on migration routes and remote sensing. Fowl farming-Breeds, indigenous and Exotic, farming techniques.

Economic importance of birds.

Unit-VI: MAMMALIA

General characters and classification up to orders with suitable examples.

Salient features of all orders with examples.

Dentition in Mammals, evolution of molar tooth.

Adaptive radiation in Mammals with reference to habit and habitat with giving suitable examples.

TEXT BOOKS

- 1. M Dhami P.K. & Dhami J.K. 1994. Vertebrate Zoology, R Chand & Co, New Delhi.
- 2. Fish And Fisheries Of India By V G Jhingran.
- 3. Fishes Of India, By Norman
- 4. Hegner R.W And Stiles K.A., 1959. College Zoology, The Macmillan Company, New York, 7th Edition.
- 5. Jordan E.L. And P.S Verma. 1963. (Reprint 2002) Vertebrate Zoology, Chand & Company, New Delhi
- 6. Kotpal R.L.1998. Vertebrates. Rastogi Publications, Meerut, 7th Edition.
- 7. Birds, By R L Kotpal.
- 8. A Manual Of Practical Zoology, Vertebrates, By Dr.P.Sverma, S.Chand& Company, New Delhi.
- 9. Nigam. H.C. 1991. Biology Of Chordates, Naginchand S.L. And Co., Jallandar,
- 10. Shukla G.S And Upadhyay V.B, Reprint 2002. Economic

Zoology, Rastogi Publications, Meerut, 4th Ed.

REFERENCE BOOKS

- 1. Economic Zoology By Reena And Mattur.
- 2. A Hand Book On Economic Zoology By Jawaidahsan And Subhas Prasad Sinha.
- 3. Marshall A.J., Parker And Haswell, W.A. 1988; Text Book Of Zoology, Vertebrates.Cbs Publ.
- 4. Majupuria T C 1990; Introduction To Chordata Pradeep Publications, Jallandar
- 5. Introductory Zoology Volumes Iii And Iv By Prof. Cm Vimala

10 Hours

7 Hours

10 Hours

Page 80

CHE-C3: Chemistry-III

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Description: Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions.

Objectives of the course are:To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions..

Learning Outcome: Research oriented skills.make aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields as well as in laboratory.

Unit-I: Gaseous state and theory of dilute solutions

14 Hours

Maxwell Boltzmann distribution of molecular velocities, mean free path, collision frequency, derivation of expression for most probable velocity definitions and expressions for rms velocity and average velocity (no derivation), relationship between them.

And rew's experiment on CO_2 , critical constants and their determination, relationship with

vander Waals constant, Joule-Thomson effect, Inversion temperature and their applications to the liquefaction of air and hydrogen. Law of corresponding states.

Theory of dilute solutions- Review of colligative properties. Raoult's law – elevation in boiling point – derivation from vapour pressure-temperature curves – determination of molar mass by Walker-Lumsden method – depression in freezing point – derivation from vapour pressure – temperature curves – determination of molar mass by Beckmann's method. Osmotic pressure, determination of osmotic pressure by Berkeley-Hartley's method – laws of osmotic pressure-determination of molar mass from osmotic pressure – isotonic solutions – reverse osmosis. Abnormal molecular weights, van't Hoff factor – degree of association and dissociation – numericals to be worked.

Unit:II Chemical kinetics

8 hours

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple reactions – zero order, first order, second order. Half-life & mean life. Determination of the order of a reaction – differential method, method of integration, method of half-life period and isolation method. Derivation of II order rate equation with a = b and $a \neq b$.

Radioactive decay as a first order phenomenon. Theories of chemical kinetics: Effect of temperature on the rate of reaction, Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Problems on rate constant, $t_{1/2}$, mean life period and order of a reaction.

Experimental determination of kinetics of

i) Inversion of cane sugar by polarimetric method.

Spectrophotometric method for the reaction between $K_2S_2O_8$ and KI.

Unit:III Solid state and structure of ionic solids

Structural differences between solids, liquids and gases. Definition of space lattice, unit cell, laws of crystallography, symmetry elements in crystals, seven basic crystal systems; Weiss and Miller indices, X-ray diffraction of crystals, derivation of Bragg's equation. Determination of the structure of NaCl and KCl by rotating crystal method. Elementary discussion of the liquid crystalline state - classification, structure and applications. Structure of ionic solids based on radius– ratio rules (Calculation not required), crystal co-ordination number, structure of ZnS, CsCl, CaF₂ and CaTiO₃. Schottky and Frenkel defects, F-centres, Gemstones.

Unit:IV Metallurgy

- a) Thermodynamic concept, selection of a reducing agent using Ellingham diagrams including Hg & Ag.
- b) Refining of metals electrolytic, vapour Phase, zone refining.
- c) Extraction of Nickel from sulphide ore, extraction of titanium from rutile.
- d) Extraction of thorium from monazite sand.
- e) Extraction of uranium from pitch blende.

Isolation of plutonium from spent nuclear fuel.

Unit:VOrganic halogen compounds and Organo metallic compounds9HoursAlkyl halides: Introduction and classification: Nucleophilic substitution reactions- S_N1 and S_N2substitution reactions- S_N1 and S_N2mechanisms with energy profile diagrams. Effect of (i) nature of alkyl groups (ii) nature of

leaving groups (iii) nucleophiles and (iv) solvents on S_N1 and S_N2 mechanisms. Elimination reactions- E_1 and E_2 mechanisms, Saytzeff and Hofmann eliminations with

mechanisms. Aryl halides: Preparation by halogenation. Generation of benzyne-trapping with dienes

Aryl halides: Preparation by halogenation. Generation of benzyne-trapping with dienes (example: furan and anthracene).

Relative reactivity of alkyl, allyl, vinyl, aryl and aralkyl halides towards nucleophilic substitution.

Organo metallic compounds- Preparation and synthetic applications of Grignard – reagents. Organo lithium compound & lithium dialkylcuprates.

Unit:VI Alcohols and thiols and Active methylene compounds

7 Hours

Polyhydric alcohols - Preparation of glycols from alkenes using OsO_4 and $KMnO_4$ and from epoxides; oxidation of glycols by periodic acid/lead tetra acetate. Preparation of glycerol from propene, isolation from oils and fats; reactions of glycerol – nitration, action of con. H_2SO_4 and oxidation by HIO_4 .

Thiols : Nomenclature, methods of preparation and chemical reactions.

Active methylene compounds-Active methylene compounds – Introduction, definition, acidity of alpha hydrogen- Tautomerism - differences between resonance and tautomerism. Aceto acetic ester – Preparation by Claisen condensation, Synthetic applications – Acid and ketonic hydrolysis, preparation of mono and dicarboxylic acids. Unsaturated acids, ketones, cyclic compounds

TEXT BOOKS :

1.College chemistry-III: L.Indira and Chatwal

2.Comprehensible chemistry-III: Vinod kumar B. and M.Aswathanarayanappa

REFERENCE BOOKS:

1.General chemistry-R.Sarkar-volume-III-2012

2. Advanced chemistry-sachin kumar ghosh-vol-III-2011

ELE-C3: Electronics-III ADVANCED ELECTRONICS-I

(Digital Electronics, Nanoelectronics and C Programming)

Lecture Hrs : 54

Internal Marks : 30

Exam Marks: 70

Objective: To enhance the knowledge in Electronics

Outcome: After studying this paper the students will be able to design the logical circuits for sequential circuits, write the codes using C programming and gets the knowledge about nano materials and its synthesis mechanism and characterization techniques.

Unit-I: SequentialLogicCircuits:

12 Hours

Flip-flops-Basic SR latch (NAND and NOR latches), Edge triggering and level triggering, Edge triggered S-R flip flop (NAND), D Flip Flop, T Flip Flop, and Edge triggered JK Flip Flop, Pulse Triggered M/S JK Flip Flop, Clear and Present inputs, IC 7474 and IC 7476 (logic diagrams).

Registers -4 bit serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out, Applications.

Counters-Asynchronous counters- Logic diagram, Truth table and timing diagrams of 3 bit asynchronous binary counter and Decade counters, IC 7493- 4 bit binary counter, mod n asynchronous counter.

Synchronous counters- 3 bit synchronous binary counter and Decade counters, Up/down synchronous counters designing of synchronous counters using K-map, IC 7490, Ring Counter, Applications.

D to A conversion – Characteristics – Resolution, linearity, accuracy, settling time and temperature sensitivity, -4 bit Binary Weighted DAC and R-2R ladder circuit, IC DAC 08.

A to D conversion - Characteristics, Successive approximation method, IC ADC 0804. Unit - II 13 Hours

Basics of Programming: Algorithm, flowchart and pseudo code.

Introduction to C: Development of C, features, constants and variables, data types, operators and expressions, library functions.

I/O statements: Formatted and unformatted I/O, *scanf()*, *printf()*,*getchar()* and *putchar()*functions.Control Structures: Conditional and unconditional, *if*, *for*, *while and dowhile*, *switch*, *break* and *continue*, *goto* statement

Arrays : One and multi dimensional arrays, strings and string functions, bubble sort, linear and binary search.

Unit - III

12 Hours

Functions:Definition,differenttypes,advantages,callingafunction,passingparameters,callby reference and call by value, local and global variables, recursivefunctions.

Pointers : Declaration, operations on pointers, relationship between arrays and pointers, address arithmetic, array of pointers, pointer to a pointer, pointer to a function, dynamic memory allocation(not in detail).

Structures, Unions and macros.

Unit-IV

17 Hours

Introduction to nanomaterials: Introduction, to One dimensional, Two dimensional and Three dimensional nanostructured materials

Various kind of Nanostructure electronics devices: Carbon fullerenes and CNT. Metal and metal oxide nanowires, resonant tunnelling diodes, FETs, single electron transfer devices, LEDs and lasers

Preparation methods: Bottom-up synthesis – Top-down synthesis:

Synthesis of Nanomaterials: PVD, CVD, Nucleation and Growth, ALD, Epitaxy, MBE. Characterization techniques of nanomaterials: Introduction,structuralcharacterization:Xraydiffraction,scanningelectronmicroscopy(SEM), transmission electron microscopy including high resolution imaging (TEM), scanning probe microscopy (SPM) – principle of operation, instrumentation and probes, Atomic force microscopy(AFM)

TEXT BOOKS

- 1. Digital Fundamentals: Floyd-UBSpublishers.
- 2. Solidstateelectronicdevices-SixtheditionbyBenGStreetman,SanjaykumarBanerjee.
- 3. Nanostructures and Nanomaterials: Synthesis, Properties and Applications by Guozhong Cao, Imperial College Press, London, 2004.
- 4. Let us C by YeshwantKanetkar
- 5. The C Programming Language:Balagurusamy.

REFERENCE BOOKS

- 1. Electronic Principles: A.P. MALVINO-TMH 5thedition.
- 2. Silicon VLSI Technology, Plummer, Deal, Griffin, Pearson EducationIndia.
- 3. Encyclopedia of Materials Characterization, Edited by: Brundle, C.Richard; Evans, Charles A. Jr.; Wilson, Shaun ;Elsevier.
- 4. Introduction to nano electronics Vladimir V.Mitin
- 5. The C programming Language: B.W. kerningham and D.M.Ritchie, prentice Hall of India.
- 6. C Programming (Schaumseries)

CS-C3: Unix Operating System and Software EngineeringLecture Hours : 54Internal Marks : 30Exam Marks : 70

Course Description:

A study of the UNIX operating system including multi-user concepts, terminal emulation, use of system editor, basic UNIX commands, and writing script files. Topics include introductory systems management concepts.

Course Objectives: To familiarize students with the concepts, design, and structure of the UNIX operating system. To teach students the use of basic UNIX Utilities, the principles of UNIX shell programming.

Learning Outcome:Ability to understand the Unix Operating System and the working of the built in commands available in Unix. This course will prepare students to develop software in and for effective command line usage, shell programming and C Language.

Unit-I

Introduction: History, features of Unix System architecture, Unix File System,Boot Block, super block, I-node table, data block, storing and accessing files, directory and file related commands. Process management: Process creation, process examining and process killing, background process, piped process, demon process, delaying of processing and processing at specified time.

Unit - II

Special tools and utilities: Filters, processes,Unix signals, storage and compression facilities. System administration: User and supervisor privileges and facilities, controlling processes, accessing the file system, security issues, secondary storage management, Unix System Communication: Introduction, write, read, wall commands, sending and handling mails.

Unit - III

Shell Programming 1:Vi Editor, shelltypes, shell command line processing, shell script features, executing shell script,system and defined а user variables,exprcommand,shell interface.read echo screen and statement,commandsubstitution,escape characters.shell sequence script arguments,test command, simple programs. Conditional Control Structures-If statement, case statement, Looping control structure-While, Until, For, Break, and continue statements, Shell programs.

Unit-IV

Introduction:Evolution, S/W characteristics, Challenges, Applications, Software engineering process, S/W engineering models, Waterfall Model, Prototyping, Iterative Development, Rational Unified Process, Extreme Programming and Agile Process. Software Requirements Analysis and Specification:Role of SRS, Requirement Process, Requirementsspecification, Desirable Characteristics of an SRS, Component of an SRS, Structure of a Requirement Document, Functional Specification with Use cases, Other Approaches for Analysis, Validation.

Unit-V

Design:Design concepts, Design Principles,Function-Oriented Design: Module-Level Concepts,Design Notation and Specification,Structured Design Methodology, Detail Design:PDL,Logic/Algorithm Design, Verification.

9 Hours

9 Hours

9 Hours

9 Hours

Unit-VI

9 Hours

Coding:Programming Principles and Guidelines,UnitTesting,Coding Standards and Verification,Code Inspection and Static Analysis.

Testing:TestingConcepts,TestingProcess,Test Planning and Strategies , Black-Box Testing,White-Box Testing.

TEXT BOOKS

1 Unix Shell programming" by Yeshwant Kanetkar, BPB Publications, 4th Edition, 2017.

2. Unix concepts and Applications" by Sumitabha Das, Tata McGraw-Hill Education 4th Edition,2017.

3 An Integrated approach to Software Engineering by Pankaj Jalote,3rdEdition,Narosa Publishing House,2013.

2. Software Engineering by Roger S.Pressman, A Practitioner's approach, 7thEdition, McGraw-HILL Publication, 2010.

REFERENCES BOOKS

1 M.G.Venkateshmurthy,"Introduction to UNIX & SHELL

Programming", FirstEdition, Pearson Education, 2004.

2. Forouzan,"Unix and Shell Programming",1st Edition,2008 Cengage Learning India.

3. Software Engineering by Ian Sommerville,9thEdition,Pearson Education Ltd,2010.

MAT-C3: Mathematics-III

Lecture Hrs : 54

Internal Marks : 30

Objective: The objective of the course will lead to future basic courses in advanced Mathematics such as cyclic groups, have the knowledge on basic properties of the field of real numbers, sequences and convergence of sequences and its convergence, to have knowledge on limit theorems and mean value theorems on function and to solve differential equation problems to understand the methods.

Learning Outcome: On successful completion of this course, students will understand cyclic groups and related results, limits and their use in sequences. and they can use derivative to analyze and sketch the graph of a function of one variable, can also obtain absolute value and relative extrema of functions. students are able to apply knowledge of calculus and differential equations in the areas of their own interest.

Unit-I

Groups: Order of an element of group-properties related to order of an element-subgroup generated by an element of a group-coset decomposition of a group, Cyclic groups-properties-modulo relation-index of a group-Lagrange's theorem-consequences.

Unit - II

REAL ANALYSIS-I: Sequences of Real Numbers

Definition of sequences-Bounded sequences-limit of a sequence-Convergent ,Divergent and Oscillatory sequence-Monotonic sequences and their properties-Cauchy's criterion.

Unit - III

Differential Calculus

Recapitulation of Equivalence Class and partition of a set. Definition of the limit of a function in $\in -\delta$ form- continuity-types of discontinuities. Properties of continuous function on a closed interval (boundedness, attainment of bounds and taking every value between bounds).Differentiability –implies continuity-Converse not true. Rolle's Theorem-Lagrange's and Cauchy's First Mean Value Theorem (Lagrange's form) – Maclaurin's expansion. Evaluation of limits by L'Hospital's rule.

Continuity and differentiability of a function of two and three variables-Taylor's theorem and expansion of functions of two variables- Maxima and Minima of functions of two variables. Method of Lagrange multipliers.

Unit-IV

DIFFERENTIAL EQUATION-II

Second and higher order ordinary linear differential equations with constant Cofficientscomplimentary functions-particular integrals (standard types) Cauchy- Euler differential equation. Simultaneous linear differential equations (two variables) with constant coefficients. Solutions of second order linear differential equations with variables coefficients by the following methods.

- i. When a part of complimentary function is given.
- ii. Changing the independent variables.
- iii. Changing the dependent variable.
- iv. Variation of parameters.
- v. condition for exactness and the solution when the equation is exact.

TEXT BOOKS

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

16 Hours

14 Hours

14 Hours

10 Hours

Exam Marks: 70

Page 87

- 1. Herstein I n Topics in Algebra, 4thed. New Delhi, India: Vikas Publishing House Pvt Ltd, 1991.
- 2. S. C. Malik and SavitaArora, mathematical analysis, 2nded. New Delhi, India: New Age International (P) Ltd., 1992.
- 3. Shanthi Narayan and P K Mittal, Differential calculus, Reprint. New Delhi: S Chand and Co. Pvt.Ltd., 2014.
- 4. M D Raisinghania, Ordinary and Partial Differential Equations S Chand and Co.Pvt.
- 5. <u>www.scilab.org</u>.
- 6. <u>www.maxima.sourceforge.net</u>
- 7. <u>www.geogebra.org</u>

REFERENCE BOOKS

- 1. Michael Artin, Algebra, 2nded.New Delhi, India:PHI Learning Pvt. Ltd.,2011.
- 2. Vashista, A First Course in Modern Algebra, 11th ed.:, Krishna Prakashana Mandir,1980..
- 3. John B Fraleigh, A First Course in abstract Algebra, 3rd ed.: Narosa Publishing House., 1990.
- 4. R Balakrishan and N. Ramabadran, A Textbook of Modern Algebra, 1st ed. New Delhi, India: Vikas Publishing
- 5. Richard R Goldberg, Methods of Real Analysis, Indian ed. New Delhi, India: Oxford and IBH Publishing Co., 1970.
- 6. G B Thomas and R L Finney, Calculus and analytical geometry, Addison Wesley, 1995.
- 7. J Edwards, An elementary treatise on the differential calculus: with applications and numerous example, reprint. Charleston, USA: BiblioBazaar, 2010.
- 8. N. P. Bali, Differential Calculus, India: Laxmi Publications (P) Ltd., 2010.
- 9. S Narayanan and T. K. ManicavachogamPillay, Calculus.: S. Viswanathan Pvt. Ltd., vol. I & II 1996.
- Frank Ayres and Elliott Mendelson, Schaum's Outline of Calculus, 5th ed. USA: Mc. Graw Hill., 2008.
- 11. E Spiegel, Schaum's Outline of advanced Calculus, 5th ed. USA: McGrawHill., 2009
- 12. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.
- 13. FAyres, Schaum's outline of theory and problems of Differential Equations, 1st ed. USA: McGraw-Hill, 2010.
- 14. S Narayanan and T K ManicavachogamPillay, Differential Equations.: S V Publishers Private Ltd., 1981.
- 15.G F Simmons, Differential equation with Applications and historical notes, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.Useful web links:
- 1. <u>http://www.themathpage.com/</u>
- 2. http://www.abstractmath.org/
- 3. http://ocw.mit.edu/courses/mathematics/
- 4. <u>http://www.math.unl.edu/~webnotes/contents/chapters.htm</u>
- 5. <u>http://www-groups.mcs.st-</u> andrews.ac.uk/~andrews.ac.uk/~john/analysiss/index.html
- $6. \ \underline{http://web01.shu.edu/projects/reals/index.html}$

The National College, Autonomous, Basavanagudi, Bengaluru-04

- 7. <u>http://www.mathcs.org/analysis/reals/index.html</u>
- 8. <u>http://planetmath.org/encyclopedia/TopicsOnCalculus.html</u>
- 9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
- 10. http://mathworld.wolfram.com?Calculus.html
- 11. http://ocw.mit.edu/courses/mathematics/
- 12. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PHY-C3: Physics-III

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Description: This course, provides an introduction to the basic concepts of Electricity, Magnetism and Radiation

Introduces students to understanding concepts of Electricity, Magnetism and Radiation using mathematical tools.

Objectives of the course are: To understand the different physical processes of nature in terms of Electricity, Magnetism and Radiation

Learning Outcome: The student should be able to apply mathematical tool to solve reallife problems in Electricity, Magnetism and Radiation.

Unit-I

Magnetism: Review: Definition of magnetic field – magnetic force on a moving charge – Lorentz force – force on a current carrying conductor in a magnetic field. Torque on a current loop in a magnetic field.

Ballistic galvanometer with theory – charge sensitivity – effect of damping, applications of BG – Determination of capacitance and high resistance by leakage. Magnetic dipole moment - torque on a magnetic dipole – equivalence of a current loop to a magnetic dipole.

Biot- Savart's law – applications, theory of Helmholtz galvanometer – magnetic field due to a current in a straight conductor of finite length – field along the axis of a solenoid. Ampere's law, applications – magnetic field at a point due to a straight current carrying conductor of infinite length – magnetic field inside a solenoid. Magnetic field outside the solenoid. Problems.

Unit-II:

Vector Calculus: Physical significance of divergence and curl of a vector – Gauss theorem and Stoke's theorem. Problems.

Electromagnetism: Concept of displacement and total current, equation of continuity. Setting up of Maxwell's equations – setting up of wave equations for E and B – velocity of electromagnetic wave – light as e.m. wave-Concept of Lorentz force to e.m.field – velocity of e.m. wave in dielectric media – transverse nature of e.m. wave – Poynting theorem–pointing vector–energy density of e.m. waves, Propagation of electromagnetic waves in a conducting medium- Skin effect. Problems

Unit – III:

Network Theorems: Thevenin's theorem, Superposition theorem (Mesh current analysis), Maximum power transfer theorem, w.r.t D.C. currents. Problems.

Transient Current – theory of C R circuit, charging and discharging – L R circuit – growth and decay – decay of charge in LCR (series) circuit. Problems

Alternating currents: Response of L R, C R and L C R (series) circuit to sinusoidal voltages –impedance using j operator – series resonant circuit – parallel resonant circuit (LR parallel to C by vector method) – Expression for Q – factor, band width, power in ac circuit –problems.

UNIT –IV:

Thermo electricity: Seebeck effect, thermoelectric series, neutral temperature, laws of thermoelectricity. Peltier effect – demonstration of Peltier effect (any one experiment) – Peltier coefficient.Thomson effect – experiment to demonstrate Thomson effect (any one experiment) – Thomson coefficient. Expression for Peltier and Thomson coefficients.

14 Hours

13 Hours

13 Hours

Applications of thermodynamics to a thermoelectric circuit – total emf. Thermoelectric diagram and uses. Thermoelectric thermometers – problems.

Radiation: Black body radiation and distribution of energy in its spectrum, mention of Kirchhoff's law – Stefan Boltzmann law – Wien's distribution and displacement law – Rayleigh-Jean's law. Derivation of Planck's law-Deduction of Wein's law and Rayleigh Jeans law from Planck's law, pyrometers. problems.

Reference books:

- 1. Understanding physics Sarmistha Sahu, Kala.N –Subhas stores
- 2. Electronic Principles B.Basavaraj vol.1-Omkar Publications
- 3. Feynman lectures –Narosa Publishing House
- 4. Fundamentals of Magnetism and electricity-D.N.Vasudeva- S Chand & Company.
- 5. Electricity and Magnetism Brijlal Subramanya, Ratan Prakash Publication.
- 6. College Physics N.Sunderrajan Et.al- United Publishers
- 7. A treatise on heat Saha and Srivatsav.

The National College, Autonomous, Basavanagudi, Bengaluru-04

BOT-P3:	Botany	Lab-III
	Dotany	

Lab 1	Hrs. : 44 Internal Marks: 15 Exam Marks: 35
SL No.	Experiment
1.	Study of plant tissues and cell types in a T.S of Cucurbita stem and also through macerated material of Cucurbita stem.
2.	Comparative stem anatomy – dicot stem (Tridax) & monocot stem (Grass).
3.	Comparative root anatomy – dicot root (Cicer seedlings) & monocot root (Canna).
4.	Comparative leaf anatomy – dicot leaf (Tridax) & monocot leaf (Grass).
5.	Normal & anomalous secondary growth (Study of Boerhaavia stem).
6.	Study of Psilotum – morphology & reproductive structure.
7.	Study of Selaginella – morphology & reproductive structure.
8.	Study of Equisetum – morphology & reproductive structure.
9.	Study of Marsilea – morphology & reproductive structure.
10.	Comparative study of stem anatomy of Psilotum, Selaginella, Equisetum &Marsilea with slide preparation.
11.	Study of hydrophytic, xerophytic and epiphytic adaptations.
12.	Study of quadrat and line transect methods in ecology (to be conducted in the field).

The National College, Autonomous, Basavanagudi, Bengaluru-04					
ZOO-P3: Zoology Lab-III					
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35				
Sl. No.	Experiment				
1.	<u>PROTOCHORDATA</u> :Balanoglossus, T.S. through Proboscis, Ascidia and Tornaria larva.				
2.	<u>CYCLOSTOMATA</u> : Amphioxus-, T.S. through pharynx and intestine. Petromyzon, Myxine and Ammocoete larva				
3.	<u>PISCES</u> :Narcine, Ostracion, Eel, Tetradon, Hippocampus (male and female) and Echeneis				
4.	<u>PISCES</u> : Accessory respiratory organs in Anabas, Clarias and Heteropneustes Types of scales, Staining and mounting of bony fish scales				
5.	Dissection of Shark (Scoliodon sp.) or any bony fish. Circulatory system: Afferent arterial System, Efferent arterial System, Afferent branchial system Nervous system: Origin and distribution of 9 th 10 th cranial nerves.				
6.	<u>AMPHIBIA</u> : Bufo, Hyla, Amblystoma, Axolotl larva, Necturus and Ichthyophis				
7.	Skeleton of Frog- skull, vertebral column, pectoral and pelvic girdles, fore limb and hind limb bones.				
8.	<u>REPTILIA</u> : Chelone, Chamaeleon, Varanus, Draco and Phrynosoma				
9.	Snakes- Hydrophis, Najanaja, Bungarus Viper and Dryophis.				
10.	<u>AVES</u> :Ecological adaptation in Duck, Eagle, Parrot, Kingfisher, Woodpecker and Pigeon with reference beak and feet.				
11.	<u>AVES</u> : Skeleton- Skull, heterocoelous vertebra, synsacrum, Sternum,				
12.	\underline{AVES} : Pectoral girdle, Pelvic girdle and limb bones. (excluding bones of hand and foot)				

The National College, Autonomous, Basavanagudi, Bengaluru-04

CHE-P3: Chemistry Lab-III

Organic chemistry

Lab Hrs. : 44

Sl. No.

Internal Marks: 15

Exam Marks: 35

Experiment

Preparation and purification of organic compounds:

- 1. Recrystallisation and determination of melting point of solids (demonstration of mixed melting point determination).
- 2. Simple distillation and determination of boiling point of liquids, air/water cooled condenser.
- 3. Purification of solids by sublimation.

One stage preparation:

(Preparation, re-crystallization, determination of melting point of the unknown compound)

- 4. Preparation of aspirin from salicylic acid. (Note: freshly prepared Acetic anhydride will be provided).
- 5. Preparation of paracetamol from *para*-aminophenol.
- 6. Preparation of dibenzal acetone from benzaldehyde. (using acetone and alcoholic sodium hydroxide).
- 7. Preparation of *para*-aminobenzoic acid from *para*-nitrobenzoic acid.
- 8. Preparation of *meta*-dinitrobenzene from nitrobenzene.
- 9. Preparation of benzoic acid from toluene.

Two stage preparations:

- 10. Preparation of para-bromoaniline from acetanilide.
- 11. Preparation of para-nitroaniline from acetanilide.
- 12. Preparation of methyl orange/methyl red by diazotization and coupling.

Kinetics

13. Kinetics of the reaction between $K_2S_2O_8$ and KI by spectrophotometry.(clock reaction)

Chromatography:

- 14. Paper chromatography: Separation of components in spinach extract (using 1 : 1 alcohol and Whatmann filter paper)-To be performed by the students.
- 15. Thin layer chromatography: Separation of green leaf pigments/separation of a mixture of two organic compounds.
- 16. Column chromatography: Separation of a mixture of two organic compounds.

ELE-P3: Electronics Lab-III LAB IN DIGITAL ELECTRONICS AND C PROGRAMMING

Lab Hrs. : 44

Internal Marks: 15 Experiment

Exam Marks: 35

Sl. No.

PART-A: Digital Electronics

- 1. Decimal to BCD Priority encoder and BCD to DecimalDecoder.
- 2. BCD to seven segment conversion using IC7447.
- 3. Study of Multiplexer using IC 74150 and De-Multiplexer using IC74154.
- 4. Unclocked and Clocked SRFlip-Flop.
- 5. J-K Flip-flop and conversion to D and T flip flop using IC7476.
- 6. Four bit binary ripple counter using IC7476.
- 7. Johnson/RingCounter.
- 8. ShiftRegisters

PART-B: C programming

- 1. Printing the reverse of an integer and astring.
- 2. Printing the odd and even series of Nnumbers.
- 3. Get a string and convert the lowercase to uppercase and vice--versa using *getchar()* and *putchar()*.
- 4. Finding the occurrence of a particular character in astring.
- 5. Input a string and find the number of each of the vowels appear in thestring.
- 6. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
- 7. Checking whether the given matrix is an identity matrix ornot.
- 8. Finding the first N terms of Fibonacciseries.
- 9. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of eachvariable.
- 10. Recursive program to find the factorial of aninteger.
- 11. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
- 12. Define a structure with three members and display thesame.
- 13. Declare a union with three members of type integer, char, string and illustrate the use of union.
- 14. Printing the reverse of an integer and astring.

The National College, Autonomous, Basavanagudi, Bengaluru-04

CS-P3: Computer Science Lab-III UNIX Programming Lab

Lab Hrs. : 44

Sl. No.

Internal Marks: 15

Exam Marks: 35

Experiment PART-A:

- 1. To print all prime numbers between m and n(m < n).
- 2. To check whether a given number is Armstrong or not.
- 3. To find GCD and LCM of two numbers.
- 4. To count the number of vowels.
- 5. Checking whether the given string is a palindrome or not.
- 6. To find the occurrence of a character in given string.
- 7. Write a shell script, which displays all the files in the current directory, which has read or write permission.
- 8. Write a shell script to find a given pattern in a list of files of current directory using grep command.
- 9. To print a string in the reverse order.
- 10. Create a file containing the following fields candidate no name, Age, Sex, Height and Weights. Print all the details in a neat format.

PART-B:

- 11. Write a menu driven shell program for payroll System.
- 12. Write a menu driven shell program to generate a Electricity Bill.
- 13. Write a menu driven shell program to generate a shopping Bill.
- 14. Write a shell script to print the student details and generate the marks card.
- 15. Write a menu driven shell script to implement the following unixcommands. a.rm b. uniq c. tail d. cmp
- 16. Write a shell program for Inventory control of Super market.

The National College, Autonomous, Basavanagudi, Bengaluru-04						
MAT-P3: Mathematics Lab-III						
Lab]	Irs.: 44 Internal Marks: 15 Exam Marks: 35					
Sl. No.	Experiment					
1.	Example to verify Lagrange's Theorem.					
2.	Examples for finding left and right coset and finding the index of a group.					
3.	Illustration of convergent, divergent and Oscillatory sequences using Scilab/Maxima.					
4.	Scilab/Maxima programs to illustrate continuity of a function.					
5.	Scilab/Maxima programs to illustrate differentiability of a function and unequal left hand and right hand limit for discontinuous functions.					
6.	Scilab/Maxima programs to verify Rolle's theorem and Lagrange's theorem.					
7.	Scilab/Maxima programs to verify Cauchy's mean value theorem and finding Taylor's theorem for a given function.					
8.	Evaluation of limits by L'Hospital's rule using Scilab/Maxima.					
9.	Finding maxima/minima of functions of two variables.					
10.	Finding complementary function and particular integral with constant coefficient second and higher order ordinary differential equations.					
11.	Maxima Program to Solve Method of Variation of Parameters.					
12.	Maxima program to verify the condition for exactness and to find its solution.					

PHY-P3: Physics Lab-III Internal Marks: 15

Exam Marks: 35

Course Objectives/Course Description:

The course is designed to provide a practical exposure to the students. **LearningOutcome:** Students acquire the knowledge to build the logic and develop a solution for a problem statement.

Sl. No.

Lab Hrs. : 44

Experiment

- 1. Verification of Thevenin's theorem.
- 2. Verification of Superposition theorem
- 3. Verification of maximum power transfer theorem.
- 4. Study of charging and discharging of a capacitor in RC circuit.
- 5. Thermocouple determination of constants.
- 6. Study of LCR Series resonance and determination of resonant frequency, Bandwidth and quality factor.
- 7. Study of LCR Parallel resonance and determination of resonant frequency, Bandwidth and quality factor
- 8. Determination of Constants of B.G.
- 9. Determinations of self inductance of a coil using Anderson's bridge
- 10. Determination of self inductance of a coil using Maxwell's bridge
- 11. Verification of Stefan's law of radiation by electrical method.
- 12. Determination of L and C by equal voltage method.
- 13. Determination of effective capacitance of series and parallel connections of two capacitors using Desauty's bridge.
- 14. Determination of high resistance by the method of leakage using B.G

MC2:Human Resource Management

Lecture Hrs : 27

Internal Marks :15

Course Objective:Explain the importance of human resources and their effective management in organizations. Demonstrate a basic understanding of different tools used in forecasting and planning human resource needs. Describe the meanings of terminology and tools used in managing employees effectively. Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training.

Unit-I:Introduction to Management and HRM

Definition of Management , Principles and Levels of Organization-Functions of Management meaning , Importance, Objectives and Functions of Human Resource Management – Nature and scope of Human Resource Management – Systems of HRM- Duties and of Responsibilities of Human Resource Manager

Unit - II :Human Resources Planning

Meaning and Importance's of Human Resource Planning- factors affecting Human Resource planning-Demand and Supply Forecasting- Estimating the net Human Resource requirement.

Unit-III : Recruitment and Selection

Meaning and Objectives of Recruitment – Factors affecting Recruitment applicant pool- Methods of Recruitment- Methods and objective of Selection – Process of Selection- Uses of test in Selection – Placement- Problems in making effective Placement.

REFERENCE BOOKS

- Biswananth Ghosh- Human Resource Development and Management, 2004,Vikas Publishing House.
- Subba Rao- Personnel and Human Resource Management
- Aswathappa K- Human Resource Management
- Richard Rudman- Performance planning and Review, 2003, Allen and Unwin
- Allen B.Clardy Managing Human Resources Exercises, Experiments and Applications Work book Lawrence Erlbaum Assoicates,1996.
- Cases In HRM- Dr. D.Gopal Krishna 2014, IK International Publishers, New Delhi.
- Rudra Basavaraj- Personnel management in India. VSP Rao- Human Resource Management Text and Cases.

END SEMESTER EXAMINATION PATTERN

Part A:Multiple choice questions15 x 1 = 15 marksPart B:Four to be answered from Six questions4 x 5 = 20 marksThe distribution of marks for the CONTINUOUS INTERNAL ASSESMENT1.Test10 marks2.Attendance05 marksTotal15 marks

Exam Marks: 35

10 Hours

7 Hours

10 Hours

Page 99

Fourth Semester

Fourth Semester B.Sc							
	Code	Course(Subject)	Hours	Marks			
Part				IA	Exam	Total	Credits
Part-1	LBSK-C4	Kannada-IV		30	70		2
	LBSH-C4	Hindi-IV	4			100	
	LBSS-C4	Sanskrit-IV					
	LBSA-C4	Additional English-IV					
	LBSE-C4	English-IV	4	30	70	100	2
	BOT-C4	Botany-IV	4	30	70	100	4
	ZOO-C4	Zoology-IV	4	30	70	100	4
	CHE-C4	Chemistry-IV					4
	ELE-C4	Electronics-IV	4	30	70	100	
	CS-C4	Computer Science-IV					
	MAT-C4	Mathematics-IV	4	30	70	100	4
Dent 2	PHY-C4	Physics-IV	4	30	70	100	4
Part-2	BOT-P4	Botany Lab -IV	3	15	35	50	1
	ZOO-P4	Zoology Lab -IV	3	15	35	50	1
	CHE-P4	Chemistry Lab -IV		15	35	50	1
	ELE-P4	Electronics Lab -IV	3				
	CS-P4	Computer Science Lab -IV					
	MAT-P4	Mathematics Lab -IV	3	15	35	50	1
	PHY-P4	Physics Lab –IV	3	15	35	50	1
Dout 2	BSMC-C4	Human Resource Management	2	15	35	50	1
Part-5	BSSD-C4	Skill Development	-	-	-	-	1
		Total Marks & Credits		220	480	700	21
	Pa	art-1 and Part-3 are commor	n for all	combi	nations		
		Part-2 Program co	<u>mbinati</u>	on			
CBZ	Chemistry-	IV , Botany-IV , Zoology-IV					
	Chemistry	Lab-IV , Botany Lab -IV , Zool	ogy Lab	-IV			
РСМ	Physics-IV	, Chemistry-IV , Mathematics	-IV				
DIST	Physics Lab	-IV, Chemistry Lab -IV, Mai	thematio	cs Lab	·IV		
PME	Physics-IV	, Mathematics-IV , Electronic	S-IV	an I - I	117		
DMC	Physics Lab -IV , Mathematics Lab -IV , Electronics Lab -IV						
PMC	Physics-IV, Mathematics-IV, Computer Science-IV						
5	Physics Lab -IV , Mathematics Lab -IV , Computer Science Lab -IV						

The National College, Autonomous, Basavanagudi, Bengaluru-04					
LBSK-C4 : Kannada-IV					
Lecture Hrs : 54Internal Marks : 30Exam Marks : 70					
Objectives of the course:ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುವುದರೊಂದಿಗೆ, ನಾಟಕ ಪ್ರಕಾರದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷೆಯನ್ನು ಕಲಿಸುವುದರೊಂದಿಗೆ ಭಾಷೆಯ ವಿವಿಧ ಮುಖಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.					
Course Outcome:ನಾಟಕಗಳು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಸಾಮಾಜಿಕ ಜವಾಬ್ದಾರಿಯನ್ನು ಕಲಿಸುವುದರಲ್ಲಿ ಮಹತ್ವದಾಯಕವಾಗಿವೆ.ಕಾದಂಬರಿಯು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಸಾಹಿತ್ಯ ಪ್ರಕಾರದ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವಲ್ಲಿ ಅನುಕೂಲಕರವಾಗಿರುತ್ತದೆ.ಕಥೆಗಳು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಸಾಹಿತ್ಯ ಸೃಷ್ಟಿಯಂತಹ ಕ್ರಿಯಾಶೀಲ ಬರವಣಿಗೆಗೆ ಸಹಾಯಕವಾಗಿರುತ್ತದೆ.ಪ್ರಬಂಧಗಳು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ವಿಷಯವೊಂದನ್ನು ವಿಶ್ಲೇಷಿಸುವುದನ್ನು ಕಲಿಸುತ್ತದೆ					
Unit-I 20 Hours ನಾಟಕ : ಏಕಲವ್ಯ–ಸಿದ್ಧಲಿಂಗಯ್ಯ					
Unit - II ಕಾದಂಬರಿ: ಬೆಟ್ಟದಜೀವ– ಶಿವರಾಮ ಕಾರಂತರು					
Unit - III 18 Hours 1. ಬಿಳಿಯ ಕಾಗೆ–ಎಚ್.ನಾಗವೇಣಿ.					
2. ನಾಗರ ಬೆತ್ತ–ಸೇಡಿಯಾಪ್ಪುಕೃಷ್ಣಭಟ್ಟ 3. ನಮ್ಮಎಮ್ಮೆಗೆ ಮಾತು ಬಾರದು–ಪು.ತಿ.ನ					
4. ಹೀಗೊಂದುಟಾಪ್ ಪ್ರಯಾಣ– ಈರಪ್ಪ ಎಂ. ಕಂಬಳಿ ಹರಾಮರ್ಶನ ಗ್ರಂಥಗಳು ಏಕಲವ್ಯ–ಸಿದ್ಧಲಿಂಗಯ್ಯ, ಅಂಕಿತ ಪುಸ್ತಕ, ಬೆಂಗಳೂರು ಬೆಟ್ಟದ ಜೀವ– ಶಿವರಾಮ ಕಾರಂತರು, ಸ್ವಪ್ನ ಬುಕ್ ಹೌಸ್, ಬೆಂಗಳೂರು ಲಲಿತ ಪ್ರಬಂಧಗಳು– ಅ.ರಾ.ಮಿತ್ರ–ಕರ್ನಾಟಕ ಸರ್ಕಾರ, ಬೆಂಗಳೂರು					
. ಹೀಗೊಂದು ಟಾಪ್ ಪ್ರಯಾಣ–ಈರಪ್ಪ ಎಂ.ಕಂಬಳಿ					

LBSH-C4: Hindi-IV "नरसिंहकथा"

Lecture Hrs : 54	Internal Marks : 30	Exam Marks : 70
Unit-I		45 Hours
नरसिंहकथा। नाटककारकापरिः	चय।पाँचअंकोंकोनाटकनरसिंहकथाक	विवरण।
Unit - II		9 Hours
रचना।		
निबंधलेखनकापरिचय।कल्पका	पसंद : चलनचित्रऔरनाटककेतुलना।	
TEXT BOOKS	C C	
'नरसिंहकथा' संपादकलक्ष्मीनाः	रायणलाल।	
प्रकाशकऔरमुद्रक : लोकभारती	प्रकाशन , इलाहाबाद।	
REFERENCE BOOKS		
सुबोधव्यवहारिकहिन्दी, संपादव	क : डॉ. कुलदीपगुप्त।प्रकाशकओरमुद्र	रक : अनिल
पुस्तककेंद्र, बेंगलूरु		

The	National	College,	Autonomous,	Basavanagudi	,Bengaluru-04
	acionai	Concec)	/ lacononio ab)	Basaranagaa	, beingarara er

LBSS-C4 : Sanskrit IV

Lecture Hrs : 54	Internal Marks : 30	Exam Marks	s : 70	
Unit-I: Drishya kavya and Sh and Uparupaka, drama – it's	ravya, Gadhya, padhya and Champu a kind of Rupaka	, Rupaka	8 Hrs.	
Unit - II : Drama – origin and	d development of drama, theories of	drama	8 Hrs.	
Unit-III : Important dramatists, Bhasa is one of the dramatist, his life history, his date, works, common features found in dramas of Bhasa, his style				
Unit – IV: Detailed text – acts), dramatists personae, N worship sutradhara, his role,	drama Swapna vasava dattam of Jandi, its significance in drama, it is , prasthavana, slokas and dialogues,	Bhasa (I–III preliminary explanation	26Hrs	
Units – V: Translation of uns	een passages and comprehension		4 Hrs.	

Text Book : Swapna Vasava Dattam of Bhasa by Prof. M. K Surya Narayana Rao, Subhash Publications

The National College, Autonomous, Basavanagudi, Bengaluru-04 LBSA-C4 : Additional English-IV Lecture Hrs : 54 Exam Marks: 70 **Internal Marks : 30 Prose & Poetry 20 Hours** 1. Character - William Wordsworth 2. The unknown citizen- W.H. Auden 3. Invictus - William Ernest Henley 4. Telephone Conversation - Wole Soyinka 5. White Paper - Sharankumar Limbale (Translated) by Priya Adarkar 6. Punishment in Kindergarten - Kamala Das 07 Hours Play 1. "Never Never Nest" - Cedric Mount Language **27 Hours** 1. Summary Writing 2. Note making

The National College, Autonomous, Basavanagudi,Bengaluru-04 LBSE-C4: English-IV

Lecture Hrs : 54 Internal Marks : 30 Exam Ma	rks : 70
 Course Description: The course introduces the learners with contemporary texts and prepares the aspiring learners to competitive examination. Objectives of the course: To introduce the learners to Children's Literature and the perspective it presents. The course also helps learners to acquire critical thinking through exercises in Critical Reasoning. Course Outcome: Learners will comprehend the contextualised discuss contemporary issues through Children's Literature. To equip learners with the following language abilities: a. To become independent readers 	literary ne larger ng skills sion of
b. To express their thoughts and opinions in writing in the format of the blog c. To equip learners with important short writings for official communication	
Unit-I Haroun and the sea of stories—Salman Rushdie	0 Hours
Unit - II101. A Far cry from Africa Derek Wallcot2. I do not love you except because I Love you Pablo Neruda3. A Study in Emerald Neil Gaiman4. How the Flamingos got red legs —Folktale from Latin AmericaUnit - III24Language Skills1. Reading Skills: SQ3R2. Writing for the blog3. Official Letter Writing4. Resume with Covering Letter5. Critical Reasoning	0 Hours 4 Hours

The National College, Autonomous, Basavanagudi, Bengaluru-04

BOT-C4 : Botany-IV

Internal Marks : 30

Lecture Hrs : 54

Objectives of the course:To study the commercial importance of Gymnosperms & Angiosperms. To acquire the knowledge of Palaeobotany, geographical distribution of coal, water, fossil fuels & tissue culture. To understand the gradual evolution of life & existence of new life.

Course Outcome:Research Scholar in tissue culture. Archaeologist & Environmentalist Unit-I **12 Hours**

GYMNOSPERMS: Introduction – General character & Classification as per K.R. Sporne. Vegetative characters, Anatomy, Life history of the following generaPinus & Gnetum. A brief account on evolution & Economic importance of Gymnosperms.

Unit - II

PALEOBOTANY & ORGANIC EVOLUTION PALEOBOTANY:

Introduction & contributions of Birbal Sahni to Paleobotany. Geological time scale, Process of fossilization & types of fossils Study of fossil. Pteridophytes - Rhynia, Lepidodendron& Calamiies. Study of fossil Gymnosperms - Cycadeoidea & Glossopteris.

Unit - III

ORGANIC EVOLUTION: Theories on organic evolution – Lamarck's Theory, Darwin's Theory & Neo Darwinis. Phylogenetic interpretation on the basis of data base. Evolution of angiosperms – A brief account.

Unit-IV

EMBRYOLOGY OF ANGIOSPERMS – PART II: A brief review of post fertilization changes in a flower. Endosperm – Types, functions, endosperm haustoria & Ruminate endosperm. Embryo - Classification - SchanrfDevelopment of Dicto & Monocot Apomixis - Definition, types, causes & significanc. Polyembryony embryos. Definition, concept, types, causes & significances. Experimental embryology -Totipotency, Tissue, organ & protoplast culture, basic. Methods, nutrient media, application & somatic hybridizatio .Transgenic Plants. **15 Hours**

Unit-V

APPLIED ECOLOGY & PHYTOGEOGRAPHY: Eco system management - soil erosion. conservation, watershed management & remote sensing. Pollution Ecology – Types of pollution & pollutants, effects & control measures of Air, water, soil, radioactive & noise pollution. Brief account & effects of acid rain, green house gases, nuclear winter & ozone depletion. Conservation plant diversity - Role of germ plasm, genes & pollen banks Man & Biosphere. Chipko movement, Appiko movement & Narmada Andolan. Phytogeography – Phytogeographical regions in India & Vegetational types of Karnataka.

REFERENCE BOOKS

- 1. College Botany Vol 3, Dr S Sundara Rajan 3 edition
- 2. Botany for Degree students Pteridophytes B R Vashishta, Dr AK Sinha & Dr Adarsh Kumar
- 3. Plant Ecology, R S Shukla & P S Chande

12 Hours

6 Hours

9 Hours

Exam Marks : 70

ZOO-C4 : Zoology-IV

Comparative Anatomy, Human Anatomy And Histology

Lecture Hrs : 54

Internal Marks : 30

Exam Marks: 70

Objectives of the course: Course provide introduction to comparative anatomy, deals similarities and differences in anatomy of different species, human anatomy, giving descriptions human body parts and organ system of and histology, detailing the microanatomy of cells, and organs with aid of microscopes, correlating structure and function **Course Outcome:** Students gain the knowledge about functional anatomy of vertebrates from fishes to mammals Gross Anatomy of Human system, histological details of mammalian organs teaching the visual art of recognizing the structure of cells, tissues and understanding their function and histochemistry. Hence understanding the microscopic counterpart to gross anatomy, Which looks at larger organ structures.

Unit-I

COMPARATIVE ANATOMY: Comparative study of skin and epidermal derivatives in vertebrates. Evolutionary trends in the hearts of Shark, Frog, Lizard, Pigeon and Rabbit. Evolution of Aortic arches in vertebrate groups. Evolutionary trends in the respiratory system with special reference to the modifications of Pharynx in vertebrates. Evolutionary trends in the excretory system- pro, mesonephros and metanephros. Evolutionary trends in the structure of brain of Shark, Frog, Lizard, Pigeon& Rabbit **20 Hours**

Unit - II

HUMAN ANATOMY: Unique human characteristics.Study of Human skeleton- Skull, Vertebrae, Pectoral girdle and forelimb skeleton, pelvic girdle and Hind limb skeleton.(Excluding bones of hand and foot).Gross anatomy of Digestive system (including oral cavity). Gross anatomy of circulatory system: Arterial system. Venous system of man including Hepatic portal system. Gross anatomy of Respiratory system. Gross anatomy of excretory system. Gross structure of Brain and Spinal cord. Anatomy of Eye and Ear. Gross anatomy of Male and Female Reproductive systems

Unit - III

14 Hours

HISTOLOGY: Histological structure of Mammalian organs- Tongue, Stomach, Small Ovary, Pituitary, and Adrenal gland. Intestine, liver Pancreas, Testis. Histochemistry - Stains/Dyes Types, preparation and applications.

REFERENCE BOOKS

- 1. Wilson K J, Anne Waugh. 1999. Ross And Wilson Anatomy And Physiology In Health And Illness, Churchill Livingstone Publishers Limited 8th Edition
- 2. Sear's Anatomy And Physiology For Nurses By R S Windwood And J L Smith.
- 3. Foundations Of Anatomy And Physiology By Ross And Wilson.
- 4. Grove & Newell. 1990. Animal Biology, Universal Book Stall, New Delhi9th Ed.
- 5. Hilderbrand. 1988 Analysis Of Vertebrate Structure John Wiley And Sons, New York, 3rd Ed
- 6. Hegner & Stiles K.A.1959.College Zoology, The Macmillan Company, New York, 7th Ed.
- 7. Kent G. C.1969. Comparative Anatomy Of Vertebrates, C.V Mosby Comp.
- 8. Kotpal R.L.1991. Vertebrates, Rastogi Publications, Meerut
- 9. Kulshrestha S.K.1999.Comparative Anatomy Of Vertebrates, Anmol Publications.
- 10. A Text Book Of Histology By Bailey.

CHE-C4 : Chemistry-IV

Lecture Hrs : 54

Internal Marks : 30

Exam Marks : 70

Course Description: Employ critical thinking and the scientific knowledge to design, carryout, record and analyse the results of chemical reactions. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community. Find out the green route for chemical reaction for sustainable development. To inculcate the scientific temperament in the students and outside the scientific community.

Objectives of the course are: Gain the knowledge of Chemistry through theory and practical's.To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.

Learning Outcome: Good laboratory practices and safety. Develop research oriented skills. Make aware and handle the sophisticated instruments/equipment's. Students acquired knowledge through practical work in fields as in laboratory. 7 Hours

Unit-I

Nuclear and radiochemistry: Introduction to radioactivity (review). Nucleus – structure and instability – nuclear particles,-factors deciding the stability of the nucleus : nuclear forces- neutron/proton ratio- mass defect – binding energy -calculations, numericals to be worked – packing fraction, – group displacement law- radioactive decay law – (derivation not required) - half-life - Numerical problems - radioactive equilibrium -radioactive series (four examples and features)- detection and measurement of radioactivity by GM counter and Scintillation counter, artificial transmutation,- Concept and examples -artificial radioactivity - Concept and examples - nuclear reactors - radioisotopes- examples and applications (²⁴Na, ³²P, ⁶⁰Co, ¹³¹I, ¹⁴C). Review of atomic energy programme in India (Defence, Breeder and energy production).

Unit - II

Metallurgy-2: Powder Metallurgy: Advantages of powder metallurgy, applications. Techniques in production of metal powders. Production of tungsten powder from wolframite.

Steel: Iron-carbon Phase diagram: austenite, ferrite, cementite and pearlite phases. Alloy Steels - influence of Si, Mn, Cr, Ni, Ti and W on the properties of steel. Ferro-alloys production of ferrochrome, ferromanganese and ferrosiliconCarbon steel - classification. Heat treatment - Hardening, Case-hardening, Carburizing, Nitriding, Tempering and Annealing.

Unit - III

Surface chemistry and phase equilibria: Surface chemistry: Freundlich's adsorption and Langmuir's isotherms, BET equation (derivation not required) and its applications. Catalysis: Characteristics, Types of Catalysis - homogenous and heterogeneons with examples. Homogeneous catalysis - acid -base catalysis, enzyme catalysis and Autocatalysis. Heterogeneous catalysis - Surface reactions, unimolecular and bimolecular reactions.

Phase rule: Statement and explanation of the terms with examples, one component systems – water and sulphur. Two component systems – KI-water; Pb-Ag system; Eutectic and freezing mixtures and their applications. **Unit-IV**

8 Hours

9 Hours
Industrial materials -1: Refractories: - Properties, determination of PCE values.

Abrasives- classification, applications, hardness. Manufacture and importance of carborundum, alundum and tungsten carbide.

Glass – properties, types, manufacture of soda glass, borosilicate and optical glasses. Safety glass, fire and bullet proof glasses.

Ceramics – Raw materials and their role, Varieties of clay, production of ceramic ware, glazing, insulators.

Cement – Raw materials, grades, manufacture of Portland cement (Ordinary Portland Cement and Pozzolonic Portland Cement), setting process.

Unit-V

8 Hours

Aldehydes and Ketones and Carboxylic acids and their derivatives: Nomenclature, synthesis of aldehydes from acid chlorides; synthesis of ketones from nitriles and carboxylic acids, Polarity of the carbonyl group; **mechanisms** of Aldol condensation, Claisen condensation, Perkin condensation, Knoevenagel condensation; benzoin condensation and acetal formation. Mannic reaction. Reduction: Clemmenson and Wolff-Kishner reductions, reduction by $LiAlH_4$ and $NaBH_4$.

Carboxylic acids and their derivatives- Nomenclature: acidic strength – effect of substitutents on the strength of aliphatic and aromatic acids. *Di* and *tri* carboxylic acids – action of heat on dicarboxylic acids, Reactions of tartaric acid and citric acid (effect of heat and Con. HI). Reactions of acid chlorides, acid anhydrides, esters and amides (hydrolysis, ammonolysis, alcoholysis, Hoffmann degradation); mechanism of nucleophilic substitution at the carbonyl carbon.

Unit-VI

14 Hours

Photochemistry and Environmental chemistry: Consequences of the absorption of light – Jablonski diagrams – singlet and triplet excited states – radiative and non-radiative transitions. Fluorescence – phosphorescence – photosensitization –quenching and chemiluminescence. Lambert-Beer's law (no derivation) and its limitations, Grotthus-Draper law, Stark-Einstein law of photochemical equivalence – concept of quantum efficiency or quantum yield, with suitable examples.

Introduction to lasers and their applications in Laser light photolysis and flash photolysis. Photochemistry of stratospheric ozone, plant photosynthesis, DNA damage by UV radiation, Photodynamic therapy for tumors.

Environmental chemistry- Earth's atmosphere; Depletion of ozone in the stratosphere – cause and remedial measures; The greenhouse effect and its consequences; acid rain; photochemical smog. Treatment of sewage and Industrial effluents. Disposal of radioactive wastes. Green chemistry: Particulate pollution and electrostatic precipitator; chemical toxicology – with respect to As, Pb, and Hg.

TEXT BOOKS

1. College chemistry-IV: L.Indira and Chatwal

2. Comprehensible chemistry-IV: Vinod kumar B. and M.Aswathanarayanappa

REFERENCE BOOKS

- 1. Physical chemistry-P.L.Soni-volume-II-2011
- 2. Advanced Organic chemistry-Arun bahl and bhal-vol-II-2012

ELE-C4 : Electronics-IV

ADVANCED ELECTRONICS-II

(Microcontroller 8051 with Embedded C and MEMS) **Internal Marks : 30**

Lecture Hrs: 54

Objectives of the course: To strengthen the knowledge in application of Electronics. Course Outcome: After studying this paper the students will be able to understand the application of digital electronics and be able to write the codes for microcontroller using assembly level language as well as embedded C. Students will get the knowledge of MEMS technology in the research area.

Unit-I

Introductionto **Microcontrollers:** Introduction, Comparison between Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPUarchitecture. The 8051 Architecture: Introduction to 8051 Microcontroller Hardware, Input/output Pins, Ports and Circuits- Port 0, Port1, Port2 and Port3. External memory- Connecting external memory. Counters and Timers-Timer Counter Interrupts, Timing, Counting.

Unit - II

Addressing Modes and Instructions Sets: Introduction, Addressing modes, External data Moves, Code Memory, Read Only Data Moves / Indexed Addressing mode, PUSH and POP Op-codes, Data exchanges, ExamplePrograms.

Byte level logical Operations, Bit level Logical Operations, Rotate and Swap Operations, Example Programs. Arithmetic Operations: Flags, Incrementing and Addition, Subtraction, Multiplication and Division, Decimal Decrementing, Arithmetic, Example Programs.

Jump and Call Instructions: The JUMP and CALL Program range, Jumps, calls and Subroutines, Interrupts and Returns, More Detail on Interrupts, Example Problems. Unit - III **13 Hours**

8051 programminginC: Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization. Programming 8051 Timers, Counter Programming, programming timers 0 and 1 in 8051C Interrupts Programming: 8051 Interrupts, Programming Timer Interrupts, External Hardware Interrupts. Programming serial data transfer, Programming the Serial Communication Interrupts, Interrupt Priority in the 8051/52, Interrupt programming in C. Interfacing with 8051: Interfacing 8051 to LCD, Keyboard, ADC, DAC, Stepper motor.

Unit-IV

IntroductiontoMEMS: System On Chip, Scale of integration, next generation MEMS, Applications. Microsensors, Microactuators and microelectronics fabrication. Introduction to Microfabrication Techniques: Micromachining (Bulk and Surface), Wet and dry etching, Thin-film depositions (LPCVD, Sputtering, Evaporation), Other techniques (LIGA, Electroplating).

Thermal Sensors and Actuators: Thermistors, Thermodevices, Thermocouple, Electrothermal actuator, Microspring thermal actuator, Data storage cantilever.

Micro-opto-electromechanical Systems: Fundamental principle of **MOEMS** technology, light modulators, beam splitter, microlens, micromirrors, light detectors, optical switch, waveguide and tuning, shear stress measurement.

Radio Frequency (RF) MEMS: review of RF-Based communication systems, RF

13 Hours

14 Hours

Exam Marks: 70

MEMS, MEMS inductors, varactors, tuner/filter, resonator, MEMS switches, Phase shifter.

TEXT BOOKS

- 1 Kenneth J. Ayala ;"The 8051 Microcontroller Architecture, Programming & Applications" 2e, Penram International, 1996 / Thomson Learning2005.
- 2 Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D.McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C "- PHI, 2006/ Pearson,2006
- 3 "MEMS" by Nitaigour Premachand Mahalik, Tata McGraw Hill Education Private
- 4 Limites, NewDelhi.

REFERENCE BOOKS

- 1 Ajay V.Deshmukh; "Microcontrollers- Theory and Applications", TMH, 2005.
- 2. Predko ; "Programming and Customizing the 8051 Microcontroller" -, TMH
- 3. "Introduction to Microelectromechanical Microwave Systems, SecondEdition",
- 4. Hector J. De Los Santos, Artech House, 2004.
- 5. "RF MEMS Circuit Design for Wireless Applications", Hector J. De LosSantos, Artech House, 2002.
- 6. Plasma techniques for film deposition, Konuma Mitsuharu, Alpha Science, Harrow, UK, c2005.
- 7. Introduction to surface and thin film film processes /John A. Venables, Cambridge: Cambridge University Press, c2000.

CS-C4 : Database Management Systems

Lecture Hours : 54 Internal Marks : 30 Exam Marks: 70

Course Description: Advanced topics in database management and programming including client server application development are introduced. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques. **Objectives of the course are:** Students will learn the use of Structured Query Language in a variety of application and operating system environments. Technologies addressed in this course include SQL and relational database management systems such as MySQL, and SQL Server.

Learning Outcome : Have a broad understanding of database concepts and database management system software. Have a high-level understanding of major DBMS components and their function. Be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.

Unit-I

9 Hours

9 Hours

Introduction, Database Systems, Characteristics of DB Approach, Advantages of DBMS, Database Users, DB Languages, Applications of Database.

Unit - II

Data Model Concepts, Database System Architecture-Centralized, Client/Server: Twotier, Three-tier, Three-Schema Architecture-Physical Data Independence and Logical Data Independence, Different types of data models, Database Interfaces.

Unit - III

E-R Model concepts- Entities, Attributes, Relationship, E-R model constraints, E-R diagrams, Relational model concepts, Characteristics of relations, constraints on relations, Relational Algebra-Unary and Binary operations.

Unit-IV

SQL:DDL - Create table/views, Drop, Alter commands, DML - Insert, Delete, Update, Select, queries ,sub-queries, nested queries, Joins - equijoin, non-equijoin, Built-in functions of SQL & grouping.Concept of Functional dependency, Normalization -1NF,2NF,3NF. 9 Hours

Unit-V

Secondary Storage devices, Buffering of Blocks, Files on disk, Operations on files, File organization: Ordered files, Hashed files, Indexed files, Heap files, RAID organization.

Unit-VI

Concurrency Control Techniques, Recovery Techniques on databases, Transaction processing concepts, Database security and authorization. Introduction to Distributed databases, Data fragmentation, Replication and Allocation in distributed database, Query Processing in Databases.

TEXT BOOKS

1. RemezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5 th Edition, Pearson Education, 2007.

REFERENCES BOOKS

1. Abrahamsi. Silberschatz, Henry. F. Korth, S. Sudarshan, "Database System Concepts" 6th Edition, McGraw Hill, 2012.

2. Database Design and Relational Theory: Normal Forms and All That Jazz 2nd ed. Editionby C. J. Date (Author)Publisher: Apress; 2nd ed. edition (December 16, 2019)

9 Hours

9 Hours

9 Hours

Page 112

waves acoustics and optics - both geometrical and physical.

PHY-C4 : Physics-IV

Course Description: This course, provides an introduction to the basic concepts of (Acoustics, Optics and Lasers)Introduces students to the concepts and applications of

Internal Marks : 30

NCB - B.Sc(CBZ/PCM/PME/PMCs) Syllabus

To understand the different physical processes of nature expressed in optical and acoustic world.

Course Outcome :

Objectives of the course:

Lecture Hrs : 54

The student will be able to apply the concepts of waves acoustics and optics both geometrical and physical to solve real life problems. **13 Hours**

Unit-I

Elastic waves: Derivation of expression for the velocity of longitudinal waves in a thin rod. Velocity of transverse wave along a stretched string. kundt's tube experiment. Problems.

Acoustics: Reflection, refraction and diffraction of sound (qualitative) - acoustic Impedance of a medium - Percentage of reflection and refraction at boundary impedance matching (all qualitative), Transducers(three types), principle of microphone and loud Speaker. Acoustics of auditorium- Sabine's formula.

Geometrical Optics: Velocity of light -Foucault's method. Fermat's principle of extremum path and it's applications to reflection, refraction and rectilinear propagation of light.

Unit - II

Physical Optics: Review of Huygen's wave theory of light – Huygen's Principle and construction of wave front – spherical, cylindrical and plane wave front.

Interference of light waves: Review of Young's double slit experiment, condition for observable interference. Coherent sources- conditions for coherent sources -Production of coherent sources by division of wave front and division of amplitude. Bi- prism construction, working and experiment with theory - white light fringes - effect of introducing a transparent sheet in the path of interfering beam. Colours in thin films in the reflected system with theory, Problems. Stoke's treatment of reflected and transmitted amplitude – theory and experiment with air wedge and Newton's rings in the reflected system- Scattering of light: Difference between general absorption, selective absorption and scattering coefficient, Rayleigh, Tyndall and Raman scattering.

Unit - III

Diffraction of light: Fresnel diffraction – division of wave front into half period zones-Rectilinear propagation – construction and theory of zone plate. Zone plate as a lens. Comparison of zone plate and a lens. Diffraction at a straight edge – Problems. Fraunhoffer diffraction - single slit - Theory of diffraction grating-Normal and obliqueincidence - dispersive power - resolving power - Rayleigh's criterion -Expression for Resolving power of grating and telescope – Problems.

Unit-IV

Lasers: General principles - induced absorption, spontaneous and stimulated emission -Concept of coherence and directionality - temporal and spatial coherence- optical pumping, Resonance cavity – active medium – population inversion – condition for laser action . Derivation of Einstein's co-efficients A and B - He-Ne laser. Production

13 Hours

13 Hours

13 Hours

Exam Marks : 70

and analysis of a hologram **Polarization**: Review of polarization, Polarization by double refraction in crystals – Uniaxial and biaxial crystals –Positive and negative crystals- Huygen's explanation of double refraction- Theory of retarding plates –Quarter wave plate and half wave plate. Production and detection of circularly, elliptically and Linearly polarized light Problems. **Optical activity**:

Specific rotation- Polarimeter – Lorentz half shade Polarimeter theory and experiment – Fresnel's explanation of optical activity.

REFERENCE BOOKS

- Understanding Physics-Sharmistha Sahu, Kala. N-Subhas Stores
- Acoustics Kinsler and Fray Newyork publication
- Lasers and optics A.K. Ghatak TATA McGrawHill
- Text book of optics A.K. Ghatak TATA McGrawHill
- Principles of Optics B.K.Mathur –Gopal Printing Press
- A Text book of Optics- Subramanyam and Brijlal-S chand & Co.
- Fundamentals of Optics Jenkins and white McGraw hills pub
- A Textbook of Sound-M.Ghosh- S chand & Co.
- Concepts of Physics Arther Beiser

BOT-P4: BOTANY LAB-IV

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No. Experiment

- 1. Pinus Vegetative Studies.
- 2. Pinus Reproduction.
- 3. Gnetum Vegetative Studies.
- 4. Gnetum Reproduction.
- 5. Embryology Study of anther & microspore development.
- 6. Pollen mounting & pollen germination.
- 7. Study of Ovule Types, Megasporogenesis& Types of embryo sac.
- 8. Mounting of endosperm (Cucumis) & embryo (Tridax&Crotolaria)
- 9. Seminar / Activity Museum up keep program.
- 10. Estimation of Chlorine in a given sample of water.

The National College, Autonomous, Basavanagudi, Bengaluru-04								
ZOO-P4: ZOOLOGY LAB- IV								
Lab Hrs.: 44Internal Marks: 15Exam Marks: 35								
Sl. No.	Experiment							
1.	Comparative anatomy of Sections of the skin of Fish, Frog, and Rabbit, types of feathers.							
2.	Comparative anatomy of Sections of Hearts of Shark, Frog,Reptile, Pigeon and Rabbit.							
3.	Comparative anatomy of Sections of Brains of Shark, Frog, Reptile, Pigeon and Rabbit							
4.	Human Skeleton-Skull- lateral and frontal view. Vertebrae- Atlas. Axis, Typical cervical vertebra, Thoracic vertebra, Lumbar vertebra							
5.	Human Skeleton-Pectoral Girdle and fore limb skeleton.							
6.	Human Skeleton-Pelvic girdle and hind limb skeleton.							
7.	Human Skeleton-Types of fractures and first aid.							
8.	Histology-T. S Tongue, fungi form, fili form and Circumvallate papillae.							
9.	Histology-T. S of Stomach, T.S Small intestine T.S of Liver and T. S of Pancreas.							
10.	Histology-T. S ovary, and T. S of Testis.							
11.	Histology-T. S of Pituitary and T. S Adrenal gland							
12.	 PROJECT WORK a. Histochemistry- types of dyes/stains, preparations and applications including pathological conditions. b. Anatomy and disorders of eye and ear of man. c. Diagnostic tools – ECG, EEG, CT Scan, MRI, Endoscopy, latest scanning technique of heart (visit to a lab) d. Therapeutic interventions- Angioplasty, Bypass surgery, Dialysis, Lithotripsy, Laser technology, Biopsy. 							

The National College, Autonomous, Basavanagudi, Bengaluru-04										
CHE-P4: Chemistry Lab IV										
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35									
Sl. No.	Experiment									
1.	Systematic semi-micro qualitative analysis of a mixture of two simple salts. (With no interfering radicals).									
2.	Separation of metal ions (Cu^{2+} , Co^{2+} , Ni^{2+} , Fe^{2+}) using paper chromatography and calculation of R_f value(To be performed by students)									
3.	Separation of Mg (II) and Fe (II) by solvent extraction technique.									
4.	Separation of Mg (II) and Fe (II) by ion exchange method.									
5.	Effluent analysis – COD and BOD of sewage water.									

ELE-P4: Electronics Lab- IV LAB IN 8051 PROGRAMMING

Lab Hrs.: 44

Internal Marks: 15 Experiment Exam Marks: 35

Sl. No.

Part-A

- 1. Program to add and subtract two 8-bitnumbers.
- 2. Program to find 2's complements of an16-bitnumber.
- 3. Program to find the sum of N 8-bitnumbers.
- 4. Program to multiply two 8-bitnumbers.
- 5. Program to multiply two 16-bitnumbers.
- 6. Program to solve the linear equation y = mx + c.
- 7. Program to find the square of a number from look-uptable.
- 8. Program to find largest of Nnumbers.
- 9. Program to find smallest of Nnumbers
- 10. Program to verify the truth tables of logicgates.
- 11. Program to find whether the given data ispalindrome.
- 12. Program to arrange the numbers in ascendingorder.

Part-B

- 1. Toggling ofports.
- 2. Experimentsrelated with timerin mode 1.
- 3. Experimentsrelated with timerin mode 2.
- 4. Experiments related with serial data transfer with baud rate4800.
- 5. Experiments related with serial data transfer wit baud rate9600.
- 6. Experiments related withinterrupts.
- 7. DACinterfacing.
- 8. Stepper motor interfacing.
- 9. Keyboardinterfacing.
- 10. Traffic controlinterfacing

CS-P4: Computer Science Lab- IV DBMS lab

Lab Hrs.: 44

Internal Marks: 15 Experiment Exam Marks: 35

Sl. No.

Experim

1. STUDENT DATABASE

- **STUDENT(regno# ,name ,course ,class ,comb, add, mob no, marks , percent)** a. Create a table for student database.
- b. To the table add the values (10 tuples).
- c. Add new attribute section as 'sec' to the table.
- d. Select course='PCM'
- e. Count the number of students who have taken Commerce course.
- f. Select all details of the student where regno=6
- g. Select the student details whose percentage is between 70 and 100.
- h. Order in ascending order of regno
- i. Retrieve all students name whose name begin with 'B'.
- j. Select * from students where combination ='PCMB' and fees>25000.

2. LIBRARY DATABASE

Library(bookid#, title, author, publication, price)

a. Create the above table.

- b. Enter five tuples into the table.
- c. Display the different author from the list.
- d. List all the details of the books whose price is more than Rs. 900.
- e. Count total number of books in the library.
- f. Display details of Publications whose name s start with M.
- g. Create a view call Libview by selecting bookid, title and price.
- h. Select tittle of the book whose name do not exceed by 10 letters.

3. <u>EMPLOYEE DATABASE</u>

Emp11(Empno #,ename ,esal, deptno ,deptname ,doj) And Dept11(deptno#, deptname ,dloc ,dadd)

a. Create the table

- b. Insert values into the table.
- c. Alter the table to add job of character size 10.
- d. Display in descending order of salary
- e. Select min salary in deptno 10.
- f. Increment salary of all employees by adding Rs. 1000
- g. Count the number of Managers.
- h. Find the average salary earned by each job in each dept.
- i. select those employee names who do not exceed by 10 characters.
- j. Select employees data and convert all jobs of "salesman" as "executives".

4. ADVANCED SQL QUERIES

- Consider the EMP11 Table,
- a. Calculate the service rendered by employees
- b. Select the second highest paid salary in the Company.
- c. Find the employees whose salary is greater than minimum salary in each dept.
- d. Find the avgsal earned by all employees except Managers in the Company.

- e. Select the job and average sal of all the dept where number of employees are more than 10.
- f. Select all employees data who were employed in the year 2000.
- g. Create a view for emp11 by selecting the empno, ename, deptno, deptname.
- h. Demonstrate inner join.
- i. Demonstrate the outer join and equijoin using Emp11 and Dept11 table.

5. SET OPERATIONS QUERIES

Consider three tables:

- i) Order_info (ordid#, ordate, custid, shipdate)
- ii) Customer(custid#, Name ,addr)
- iii) Item(Itemid#, ordid, price, qty)
- a. Demonstrate union operation by selecting ordid and custid.
- b. Intersect ordid from order_info and itemid from item.
- c. Minus operation for ordered from item and ordid from Order_info
- d. Simple join operation by selecting item, Order-info use Orderid

The National College, Autonomous, Basavanagudi, Bengaluru-04									
MAT-P4: Mathematics Lab- IV									
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35								
Sl. No.	Experiment								
1.	Illustrating homomorphism and isomorphism of groups.								
2.	Verification of Normality of a given subgroup.								
3.	Verifying Cayley's theorem and isomorphism theorems.								
4.	Illustration of convergent, divergent and Oscillatory series using								
5.	Scilab/Maxima programs to find the sum of the series and its radius of convergence.								
6.	Using Cauchy's criterion to determine convergence of a sequence (simple examples).								
7.	Using Cauchy's criterion on the sequence of partial sums of the series to determine convergence of a series.								
8.	Testing the convergence of binomial, exponential and logarithmic series and finding the sum.								
9.	To plot periodic functions with period 2π and $2L$.								
10.	To find full range trigonometric Fourier series of some simple functions with period 2π and 2 <i>l</i> .								
11.	To find the half-range sine and cosine series of simple functions.								
12.	Plotting of functions in half-range and including their even and odd extensions.								
13.	Finding the Laplace transforms of some standard functions.								
14.	Finding the inverse Laplace transform of simple functions.								
15.	5. Implementing Laplace transform method of solving ordinary linear differentia equations of first and second order with constant coefficient.								

PHY-P4: Physics Lab- IV

Lab Hrs.: 44

Internal Marks: 15

Experiment

Exam Marks: 35

Course Objectives/Course Description:

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

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

Sl. No.

- 1. Verification of Brewster' law
- 2. Bi-Prism
- 3. Air Wedge
- 4. Newton's Rings
- 5. Diffraction Grating minimum deviation method.
- 6. Diffraction Grating normal incidence method.
- 7. Resolving power of a telescope
- 8. Diffraction at a straight edge
- 9. Wavelength of a laser by reflection.
- 10. Specific rotation of sugar solution using polarimeter.
- 11. Modes of vibration of strip.
- 12. Kundt's tube.
- 13. Analysis of diffraction pattern of a spiral spring.
- 14. Analysis of diffraction pattern of DNA structure.

MC4-VALUE EDUCATION

Lecture Hrs : 24

Internal Marks : 30

Exam Marks : 70

Objectives of the course: Values are timeless truths. They represent norms of decency; civility and righteous conduct which are handed down from generation to generation. We imbibe the right values from our elders, parents and teachers. However for a variety of reasons, value systems are under threat today, necessitating the need to introduce Value Education as a paper to be taught in the classroom.

Course Outcome:

Unit-I

Introduction: Definition, Concept and Classification of Values. Need for Value Education. Challenges of Value Adoption

Unit - II

Personality Development and Values of Life: Leadership qualities. Principles of Integrity, Character Development, Self-Confidence and Self-Esteem. Values in everyday life. Timeless Truths/ good character qualities – Honesty, Trust, Morality, Integrity, Reliability, Empathy, Forgiveness- Love.

Unit - III

Values in Society: Time Management/ Social Commitment. Environmental Awareness/ Civic Sense. Positive thinking and emotional maturity.

REFERENCE BOOKS

- 1. M.G.Chitakra, Education and Human Values, A.P.H. Publishing Corporation, New Delhi, 2003.
- 2. NCERT, Education in Values, New Delhi, 1992.
- 3. Swami Budhananda, How to Build Character: A Primer, Ramakrishna Mission, New Delhi, 1983.
- 4. Swami Vivekananda, Youth and Modern India, Ramakrishna Mission, Chennai.
- 5. M.K.Gandhi, My Experiments with Truth, Navjivan Publishing House, Ahmedabad.
- 6. Rameshwari Pandya & Anuradha Mathur, Imbibing Value Education: Various Perspectives, Kalpaz Publications, New Delhi, 2003.
- 7. Dhankar, N, Value Education, A.P.H. Publishing Corporation, New Delhi, 2010.

8 Hours

8 Hours

Fifth Semester

Fifth Semester B.Sc										
			Marks							
Part	Code	Course(Subject)	Hours	IA	Exam	Total	Credits			
	BOT-C5.5	Botany-V	3	30	70	100	4			
	BOT-C5.6	Botany-VI	3	30	70	100	4			
	ZOO-C5.5	Zoology-V	3	30	70	100	4			
	ZOO-C5.6	Zoology-VI	3	30	70	100	4			
	CHE-C5.5	Chemistry-V	3	30	70	100				
	ELE-C5.5	Electronics-V					4			
	CS-C5.5	Computer Science-V								
	CHE-C5.6	Chemistry-VI	3	30	70	100				
	ELE-C5.6	Electronics-VI					4			
	CS-C5.6	Computer Science-VI								
	MAT-C5.5	Mathematics-V	3	30	70	100	4			
	MAT-C5.6	Mathematics-VI	3	30	70	100	4			
	PHY-C5.5	Physics-V	3	30	70	100	4			
Death 2	PHY-C5.6	Physics-VI	3	30	70	100	4			
Part-2	BOT-P5.5	Botany Lab -V	3	15	35	50	1			
	BOT-P5.6	Botany Lab -VI	3	15	35	50	1			
	ZOO-P5.5	Zoology Lab -V	3	15	35	50	1			
	ZOO-P5.6	Zoology Lab -VI	3	15	35	50	1			
	CHE-P5.5	Chemistry Lab -V	3	15	35	50	1			
	ELE-P5.5	Electronics Lab -V								
	CS-P5.5	Computer Science Lab -V								
	CHE-P5.6	Chemistry Lab -VI	3	15	35	50	1			
	ELE-P5.6	Electronics Lab -VI								
	CS-P5.6	Computer Science Lab -VI								
	MAT-P5.5	Mathematics Lab -V	3	15	35	50	1			
	MAT-P5.6	Mathematics Lab -VI	3	15	35	50	1			
	PHY-P5.5	Physics Lab –V	3	15	35	50	1			
	PHY-P5.6	Physics Lab –VI	3	15	35	50	1			
	BSCE-1	Communicative Skill	2	15	35	50	1			
Part-3	BSS-1	Seminar-I	-	-	-	50	1			
	BSS-2	Seminar-II	-	-	-	50	1			
Total Marks & Credits 300 700 1100						34				
Part-2 Program combination – Theory & Practical										
CBZ Chemistry , Botany , Zoology (V & VI)										
PCM	Physics , Chemistry , Mathematics (V & VI)									
PME	E Physics , Mathematics , Electronics (V & VI)									
PMCS	Physics , Mathematics , Computer Science (V & VI)									

BOT-C5.5: Botany-V

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course: To inculcate the knowledge in Taxonomy, Economic Botany & Ethnobotany. To understand the role of horticulture & applied botany.

Course Outcome: Research assistant as taxonomist & Ethnobotanist. Serve in Pharmaceutical company as plant explorer seeking new species of medicinal herbs.Plant breeders, Cosmetologist & Druggist.

Unit-I ANGIOSPERM TAXONOMY- GENERAL PRINCIPLES 15 Hours

Principles of taxonomy – A brief account of classical and modern taxonomy, systems of classification & species concept. Broad outlines of systems of classification proposed by Bentham & Hooker & Engler and Prantl.Plant Nomenclature – Binomial Nomenclature ICBN and its principles and aims. A brief account of recent trends in taxonomy – Chemotaxonomy, Cytotaxonomy, Numerical taxonomy and Computer and its application in systematics. Botanical gardens (Lalbagh, Ooty, Kolkutta& Kew) Herbarium techniques, Floras and their importance, Botanical Survey of India and its functions.

Unit-II: ANGIOSPERM TAXONOMY – STUDY OF FAMILIES 15 Hours

Study of following families [the system of classification proposed by Engler &Prantl] **Monocot families**:Cannanceae, Graminae&Orchidaceae.

Dicot families: Magnoliaceae, Cruciferae (Brassicaceae), Rosaceae, Rutaceae,

Euphorbiaceae, Umbelliferae (Apiaceae), Asclepiadaceae, Verbenaceae, Labiatae

(Lamiaceae), Rubiaceae, Cucurbitaceae & Compositae (Asteraceae)

[Note: Economically important plants of these families are to be highlighted with

reference to their botanical names, parts used and their uses].

Unit–III:ECONOMIC BOTANY, EHNOBOTANY & HORTICULTURE 14 Hours

1. Economic botany with regard to the following categories.

- a) Cereals & Millets: Wheat, Rice, Jowar & Ragi
- b) Pulses: Pigeon pea, Black gram & Bengal gram.
- c) Oils & fats: Ground nut, Coconut, Safflower & Sunflower.
- d) Fibres: Cotton, Jute & Coir.
- e) Beverages: Coffee, Tea & Cocoa.
- f) Spices: Cardamom, Cloves & Cinnamon.
- g) Timber: Teakwood & Rosewood.
- h) Paper Pulp: Bamboo & Eucalyptus.
- i) Narcotics: Ganja& Opium.

j) Medicinal plants: Catharanthus, Sarpagandha&Azadorachta

Note: For each of the above Botanical name, Family, Part used & uses are to be mentioned.

- 2. Ethnobotany Principles, Practices, relevance & importance of plants to man; a brief study of ethno taxonomy, ethno mycology, ethno pharmacology, ethno toxicology.
- **3.** Horticultural Botany A brief review of vegetative propagation of the artificial type like cutting, layering, gootee& grafting.

REFERENCE BOOKS

NCB - B.Sc(CBZ/PCM/PME/PMCs) Syllabus

- Economic Botany BP pandey
- Economic Botany & tropics S.L Kochar 2nd edition
- Advanced Plant Taxonomy Amal Kumar 2014,
- Plant Taxonomy Saxena 2014

BOT-C5.6: Botany-VI

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

14 Hours

Objectives of the course: To acquire the knowledge in genetics & molecular biology. To impart quality education in plant breeding.

Course Outcome: Molecular biologist & Plant Biochemist. Herbal product companies & research organisations.

Unit-I: PLANT BIOCHEMSTRY

- 1. Carbohydrates- Introduction, Classification Monosaccharides (pentose & hexose) Disaccharides (Sucrose & Maltose) and Polysaccharides (cellulose, starch, insulin, pectin & callose).
- 2. Proteins Introduction, primary structure (amino acids their characters, types & peptide bond formation), other levels of structure and classification of proteins.
- 3. Lipids Introduction, Classification (simple & complex).
- 4. Natural products Alkaloids, Resins, Tannins, Gums & Essential oils.

Unit-II: CYTOGENTICS AND PLANT BREEDING

- 1. Chromosome biology A brief account of chromosome structure; chromosomal aberrations structural and numerical; Cell Senescence & Apoptosis.
- 2. Genetics Mendelian principles, gene interaction (Supplementary factors, Complementary factors & Epistasis) Pleotropism, Linkage & Crossing over in Maize.
- 3. Plant breeding Historical account, objectives and methods [Conventional & Modern], hybrid vigour, examples of crop improvement Sugarcane & Rice.

Unit – III: MOLECULAR BIOLOGY

 Nucleic acids – Introduction, discovery & Components of nucleic acids – Nucleosides & Nucleotides.

02 hrs

- DNA Experimental proof to show the role of DNA as genetic material, structure of DNA [[Double helix model of Watson & Crick], types of DNA [B-DNA & Z- DNA]. 04 hrs
- 3. RNA Structure & functions, types of RNA [genetic RNA, ribosomal RNA, messenger RNA & transfer RNA].
- 4. Synthesis of nucleic acids Replication of DNA detailed study of semiconservative method; Transcription general account involving synthesis of all types of RNA.

REFERENCE BOOKS

- Principles of Genetics Gardner, Simmons & Snustad 8th edition
- Fundamentals of Genetics B. D Singh
- Genetics P.S Verma & V.K Agarwal 9th edition
- Molecular biology P.S Verma & P.K Agarwal 9th edition 2. De Robertis & De Robertis

15Hours

ZOO-C5.5: ZOOLOGY-V

Genetics, Bio-technology and Research Methodology

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Course objective: Course introduces basic principles of genetics, human genetics, concept behind genetic disorders, gene mutations, biotechnology dealing with animal cells in culture, growth of cell lines, importance of Recombinant DNA technology, PCR technique, DNA sequencing and screening . imparts scientific methods, concepts and steps in research. Elaborates on techniques of data collection, processing and analysis.

Learning outcome: Understanding of basic concepts of genetics, laws of inheritance, and central dogma of biology, thus getting the basis of various causes associated with inborn errors metabolism.Become compitant in various cell/tissue culture techniques, genetic manipulations and in a variety of industrial process.Gains skills in medical. Environmental and agricultural biotechnology. This insights them to consider ethical issues involved in cloning, transgenics and use of animals as bioreactors.Understand laboratory safety measures, good practices, animal model systems, and animal ethics.Writing of dissertations, project proposals, project reports and scientific research papers.

Unit-I: GENETICS

Hredity and environment- Definition of Genotype, Phenotype, Allele, Phenocopy, Norm of Reactions. Brief account of Mendelism. Solving Problems on Mendelism

Deviation from classical Mendelism:Interaction of genes- Inheritance of comb shape in Poultry, problem solving. Epistasis, Complementary and Supplementary genes

Multiple alleles- Inheritance of ABO and Rh blood groups and their applications, problem solving. Polygenic inheritance- skin color in humans. Linkage and crossing over, Chromosome mapping in *Drosophila*, Sex linked inheritance- *Drosophila* examples

Genetic determination of sex- XX-XY, XX-XO and ZZ-ZW, ZZ-ZO types, genetic balance theory of Bridges. Gynandromorphs and Freemartinn.

Human Karyotyping: Chromosomal aberrations- Turner's, Klienfelter's, Down's Edward's syndrome, Patau's, Supermale, Super female, Cri-du-chaat.

Inborn errors of Metabolism - Alkaptoneuria, Phenylketonuriaa, Tyrosinosis, Galactosemia. Brief account on concept of gene – Dominant and Recessive, Fine structure of gene, Cistron, Muton and Recon.Operon concept and position effect.Gene mutations-spontaneous and induced mutations, ClB method for the detection of mutations, chemical mutagens and effects of radiationEugenics- definition, positive and negative aspects, genetic counseling, Euthenics and Euphenics.

Unit-II: BIO-TECHNOLOGY

Genetic engineering and tools- Endonuclease, Plasmids, Vector, Host cell, Cloning, Recombinant DNA technology. Polymerase Chain Reaction (PCR), DNA sequencing, DNA Finger printing , DNA chip technology, Gene Screening, Transgenics, Genetherapy, Antisense RNA, Terminator technology, DNA vaccines Applications of genetic engineering in Pharmacogenomics and drug delivery, Food technology -G.M. food, Insulin and Interferon. Environmental bio-technology- Treatment of municipal wastes and industrial effluents. Beneficial **a**nd harmful effects of biotechnology.

Unit – III: RESEARCH METHODOLOGY

Introduction – Definition, Objectives, Types, Significance.Selection of research problem Research Design. Methods of Sample Collection. Methods of data collection –Statistical analysis-Mean ,Mode, Median, SD, Probit analysis. Report Writing

REFERENCE BOOKS

- 1. Bhatnagar S.M.*Et Al.* 1999. Essentials Of Human Genetics, Orient Longman, 4th Ed.
- Gardener E.J., Simmons M.J. And Snustad D.P.*Et Al.* 2005. Principles Of Genetics, John Wiley And Sons Inc., New York, 8th Ed.
- 3. Glick B.R. And Pasternak J.J. 1998. Molecular Biotechnology, Asm Press, Washington, 2nd Ed.
- 4. Gupta P. K. 2002. Elements Of Biotechnology, Rastogi Publications, Meerut.
- 5. Singh B.D. 2002. Biotechnology, Kalyani Publishers, New Delhi.
- Sinnott E.W., Dunn L.C. And Dobzhansky T. 1958. Principles Of Genetics, Mcgraw-Hill Publications, New York, 5th Ed.
- 7. Snustad D.P. And Simmons M.J. 2006. Principles Of Genetics, Wiley Asia Student Edition, 4th Ed.
- 8. Strickberger M.W. 1985. Genetics, Pearson Prentice Hall, Low Price Edition, New Delhi.
- 9. Tamarin R.H. 2002. Principles Of Genetics, Tata Mcgraw-Hill, New Delhi,
- 10. Watson J.D. *Et Al*.1987. Molecular Biology Of The Gene, Benjamin/Cummings, 4th Ed.

ZOO-C5.6: ZOOLOGY-VI CELL BIOLOGY, IMMUNOLOGY & ECOLOGY

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Course objective: Course introduces cell and its organelles, their internal structure, functions in control of various metabolic functions of organisms. Principles and mechanism of working of microscopes, Imparts knowledge of types of immunity, MCH's and immune responses, hypersensitivity reactions, auto-immune diseases, tumour immunology and transplantation immunology. Distribution of fauna in different realms interaction, strategies of its conservation, and ecology.

Learning outcome: students become compitant in techniques and mechanism of an arraybof microscopes.Gain knowledge skill in fundamentals of cellular structures and functions in metabolic activities of organisms. Understanding of immune mechanisms in disease control, vaccinationimmune interactions which allows them to create insight as to improve their personal and public health.Biodiversity and conservation increases awareness and understanding of how human life depends on preserving animal and natural resources.Consevation in situations like climate change, habitat modification is current challenge we are facing globally.Management actions to mitigate threats to biodiversity ,including selecting nature reserves, connectivity ecosystem restoration, etics and policies of conservation.

Unit-I: CELL BIOLOGY

Microscopy: principles of light, phase contrast and electron microscopes. Ultra structure and function of plasma membrane: theories regarding the structure of plasma membrane with on Singer and Nicolson model. Cell-cell interaction, surface markers, cell fractioning, principles and applications of centrifugation. Parthenogenesis: Definition, types, Arrhenotoky, Amphytoky and cyclical parthenogenesis with suitable examples.

Unit-II: IMMUNOLOGY

Defense against diseases: Introduction, production of monoclonal and polyclonal antibodies, role of B and T lymphocytes, primary and secondary immunity and immunization, hypersensitivity or allergic reactions and auto- immune diseases

Biology of cancer: definition, general properties of cancer cells, carcinogens, structural and metabolic variations in cancer cells (physical, chemical and biological)

Acquired immuno deficiency syndrome: causes, symptoms, preventive measures, HIV test-ELISA and western blot test. Organ transplantation: Graft rejection, chemotherapy, immuno-suppressors, plastic surgery and cornea grafting, stem cells and organ culture

Unit – III: ECOLOGY

Introduction- sub divisions and scope of ecology.

Habitat ecology- concept of habitat and niche

- 1. Habitat: definition, types- spatial, trophic, multidimensional
- 2. Niche: definition, micro habitat and macro habitat

Abiotic factors- principles of limiting factors, Liebig's law of minimum, Shelford's law of tolerance, combined law concept

Ecological factors:

1. Temperature- thermal stratification, range of tolerance, poikilothermy and homeothermy.

20 Hours

10 Hours

2. Light- distribution, ecological effects, photo periodism and bioluminescence.

Energy flow in the eco- system: concept of productivity, laws of thermodynamics

Population ecology- population density, natality, mortality, population growth, biotic potential, population regulation, human population explosion

Community ecology- intra and inter specific interactions-

- 1. Neutral (neutralism),
- 2. Positive (mutualism, proto co-operation and commensalisms),
- 3. Negative (antibiosis, exploitation, Competition)

Bio-diversity and its conservation

Wild life Management

REFERENCE BOOKS

- ^{1.} Bruce Alberts*Et Al.* 1989. Molecular Biology Of The Cell,Garland Publications, New York, 4th Ed.
- ^{2.} Cooper Isbn-10: 0-87893-106-6 ...
- ^{3.} Gerald Karp 2005. Cell And Molecular Biology, John Wiley And Sons Inc., New York, 4th Ed.
- ^{4.} Geoffrey M Cooper- The Cell, 2nd Edition. A Molecular Approach. Geoffrey M Cooper. Boston University. Sunderland (Ma): Sinauer Associates; 2000.
- ^{5.} Gupta P.K. 2003. Cell And Molecular Biology, Rastogi Publications, Meerut, 2nd Ed.
- ^{6.} Sadava D.E. 1993. Cell Biology, Organelle Structure And Function, Panima Publishing Corporation, New Delhi.
- ^{7.} Verma P.S. And Agarwal V.K. 2005. Cell Biology, Genetics, Molecular Biology, Evolution And Ecology, S. Chand And Co. Ltd., New Delhi.

CHE-C5.5 Chemistry Paper- V Organic chemistry

Lecture Hrs:44

Internal Marks:30

Exam Marks:70

Course Description: Solve the problem and also think methodically, independently and draw a logical conclusion.. Employ critical thinking and the scientific knowledge to design, carryout, record and analyse the results of chemical reactions... Find out the green route for chemical reaction for sustainable development.To inculcate the scientific temperament in the students and outside the scientific community.

Objectives of the course are:

To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.. Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Develop research oriented skills. make aware and handle the sophisticated instruments/equipment's. Students acquired knowledge through practical work in fields aswell as in laboratory.

Unit-I: Stereochemistry

Elements of symmetry(Plane, center and axis with relevant examples), chirality, stereogenic centre(2^n formula for number of stereoisomers). Fischer projection formulae. Enantiomers: Optical activity; use of +/-, d/l and D/L notations. Properties of enantiomers (Glyceraldehydes, Lactic acid), chiral and achiral molecules with two stereogenic centers (2, 3-dichloro butane, Tartaric acid). Meso compounds. Cohn-Ingold-Prelog sequence rules: R, S system of nomenclature.Diastereomers: threo and erythreo diastereomers. Racemisation and resolution(Chemical,mechanical,biochemical). Relative and absolute configuration. Optical isomerism due to restricted rotation about single bonds-diphenyl systems.Geometric isomerism: Determination of configuration of geometric isomers. Cis & trans, (i)Physicalmethods(meltingandboilingpoints,dipolemoments,solubility) ii)Spectroscopic methods(UV,IR,NMR evidences) iii)chemical methods(cyclisation method,pKa values and conversion to a compound of known configuration)E, Z system of nomenclature. Geometric isomerism in oximes. Alicyclic compounds: Conformations of four to eight membered cycloalkanes and disubstituted cyclohexanes. (1,2-,1,3- and 1,4dimethyl cyclo hexanes).Bicylic systems: Nomenclature and conformations of decalins and norbornane.

Unit-II: Amines and Pericyclic Reactions

Diazotization and synthetic applications of diazonium salts. Sandmeyer's reaction. (conversion to chlorobenzene, bromobenzene and benzonitrile), hydrolysis, reduction (to phenyl hydrazine and aniline), coupling reactions to give azo dyes (p-hydroxyazobenzene and 1-phenylazo-2-naphthol).

Pericyclic Reactions- Molecular orbital symmetry, Woodward-Hoffmann correlation diagrams. FMO and PMO approaches. Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl system. Electrocyclic reactions: conrotatory and disrotatory motions, 4n, 4n+2 and allyl systems.

Unit-III: Heterocyclic compounds

Introduction, classification, structures, resonance and aromatic character of furan, pyrrole, thiophene and pyridine. Methods of preparation ;furan(from mucic acid and furfural),thiophene(from acetylene and butane),pyrrole(from acetylene and from

8 Hours

5 Hours

ammonium mucate) and pyridine(from acetylene and from nicotinic acid)and reactions of pyrrole, furan, thiophene, pyridine(electrophilic aromatic substitution reactions, nitration and friedel- crafts reaction), and Mechanism of electrophilic substitution reactions. Comparison of basicity of pyrrole, pyridine and piperidine. Preparation of indole by fischer synthesis, quinoline by Skraup synthesis, isoquinoline by Bischler-Napieralski method and reactions of indole, quinoline and isoquinoline(nitration reaction).

Unit-IV: Chemistry of Natural Products

Carbohydrates: Introduction and classification.

Monosaccharides: Aldoses, structures of all the D-aldohexoses. Elucidation of open chain structure of D-glucose. Mechanism of mutarotation and anomeric effect. Elucidation of ring structure of D-glucose(by HIO₄ and HNO₃) in detail.

Ketoses: Fructose, interconversion of glucose and fructose.

Disaccharides: Glycosidic bond. Structures of maltose, lactose and sucrose-Haworth and conformational structures.

Terpenes and terpenoids: Occurrence, classification(on the basis of number of isoprene units, acyclic and cyclic) and isoprene rule. Elucidation of structure and synthesis of citral and zingiberene. Structures of limonene, menthol, α -terpineol, camphor, β -carotene, Vitamins-A and their uses.

Alkaloids: Introduction, classification and general characteristics. Structural elucidation and synthesis of nicotine. Structures and uses of ephedrine, caffeine, cocaine, atropine, quinine and morphine.

Unit-V: Spectroscopy of Organic compounds

UV-Visible spectroscopy: Introduction. Chromophores and auxochormes; blue shift and red shift. Graphical representation of spectra of 1,3-butadiene, benzene and lycopene. Influence of conjugation on UV absorption-Comparison of UV spectra of acetone and methyl vinyl ketone.

IR spectroscopy: Introduction. Stretching frequencies of -OH (free and H-bonded), alkyl -C-H, C=C, C=C, C=C, C=O and C-O groups (by taking suitable examples). Graphical representation of IR spectra of benzoic acid and methyl benzoate.

NMR spectroscopy: Basic principles of proton magnetic resonance: Nuclear magnetic spin quantum number I, influence of the magnetic field on the spin of nuclei, spin population, saturation using radio frequency. Nuclear magnetic resonance. chemical shift (δ values), uses of TMS as reference. Nuclear shielding and deshielding effects. Equivalent and non-equivalent protons. Effect of electronegativity of adjacent atoms on chemical shift values. Spin-spin splitting and spin-spin coupling (qualitative treatment only).

Applications of NMR spectroscopy including identification of simple organic molecules. Examples: Shielding and deshielding effects for (i) methane (ii) CH_3 –Cl (iii) CH_2Cl_2 (iv) CHCl₃. Spin-spin coupling in (i) Cl_2CHCHO (ii) 1,1,2-trichloroethane (iii) CH_3CH_2Cl .

Unit-VI: Industrial Organic chemistry

7Hours

Sythetic dyes: Introduction and classification. Colour and constitution. Synthesis of congo red, malachite green, alizarin and indigo.

Drugs: Chemotherapy, classification of drugs (i) drugs used for the treatment of diseases due to infection ii). drugs used for the treatment of diseases not due to infection), Synthesis and uses of paracetamol, diclofenac, ranitidine, sulphanilamide and chloramphe nicol.

TEXT BOOKS :

1.College chemistry-V: L.Indira and Chatwal

2.Comprehensible chemistry-V: Vinod kumar B. and M.Aswathanarayanappa **REFERENCE BOOKS:**

1.General and Inorganic chemistry-Arun bahl and bahl-volume-V-2012

2. Advanced general chemistry-Jagadamba singh-vol-II-2009

ELE-C5.5 Electronics-V COMMUNICATIONS

Lecture Hrs:44

Internal Marks:30

Exam Marks:70

Course Objectives: After studying this paper the students will be able to explain the basics of Communications Techniques and Devices. The students will also be able to explain about the various types of CommunicationsTechniques.

Module1:

14 Hours

Electromagnetic spectrum, propagation of EM waves, Introduction to communication system and Noise:

Analog Modulation Techniques and Receivers: Types of modulation: AM, FM & PM with brief explanation of all the three types. Comparison between all the three.

Block diagram of AM and FM Transmitter. Characteristics of Radio Receiver, AM Super Heterodyne receiver, Diode Detector, Principle of AGC, Choice of IF, Image frequency and rejection.FM Superhetrodyne Receiver Detectors - Balance Slope Detector. Transmission lines and Antennas: Types of transmission lines, Metallic transmission line and its equivalent circuit, Transmission line

Characteristics, Standingwaves, Transmissionline input impedance, Microstripandstripline transmissionlines. Antenna – Introduction, Basic antenna operation: Antenna equivalent circuit, Antenna radiation patterns: Resonant and Non Resonant Antenna, Antenna Bandwidth, Beam width, Radiation Resistance, Expression parameters-Gain, for Radiation resistance and power radiatedbyAntenna, Basic Antenna: Elementary Doublet, Half wave dipole, Antenna Arrays: Broadside array, End Fire Array, Non-resonant array, Folded Dipole, Special Purpose Antennas: Yagi uda antenna, Loopantenna, Phased Arrayantennas, Helicalantenna, UHF and Microwaveantennas: Parabol ic reflector antenna, Feed mechanisms, conical hornantenna.

Module2:PulseandDigitalmodulationtechniques:

5 Hours

Introduction to pulse modulation techniques- Sampling Theorem, Types- PAM, PWM, PPM, PCM-Quantization.

Characteristics of data transmission circuits-Bandwidth requirements, Data transmission speeds, Noise, Cross talk, Echo Suppressors, Distortion and Equalizer. Modems-classifications, modes of modem operation. Advantages and disadvantages of digital transmissions, Applications.

Digital communication systems- Introduction, information capacity, bits, bit rate, baud and m- ary encoding. Digital modulations (ASK, FSK and PSK and QPSK).

Module3: Introduction to different types of Communication system 15 Hours

Cellular Communication System:Introduction, Cellular Telephone, Frequency reuse, Interference, cell splitting, sectoring, segmentation and dualization, cellular system topology, roaming and handoffs, cellular telephone network components,

Global system for mobile communications Data communications and networking:

Introduction, Data communications network architecture, protocols and standards, standards organization for data communications, layered network architecture, open system interconnection, Serial and parallel data transmission, Data communications networks (network models, network topologies)

Public Switched Data Networks (PSDN), Integrated Services Digital Network (ISDN), Asynchronous Transfer Mode (ATM):

Satellite Communications:Satellite orbits: Satellite elevation categories, satellite orbital patterns. Geosynchronous Satellites: orbital velocity, clarke orbit, Advantages and disadvantages of geosynchronous satellites, satellite system link models:

Satellite Multiple Accessing arrangements Optical Fiber Communication System:

Block diagram of optical fiber communication system, optical fiber types, losses in optical fiber cables, light sources, light detectors.

Module4: Microwave Radio Communications:

10Hours

Introduction, Characteristic features of microwaves, Advantages and disadvantages of microwave, Applications of microwaves.FM Microwave radio system, FM microwave radio repeaters, Diversity, Line of sight path characteristics: free space path loss, path clearance and antenna heights.Microwave Tubes, Semiconductor microwave devices and RADAR:Microwave Tubes: Construction and working of Klystron of amplifier, Reflex Klystron, Magnetron and Traveling Wave Tube (TWT)Semiconductor microwave devices: Gunn effect and Gunn diode and tunnel diode.RADAR-Principles, Block diagram of pulsed RADAR system, RADAR range equation applications of RADAR.

TEXT BOOKS :

- 1. ElectronicCommunicationsystem,Kennedy&Davis,IVedition-TATAMc-GRAWhill.
- 2. Electronic Communication systems, Fundamentals throughAdvanced Wayne Tomasi-Vth edition-PearsonEducation

REFERENCE BOOKS:

- 1. LAB experiments- Quarterly Journals, KamaljeethInstruments.
- 2. PrinciplesofCommunicationEngineering-UmeshSinha-satya prakashan,NewDelhi

CS-C5: Object Oriented Programming using Java

Lecture Hrs : 54Internal Marks : 30Exam Marks : 70

Course Description: Java is one of the most popular programming languages used to create Web applications and platforms. It was designed for flexibility, allowing developers to write code that would run on any machine, regardless of architecture or platform.

Objectives of the course are: Its main objective is to teach the basic concepts and techniques like classes, objects, interfaces, exceptions and libraries of object collections which form the object oriented programming paradigm.

Learning Outcome: Read and understand Java-based software code of medium-tohigh complexity. Upon completing requirements for this course, the student will be able to: A. Create a software application using the Java programming language.

Unit-I

9 Hours

9 Hours

Fundamentals of OOP: Introduction, Object-Oriented paradigm, Basic concepts of OOP, Benefits of OOP, Application of OOP. An Overview of Java: Java History, Java Features, Simple Java Programs, More of Java, An application with two classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments, Programming Style.

Unit - II

Constants, Variables & Data Types: Introduction, Constants, variables, Data types, Declaration of variables, Scope of variables, Arrays, 1-D Arrays, 2-D Arrays.

Classes, Objects and Methods: Introduction, Defining a class, Adding variables, Adding Methods, Creating Objects, Accessing class Members, Constructors, Method Overloading, Static Members, Nesting of Methods, Inheritance, Overriding Methods, Final Variables & Methods, Final Classes, Finalizer methods, Abstract Methods & Classes, Visibility Control, Dynamic Binding.

Unit - III

Interfaces, Multiple Inheritance, And Packages:Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface variables, Java API Packages, Using System Packages, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, String Handling.

Unit-IV

Exception handling: Types of errors, Exceptions, syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing our own Exception. Multi-threading programming: Creating Threads, Extending the Thread Class, Stopping & Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

Unit-V

Applets, Event handling: Introduction, Difference b/w Applets & Application, Preparing & building Applet Code, Applet Life Cycle, Creating an Executable Applet, Applet Tag, Adding Applet to HTML Tag, running the Applet, Attributes of Applet Tag, Passing Parameters to Applet, Applet Capability & Security.

Unit-VI

AWT: Abstract Window Toolkit, working with windows, Graphic and text, AWT

9 Hours

9 Hours

9 Hours

(, 11VV I

Controls, Layout Managers & Menus. Introduction to Event Handling, Event Handling Mechanism, Listener Implementation, AWT Events.

TEXT BOOKS

- 1. JAVA The complete reference ,Ninth Edition, by Patrik Naughton and Herbert Sehildt, Oracle Press 2013.
- 2. Programming With JAVA By E Balaguruswamy, Mc-Grawhill publishers 2010 **REFERENCES BOOKS**
- 1. Java 7 Programming Black book, Dreamtech publication. 2010
- 2. Introduction to Java Programming,10th Edition by Y.Daniel Liang, Pearson Publications. 2011

standard hydrogen electrode, calomel electrode, Quinhydrone and glass electrodes. Determination of PH using hydrogen, quinhydrone and glass electrodes. Numerical problems.

Concentration cells, determination of solubility of a sparingly soluble salt and numerical problems. Redox electrodes, emf of redox electrodes. potentiometric titration involving only redox systems.

Unit-II: Analytical Chemistry

Organic reagents-Advantages, uses of EDTA, Oxines, DMG and O-phenanthrolene in the estimation of Mg, Ca, Zn, Ni(gravimetry) and Fe(calorimetry). Electro gravimetric estimation of Cu, Flame photometric determination of Na and K. Redox titration, selection of redox indicators. Chromatography- basic principles of adsorption and partition chromatography. Separation of mixtures involving TLC, paper and vapour phase chromatography, ion exchange method.

Polarisation – Orientation of dipoles in an electric field, dipole moment. Induced dipole moment(experimental determination of dipole moment not included). Clausius - Mossotti equation (only statement). Dipole moment and structures of molecules(planar and nonpolar) .Magnetic properties – paramagnetic, diamagnetic and ferromagnetic.

Unit-IV : Chemical Spectroscopy -I

Introduction : electromagnetic radiation, regions of the spectrum, statement of the Born -Oppenheimer approximation, degrees of freedom.

The National College, Autonomous, Basavanagudi, Bengaluru-04

CHE-C5.6: CHEMISTRY PAPER- VI (Physical chemistry)

Course Description: Solve the problem and also think methodically, independently

Lecture Hrs:44

Internal Marks:30

Exam Marks:70

anddraw a logical conclusion.. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions.... **Objectives of the course are:**

\ Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields as in laboratory.

Unit-I: Electrochemistry

Specific, equivalent and molar conductances and their determination. Variation of conductance with concentration. Weak and strong electrolytes. Transport number, determination by moving boundary method. Abnormal transference numbers.

Kohlrausch law and its applications. Conductometric titrations.

Limitations of Arrhenius theory. Debye - Huckel - Onsager theory (qualitative treatment). Galvanic cells, convention of representing cells, reversible and irreversible cells. Standard Weston cadmium cell, EMF of cells and their determination. Thermodynamic deduction of Nernst equation.

Determination of E° of an electrode. Equilibrium constant of a cell reaction, free energy of a cell reaction.

Unit-III: Physical properties and Molecular structure

Page 139

7Hours

6 Hours

6Hours

Rotational spectroscopy : Diatomic molecules. Relationship between internuclear distance and moment of inertia. Expression for rotational energy. Numerical problems. Criterion for absorption of radiation-selection rule.

Unit-V:Vibrational Spectroscopy

Vibrational Spectroscopy : Hooke's law- Expression for the frequency of SHO- force constant and its significance. Expression for vibrational energy levels of SHO. Zero point energy, numerical problems. Degree of freedom of polyatomic molecules- modes of vibration for CO_2 and H_2O molecules.

Unit-VI: Raman spectroscopy

Raman Spectra : Concept of polarizability, pure rotational and vibrational Raman spectra of diatomic molecules. Origin of Stokes and anti-Stokes lines. Selection rules. Instrumentation of Raman spectra.

Advantages of Raman Spectroscopy over IR spectroscopy.

TEXT BOOKS :

1.College chemistry-V: L.Indira and Chatwal

2.Comprehensible chemistry-V: Vinod kumar B. and M.Aswathanarayanappa

REFERENCE BOOKS:

1.Organic spectroscopy by- Veera reddy-volume-V-2014

2. Advanced physical chemistry-Puri and sharma-vol-V-2010

4 Hours

ELEC5.6: VERILOG AND INSTRUMENTATION

Lecture Hrs:44

Internal Marks:30

Course Objectives: After studying this paper the students will be able tounderstand the programming of hardware and also the application of instruments in the medical field.

Unit-I:

Basics of Verilog: Introduction to HDL, Structure of Verilog module, Operators, data types, simulation and synthesis

Types of descriptions: Data flow descriptions, Behavioral Descriptions, Structural Descriptions, Switch – level descriptions, mixed type descriptions

Concentration cells, determination of solubility of a sparingly soluble salt and numerical problems. Redox electrodes, emf of redox electrodes. potentiometric titration involving only redox systems.

Unit-II:

Modularity in Verilog: Procedure, tasks and functions, advanced HDL descriptions.

Synthesis Basics: Highlights of synthesis, Synthesis information from module, mapping process and always in hardware domain.

Unit-III:

Measurement Errors: Gross errors and systematic errors, Absolute and relative errors, Accuracy, Precision, Resolution and Significant figures.

Measurement of resistance, inductance and capacitance:

Whetstone's bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell's bridge, Wien's bridge, Wagner's earth connection

Fundamentals of biomedical instruments: Sources of biomedical signals, Basic instrumentation system, General constraints in design of biomedical instrumentation systems

Bioelectric Signals and Electrodes:Origin of bioelectric signals, Types of bioelectric signals, recording electrodes, Electrode-Tissue interface, Polarization, Skin contact impedance, Silver- silver chloride electrodes, Electrodes for ECG, EEG, EMG, Microelectrodes.

Unit-IV :

11 Hours

Electrocardiograph: Electrical activity of the heart, Genesis & characteristics of Electrocardiogram (ECG), Block diagram description of an Electrocardiograph, Electroencephalograph: Genesis of Electroencephalogram (EEG), Block diagram description of an Electroencephalograph.

Blood pressure measurement: Direct & Indirect method, Automatic blood pressure measuring apparatus using Korotkoff's method,

Measurement of Respiration rate: Thermistor method, Impedance pnuemography, CO ₂ method, Apnea detectors. Blood Flow Meters: Electromagnetic blood flow meters, Ultrasonic blood flow meters, NMR blood flow meters, and Laser Doppler blood flow meters.Cardiac Pacemakers and Defibrillators: Need for cardiac pacemaker, External pacemaker, Implantable pacemaker, Types of Implantable pacemakers, Programmable pacemaker, Rate- responsive pacemakers, and AC & DC defibrillators.

Page 141

13 Hours

9 Hours

11 Hours

Exam Marks:70

TEXT BOOKS :

- 1. Guide to Verilog HDL A practical primer by J. Bhasker; Addison Wesley Longman Pub.
- 2. HDL programming Fundamental: VHDL and Verilog –Botros
- 3. "Modern Electronic Instrumentation and Measurement Techniques", A.D. Helfricand

W.D. Cooper, PHI of India ltd.,

4. Biomedical Instrumentation –Khandpur

REFERENCE BOOKS:

- 1. Bio-Medical instrumentation- Rangan ManiSharma
- 2. Bio-Medical Instrumentation- Dr. MArumugam

CS-C6: Visual Programming Internal Marks : 30

Lecture Hrs : 54

Course Description:

This course introduces computer programming using the Visual BASIC programming language with object-oriented programming principles. Emphasis is on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.

Objectives of the course are: The student will use VB.Net to build Windows applications using structured and object-based programming techniques.

Learning Outcome: The student will be able to Design, create, build, and debug Explore Visual Basic's Integrated Development Visual Basic applications. Environment (IDE).

Unit-I

Overview of Microsoft .NET Framework

The .NET Framework, Managed Code MSIL, Metadata and JIT Compilation -Automatic Memory Management, The Common Language Runtime (CLR), The .NET Framework class Library.

Unit - II

Programming in Visual basic .net

IDE, Variables and Data Types, operators, Data Type Conversion Functions, String & Date Functions and Methods Procedures and Functions, Arrays, Dynamic Arrays, Arrayclass, Arraylist, Control Flow Statements, Conditional Statements, Loop Statements. MsgBox and InputBox.

Unit - III

Introduction to Windows controls

Working with Tool Box Controls, Common controls - Label, Text Box, Button, Check Box, Radio Button, Date Time Picker, List Box, Combo box, Picture Box, Rich Text Box, Tree View, Tool Tip, Progress bar, Masked Textbox, Checked List box, Data Grid, error provider, Help provider, Timer

Unit-IV

Object Oriented Programming

Creating Classes, Object Construction & Destruction, Properties, Methods, Events, Access Specifiers: Public, Private, Protected, Protected, Friend, Me, MyBase and MyClass keywords, Abstraction, Encapsulation & Polymorphism Interfaces & Inheritance.

Unit-V

Creating Applications, Building Projects, Using simple components, Running **VB.NET** applications, Console Programs.

Unit-VI

Database access using ADO.NET

Visual Database Tools, ADO .NET Object Model, ADO .NET Programming

9 Hours

9 Hours

9 Hours

9 Hours

Page 143

9 Hours

9 Hours

Exam Marks: 70

TEXT BOOKS

1 Beginning Visual Basic - 2019 Edition: A Step by Step Computer Programming Tutorial [Print Replica] by Philip Conrod (Author), Lou Tylee (Author)

REFERENCES BOOKS

1. Computer Bible Games with Visual Basic 2019 EditionA Beginning Programming Tutorial For Christian Schools & Homeschools

2. 3. Visual Basic in easy steps, 6th edition: Updated for Visual Basic 2019 Mike McGrath (Author)

4. Visual Basic and Databases 2019 Edition: A Step-By-Step Database Programming Tutorial by Philip Conrod (Author), Lou Tylee (Author)
MAT-C 5.5: MATHEMATICS V

Lecture Hrs: 44

Internal Marks : 30

Exam Marks : 70

Objective: Students will learn basics of ring theory like rings, subrings, ideals, ring homomorphism and their properties, and Compute directional derivatives and gradients of scalar functions and explain their meaning. Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. And also they will learn to finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of systems of linear equations and differential equations, interpolation, differentiation, evaluating integration.

Learning Outcome: Upon completion of this course will help students to continue more courses in advanced Ring theory modules, Galois groups. Students should be able tomanipulate vectors to perform geometrical calculations in three dimensions. They use Green's theorem and the Divergence theorem to compute integrals. Student can opt for advance courses in Numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance, Students can also handle physical problems to find an approximated solution.

Unit-I: ALGEBRA - IV

Rings, Integral Domains, Fields

Rings, Types of Rings properties of rings – Rings of integers modulo n – Subrings – Ideals, Principal, Prime and Maximal ideals in a commutative ring – examples and standard properties following the definition – Homomorphism, Isomorphism – Properties

– Quotient rings – Integral Domain- Fields - properties following the definition – Fundamental Theorem of Homomorphism of Rings - Every field is an integral domain – Every finite integral domain is a field – Problems.

Unit – II: CALCULUS - V

Differential Calculus Of Scalar And Vector Fields

Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field – divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties, Harmonic functions, Problems.

Unit – III: NUMERICAL METHODS - I

Finite differences – Definition and properties of and E, the relation between them – The nth differences of a polynomial, Factorial notations, separation of symbols, divided differences and related theorems. $,,,\delta\mu\Delta\nabla$

Newton –Gregory forward and backward interpolation formulae – Lagrange's and Newton's interpolation formulae for unequal intervals - Inverse interpolation.

Numerical Integration: Quadrature formula – Trapezoidal rule -Simpon's 1/3 and 3/8 rule(without proofs) and problems.

TEXT BOOKS

- 1. Herstein I N, Topics in Algebra, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
- 2. Shanthi Narayan and P K Mittal, Differential Calculus, Reprint. New Delhi:
- S Chand and Co. Pvt. Ltd., 2014.
- 3. M D Raisinghania, Vector calculus, S Chand Co. Pvt. Ltd., 2013.
- 4. M K Jain, S R K Iyengar, and R K Jain, Numerical Methods for Scientific and

Page 145

15 Hours

14 Hours

15 Hours

Engineering Computation, 4th ed. New Delhi, India: New Age International, 2012.

- 5. www.scilab.org.
- 6. **wxmaxima**.sourceforge.net
- 7. www.geogebra.org

REFERENCES BOOKS

- 1. Michael Artin, Algebra, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
- 2. Vashista, A First Course in Modern Algebra, 11th ed.: Krishna Prakasan Mandir, 1980.
- 3. John B Fraleigh, A First course in Abstract Algebra, 3rd ed.: Narosa Publishing House., 1990.
- 4. R Balakrishan and N.Ramabadran, A Textbook of Modern Algebra, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
- 5. G B Thomasand R L Finney, Calculus and analytical geometry, Addison Wesley, 1995.
- 6. B Spain, Vector Analysis, ELBS, 1994.
- 7. D E Bournesand, P C Kendall, Vector Analysis, ELBS, 1996.
- 8. S S Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India, 2012.

MAT-C 5.6: MATHEMATICS VI

Lecture Hrs: 44

Internal Marks : 30

Objective: This course is designed to provide for the graduate student in mathematics, an introduction to the ideas and techniques of the calculus of variations.it will introduce double and triple integrals along with line integrals which are fundamental to all streams where calculus can be used.

Learning Outcome: Students will be able to formulate variational problems and analyze them to deduce key properties of system behavior. They will be able to calculate extremum values, double, triple and line integrals. He will have idea of basic vector calculus including green's theorem, divergence theorem. and stokes theorem.

Unit-I: MATHEMATICAL METHODS - II Calculus Of Variation

Variation of a function – variation of the corresponding functional – extremal of a functional – variational problem – Euler's equation and its particular forms – Examples – standard problems like geodesics, minimal surface of revolution, hanging chain, Brachistochrone problem –Isoperimetric problems. f = f(x, y, y)'

Unit - II: CALCULUS - VI

a). Line And Multiple Integrals

Definition of line integral and basic properties examples evaluation of line integrals.

Definition of double integral - its conversion to iterated integrals .Evaluation of double integrals by change of order of integration and by change of variables – computation of plane and surface areas ,volume underneath a surface and volume of revolution using double integrals.

Definition of triple integral and evaluation – change of variables – volume as a triple integral.

b). Integral Theorems

Green's theorem (with proof) - Direct consequences of the theorem. The Divergence theorem (with proof) - Direct consequences of the theorem. The Stokes' theorem (with proof) - Direct consequences of the theorem.

TEXT BOOKS

1. R Weinstock, Calculus of Variation, Dover, 1970.

- 2. M. D. Raisinghania, Vector Calculus, S Chand Co. Pvt. Ltd., 2013.
- 3. www.scilab.org
- 4. wxmaxima.sourceforge.net

5. www.geogebra.org

REFERENCES BOOKS

- 1. F B Hildebrand, Methods in Applied Mathematics,
- 2. B Spain, Vector Analysis, ELBS, 1994.
- 3. D E Bournesand, P C Kendall, Vector Analysis, ELBS, 1996.

14 Hours

30 Hours

Exam Marks: 70

PHY-C 5.5: PHYSICS V

Lecture Hrs: 44

Internal Marks : 30

Exam Marks : 70

Course Description: This course, provides an introduction to the basic concepts of (Relativity & Electronics)

Introduces students to the basic concepts of relativity and solid state electronics

Objectives of the course are: To understand the relativistic effets and electronics in the world around us.

Learning Outcome: The student will be able to apply concepts of relativity and electronics to solve some of the basic real life problems in relativity and electronics. Unit-I 15 Hours

Relativity: Review of frames of reference, inertial and non inertial frames. Principle of Galilean relativity

Michelson-Morley experiment with a brief historical background, significance of its negative results

Postulates of Special theory of relativity, derivation of Lorentz transformation equation, proper time and length, time dilation experimental verification of life time of μ -meson

Lorentz-Fitzerald length contraction and simultaneity in relativity Velocity transformation equations, variation of mass with velocity, mass - energy equivalence & momentum-energy relations. Problems.

Unit-II:

Electronics I: Review of p-n junction diodes, Zener diodes characteristic, explanation of breakdown voltage (Zener effect & Avalanche effect), Zener diode as voltage regulator, V-I characteristics, LED, Problems

Review of transistors, different modes -CE,CB and CC - their comparison, characteristics of transistors in CE mode, α , $\beta \Box$ and relation between them, expression for collector current in CE mode, Transistor biasing, mention of different biasing circuits, explanation of voltage divider bias, transistor as an amplifier, working in CE mode,

FET characteristics, applications of FET as an amplifier,

CRO-expression for deflection sensitivity of CRT, applications of CRO, voltage, frequency, phase measurements, problems

Unit – III:

14 Hours

15 Hours

Electronics II: Decimal number system, binary number system, conversion of binary to decimal and vice versa, Octal and Hexadecimal number systems-conversion of octal and hexadecimal to binary and vice versa, block diagram of digital computing systems

Binary code, Conversion of decimal to BCD code, Logic gates (AND, OR, NOT, NAND & NOR- exclusive OR), truth tables and their realization using diodes and transistors

Laws of Boolean algebra, de Morgan's theorem, verification, NAND and NOR as universal gates, simplification of logic expressions-IC 7400 pin diagram, Half adder, Full adder and their truth tables, problems.

Oscillators, feedback concept, feedback amplifier, phase shift and Wein bridge oscillator using Op-amp (Principle and Working)

Op-amp IC-741 basic diagram and its terminals, characteristics of ideal Op-amp, inverting and

Non-inverting modes, Op-amp as an integrator and differentiator, Problems

Reference books:

- Understanding Physics Sharmista Sahu, Kala- Subhas Stores
- College Physics-N.Sundararajan, George Thomas, Syed Azeez-United Publishers
- Electronic Circuits and Devices by Boylstead.
- Electronics and Linear Circuits- N.N.Bhargava, D.C.Kulshreshtha-Tata Mcgraw Hill
- Electronics principles, Malvino-V edition- Tata Mcgraw Hill
- Electronic Devices and Circuits Millman and Halkias-Tata Mcgraw Hill
- Principles of Electronics-V.K.Mehta-S.Chand and Co.
- Fundamentals of Electronics –Revised Edition-B.Basavaraj-Omkar Pub.
- Electronic Devices and circuits-Analog and Digital-B.L.Theraja and R.S.Sedha-S.Chand and Co.
- Modern Physics-R.Murugeshan; S.Chand & Co.
- Introduction to Special theory of Relativity-Romber Reneck; Wiley eastern Ltd
- Basic physics for 6th semester- B.Basavaraj & P.Sasdhashiva; Omkar Publications
- Modern Physics Robert Resnick
- Modern Physics H.S.Mani

PHY- C 5.6: PHYSICS VI

Lecture Hrs: 44

Internal Marks : 30

Exam Marks : 70

Course Description: This course, provides an introduction to the basic concepts of Quantum Mechanics, Atomic and Molecular physics.

Introduces students to the use of basic tools of Quantum mechanics and mathematical basis of atomic and molecular physics.

Objectives of the course are: To understand the different physical processes taking place in our surroundings in atomic and sub atomic world.

Learning Outcome: The student will develop skills to solve basic problems of quantum mechanics and atomic physics. **15 Hours**

Unit-I

Introduction to quantum physics: Failure of classical physics to explain the phenomena-stability of an atom, atomic spectra, black body radiation, Photoelectric effect, Compton effect and specific heat of solids. Explanation by Planck's Quantum theory.

DeBroglie's hypothesis of matter waves: Wave-particle duality, Thomson's experiment, Davisson and Germer's experiment-Normal incidence method, concept of wave packet for a quantum particle, group velocity and phase velocity, relation between particle velocity and group velocity, Bohr's quantum condition and matter waves, Heisenberg's uncertainty principle-different forms. Gamma ray microscope experiment, Applications. Problems.

Unit-II:

Schrödinger's equation: the concept of wave function, physical significance of wave function, development of time dependent Schrödinger's wave equation for a free particle, operators for x, p and E – time independent Schrödinger's wave equation, applications: (a) particle in one dimensional box, derivation of Eigen values and Eigen functions, graphical representation mention of solution for three dimensional case (b) Linear Harmonic oscillator, Eigen values and mention of Eigen functions.

Molecular spectra: Pure rotational motion, spectrum and selection rules, vibrational motion, spectrum and selection rules, rotation vibration spectrum. Review of scattering of light, Raman's scattering, experimental study and Quantum theory of Raman Effect. Applications - comparison with IR spectrum, Problems

Unit – III:

Atomic spectra: Review of Bohr's theory of hydrogen atom, mention of expression for total energy, wave number and Rydberg's constant, variation of Rydberg's constant with nuclear mass, Sommerfield's modification of Bohr's model (qualitative), excitation and ionization potentials, Frank-Hertz experiment

Vector atom model: concept of spatial quantization and spin of an electron. Stern-Gerlach experiment. Different quantum numbers associated with the vector atom model. Spectral terms, selection rules, L-S coupling, J-J coupling, Pauli's exclusion principle, expression for maximum number of electrons in an orbit, Spectra of hydrogen atom and alkali elements, Larmor Precession, Bohr Magneton, experimental study of Zeeman effect and quantum theory of Zeeman effect, Paschen-Bach effect and Stark effect, Problems. Op-amp IC-741 basic diagram and its terminals, characteristics of ideal Opamp, inverting and Non-inverting modes, Op-amp as an integrator and differentiator, Problems

15 Hours

14 Hours

Reference books:

- Understanding physics –Sarmista Sahu,Kala.N-Subhas Stores
- College Physics-N.Sundararajan, George Thomas, Syed Azeez-United Publishers
- Modern Physics R.Murugason S.Chand and company
- Modern Physics-Brijlal and Subramanyam S.Chand and company
- Modern Physics-Duggal and Chhabra- Shabanlal NaginChand and co.
- A Text book of Atomic and Molecular Physics-S.K.Sharma & Others-S.Dinesh and Co.
- Quantum Mechanics Mathews
- Modern Physics-S.N.Ghoshal; Wiley eastern Ltd
- Introductory Quantum Mechanics. by Y.R.Waghmare, Publisher: 1989, S. Chand

The National College, Autonomous, Basavanagudi, Bengaluru-04		
BOT-P 5.5: BOTANY LAB V		
Lab	Hrs.: 44Internal Marks: 15	Exam Marks: 35
Sl. No. 1.	Experiment Magnoliacea.	
2.	Cruciferae.	
3.	Rosaceae.	
4.	Rutaceae, Euphorbiaceae.	
5.	Umbelliferae, Asclepiadaceae.	
6.	Verbinaceae, Labiatae	
7.	Rubiaceae,Cucurbitaceae.	
8.	Compositae, Cannaceae.	
9.	Cannaceae,Orchidaceae.	
10.	Graminae.	
11.	Economic importance	

BOT-P 5.6: BOTANY LAB VI

Lab Hrs. : 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

Experiment

- 1. Study of Mitosis through onion root tip squash & permanent slides.
- 2. Study of Meiosis through smear of sporogenous tissue from anthers of Rheo or Onion flower buds & permanent slides.
- 3. Karyotypes studies Study of karyotypes of Onion.
- 4. Qualitative test for a) Reducing sugar (Benedict's test), b) Starch (Iodione test), Amino acid (Ninhydrin test), d) Proteins (Biuret's test), e) Lipids(Alcohol – water test); f) DNA (Feulgen's test)
- 5. Quantitative estimation of proteins using colorimeter.
- 6. Estimation of ascorbic acid in a given plant extract (from fruits of capsicum or gooseberry) using titration against DCPIP.
- 7. slide preparation & revision of permanent slides of mitosis & meiosis.

	The National College, Autonomous, Basavanagudi,Bengaluru-04
	ZOO-P 5.5: ZOOLOGY LAB V
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35
Sl. No.	Experiment
1.	Solving of problems based on -
	Monohybrid inheritance
2	Dinybrid inneritance Drosophila Constias
۷.	Identification of male and female Drosophila
	Sex comb mounting in Drosophila
	Mounting of genital plate in Drosophila
3.	Identification of mutants in Drosophila.
	Sex linked inheritance in Drosophila
4.	Human genetics-
	Blood groups in man
~	Preparation of Buccal Smear for sex chromatin (Barr body) identification.
5.	Extraction of DNA in Liver cells/ Cauli flower
6.	Quantitative and Qualitative analysis of DNA
7.	Problems on Statistical analysis.

The National College.	Autonomous.	Basavanagudi.Bengaluru-04	1
The National Conege,	/ aconomous,	basavanagaai,bengalara o	•

	Z00-	P 5.6: ZOOLOGY LA	AB VI
Lab	Hrs. : 44	Internal Marks: 15	Exam Marks: 35
Sl. No.		Experiment	
1.	Squash preparation- Grass hopper testis for me Onion root tip for mitosis	eiosis stages s stages ds /onion buds	
2.	Mounting of salivary glan Blood smear preparation, Micrometry-Measuremen	d chromosome- Drosophila Haemocytometer and Blood ts of Paramecium slide / on	or Chironomous larva d Grouping iion cells
3.	 Analysis of water samples 1. Estimation of salinity 2. Estimation of oxygen 3. Estimation of organic 4. Determination of pH (matter titrimetric/ pH meter, if ava	ilable)
4.	 Determination of total Tubiculous worms-Ar Burrowing worms- Det Sedentary forms- Meth Passive flight adaptation Animal associations: Colonial forms- Physia Parasitism- Taenia, Sa Facultative mutualism Mimicry/ Camouflage 	enicola, Chaetopterus. entalium, Amphioxus ridium, Balanus. ons- Exocoetus, Draco. dia, Honey Bee, cculina on Crab - Hermit Crab with Sea Ane - Stick insect. Chameleon.	emone

CHE-P 5.5: CHEMISTRY LAB V

Lab Hrs. : 44

Internal Marks: 15

Exam Marks: 35

Organic equitative analysis – identification of mono-functional organic compounds through functional group analysis, determination of physical constant, preparation and characterization of a suitable derivative.

ELE-P 5.5: ELECTRONICS LAB V LAB IN COMMUNICATIONS

Lab Hrs.: 44 Exam Marks: 35 **Internal Marks: 15** Sl. No. **Experiment** AmplitudeModulator 1. 2. Amplitudedemodulator. 3. 555 as astable and monostablemultivibrators. 4. Pre-Emphasis and De-Emphasis. 5. Automatic GainControl. 6. Saw-tooth wave generator using IC555. 7. Voltage controlled oscillator using IC555. 8. Frequency multiplier usingtransistor. 9. FrequencyMixer. 10. PAM usingtransistor. 11. PWM and PPM usingIC-555. 12. ASK modulation and demodulation using OP-AMP ortransistor

13. FSK modulation using IC-555 or565.

The National College	, Autonomous,	Basavanagudi, Bengaluru-04
----------------------	---------------	----------------------------

	The National College, Autonomous, Basavanagudi,Bengaluru-04
	CS- P 5.5: COMPUTER SCIENCE PRACTICALS V
	Java Programming Lab
Lab I	Hrs.: 44 Internal Marks: 15 Exam Marks: 35 Exportment
51. INU.	PART-A:
1.	Write a program to find whether the character 'a' is in your name or not. If yes find the number of times of character 'a' appears in your name. Print locations of occurrences of 'a'.
2.	To find sum of a digits of a given number.
3.	To insert element in an existing array.
4.	To display IP address of a system.
5.	To sort an existing array.
6.	To illustrate Method Overloading.
7.	To create object for TreeSet and use all methods.
8.	To check all math functions.
9.	To generate random numbers between 50 and 100.
10.	Program to create an applet to scroll a text message.
	PART-B:
11.	To arrange the given string in ascending and descending order.
12.	To illustrate Hybrid Inheritance.
13.	To illustrate Thread Synchronization.
14.	To create a object for Stack and all methods.
15.	To calculate Tax using Interface.
16.	To draw a human face using Applet.
17.	To Demonstrate Custom Exception.
18.	To find various colleges under every University using packages.

The National College,	Autonomous,	Basavanagudi, Bengaluru-04
0,	,	0,0

	CHE-P 5.6: CHEMISTRY LAB VI
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35
Sl. No.	Experiment
1.	Velocity constant for the acid hydrolysis of methyl acetate.
2.	Velocity constant for the saponification of ethyl acetate $(a = b \text{ method})$
3.	Effect of concetration and temprature on the rate of oxidation of KI by $K_2S_2O_8$.
4.	a. Determination of the equivalent conductivity of O.I.N Naclb. Determination of solubility of a sparingly soluble salt (<i>Agcl</i>) by conductivity method.
5.	 a. Determination of the dissociation constant of monochloro acetic acid by conductivity method b. Conductometric titration of <i>Hcl</i> with <i>NaOH</i>
6.	a. Determination of standard redox potential of an electrode. b. Redox titration of $K_2Cr_2O_7$ with ferrons ammonium sulphate by potentiometry.
7.	Preparation of a buffer solution and determination of its pH by potentiometer.
8.	Determination of the percentage of <i>Nacl</i> by miscibility temparature method.
9.	Determination of transition temparature of a salt hydrate by thermometric method.

ELE-P 5.6: ELECTRONICS LAB VI LAB IN VERILOG PROGRAMMING

Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35
Sl. No.	Experiment
1.	Introduction to HDL (verilog) and softwaretool
2.	Realization of all the Logicgates
3.	Realization of Adder and subtractor (Both Half andFull)
4.	Design of Decoders, encoders and comparators
5.	Design of Multiplexer, demultiplexer.
6.	Implementation of full adder using three modelingstyles
7.	Design of 32 bitALU
8.	Realization of Flip flops (SR, D, JK andT)
9.	Binary and BCD counters (synchronous and asynchronous)
10.	Shift register counters – ring counter and Johnsoncounter

	The National College, Autonomous, basavanaguul, bengalulu-04		
	CS- P 5.6: COMPUTER SCIENCE PRACTICALS VI		
Lah	Visual Programming Lab Hrs • 44 Internal Marks• 15 Evam Mark	ze• 35	
SI. No.	Exam Marks. 15 Exam Mark	AS. JJ	
	PART-A:		
1.	Accept a character from console and check the case of the character.		
2.	Write a program to accept any character from keyboard and display whether isvowel or not.	r it	
3.	Write a VB.Net program to accept a string and convert the case of the chara	cters.	
4.	Develop a menu based VB.Net application to implement a text editor with c copy,paste, save and close operations.	eut,	
5.	Develop a form in VB.NET to pick a date from Calendar control and display day, month, and year details in separate text boxes.	y the	
6.	Develop a database application using ADO.NET to insert, modify, update a operations.	nd delete	
7.	Develop a VB.Net application using Datagrid to display records.		
8.	Write a Program to demonstrate Crystal Report for Sales Order.		
9.	Write a program to validate login form.		
	PART-B:		
10.	Write a program to demonstrate Class object.		
11.	Write a program to demonstrate inheritance, polymorphism, and inheritance.		
12.	Write a program to demonstrate treeview control.		
13.	Write a Program to demonstrate abstract classes.		
14.	Write a program to demonstrate array.		

٦

MAT-P5.5-MATHEMATICS LAB V

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

- 1. Examples on different types of rings.
- 2. Examples on integral domains and fields.

3. Examples on subrings, ideals and subrings which are not ideals.

4. Homomorphism and isomorphism of rings- illustrative examples.

5. To demonstrate the physical interpretation of gradient, divergence and curl.

6. Writing gradient, divergence, curl and Laplacian in cylindrical coordinates.

7. Writing gradient, divergence, curl and Laplacian in spherical coordinates.

8. Using cyclic notations to derive different vector identities.

9. Using cyclic notations to derive some more vector identities.

10.Scilab/Maxima programs on Interpolations with equal intervals.

- 11.Scilab/Maxima programs on Interpolations with unequal intervals.
- 12.Scilab/Maxima programs to evaluate integrals using Simpson's rule. 1/3rd

13.Scilab/Maxima programs to evaluate integrals using Simpson's rule. 3/8th

MAT-P5.6-MATHEMATICS LAB VI

Lab Hrs. : 44 hrs

Internal Marks: 15

Exam Marks: 35

- 1. Example on Euler's equation in full form.
- 2. Example on particular forms of Euler's equation.
- 3. Examples on minimum surface of revolution and Brachistochrome problem.
- 4. Examples on Isoperimetric problems.
- 5. Evaluation of the line integral with constant limits.
- 6. Evaluation of the double integral with constant limits.
- 7. Evaluation of the triple integral with constant limits.
- 8. Evaluation of the line integral with variable limits.
- 9. Evaluation of the double integral with variable limits.
- 10. Evaluation of the triple integral with variable limits.
- 11. Verifying Green's theorem.
- 12. Verifying Gauss divergence theorem.
- 13. Verifying Stokes' theorem

	The National College, Autonomous, Basavanagudi, Bengaluru-04
	PHY-P5.5: Physics Lab- V
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35
SI. No. 1	Experiment CRO and its applications (Lissaious figures)
2.	Zener diode characteristics and zener diode as voltage regulator.
3.	FET characteristics
4.	RC coupled amplifier (transistor)
5	EET omplifier
5.	FET amplifier
6.	Phase shift oscillator
7.	AF and RF oscillator
8.	Study of regulated power supply
9.	Digital gates – Half and full adder circuits.
10.	Op amp (differentiator, integrator etc), Inverter, Summing amplifier (AC and DC output).
11.	P Spice – circuits schematic editor (any circuit can be built up and output can be got) using computer – for project.
12.	Emitter follower
13.	Inverting and non inverting amplifier.
14.	Computer interfaced experiments.

	The National College, Autonomous, Basavanagudi, Bengaluru-04
	PHY-P5.6: Physics Lab- VI
Lab	Hrs.: 44Internal Marks: 15Exam Marks: 35
SI. No.	Experiment
1. 2	Determination of Dianale's constant using a photo cell on LED
2.	Determination of Planck's constant using a photo cell of LED
3.	Determination of e/m by Thomson's method
4.	Ionization potential of xenon
5.	Study of solar spectrum – determination of Rydberg's constant
6.	Analysis of Band spectra
7.	Analysis of Rotational spectra
8.	Analysis of Rotation – vibration spectra
9.	Study of Hydrogen spectra
10.	Study of absorption spectrum of KMnO ₄
11.	Summerfeld fine structure constant ά
12.	Study of Raman spectra of CCl ₄ .

BSCE-1: COMMUNICATIVE SKILLS

Lecture Hours: 35	Internal Marks:15	Exam Marks:35		
Course objective :				
• To encourage learners to	acquire fluent communication in	English Language		
• To introduce learners to subsidiary speaking skills—debate/argument, interview				
• To equip learners to make good academic presentations using digital skills				
Unit-I : Listening Skills- Lis	stening Comprehension	05Hours		
Unit - II : Academic Listening	03 Hours			
Unit-III: Short Speeches— Tec	d Talks	04Hours		
Unit – IV: Speaking Skills—Introduction To Spoken English; 10Hours				
Debate and Group Discussion				
Unit-V : Presentation Skills—	Academic PPT Presentation	08 Hours		
Unit VI: Digital Skills—E Mail	etiquettes, Time	05 Hours		
Management skills, Creating PP	Ts, blog writing			

Scheme of evaluation						
Internal Assessment marks		Presentation skills in group (30 minutes duration)				
1.Test	05 marks	PPT	05 marks			
2.Attendance	05 marks	Structure of the	05 marks			
3.Presentation	05 marks	Non-verbal Communication	05 marks			
		Creativity	05 marks			
		Group Dynamics	05 marks			
		Time Management	05 marks			
		Ability to answer questions	05 marks			
Total	15 Marks	Total	35 Marks			

BSS-1, 2 SEMINAR/PROJECT WORK

Third year BSc UG students should give Seminar, individually or in group conduct a Project work for 50 Marks.

1.	Introduction	05 Marks
2.	Content /Design & Coding	20 Marks
3.	Presentation/Excecution	10 Marks
4.	Interaction with audience	10 Marks
5.	Hard Copy Submission	05 Marks
6.	Total	50 Marks

NCB – B.Sc(CBZ/PCM/PME/PMCs) Syllabus

Sixth Semester

Sixth Semester B.Sc							
Part Code	Course(Subject)	Hours		Marks	1	Credite	
	Coue	Course(Subject)	Hours	IA	Exam	Total	creuits
-	BOT-C6.7	Botany-VII	3	30	70	100	4
	BOT-C6.8	Botany-VIII	3	30	70	100	4
	ZOO-C6.7	Zoology-VII	3	30	70	100	4
	ZOO-C6.8	Zoology-VIII	3	30	70	100	4
	CHE-C6.7	Chemistry-VII	3	30	70	100	4
	ELE-C6.7	Electronics-VII					
	CS-C6.7	Computer Science-VII					
	CHE-C6.8	Chemistry-VIII		30	70	100	
	ELE-C6.8	Electronics-VIII	3				4
	CS-C6.8	Computer Science-VIII					
	MAT-C6.7	Mathematics-VII	3	30	70	100	4
	MAT-C6.8	Mathematics-VIII	3	30	70	100	4
	PHY-C6.7	Physics-VII	3	30	70	100	4
D. ()	PHY-C6.8	Physics-VIII	3	30	70	100	4
Part-2	BOT-P6.7	Botany Lab -VII	3	15	35	50	1
	BOT-P6.8	Botany Lab -VIII	3	15	35	50	1
Z00-P6.7 Z00-P6.8	ZOO-P6.7	Zoology Lab -VII	3	15	35	50	1
	ZOO-P6.8	Zoology Lab -VIII	3	15	35	50	1
	CHE-P6.7	Chemistry Lab -VII		15	35	50	1
	ELE-P6.7	Electronics Lab -VII	3				
	CS-P6.7	Computer Science Lab -VII					
	CHE-P6.8	Chemistry Lab -VIII		15	35	50	1
	ELE-P6.8	Electronics Lab -VIII	3				
	CS-P6.8	Computer Science Lab -VIII					
	MAT-P6.7	Mathematics Lab -VII	3	15	35	50	1
	MAT-P6.8	Mathematics Lab -VIII	3	15	35	50	1
	PHY-P6.7	Physics Lab –VII	3	15	35	50	1
	PHY-P6.8	Physics Lab –VIII	3	15	35	50	1
D . 0	BSEVS-1	Environment Science	2	15	35	50	1
Part-3	BSPRO-1	Project	-	-	-	50	1
Total Marks & Credits 300 700 1050 33					33		
Part-2 Program combination – Theory & Practical							
CBZ Chemistry , Botany , Zoology (VII & VIII)							
PCM	Physics , Ch	emistry , Mathematics (VI	I & VIII)				
PME	E Physics , Mathematics , Electronics (VII & VIII)						
PMCS	S Physics , Mathematics , Computer Science (VII & VIII)						

BOT-C6.7: Botany-VII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course:

- Botany is one of the vibrant & amp; dynamic life with enormous information.
- Motivates the students to understand the nature better than others.
- New challenges in learning biotechnology & amp; nanotechnology.
- To impart quality education in industrial biotechnology.

Course Outcome:

- Biotechnologist in agriculture, sericulture, floriculture & amp; pomiculture.
- Medicine, food & amp; alcohol industry.
- Research assistant in molecular biology & amp; biochemistry.
- Bio instrumentation & amp; Bio medical.
- To equip & amp; encourage young students for self- employment.
- Administrative work in Biotechnology farm houses & amp; business houses.

Unit-I: MOLECULAR BIOLOGY – II

Gene – Introduction & Discovery ,Genetic code – History, discovery & characteristic features.Gene action –I Transcription [Prokaryotic& Eukaryotic].

Gene action - II RNA processing - splicing of RNA

Gene action - III Translation [Prokaryotic & Eukaryotic] roles of t RNA & m RNA.

Gene regulation- General concepts, Gene regulatory sequences & Proteins.

Gene regulation in prokaryotes: The Operon Concept – Study of Lac Operon

Unit-II: Plant Physiology – Plant Water Relations

15 Hours

14 Hours

Fundamental Concepts – Diffusion, Osmosis [Endosmosis & Exosmosis], Plasmolysis. Imbibition, water potential & its components, concept of free energy [Gibbs free energy] and need for water in plants.

Physiology of absorption of water in plants- Availability of water for plants, regions of absorption, mechanism of active absorption of water in plants [concepts of aquaporins] radial movement of water in the root and pathways of movement of water.

Physiology of ascent of sap in plats – Definition, composition of xylem sap, mechanism – vital theories and physical theories with emphasis on cohesion-tension theory; merits & demerits of cohesion tension theory.

Physiology of loss of water in plants- Transpiration – Definition, types. Stomatal structure [Dicot & Monocot], stomatal movement theories on stomatal mechanism – Starch hydrolysis & K+ pump theory, factors governing the rate of transpiration in plants. A brief reference to anti-transpirants significance of transpiration. Guttation – Definition, structure of hydathodes & significance

Translocation of organic solutes – Nature of solutes, pathways, speed of translocation of organic solutes, composition of phloem sap, mechanism – Munch's mass flow hypothesis, merits & demerits of the theory & vein loading & unloading.

Unit – III: PLANT PHYSIOLOGY – II

Mineral Nutrition in Plants- Macro & Micro Nutrients, their role, beneficial elements, chelating agents, ion antagonism, soilless cultivation [Hydroponics & Aeroponics].

Absorption of mineral solutes – Mechanism of passive absorption – Diffusion, ion exchange & mass flow. Mechanism ofActive absorption – Carrier – ion theory, mode of

15 Hours

carrier action & types of carriers.

Physiology of growth & growth regulators in plants – Types, Phases & Regions of growth in plants& growth curve; Discovery, chemical nature, physiological effects & applications of the growth regulators – Auxin, Gibberellins, Cytokinins, Abscissic acid & Ethylene.

Physiology of flowering; role of phytochromes, photoperiodism &venalization.

Dormancy - Concept. Mechanism & break of dormancy.

Plant movements – A general account with emphasis on tropic – all types & nastic movements – seismonasty & nyctinasty.

REFERENCE BOOKS

- 1. Plant Physiology, S N Pandey & B K Sinha
- 2. Plant Physiology, S N Srivatsa
- 3. Molecular Biology, Verma & Agarwal

BOT-C6.8: Botany-VIII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course:

- Botany is one of the vibrant & amp; dynamic life with enormous information.
- Motivates the students to understand the nature better than others.
- New challenges in learning biotechnology & amp; nanotechnology.
- To impart quality education in industrial biotechnology.

Course Outcome:

- Biotechnologist in agriculture, sericulture, floriculture & amp; pomiculture.
- Medicine, food & amp; alcohol industry.
- Research assistant in molecular biology & amp; biochemistry.
- Bio instrumentation & amp; Bio medical.
- To equip & amp; encourage young students for self- employment.
- Administrative work in Biotechnology farm houses & amp; business houses.

Unit-I: BIOENERGETICS

18 Hours

Enzymes – Introduction, occurrence, properties, nomenclature [IUB]. Classification [IUB], chemical nature, mode of action [lock & key mechanism & induced fit theory], Enzyme kinetics & multi-enzyme complexes. An account of coenzyme [NADP & CoA].

Photosynthesis – Photosynthetic apparatus [Ultra structure of the chloroplast]; Mechanism of photosynthesis – light reaction [all types] & dark reaction [C3. C4 & CAM], factors governing rate of photosynthesis in plants both external & internal. Law of Limiting factors & significance.

Respiration – Respiratory organelle [ultra- structure of Mitochondria, all types of respiration; study of the stages of respiration – Glycolysis, Krebs Cycle, Terminal oxidation, Alcoholic fermentation and lactate fermentation; Chemiosmotic hypothesis in terminal oxidation; Pentose phosphate pathway; factors governing rate of respiration both internal and external, Concept of RQ & Significance.

Photorespiration – Mechanism, organelles involved & significance.

Nitrogen metabolism – Introduction, nitrogen fixation; physical & biological [symbiotic & a symbiotic]. Amino acid synthesis – Brief account of trans amination & reductive amination.

Unit-II: BIOTECHNOLOGY

14 Hours

Introduction to Biotechnology – Concept, History & Biotechnology in India.

Genetic Engineering – Introduction, tools used in GE [RENs, ligases, phosphatases, methylases], Vectors & their characteristics, a simple protocol for GE experiments – Insulin gene cloned in E.coli cells; GE in agriculture e.g. Bt cotton, Floriculture e.g. genetically modified Petunias & Blue Rose, Wildlife conservation [protection of wild carnivore from rabies virus]; Hazards of genetic engineering and Safeguards against misuse of genetic engineering.

Industrial Biotechnology – Manufacture of alcohol [as biofuel]. Amylase, SCP from Spirulina, Hepatitis -B vaccine in Yeasts & Nitrogen fixation in non-leguminous plants.

Unit – III: MODERN INVESTIGATIVE TECHNIQUES IN BIOLOGY 08 Hours

A brief insight on [concept, basic mechanism & application] the following modern investigative techniques – Phase Contrast Microscopy, Electron Microscopy [TEM & SEM]. X-ray crystallography, Electrophoresis & Spectrophotometry, Chromatography & DNA sequencing and finger printing.

Unit – IV: FRONTIERS OF MODERN BIOLOGY

4 Hours

Genomics, Proteomics, Bioinformatics & Principles of Nano-biology. Definition & Applications only.

REFERENCE BOOKS

- 1. Plant Physiology, S N Pandey & B K Sinha 3rd edition
- 2. Plant Physiology, S N Srivatsa
- 3. Molecular Biology ,Verma & Agarwal
- 4. Biotechnology & Genomics ,P K Gupta
- 5. Biotechnology, U Sathyanarayana 9th edition

ZOO-C 6.7: ZOOLOGY VII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course: Course introduces basic concepts of developmental process of vertebrates, Continuity of life in humans, infertility, Assisted Reproductive Techniques imparts knowledge of animal behavior and response to different instinct and their adaptations. organic evolution reveals changes in genetic composition of populations of organisms in response to environmental changes.

Course Outcome: Students gain the knowledge about gametogenesis, cleavage, gastrulation and organ of genesis of vertebrates. comparative understanding of developmental biology of vertebrates, cell lineage, role of organizers in development, foetal membrane, reproductive cycles, placentation, Assisted Reproductive Techniques and their success rates. Get objective information of animal behavior with focus on natural conditions and viewing behavior as an evolutionary adaptive trait. They get to know the hypothesis that all organisms on earth are connected by bonds of genealogy and the changes at different time periods in organic evolution.

Unit-I: DEVELOPMENT BIOLOGY

20 Hours

Introduction to development biology:

Theories of development- Epigenetic, Preformation, Von Baer's law, bio-genetic law. Types of cleavage based on distribution and amount of yolk. Mosaic and regulative eggs, determinate and indeterminate development. Patterns of development- oviparity, ovoviviparity and viviparity with examples.

Comparative developmental biology:

Fate map- definition, presumptive organ forming areas and fate maps of Amphioxus, frog and chick. Comparative account of blastula in Amphioxus, frog and chick. Comparative account of gastrulation in Amphioxus, frog and chick.

General development biology:

Cell lineage with reference to spiral cleavage in *Nereis*. Evolutionary significance of cleidoic eggs. Role of organizers in development- primary, secondary and tertiary organizers. Transplantation experiments to substantiate their role in Amphibians. Chemistry of Organizers, homeotic genes. Foetal membranes in chick- definition, types, their structure, function and development.

Development biology in Mammals:

Reproductive cycles- Oestrous and Menstrual cycle and their hormonal regulation. Placentation- yolk sac and allantoic placenta, morphological and histological types, functions of placenta.

Human Embryology:

Infertility in male and female. Endometrial Receptivity and infertility Treatment: ART, ICSI, AIH, AID, Surrogate mother, IVF-ET (Test tube baby), GIFT, ZIFT.

Unit-II: ETHOLOGY

12 Hours

Introduction to animal behavior- aims and objectives Stereotyped behavior- taxis, kinesis, reflexes, instincts with suitable examples Learning- imprinting, habituation, trial and error learning Animal communication- functions of signals, odors, sounds and light Social organization- origin and evolution of social organization in Primate Society (*eg* monkey)

Unit – III: ORGANIC EVOLUTION

Theories of organic evolution:

Lamarckism, Darwinism ,Hugo de Vries theory,Neo- Darwinism,Elementary forces of evolution- mutation, selection and genetic drift .,Population genetics and evolution-Hardy- Weinberg law, origin of new species, role of isolation.

Evidences for evolution:

Anatomical and morphological evidences.

Paleontological evidences:

Fossils- definition, their importance, formation, types of fossils. Dating of fossils-Uranium- Lead method, Potassium- Argon method, Radio- carbon method.

3**Zoo- geographical evidences**: Realms, continental drift, distribution of animals, isolation mechanism and speciation

Evolution of man: Australopithecus, Ramapithecus, Java man, Peking man, Neanderthal man, Cro- magnon man, Modern man.

Evolution of Horse: Hyracotherium, Mesohipus, Merichippus, Equus REFERENCE BOOKS

- 1. Balinsky B.I. 1976. An Introduction To Embryology, W.B Saunders Company, London, 4th Ed.
- Bradley M.Pattern.1964.Foundations Of Embryology, Mc Graw -Hill Publications, New York, 2nd Ed.
- 3. Inderbirsingh.1996.Human Embryology, Macmillan Publications, New Delhi, 6th Ed.
- 4. Smith Williams And Treadgold. 1988. Basic Human Embryology, Elbs Publications.
- 5. Gilbert Developmental Biology, Ninth Edition (Developmental Biology Developmental Biology Sinauer Associates
- 6. Verma P.S.And Agarwal V.K. 2005.Chordate Embryology, S.Chand And Company.
- 7. Arora, M.P 1992. Animal Behaviour, Himalaya Publishing House
- 8. Aubrey Manning. 1979. An Introduction To Animal Behaviour, The Elbs & Edward Arnold (Publishers) Ltd3rd Ed.
- Colbert E.H. *Et Al.* 2001. Evolution Of The Vertebrates, Wiley-Liss Inc., Canada, 5th Ed.
- 10. Dobzhansky T. Et Al. 1977. Evolution, W.H. Freeman And Co., San Fransisco.
- 11. Richard Swann Lull .1984. Organic Evolution, Seema Publication .New Delhi. Revised Ed.
- 12. Simpson G.G. 1949. The Meaning Of Evolution, Oxford And Ibh Publishing Co., New Delhi.

ZOO-C 6.8: ZOOLOGY - VIII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course: Course imparts knowledge on central dogma of animal physiology various metabolic and physiological mechanisms of the human body. Nutritional biology focuses on the study and evaluation of bio- active compounds in conventional foods and in supplements., and even recommended daily allowance RDA.

Course Outcome: Students gain the concepts of homeostasis- central dogma of physiology for physiological functioning of the animal body, osmoregulation, thermoregulation, muscle contraction, sensory physiology, neuroendocrine regulation and physiological disorders thus understanding the mechanisms that work to keep human body alive and functioning. Thus, gain skills to execute the roles of teacher in life science stream, lab technicians, gym instructors, dietitians etc. Understanding of Stress physiology and endocrine mechanisms allow them to divert their energy towards the positive nation building activities. Nutritional biology makes them understand shelf life parameters of food technology products, and basic food processing techniques, bio active compounds, vitamins, which play a role in improving the general health and preventing diseases

Unit-I: ANIMAL PHYSIOLOGY

30 Hours

Digestion:

Homeostasis- definition and significance, role of positive and negative feedback ,mechanisms in homeostasis with examples.Neural and hormonal regulation of digestive secretions.Common gastro- intestinal disorders in man- hyperacidity, ulcer, jaundice, liver cirrhosis.Role of micro-organisms in digestion of ruminants and termites.

Circulation:

Disorders- hypo and hyper tension, myocardial infarction, mitral stenosis, coronary thrombosis, cerebral hemorrhage, anemia and leukemia.

Respiration:

Respiratory quotient, oxygen dissociation curve and its significance.Transport of respiratory gases- types and role of respiratory pigments, exchange of gases between the cells and blood, Hamberger's phenomenon.Bronchial disorders- pneumonia, tuberculosis. Effects of smoking, bronchitis and silicosis

Excretion and osmoregulation:

Amminotelism, ureotelism and uricotelism. Formation of urea and uric acid, composition of normal urine.Ionic balance in *Artemiasalina*, teleosts (fresh water and marine), elasmobranchs and migratory Eels.Water balance in Turtle, Camel and Man.

Thermoregulation:

Hibernation and aestivation. Role of hypothalamus in temperature regulation.

Muscle contraction:

Ultra-structure and chemical composition of muscle fiber.Physio-chemical changes during muscle contraction, sliding filament theory.Myasthenia gravis, muscular fatigue, muscle hypertrophy and muscular dystrophy.

Physiology of nerve conduction:

Structure and types of Neurons, Conduction of nerve impulse. Synaptic transmission, Neurotransmitters, Multiple Sclerosis

Sensory physiology:

Vision, Hearing, Olfaction

Neuro- endocrine regulation:

Hypothalamus and its significance.

Role of adenohypophysis in the functions of thyroid, parathyroid and adrenal gland.

Unit-II: NUTRITIONAL BIOLOGY

14 Hours

Definition, Malnutrition (under and nutrition) Nutritional Status, Balanced Diet, RDA. **Nutrients:** Macronutrients – carbohydrates, proteins, water and fats.Classification, functions, sources, requirements, deficiency and excess.Micronutrients – Vitamins and minerals – sources, classification, and functions. Requirements and deficiencies: Fat soluble vitamins – A, D, E, K ,Water soluble vitamins – 'B' complex and C, Macro minerals – Calcium, Phosphorus, Sodium and Potassium ,Micro minerals – Iron, Zinc, Fluorine and Iodine ,Food Groups – Classification and chemical composition , Properties of food, application in food preparation.Basic food processing methods and cooking ,Effect of heat, acid, alkali on food and nutrients, Gelatinization and application in food industry, Caramelization, browning, hydrogenation, smoking point of oils and fats.

Shelf life parameter – fruits and vegetables, milk and milk products, fleshy foods

REFERENCE BOOKS

- 1. Agarwal Et.Al, 2007. Animal Physiology And Biochemistry.S Chand Publ.
- 2. Arora M P. 2000. Animal Physiology, Himalaya Publishing House.
- 3. Berry A K. 1995. Human Physiology With Related Biochemistry, Emkay Publications.
- 4. Emulsiesmith Et Al. 1988. A Text Book Of Physiology, Elbs Low Prices Edition.
- 5. Ganong W F. 1997. Review Of Medical Physiology, Appleton & Lange, 8th Edition.
- 6. Gerard J Tortora, Bryan H Derrickson Principles Of Anatomy And Physiology, Wiley 12th Edition.
- 7. Giese A.C 1984.Cell Physiology Saunders Publ..
- 8. Goel, K.A. And Sastri K.V, 1997. A Text Book Of Animal Physiology, Rastogi Publ., Meerut.
- 9. Guyton A.C.1986. Text Book Of Medical Physiology, W.B Saunder's Company, 7th Ed.
- 10. Hoar W. S, 1984. General And Comparative Physiology, Prentice Hall Of India, New Delhi,3rd Edition.

CHE-C 6.7: CHEMISTRY- VII (Inorganic Chemistry)

Lecture Hrs:44

Internal Marks:30

Exam Marks:70

Course Description: To provide the knowledge of synthesis and behaviour of inorganic compounds. Solve the problem and also think methodically, independently anddraw a logical conclusion. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions.

Objectives of the course are: Organic reagent in inorganic synthesis Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields aswell as in laboratory.

Unit-I: Coordination and Organometallic compounds

13 Hours

Coordination compounds, ligands and their classification (mono, bi, tri, tera and hexa dentate ligands) and ambidentate ligands, coordination number, nomenclature of coordination compounds in detail. Theories of structure and bonding (Explanation for the formation of complexes by Werner's Theory in detail and its limitations}. EAN rule, Valence bond theory-postulates, low spin and high spin complexes with examples, limitations of VBT. Crystal field theory (octahedral, tetrahedral and square planar complexes). Crystal field splitting and crystal field stabilization energies, limitations of CFT. Magnetic properties of $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3+}$, $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$. Spectral properties of $[Ti(H_2O)_6]^{3+}$, $[CoCl_4]^{2-}$. Isomerism-Structural: ionization, linkage, hydrate and coordination isomerism with examples.

Organometallic compounds – ligands, classification (hapticity); synthesis and structure of a) K[PtCl₃($\dot{\eta}^2$ -C₂H₄)], [Fe($\dot{\eta}^5$ - C₅H₅)₂],

b) Metal carbonyls – $Cr(CO)_6$, $Co_2(CO)_8$, $Mn_2(CO)_{10}$; eighteen electron rule and its deviations with examples.

Unit-II: Bioinorganic Chemistry

Essential and trace elements in biological systems with reference to Na⁺, K^{+,} Ca²⁺, Fe²⁺, P, Cu, V and Ni. Metallo-porphyrins with special reference to haemoglobin, myoglobin and chlorophyll. Role of cobalamin (vitamin- B_{12} coenzyme) in living systems.

Unit-III: Industrial Materials

Pigments-Manufacture and relative merits of white lead, lithopone and titanium white. **Fuels:** Characteristics, Calorific value and its determination using bomb calorimeter, Coal-Varieties, Gaseous fuels-advantages, constituents and their significance, production of Coal gas and composition of LPG. Octane number.

Propellants: Characteristics, classification and their applications, cryogenics.

Unit-IV: Chemistry of Newer materials

Introduction: electromagnetic radiation, regions of the spectrum, statement of the Born – Oppenheimer approximation, degrees of freedom.

Rotational spectroscopy: Diatomic molecules. Relationship between internuclear distance and moment of inertia. Expression for rotational energy. Numerical problems. Criterion for absorption of radiation-selection rule.

Unit-V: Introduction to Group theory

5Hours

5Hours

6 Hours

9Hours

Symmetry operations and symmetry elements. Identity, n-fold rotation, reflection, inversion, improper rotation. Symmetry classification (point groups) of molecules-Schoenflies system. Groups C_1 , C_i , C_s , C_n , C_n , D_n , D_n , D_n , D_n , T_d , Oh with examples of the following molecules exhibiting the corresponding symmetry elements. CHFCl, N, OCl, $C_2H_2F_2Cl_2$, mesotartaic acid, H_2O_2 , Triphenyl phosphine, H_2O , SO_2 , CH_2Cl_2 NH₃ PH₃ CH₃Cl, HCl, HCN, Trans $C_2H_2Cl_2$ B(OH)₃.

Unit-VI: Symmetrical properties and operations.

6Hours

Tetra phenyl methane , $[Co(en)_3]^{3+}$, $CH_2=CH_2$, BCl_3 , C_3H_6 , $PtCl_4^{2-}$, $Co(NH_3)_4$, Cl_2 , C_6H_6 , BeF_2 , O_2 , H_2 , CO_2 , C_2H_2 , Allene, Biphenyl, staggered C_6H_6 , C_6H_{12} , CH_4 , NH^{4+} , SO_4^{2-} , $[PtCl_6]^{2-}$, $[Fe(CN)_6]^{4-}$. Implication of molecular symmetry on properties- Polarity and Chilarity of molecules.

TEXT BOOKS:

- 1. College chemistry-VI: L.Indira and Chatwal
- 2. Comprehensible chemistry-VI: Vinod kumar B. and M.Aswathanarayanappa

REFERENCE BOOKS:

- 1. Organic spectroscopy by- Veera reddy-volume-VI-2015
- 2. Inorganic chemistry –Jagadamba singh -vol-VI-2014

ELE-C 6.7: ELECTRONICS SEMICONDUCTOR DEVICES AND NANO TECHNOLOGY Lecture Hrs.: 44 Internal Marks: 30 Exam Marks: 70

Objectives of the course:

To understand

- The basics of semiconductors
- Application of semiconductor in Nano
- Synthesis and characterization of nano materials
- Knowledge about MEMS

Course Outcome:

After studying this paper, the students will be able to analyze the field of research intheadvancedelectronics and willbemotivated towards there search in Nanoelectronics and MEMS technology.

Unit-I: Introductiontosemiconductor

Bonding forces and Energy Bands in solids, Charge carriers in semiconductors, carrier concentrations, drift of carrier in Electric and magnetic fieldsjunctions: equilibrium conditions, steady state conditions, reverse bias breakdown, transient and A-C conditions, metal semiconductor junctions, heterojunctions.FET: The junction FET, Metal-Semiconductor FET, Metal - Insulator - Semiconductor FET, MOS FET. **Unit-II: 10 Hours**

Introduction to nanomaterials: 3D, 2D, 1D, 0D Nanostructures, Nanostructure assembly: Introduction, different strategies for synthesis of 3D, 2D, 1D (nanorods and nanowires) and 0D (Semiconductor nano dots: quantum dots, Metals nano particle/dots: plasmonics) nanomaterials. Special Nanomaterials synthesis carbon nanotube, micro and mesoporous, zeolites, core shell structures, hybrid nanomaterials. Preparation methods: Bottom-up synthesis – Top-down synthesis: Synthesis of Nanomaterials: CVD, Nucleation and Growth, ALD, Epitaxy, MBE. Emerging nano materials: Nanotubes, nanorods and other nano structures, LB technique, Soft lithography etc. Microwave assisted synthesis, Self-assembly etc.

Unit – III:

Characterizationtechniques

nanomaterials:Introduction,Structuralcharacterization:X-

raydiffraction,scanningelectronmicroscopy(SEM), transmission electron microscopy including high resolution imaging (TEM), scanning probe microscopy (SPM) – principle of operation, instrumentation and probes, Atomic force microscopy (AFM), Opticalspectroscopy.

Unit – IV:

Introduction to MEMS: System on Chip, Scale of integration, next generation MEMS, Applications. Microsensors, Microactuators and microelectronics fabrication.Introduction to Microfabrication Techniques:Micromachining (Bulk and Surface), Wet and dry etching, Thin-film depositions (LPCVD, Sputtering, Evaporation), Other techniques (LIGA, Electroplating).Mechanical Sensors and actuators: Introduction, Principles of Sensing and Actuation, Beam and

10 Hours

10 Hours

14 Hours

of

Cantilever, Micropates, Capacitive effects, Strainmeasurement, pressuremeasurement, G ripping piezoactuator, Inchworm technology

Thermal Sensors and Actuators: Thermistors, Thermodevices, Thermocouple, Electrothermal actuator. Microspring thermal actuator. Data storage cantilever.Micro-opto-electromechanical Systems:Fundamental principle of MOEMS technology, light modulators, beam splitter, microlens, micromirrors, light waveguide optical switch. and tuning, shear stress detectors. measurement.MagneticSensorsandactuators:Magneticmaterialsfor

MEMSandproperties, magnetic sensing and detection, magnetoresistive sensor, magnetodiodes, magnetotransistors, MagMEMS actuators, bidirectional microactuator.

Radio Frequency (RF) MEMS: review of RF-Based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, MEMS switches, Phase shifter.

TEXT BOOKS

- 1. Solid state electronic devices Sixth edition by Ben G Streetman, Sanjay kumar Banerjee.
- 2. Nanostructures and Nanomaterials: Synthesis, Properties and Applications by Guozhong Cao, Imperial College Press, London, 2004.
- 3. "MEMS" by Nitaigour Premachand Mahalik, Tata McGraw Hill Education Private Limites, NewDelhi.

REFERENCE BOOKS

- 1. Silicon VLSI Technology, Plummer, Deal, Griffin ,Pearson EducationIndia.
- 2. Encyclopedia of Materials Characterization, Edited by: Brundle, C.Richard; Evans, Charles A. Jr.; Wilson, Shaun ; Elsevier.
- 3. Introduction to nano electronics Vladimir V.Mitin
- 4. "IntroductiontoMicroelectromechanicalMicrowaveSystems,SecondEdition",Hect orJ. De Los Santos, Artech House,2004.
- 5. "RF MEMS Circuit Design for Wireless Applications", Hector J. De Los Santos, Artech House, 2002.
- 6. Plasma techniques for film deposition, Konuma Mitsuharu, Alpha Science, Harrow, UK, c2005.
- 7. Introduction to surface and thin film processes /John A. Venables, Cambridge : Cambridge University Press, c2000.
CS-C 6.7: Computer Science-VII

Mobile Computing and Wireless Communications

Internal Marks: 30 Lecture Hrs.: 44 Exam Marks: 70 Course Description: This course will give you an understanding of mobile computer systems particularly in the context of wireless network systems such as 2G/3G/4G mobile telephony, data networks, and other wireless networks and infrastructure. The course emphasizes how to interface hardware to mobile computing devices, and programming those devices.

Course Objectives: To impart fundamental concepts in the area of mobile computing, to provide a computer systems perspective on the converging areas of wireless networking, embedded systems, and software.

Learning Outcome: On completion of this course you should be able to: Describe wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements. Be able to avoid or work around the weaknesses of mobile computing, or to reject mobile computing as a solution. Interface a mobile computing system to hardware and networks.

Unit-I

Mobile Computing Architecture: Types of Networks, Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. 8 Hours

Unit - II

Global Systems for Mobile Communication (GSM):

GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Unit - III 7 Hours

SMS (Short Message Service): Mobile computing over SMS, Short Message Service, Value Added Services through SMS.

Unit-IV

GPRS (General Packet Radio Service): GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS.

Unit-V

CDMA (Code Division Multiple Access), 3G, 4G:Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Fourth Generation Networks, Difference between 3G and 4G.

Unit-VI

Mobile client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, what is Android, Architecture of Android Application, and Features of Android.

TEXT BOOKS

1. Dr. Ashok Talukder, MsRoopaYavagal, Mr. Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2d Edition, Tata McGraw Hill, 2010.

REFERENCES BOOKS

1. Raj kamal: Mobile Computing, Oxford University Press, 2007.

2. ItiSahaMisra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

7 Hours

7 Hours

7 Hours

Page 181

CHE-C 6.8: CHEMISTRY VIII BIOCHEMISTRY

Lecture Hrs:44

Internal Marks:30

Course Description: To study the biological processes using chemical methods. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions.

Objectives of the course are: knowledge of chemical process in living organism. Identify chemical formulae and solve numerical problems. Know structure-activity relationship.

Learning Outcome: Aware and handle the sophisticated instruments/equipments. Students acquired knowledge through practical work in fields as well as in laboratory.

Unit-IIntroduction to Biochemistry

Development of biochemistry as a discipline, Elemental and biochemical composition of living organisms. Role of water in biochemical systems.

Unit-II: Carbohydrates

Structure and biological importance of derivatives of monosaccharides -amino sugars: sugar acids, Sugar phosphates, and their N-acetylated forms-N-acetylmuramic acid (NAMA) N-acetylneuraminic acid (NANA).Structure and biological importance of oligosaccharides - isomaltose, cellobiose, trehalose.

Unit-III: Lipids and Amino acids and Proteins

Structure, nomenclature and biological importance of fatty acids-saturated and Triglycerides- simple and mixed triglycerides. Phosphoglycerides, unsaturated, sphingolipids- ceramide.

Definition and significance of saponification number, iodine number and rancidity

Micelles- critical micellar concentration (CMC), formation of mono and bilayers of lipids, Amino acids and Proteins - α - Amino acids: Introduction, structure, classification on the basis of polarity of R – groups, ionic properties and reaction of amino acids. Essential and non-essential amino acids. Peptide bond and its planarity.

Proteins: biological importance, classification based on structure and composition.

Levels of organization of proteins – primary structure, secondary structure (α – helixtriple helix e.g. collagen and β – pleated), tertiary structure and forces stabilizing it, quaternary structure.

Denaturation and renaturation - Thermal denaturation - Aufinsen's experiment with ribonuclease.

Unit-IV:Nucleic acids and Enzymes

Types: Components of nucleic acids, bases, nucleosides and nucleotides.Polynucleotides Structure of DNA (Watson - Crick model) and RNA. Biological roles of DNA and RNA Enzymes- Characteristic features (mention of ribozymes), comparison between biological and non-biological catalyst.Classification (EC Code number not required), active site, specificity, cofactors, Fischer and Koshland models. Enzyme Kinetics – factors affecting rate of enzymatic reactions. Allosteric enzymes- definition, example and significance. Competitive and non-competitive inhibition.

Unit-V:Biological oxidation and metabolism

Bioenergetics: ATP and other high energy compounds. Energy coupling in biological reactions.Stepwise process of biological oxidation. Mitochondrial electron transport

9Hours

11Hours

9Hours

Exam Marks:70

3 Hours

chain, oxidative phosphorylation. Substrate level phosphorylation.

Metabolism- Catabolism and anabolism: (explanation with an example) Carbohydrate metabolism, glycolysis, fate of pyruvate. TCA cycle, energetics.

Gluconeogenesis-

Fatty acid metabolism $-\beta$ oxidation pathway, energetics.

Protein metabolism – general aspects of amino acids degradation – transamination, deamination and decarboxylation. Urea cycle.

Unit-VI:Molecular biology and Hormones

8Hours

Central dogma of molecular biology. Semi conservative replication and mechanism of DNA replication, transcription, translation.

DNA Fingerprinting- sequencing its applications in human genome maping.

Hormones- *Hormones*: Definition. Classification into a) amino acid derivatives b) peptide and polypeptide hormones c) Steroid hormones with examples and functions.

Role of insulin and glucagon in glucose metabolism.

TEXT BOOKS:

- 1. College chemistry-VI: L.Indira and Chatwal
- 2. Comprehensible chemistry-VI: Vinod kumar B. and M.Aswathanarayanappa

REFERENCE BOOKS:

1. **1.**Essential of biochemistry by- Vinay prabha sharma-volume-III-2015

2. 2. Inorganic chemistry –Jagadamba singh -vol-VI-2015

ELE- C 6.8: ELECTRONICS SIGNALS & SYSTEMS

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course:

To understand

- Signals and systems and their properties
- Application of Laplace and Fourier Transformation for the signals. •
- Z-transformations applied to signals.

Course Outcome:

After studying this paper the students will be able to analyze the functioning of a signal and the mechanism behind the processing of a digital signal. It helps the students to build career in designing the digital systems.

Unit-I:

12 Hours

10 Hours

Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems.

LTI systems: Convolution, impulse response representation, Convolution Sum and Convolution Integral.

Unit-II:

Time-domain representations for LTI systems: Properties of impulse response representation, Differential and difference equation Representations, Natural response, Forced response and complete response calculations using differential and difference equation representations of a system, Block diagram representation of a LTI system. 10 Hours

Unit – III:

classification Fourier representation for signals: Introduction, in Fourier analysis, Discrete time and continuous time Fourier series (derivation of series excluded) and their properties. Discrete and continuous Fourier transforms (derivations of transforms are excluded) and their properties.

Discrete Fourier Transforms (DFT): Frequency domain sampling and reconstruction of discrete time signals. DFT as a linear transformation, its relationship with other transforms.

Unit – IV:

12 Hours

Z-Transforms: Introduction, Z – transform, properties of ROC, properties of Z – transforms, inversion of Z – transforms.

Transform analysis of LTI Systems, unilateral Z- Transform and its application to solve difference equations.

TEXT BOOKS

- 1. SimonHaykin, "SignalsandSystems", JohnWileyIndiaPvt.Ltd., 2ndEdn, 2008.
- 2. Michael Roberts, "Fundamentals of Signals & Systems", 2 nded, Tata McGraw-Hill, 2010.

REFERENCE BOOKS

- 1. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems" Pearson Education Asia / PHI, 2 nd edition, 1997. Indian Reprint2002.
- 2. H.PHsu, R.Ranjan, "SignalsandSystems", Scham'soutlines, TMH, 2006.

- 3. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
- 4. GaneshRaoandSatishTunga, "SignalsandSystems", Pearson/SanguineTechnical Publishers, 2004.

Cs-C 6.8: Computer Science

Computer Networks

Internal Marks: 30

Exam Marks: 70

Course Description: This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols.

Objectives of the course: At the end of the course, the students will be able to: 1. Build an understanding of the fundamental concepts of computer networking. 2. Familiarize the student with the basic taxonomy and terminology of the computer networking area. 3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking. 4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Learning Outcome: After completing this course the student must demonstrate the knowledge and ability to: 1. Independently understand basic computer network technology. 2. Understand and explain Data Communications System and its components. 3. Identify the different types of network topologies and protocols. 4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. 5. Identify the different types of network devices and their functions within a network 6. Understand and building the skills of subnetting and routing mechanisms. 7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Unit-I

Lecture Hrs.: 44

8 Hours

Objectives of Networking and Physical layer: Structure, architecture, standardization OSI model. Transmission on Media - Twisted pair, base band and broad band coaxial cable, fiber-optic, analog transmission, digital transmission, PSTN, transmission and switching.

Unit - II

8 Hours

7Hours

7 Hours

MAC Sublayer: LAN protocols, IEEE standards for LANs, Token Bus, Token Ring, fiber-optic networks, satellite networks.

Unit - III

DataLink Layer: Design Issues, Error detection and correction, sliding window protocols, Data link Layer in Public networks.

Unit-IV

Network Layer: Design Issues, Routing Algorithms-Optimality Principles, Shortest Path, Flooding, flow Based Routing, Broadcast routing, Congestion control algorithms, Internet working.

Unit-V

Transport Layer and Session Layer: Design Issues, QOS, Primitives, Design Issues Remote procedure calls, session's layer in public networks.

Unit-VI

Presentation Layer and **Application Layer:** Design Issues, Cryptography (Secret Key Algorithm-DES), FTP and management, e-mail

7 Hours

TEXT BOOKS

1. Computer Networks by Andrew S. Tanenbaum, Version 4th edition, Prentice Hall 2013 **REFERENCES BOOKS**

1. Computer Networks by James Martin, Pearson, 2012

2.Computer Networks Computer Networking: A Top - Down Approach Paperback – 2012 by James F. Kurose (Author)

MAT-C 6.7: MATHEMATICS - VII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course: The objective of this course is to introduce a student the basics of linear algebra and some of its application. And they understand basic methods for solving Partial Differential Equations of first order and second order. In the process, students will be exposed to Charpit's Method, and solve wave equation, heat equation, Laplace Equation.

Course Outcome: The student will use the knowledge of linear algebra in computer science, finance mathematics, industrial mathematics, bio mathematics. and also learn how to use curvilinear coordinate systems in vector calculus. And he/she will be able to take more courses on wave equation, heat equation, non -linear evolution equations etc. All these courses are important in engineering and industrial applications for solving boundary value problem.

Unit-I: ALGEBRA –V

Linear Algebra: Vector space – Examples – Properties – Subspaces – criterion for a subset to be a subspace –linear span of a set - linear combination – linear independent and dependent subsets – Basis and dimensions– Standard properties – Examples illustrating concepts and results. Linear transformations – properties – matrix of a linear transformation – change of basis – range and kernel – rank and nullity – Rank – Nullity theorem – Non-singular and singular linear transformations - Standard properties – Examples

Unit – II: DIFFERENTIAL EQUATIONS III

a) Orthogonal Curvilinear Coordinates: Definition of orthogonal curvilinear coordinates. Fundamental vectors or base vectors, Scale factors or material factors - quadratic differential form. Spherical curvilinear system : Cartesian, Cylindrical – conversion of Cylindrical to orthogonal Spherical polar coordinates. Theorem: The Spherical coordinate system is orthogonal curvilinear coordinate system. (without proof) No problems on conversions of one system to another.

b) Partial Differential Equations : Total differential equations-Necessary condition for the equation Pdx+Qdy+Rdz=0 to be integrable-Simultaneous equations of the form dxdydz = PQR

Formation of partial differential equation. Equations of First Order Lagrange's linear equation – Charpit's method, Standard types of first order non-linear partial differential equation (By known substitution).

Solution of second order linear partial differential equations in two variables with constant coefficients by finding complementary function and particular integral

Solution of one – dimensional heat equations, Solution of one – dimensional wave equations using Fourier series.

TEXT BOOKS

- 1. Krishnamoorty V K and Mainra V P and Arora J L, *An Introduction to Linear Algebra*, Reprint. New Delhi, India: Affiliated East West Press Pvt. Ltd., 2003.
- 2. M. D. Raisinghania, Vector Calculus, S Chand Co. Pvt. Ltd., 2013.
- 3. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.

28 Hours

- 4. www.scilab.org
- 5. wxmaxima.sourceforge.net
- 6. www.geogebra.org

REFERENCE BOOKS

- 1. G Strang, MIT open courseware (http://ocw.mit.edu/courses).
- 2. B Spain, Vector Analysis, ELBS, 1994.
- 3. D E Bournes and, P C Kendall, Vector Analysis, ELBS, 1996.
- 4. Frank Ayres, Schaum's outline of theory and problems of Differential Equations, 1st ed. USA: McGraw-Hill, 1972.
- 5. GF Simmons, Differential equation with Applications and historical notes, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
- 6. S Narayanan & T K Manicavachogam Pillay, Differential Equations.: S V Publishers Private Ltd., 1981.
- 7. I N Sneddon, Elements of Partial Differential Equations, 3rd ed.: Mc. Graw Hill., 1980

Useful web links:

- 1. http://ocw.mit.edu/courses/mathematics/
- 2. http://mathworld.wolfram.com/Calculus.html
- 3. http://www.math.gatech.edu/~harrell/calc/
- 4. http://tutorial.math.lamar.edu/classes/de/de.aspx
- 5. http://www.sosmath.com/diffeq/diffeq.html
- 6. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

MAT-C 6.8: MATHEMATICS - VIII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Objectives of the course: This course aims to introduce the basic ideas of analysis for complex functions in complex variables with visualization through relevant practicals.

The concepts of analyticity, Cauchy Riemann relations and harmonic functions are then introduced. And to comprehend various computational techniques to find approximate value for possible root(s) of non-algebraic equations, to find the approximate solutions of system of linear equations and ordinary differential equations.

Course Outcome: The completion of the course will enable the students to: Understand the significance of differentiability of complex functions leading to the understanding of Cauchy-Riemann equations. Construct conformal mappings between many kinds of domain. Use conformal mapping to solve the Dirichlet problem in a region. And also understand numerical techniques to find the roots of non-linear equations and solution of system of linear equations.Understand numerical differentiation and integration and numerical solutions of ordinary and partial differential equations.

Unit-I: ANALYSIS - III

30 Hours

Complex Analysis

Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane-Euler's formula- $ei\theta = \cos\theta + i\sin\theta$. Functions of a complex variable-limit, continuity and differentiability of a complex function. Analytic function Cauchy-Riemann equations in Cartesian and Polar Forms-Sufficiency conditions for analyticity (Cartesian form only)-Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method.

Complex integration-the complex integration –properties-problems. Cauchy's Integral theorem-proof using Green's theorem- direct consequences. Cauchy's Integral formula with proof-Cauchy's generalized formula for the derivatives with proof and applications for evaluation of simple line integrals - Cauchy's inequality with proof – Liouville's theorem with proof. Fundamental theorem of algebra with proof.

Transformations – conformal transformation – some elementary transformations namely Translation, rotation, magnification and inversion - examples.

The bilinear transformation (B.T.)-cross ratio-invariant points of a B.T.-properties- (i) B.T. sets up a one to one correspondence between the extended z-plane and the extended w-plane.

(ii) Preservation of cross ratio under a B.T.

(iii) A B.T. transforms circles onto circles or straight lines.

Problems on finding a B.T., and finding images under a B.T. and invariant points of a B.T. Discussion of transformations w = z2, $w = \sin z$, $w = \cosh z$ and $w = e^z$.

Unit – II: NUMERICAL METHODS – II

14 Hours

Numerical solutions of algebraic and Transcendental equations – method of successive bisection - method of false position – Newton-Raphson method. Numerical solutions of non-Homogeneous system of linear algebraic equations in three variables by Jacobi's method and Gauss-Seidel method. Computation of largest Eigen value of a square matrix by power method.

Solutions of initial value problems for ordinary linear first order differential equations by

Taylor's series, Euler's and Euler's modified method and Runge-Kutta 4^{th} ordered method.

TEXT BOOKS

- 1. S Shanthinarayan, Complex Analysis, S Chand Co. Pvt. Ltd., 2012.
- 2. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
- 3. www.scilab.org
- 4. wxmaxima.sourceforge.net
- 5. www.geogebra.org

REFERENCE BOOKS

- 1. R V Churchil & J W Brown, Complex Variables and Applications, 5th ed.:
- 1. McGraw Hill Companies., 1989.
- 2. L V Ahlfors, Complex Analysis, 3rd ed.: Mc Graw Hill., 1979.
- 3. A R Vashista, Complex Analysis, Krishna Prakashana Mandir, 2012.
- 4. S S Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India, 2012.

Useful web links:

- 1. http://www.mathcs.org/analysis/reals/index.html
- 2. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
- 3. http://math.fullerton.edu/mathews/numerical.html
- 4. http://www.onesmartclick.com/engineering/numerical-methods.html

PHY-C 6.7: PHYSICS-VII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Course Description: This course provides an introduction to the basic concepts of Statistical physics & Solid-state physics Introduces students to the use statistical and solid-state physics concepts in real life.

Objectives of the course:

To understand the statistical analysis of different physical processes taking place in our world and theoretical and practical understanding of basics of solid-state physics.

Course Outcome:

Applying tools of Statistical physics and Solid-state physics to real life problem. Unit-I **15 Hours**

Statistical Physics: Introduction, Basic concepts, Phase space, microstate and macrostate, thermodynamic probability. Maxwell Boltzmann statistics - basic postulates, distribution function, Maxwell distribution of molecular velocities. Quantum statistics - Bosons and Fermions, Bose - Einstein statistics - postulates, distribution function, derivation of Planck's law of radiation. Fermi - Dirac statistics - postulates, distribution function, High temperature limit of BE and FD distribution.

Free electron theory of Metals: Introduction, Drude and Lorentz classical theory, Expression for electrical conductivity, Ohm's law. Wiedemann - Franz law. Review of Sommerfield theory. Density of states for free electrons, Fermi-Dirac distribution function and Fermi energy, Derivation of expression for Fermi energy and kinetic energy at absolute zero and above absolute zero (Qualitative)

Nano materials: Introduction and examples. Classification (0D,1D,2D) size effect, surface to volume ratio, distinction between nano and bulk materials, distinct properties of nano materials, applications.

Unit-II:

Semiconductor Physics: Distinction between metals, insulators and semiconductors, intrinsic semiconductors, concept of holes, concept of effective mass, Derivation of expression for intrinsic carrier concentration and electrical conductivity. Extrinsic semiconductors, impurity states, energy band diagram and the Fermi level, Hall Effect in metals and semiconductors, solar cells, photoconductivity, Light dependent resistors, Light emitting diodes.

Superconductivity: Introduction - experimental facts, zero resistivity, critical field, critical current density, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), high temperature super conductors: 1+2+3 superconductors, applications. Problems.

Unit – III:

X- rays and Crystallography: Production by Coolidge X-ray tube, Continuous and characteristic X-rays, Mosley's law, scattering of X-rays, Compton effect, Basic ideas of crystal structure, Bravais lattice, symmetry elements, lattice planes, Miller indices, spacing between lattice planes of cubic crystals, Bragg's law of X-ray diffraction, powder method, Elementary ideas of crystal binding, Liquid crystals, classification, properties and applications-LCD

REFERENCE BOOKS

15 Hours

- 1. Understanding Physics Sharmista Sahu-Subhas Stores
- 2. College Physics-N.Sundararajan, George Thomas, Syed Azeez-United Publishers
- 3. Introduction to Solid state Physics Kittel, Fifth Edition-Wily eastern University edition
- 4. Solid state Physics Gupta and Kumar
- 5. Solid state Physics Puri and Babbar, S. Chand and Co.
- 6. Solid state Physics R.L.Singhal, Revised 6th edition-Kedarnah Ramnath and co.
- 7. Thermodynamics and statistical physics, Singhal, Agarwal, Prakash
- 8. College Physics-A. B Gupta
- 9. Solid state Physics-S. O Pillai, New Age International
- 10. Solid State physics-A.J.Dekkar, Macmillan India Ltd, 1986
- 11. B.Sc Physics 6th Semester-Statistical & Solid State Physics-B.Basavaraj, P.Sadashiva & S.Siddappa; Omkar Publications
- 12. Statistical Physics By E.S.R.Gopal

PHY-C 6.8: PHYSICS VIII

Lecture Hrs.: 44

Internal Marks: 30

Exam Marks: 70

Course Description: This course provides an introduction to the basic concepts of Astrophysics, Atmospheric physics & Nuclear physics.

Objectives of the course:

To understand the different physical processes taking place in celestial world and our atmosphere. In nuclear physics students will learn physics of nucleus.

Course Outcome:

The students should be able to solve basic real-life problems in Astro, Atmospheric and nuclear world.

Unit-I

15 Hours

Astrophysics: Absolute or intrinsic luminosity, apparent brightness, apparent magnitude scale of Hipparchus. Distinction between visual and bolometric magnitudes, distance-modulus relationship.

Stellar parallax and units of stellar distances, Definition of arcsec and parsec (pc). Relation between distance of a star and its parallax, Definitions of astronomical unit (AU), light year (ly) and equations relating AU, ly and pc

Surface or effective temperature and color of a star: Definitions, Wien's displacement law, Review of distribution function. Intrinsic temperature of star, expression for average temperature, core temperature and core pressure of a star based on the linear density model of a star. Gravitational potential energy or self-energy of a star, derivation based on the linear density model.

Spectral classification of star and their chemical composition: Edward Charles Pickering classification (OBAFGKM), Size (radius) of a star, Expression for radius using Stefan – Boltzmann law, Spectral signature of element present in the stellar atmosphere, Mass-luminosity relationship & expression for life time of a star

Hertzsprung-Russel (HR) diagram: Main sequence star and their general characteristics, Mention of Chandrashekar's limit. Evolution of a star to white dwarf stage through red giant stage, Supernova explosion, Formation of a pulsar or neutron star and black hole (*qualitative*) with mention of typically required temperature and the corresponding densities. Event horizon, singularity and Schwarzschild's radius (qualitative)

Unit-II:

15 Hours

Atmospheric physics: Constituent gases and volume mass ratio (VMR). Vertical structure of the Atmosphere, Thermodynamics of dry air, moist air, hydrostatic balance, static stability, Heat balance of the atmosphere, Green House Effect. Absolute and relative humidity, variation of pressure with altitude.

Atmospheric dynamics: basic equations, equations of motion, continuity equation, equation of state, 1st law of thermodynamics, atmospheric waves, sound waves, gravity waves, Rossby waves, formation of cyclones.

Radioactivity: Review of Laws of radioactivity, Half-life, mean life. Units of activity. Law of successive disintegration, transient and secular equilibrium, composition of earth. Artificial transmutation - age of the earth, Carbon dating, Archaeological time scale. Problems.

Unit – III:

Nuclear Physics: Nuclear charge: Rutherford's theory of alpha particle scattering, derivation of Rutherford's scattering formula (assuming the path of the alpha particle to be a hyperbola), Problems

Alpha decay: Range and disintegration energy of alpha particles, Geiger-Nuttal law. Brief description of characteristics of alpha ray spectrum, Gamow's theory of alpha decay (*all qualitative*)

Beta Decay: Types of beta decay, Characteristics of beta spectrum, Pauli's neutrino hypothesis (*all qualitative*)

Detectors of nuclear radiation: Variation of ionization current with applied voltage in a gas. Ionization chamber and identification of the regions of operation of ionization detector, working of Proportional and Geiger-Muller counters.

Nuclear accelerators: Cyclotron, Betatron, Problems.

Nuclear reaction: Conservation laws in nuclear reactions with examples, Expression for Q value of a nuclear reaction, endoergic and exoergic reactions, threshold energy, Problems

REFERENCE BOOKS

- 1. Understanding Physics –Sarmista Sahu-Subhas Stores
- 2. College Physics-N.Sundararajan, George Thomas, Syed Azeez-United Publishers
- 3. Introduction to Special theory of relativity Robert Redneck-Wiley Easter Ltd.
- 4. An introduction to Astrophysics K.D. Abhayankar
- 5. Nuclear Physics Irving Kaplan-Addison Wesley Pub.
- 6. Atomic physics J.B.Rajam-S. Chand and Co.
- 7. Modern Physics- R.Murugesan- S. Chand and Co.
- 8. Modern Physics-Brijlal and Subramanyam S.Chand and company
- 9. Modern Physics-Duggal and Chhabra- Shabanlal Nagin Chand and co.
- 10. Nuclear Physics-An Introduction-S.B.Patel; New Age International Ltd
- 11. Nuclear Physics-Rajkumar; Campus Books International, New Delhi
- 12. Nuclear Physics-Theory and Experiment-R.R.Roy & B.P Nigam; New Age International Ltd
- 13. B.Sc Physics 6th Semester-Astrophysics & Nuclear physics-B.Basavaraj, P.Sadashiva; Omkar Publications
- 14. Atomic & Nuclear Physics Vol.II-S.N.Ghoshal; S.Chand & Co, New Delhi
- 15. Basics of Atmospheric Science-A.Chandrashekar
- 16. Introduction to Nuclear Physics- By Meheroff
- 17. Introduction to Nuclear Physics- By Cohen

BOT-P6.7: BOTANY LAB – VII

Exam Marks: 35

Sl. No.

Lab Hrs.: 44

Experiment

Internal Marks: 15

- 1. Experiments on Diffusion & Osmosis:
 - a) Experiment to demonstrate the influence of changing temperature on the process of diffusion [using peeled beet root pieces or tea bags & hot water at different temperatures].
 - b) Potato osmoscope by physiological process to show both endosmosis & exosmosis.
- 2. Experiment to determine the osmotic potential of Rhoeo or Onion leaf epidermal cells by plasmolytic method.
- 3. Experiments on transpiration- Ganong's potometer & Farmer's potometer [to be performed by each student; Garreau's potometer &Vosque's potometer [demonstration only].
- 4. Experiment to determine the stomatal index of a typical dicot leafe.g.Vinca& a monocot leaf e.g. Commelina.
- 5. a) Extraction of DNA from a given plant material.
 - b) Observation of the effect of growth regulators on plant growth & development.
 - Effect of Auxin on root initiation. E.g. adventitious roots of Ficuselastica.
 - Effect of Gibberellins on bolting & flowering e.g. Raphanussativaus
 - Richmond & Lang effect of Cytokinins& senescence e.g. leaf discs.
 - Induction of dormancy in buds of Potato tubers by ABA.
 - Effect of Ethylene on ripening of fruits e.g. Banana & Mango.
- 6. Experiment to demonstrate the path & rate of ascent of sap in plants.
- 7. Plant movements Phototropism, Geotropism, Hydrotropism, Thigmotropism & Seismonasty.

The National College, Autonomous, Basavanagudi, Bengaluru-04		
	BOT-P6.8: BOTANY LAB – VIII	
Lab]	Hrs.: 44Internal Marks: 15Exam Marks: 35	
Sl. No.	Experiment	
1.	Experiment to study evolution of oxygen by photosynthesis under different wavelengths of light by bubble counting method.	
2.	Experiment to study evolution of oxygen under different environmental condition like varying intensitites of sunlight, absence of CO2, excess of CO2 etc., by bubble counting method.	
3.	Separation of photosynthetic pigments in leaf extract by ascending paper chromatography.	
4.	Experiments on Photosynthesis – Presence of Starch in leaf [variegated] & Nohl's half – leaf experiment.	
5.	Demonstration of estimation of pigment concentration by colorimetric method.	
6.	 Experiment on Respiration – a) Demonstration of evolution of CO2 using KOH solution. b) Demonstration of evolution of CO2 using lime water. C] Demonstration of heat liberation during respiration. 	
7.	 Experiment on Respiration – a) Demonstration of fermentation. b) Measurement of RQ using Ganong's respirometer. 	
8.	Enzyme activity in plants tissues.a) Oxidase activity in Potato tubers.	

ZOO-P 6.7: ZOOLOGY PRACTICALS – VII DEVELOPMENT BIOLOGY, ETHOLOGY & ORGANIC EVOLUTION

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

Experiment

1. MODULE I- DEVELOPMENT BIOLOGY-Experiments

Chick embryology:

18 hrs stage of incubation.

24 hrs stage of incubation.

36 hrs stage of incubation.

48 hrs stage of incubation.

72 hrs stage of incubation.

Mounting of chick embryo

Mammalian embryology:

Mammals- T.S. of Mammalian uterus and fallopian tube for histological details.

Placenta- morphological types (cotyledonary and deciduate).

Placenta- histological types (Epithelio- chorial, Haemo- chorial, Haemo- endothelial placenta.

2. MODULE II- ETHOLOGY- Experiments

Study of Behaviour of *Paramecium* towards dye, light and hot water. Behaviour of Earthworm-Photokinesis / T-maze Experiment in rats / rabbits

3. MODULE III- ORGANIC EVOLUTION- Experiments

Study of homologous organs: Fore limbs of frog and bird. Mouth parts of cockroach and mosquito.

Study of analogous organs:

Vertebrate eye and Cephalopod eye.

Wing of bird and insect.

Study of Vestigial organs:

Appendix, Coccyx and Molar tooth.

Study of fossils:

Archeopteryx Fossils of Man

ZOO-P6.8: ZOOLOGY PRACTICALS – VIII ANIMAL PHYSIOLOGY & NUTRITIONAL BIOLOGY

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

1. MODULE I- ANIMAL PHYSIOLOGY-Experiments

Organic constituents of protoplasm- tests for glucose, sucrose, starch and proteins Tests for nitrogenous wastes- ammonia, urea and uric acid Effect of temperature on the heart beat of *Unio* Estimation of oxygen consumption by Crab Estimation of salt loss and gain by Crab in different media Quantitative estimation of Amylase activity Estimation of total glycogen in muscle (Anthrocin method)

Experiment

Detection of abnormal excretion of sugar, albumin and ketone in human urine

2. **MODULE II- MICROTECHNIQUE- Experiments Preparation of micro-slides:** Block Making, Paraffin sectioning and staining. Paraffin sectioned slides-staining (counter staining)

3. MODULE III- NUTRITIONAL BIOLOGY - Experiments

Determination of Moisture content in Food Estimation of Vitamin A,C and D from various sources Isolation of bacteria in dairy products

	The National College, Autonomous, Basavanagudi, Bengaluru-04			
CHE-P6.7 CHEMISTRY PRACTICALS – VII				
Lab Hrs.	: 44 Internal Marks: 15 Exam Marks: 35			
Sl. No.	Experiment			
1.	Determination of percentage of iron in harmatite using diphenyl amine or dephenyl benzidine as an internal indicator.			
2.	Determination of calcium in limestone.			
3.	Determination of zinc using EDTA.			
4.	Determination of magnesium using EDTA.			
5.	Determination of aluminium using EDTA (back titration)			
6.	Preparation of ferrous oxalate and estimation of ferrous iron			
7.	Determination of sulphate ar BaSO ₄ .			
8.	Determination of nickel as nickel dimethyl glyosimate			

ELE-P6.7: ELECTRONICS LAB-VII ADVANCED COMMUNICATIONS

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

Experiment

- 1. Characteristics of Opticalfibre
- 2. Transmission and reception through optical fiber.
- 3. To setting up fiber optic analoglink.
- 4. Study of losses in optical fiber.
- 5. Study of numerical aperture of optical fiber.
- 6. Study of characteristics of fiber optic LED's and photodetector.
- 7. Samplingtheorem
- 8. QPSK.
- 9. Microwave Experiments (anyfour).

CHE-P6.8: CHEMISTRY PRACTICALS – VIII

T 1 TT					
Lab Hrs.	::44 Internal Marks: 15	Exam Marks: 35			
Sl. No.	Experiment				
1.	a) Chemical tests for carbohydrates.b) Chemical tests for amino acids and proteins				
2.	Estimation of reducing sugars by Hegedorn – Jensen	nethod.			
3.	Estimation of creatinine in urine by Jaffe's method.				
4.	Estimation of inorganic phosphate in food samples by	Fiske – subbarow method.			
5.	Estimation of total reducing sugars in honey by DI method.	NS (Dinitro salicylic acid)			
6.	a) Determination of iodine value of groundnut oil andb) Determination of saponification value of groundnut	d coconut oil It oil and coconut oil.			
7.	Detection of adulterants in food stuffs.				
8.	Estimation of protein by biuret method.				

The National College, Autonomous, Basavanagudi, Bengaluru-04 **ELE-P6.8 : ELECTRONICS LAB-VIII** MATLAB PROGRAMMING Lab Hrs.: 44 **Internal Marks: 15** Exam Marks: 35 Sl. No. Experiment 1. GenerationofUnitImpulseandunitstepsignal. 2. Shifting and folding asequence. 3. Adding and multiplying two sequences of differentranges. 4. Odd and even part of asignal. 5. Verification of samplingtheorem. 6. Impulse response of a givensystem Linear convolution of two givensequences. 7. 8. Autocorrelation and Cross correlation of a given sequence. 9. Solving a given difference equation. 10. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum. Linear convolution of two sequences using DFT and IDFT. 11.

The National College, Autonomous, Basavanagudi, Bengaluru-04				
	MAT-P6.7: MATHEMATICS PRACTICALS – VII			
Lab Hrs.	.: 44 Internal Marks: 15 Exam Marks: 35			
Sl. No.	LIST OF PROBLEMS			
1.	i. Vector space, subspace – illustrative examples.			
	ii. Expressing a vector as a linear combination of given set of vectors.			
	iii. Examples on linear dependence and independence of vectors.			
2.	i. Basis and Dimension – illustrative examples.			
	ii. Verifying whether a given transformation is linear.			
3.	i. Finding matrix of a linear transformation.			
	ii. Problems on rank and nullity.			
4.	Plotting of cylinder and cone using orthogonal curvilinear coordinates.			
5.	Plotting of sphere using orthogonal curvilinear coordinates.			
6.	Solutions to the problems on total and simultaneous differential equations.			
7.	Solutions to the problems on different types of Partial differential equations.			
8.	Solving second order linear partial differential equations in two variables with			
	constant coefficient.			
9.	Solving some more second order linear partial differential equations in two variables with constant coefficient			
10.	10. Solution of one-dimensional heat equation using Fourier series with Dirichlet			
	condition.			
11. Solution of one-dimensional heat equation using Fourier series with Neumann condition				
12.	Solution of one-dimensional wave equation using Fourier series with Dirichlet			
	condition.			
13.	Solution of one-dimensional wave equation using Fourier series with Neumann			
	condition.			

The National College, Autonomous, Basavanagudi, Bengaluru-04			
MAT-P6.8: MATHEMATICS PRACTICALS – VIII			
Lab Hrs.	.: 44 Internal Marks: 15 Exam Marks: 35		
Sl. No.	LIST OF PROBLEMS		
1.	Some problems on Cauchy-Riemann equations (polar form).		
2.	Implementation of Milne-Thomson method of constructing analytic functions(simple examples).		
3.	Illustrating orthogonality of the surfaces obtained from the real and imaginary parts of an analytic function.		
4.	Verifying real and imaginary parts of an analytic function being harmonic (in		
5.	polar coordinates).		
6.	Illustrating the angle preserving property in a transformation.		
7.	Illustrating that circles are transformed to circles by a bilinear transformation.		
8.	Examples connected with Cauchy's integral theorem.		
9.	Solving algebraic equation (Bisection method).		
10.	Solving algebraic equation (Regula-Falsiand Newton-Raphson methods).		
11.	Solving system of equations (Jacobi and Gauss-Seidel methods).		
12.	Solving for largest eigenvalue by Power method.		
13.	Solving ordinary differential equation by modified Euler's method.		

PHY-P6.7: Physics Lab -VII

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

Experiment

- 1. Analysis of X ray photograph.
- 2. Energy gap of a semiconductor
- 3. Determination of dielectric constant
- 4. Solar cell characteristics open circuit voltage short circuit current form factor
- 5. LED Characteristics graph of wavelength vs current Spectral response.
- 6. LDR Characteristics dark resistance saturation resistance material constant
- 7. Semiconductor temperature sensor (Pure silicon) output voltage vs temperature (calibration)
- 8. Spectral response of a Selenium photo cell (λ vs I)
- 9. Transistor as a switch and an active device
- 10. Determination of Fermi energy of copper
- 11. Resistivity of a material by four probe technique
- 12. Determination of thermal conductivity of a material
- 13. Experiments with optical fibers, smart materials and liquid crystals

PHY-P6.8: Physics Lab -VIII

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Sl. No.

Experiment

- 1. Calculation of physical properties of star and plotting of H-R diagram
- 2. Determination of the distance of a distant object by the parallax method.
- 3. Low pass filter- using Op-amp IC-741
- 4. High pass filter- using Op-amp IC-741
- 5. Band pass filter- using Op-amp IC-741
- 6. Verification of inverse square law applicable to intensity of gamma rays emitted by a Radioactive substance using a GM counter.
- 7. Determination of mass absorption of coefficient aluminum for gamma rays.
- 8. Characteristics of a GM counter
- 9. Half life of K_{40}
- 10. Analysis of stellar spectra
- 11. Analysis of sunspot photographs
- 12. Computer simulated study of stars
- 13. Conductivity of air.
- 14. Determination of relative humidity.

BSEVS-1: ENVIRONMENTAL SCIENCE

Lab Hrs.: 44

Internal Marks: 15

Exam Marks: 35

Course Objective: This course able to Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving. Appreciate key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

Unit-I: Multi-Disciplinary Nature Of Environmental Studies 2Hours

Definition, Scope and Importance Need for public awareness

Unit - II :Natural resources and associated problems

Forest resources: use and importance, deforestation with one case study. Timber extraction, mining, dams and their effect on forests

Water resources: Use and over utilization of surface and ground water, floods, droughts, conflict over dams, -advantages and disadvantages.

Mineral resources; Use and exploitation, Environmental effectson extraction of minerals with case study.

Energy resources: Renewable and non renewable energy sources, use of alternate energy sources and case study.

Unit-III : Bio diversity and its conservation

Introduction, definition, value of bio diversity – consumptive use, productive use, social, ethical, aesthetic and option values, hot spots of biodiversity.

Threats to biodiversity: Endangered and endemic species of India, Red Data bookConservation of biodiversity: In-situ and Ex-situ Conservation of biodiversity.

Unit-IV: Environmental pollution

Definition, causes, effects and control measures with one case study of 1) Air pollution 2) Water pollution 3) Soil pollution 4) Noise pollution and 5) Radioactive pollution

Unit-V: Social issues and Environment

From unsustainable to sustainable development ,Urban problems related to energy, Water conservation ,Rain water harvest ,Watershed management ,Solid waste management ,Global warming , Acid rain ,Depletion of Ozone layer , Nuclear accidents ,Environment protection Act: Air, Water, Wildlife and forest conservation Act

Reference Books

- ➤ A text book on Environmental studies Dr D.K.Asthana, Dr Meera Asthana.
- ➤ A text book on Environmental studies B.S.Raman.
- A text book on Environmental studies Dr N.Nandini.
- A text book on Environmental studies Dr J.P.Sharma
- MCQs on Environmental studies Dr D.K.Asthana, Dr Meera Asthana.
- Parisara Adhyayana Dr T.Devaraj.
- Parisara Adhyayana Byrappa.
- Rameshwari Pandya & Anuradha Mathur, Imbibing Value Education: Various Perspectives, Kalpaz Publications, New Delhi, 2003.
- > Dhankar, N, Value Education, A.P.H. Publishing Corporation, New Delhi, 2010.

6 Hours

8 Hours

6 Hours