Shree H. V. P. Mandal's

Degree College of Physical Education, Amravati.

(An Autonomous College)

FACULTY OF SCIENCE & TECHNOLOGY

(SCIENCE GROUP)

CURRICULUM SCHEME AND SYLLABUS

OF

BACHELOR OF SCIENCE

(Computer Science, Electronics, Statistics)

(Credit Based Semester Pattern)

Program Code: BSC2015

Introduced from the Session 2015-2016

Programme Structure for BSc

1. **Programme Name in Complete**: Bachelor of Science (Computer Science)

2. **Programme Name in Short**: B.Sc. (Comp. Sci.)

3. **Nature of the Programme (Certificate / Diploma/ UG Degree / PG Diploma / PG Degree):** UG Degree

4. **Objective:** The Programme Educational Objectives of B.Sc. programme are:
   1. To impart the students, latest comprehensive and skill based knowledge with equal emphasis on theory and practice in the field of computers, electronics and statistics.
   2. To provide students with sound academic base from which an advanced career in Computer Application can be developed.
   3. To prepare students with conceptual grounding in computer usage as well as its practical business in order to craft the students as a versatile computer professional who can provide service in almost all fields of computer application in industry, government, academia, research, entrepreneurial pursuit and consulting firms.
   4. To teach the basic principles of Statistics to the students so that they are able to apply statistical methods to solve problems in a particular field of study.
   5. To provide basics as well as few advanced electronic course knowledge along with practical implementation to inculcate skills among students to develop circuit models for elementary electronic components.
   6. To prepare students to undertake higher studies in computer science, statistics and electronics.
   7. To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise.
   8. To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
   9.

5. **Duration of the Programme :** Three Years; Full Time

6. **Examination Pattern (Annual/Semester):** Semester

7. **If Semester pattern then Number of Semesters:** Six Semester
8. **Marking Scheme (Percentage/Credit):** Credit

9. **Eligibility:** Student who passed 12th standard Examination with science group OR with vocational stream and one language OR students who passed 12th standard examination (M.C.V.C. Stream) with technical trades.

10. **Total working days:** Per annual session: 200 days
    Per Semester: 100 days

11. **Teaching and Examination Scheme:** As prescribed in the curriculum design by the Subject Board and approved by Academic Board time to time.

12. Admission rules/conditions for every year/semester.

Sr. No.	Programme and Level	Type of Admission	Eligibility	Remark
1	B.Sc. First Year Sem. I	Direct Admission	Student who passed 12th standard Examination with science group OR with vocational stream and one language OR students who passed 12th standard examination (M.C.V.C. Stream) with technical trades.	
2	B.Sc. First Year Sem. II	Natural Growth	----	
3	B.Sc. Second Year Sem. III	Natural Growth	Passed Minimum 50% of total passing heads of FYBSc Semester I and Semester II	
4	B.Sc. Second Year Sem. IV	Natural Growth	----	
5	B.Sc. Third Year Sem. V	Natural Growth	Clearly Passed in FYBSc and Passed Minimum 50% of total passing heads of SYBSc Semester III and Semester IV	
6	B.Sc. Third Year Sem. VI	Natural Growth	----	

13. Programme Outcomes: The following Programme Outcomes are attained after completion of this UG programme:

PO1	Students will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise for working as an individual or in multidisciplinary teams with positive attitude.
PO2	Create awareness and attitude of concern about environmental problems.
PO3	Students can communicate efficiently to deliver their knowledge effectively.
PO4	Able to pursue advanced education in relevant subjects.

14. Programme Specific Outcomes (PSO): BSc (Computer Science) programme has been designed to prepare graduates for attaining the following program outcomes:

PSO1	Students acquire latest comprehensive and skilled based knowledge with equal emphasis on theory & practical in the field of IT, electronics and statistics.
PSO2	Able to apply the knowledge for solving real life problems using the expertise in the field of IT, electronics and statistics.

Curriculum Scheme of F.Y.B.Sc. (Comp. Sci.) Semester I

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME									
								THEORY				PRACTICAL					GRAND TOTAL
				Th.	Pr.	Total/ Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs.)	MAX. MARKS				
									Theory Exam	College Asses.	Total		Pract.	Viva	College Asses.	Total	
1	15BSC101	ENG-I	ENGLISH-I	3	--	3	2	3	40	10	50	--	--		--	--	
2	15BSC102	MAR-I / HIN-I/ SE-I	MARATHI-I / HINDI -I/ SUPPLIMENTARY ENGLISH-I	3	--	3	2	3	40	10	50	--	--		--	--	
4	15BSC103	FC	COMPUTER SCIENCE-I : FUNDAMENTALS OF COMPUTER	4	--	4	3	3	40	10	50	--	--		--	--	
5	15BSC104	CP	COMPUTER SCIENCE-II : C PROGRAMMING	4	--	4	3	3	40	10	50	--	--		--	--	
7	15BSC105	LCS-I	LABORATORY OF COMPUTER SCIENCE-I	--	6	6	3	--				3	20	10	20	50	
8	15BSC106	BS	STATISTICS-I: BASIC STATISTICS	4	--	4	3	3	40	10	50	--	--		--	--	
9	15BSC107	PTA	STATISTICS-II: PROBABILITY AND THEORY OF ATTRIBUTES	4	--	4	3	3	40	10	50	--	--		--	--	
10	15BSC108	LS-I	LABORATORY OF STATISTICS-I	--	6	6	3	--				3	20	10	20	50	
11	15BSC109	EDCT	ELECTRONICS-I: ELECTRONIC DEVICES AND CIRCUIT THEORY	4	--	4	3	3	40	10	50	--	--		--	--	
12	15BSC110	FDT	ELECTRONICS-II : FUNDAMENTAL OF DIGITAL TECHNIQUE	4	--	4	3	3	40	10	50	--	--		--	--	
13	15BSC111	LE-I	LABORATORY OF ELECTRONICS-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
			TOTAL	**30**	**18**	**48**	**31**				**400**					**150**	**550**

Curriculum Scheme of F.Y.B.Sc. (Comp. Sci.) Semester II

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME									GRAND TOTAL
								THEORY				PRACTICAL					
				Th.	Pr.	Total/ Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS				
									Theory Exam	College Asses.	Total		Pract.	Viva	College Asses.	Total	
1	15BSC112	ENG-II	ENGLISH-II	3	--	3	2	3	40	10	50	--	--		--	--	
2	15BSC113	MAR-II / HIN-II / SE-II	MARATHI-II/ HINDI-II / SUPPLIMENTARY ENGLISH-II	3	--	3	2	3	40	10	50	--	--		--	--	
4	15BSC114	WT	COMPUTER SCIENCE-III: WEB TECHNOLOGY	4	--	4	3	3	40	10	50	--	--		--	--	
5	15BSC115	CN	COMPUTER SCIENCE-IV : COMPUTER NETWORKING	4	--	4	3	3	40	10	50	--	--		--	--	
7	15BSC116	LCS-II	LABORATORY OF COMPUTER SCIENCE-II	--	6	6	3	--				3	20	10	20	50	
8	15BSC117	SDS	STATISTICS-III: STUDY OF SOME DISCRIPTIVE STATISTICS	4	--	4	3	3	40	10	50	--	--		--	--	
9	15BSC118	PD	STATISTICS-IV: PROBABILITY DISTRIBUTION	4	--	4	3	3	40	10	50	--	--		--	--	
10	15BSC119	LS-II	LABORATORY OF STATISTICS-II	--	6	6	3	--				3	20	10	20	50	
11	15BSC120	SDMI	ELECTRONICS-III: SWITCHING DEVICES AND MEASURING INSTRUMENTATION	4	--	4	3	3	40	10	50	--	--		--	--	
12	15BSC121	ADT	ELECTRONICS-IV: ADVANCED DIGITAL TECHNIQUE	4	--	4	3	3	40	10	50	--	--		--	--	
13	15BSC122	LE-II	LABORATORY OF ELECTRONICS-II	--	6	6	3	--	--	--	--	3	20	10	20	50	
			TOTAL	**30**	**18**	**48**	**30**				**400**					**150**	**550**

Curriculum Scheme of Second Year B.Sc. (Comp. Sci.) Semester III

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME									
								THEORY				PRACTICAL					Grand Total
								Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS				
				Th.	Pr.	Total/ Week			Theory Exam	College Asses.	Total		Pract.	Viva	College Asses.	Total	
1	15BSC201	DS	COMPUTER SCIENCE:DATA STRUCTURES	4	--	4	3	3	40	10	50	--	--		--	--	
2	15BSC202	VB.NET	COMPUTER SCIENCE II: VISUAL BASIC.NET	4	--	4	3	3	40	10	50	--	--		--	--	
3	15BSC203	LCS-I	LABORATORY OF COMPUTER SCIENCE-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
4	15BSC204	TE	STATISTICS I: THEORY OF ESTIMATION	4	--	4	3	3	40	10	50	--	--		--	--	
5	15BSC205	VS	STATISTICS II: VITAL STATISTICS	4	--	4	3	3	40	10	50	--	--		--	--	
6	15BSC206	LS-I	LABORATORY OF STATISTICS-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
7	15BSC207	SOPS	ELECTRONICS I: STUDY OF OPAMP AND POWER SUPPLY	4	--	4	3	3	40	10	50	--	--		--	--	
8	15BSC208	ET	ELECTRONICS II: ELECTRONIC INSTRUMENTATION	4	--	4	3	3	40	10	50	--	--		--	--	
9	15BSC209	LE-I	LABORATORY OF ELECTRONICS-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
10	15BSC210	EVS	ENVIRONMENTAL STUDY	3	--	3	2	3	--	50	50	--	--		--	--	
			TOTAL	**27**	**18**	**45**	**29**				**350**					**150**	**500**

Curriculum Scheme of Second Year B.Sc. (Comp. Sci.) Semester IV

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME								GRAND TOTAL
								THEORY				PRACTICAL				
				Th.	Pr.	Total/ Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS			
									Theory Exam	College Asses.	Total		Pract.	College Asses.	Total	
1	15BSC211	DBMS	COMPUTER SCIENCE I: DATABASE MANAGEMENT SYSTEMS	4	--	4	3	3	40	10	50	--	--	--	--	
2	15BSC212	OOP	COMPUTER SCIENCE II: OBJECT ORIENTED PROGRAMMING	4	--	4	3	3	40	10	50	--	--	--	--	
3	15BSC213	LCS-II	LABORATORY OF COMPUTER SCIENCE-II	--	6	6	3	--	--	--	--	3	30	20	50	
4	15BSC214	SI	STATISTICS I: STATISTICAL INFERENCE	4	--	4	3	3	40	10	50	--	--	--	--	
5	15BSC215	ES	STATISTICS II: ECONOMIC STATISTICS	4	--	4	3	3	40	10	50	--	--	--	--	
6	15BSC216	LS-II	LABORATORY OF STATISTICS-II	--	6	6	3	--	--	--	--	3	30	20	50	
7	15BSC217	SAO	ELECTRONICS I: STUDY OF AMPLIFIERS AND OSCILLATORS	4	--	4	3	3	40	10	50	--	--	--	--	
8	15BSC218	AC	ELECTRONICS II: ANALOG COMMUNICATION	4	--	4	3	3	40	10	50	--	--	--	--	
9	15BSC219	LE-II	LABORATORY OF ELECTRONICS-II	--	6	6	3	--	--	--	--	3	30	20	50	
10	15BSC220	DMng	DISASTER MANAGEMENT	3		3	2	--	--	50	50	3	--	--	--	
			TOTAL	**27**	**18**	**45**	**29**				**350**				**150**	**500**

Curriculum Scheme of Third Year B.Sc. (Comp. Sci.) Semester V

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME									GRAND TOTAL
								THEORY				PRACTICAL					
				Th.	Pr.	Total/ Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS				
									Theory Exam	College Asses.	Total		Pract.	Viva	College Asses.	Total	
1	15BSC301	SAD	COMPUTER SCIENCE I: SYSTEM ANALYSIS DESIGN	4	--	4	3	3	40	10	50	--	--		--	--	
2	15BSC302	OS	COMPUTER SCIENCE II: OPERATING SYSTEM	4	--	4	3	3	40	10	50	--	--		--	--	
3	15BSC303	LCS-I	LABORATORY OF COMPUTER SCIENCE-I	--	6	6	3		--	--	--	3	20	10	20	50	
4	15BSC304	SQC	STATISTICS I: STATISTICAL QUALITY CONTROL	4	--	4	3	3	40	10	50	--	--		--	--	
5	15BSC305	SSA	STATISTICS II: SAMPLE SURVEY ANALYSIS	4		4	3	3	40	10	50	--	--		--	--	
6	15BSC306	LS-I	LABORATORY OF STATISTICS-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
7	15BSC307	8085µP	ELECTRONICS I: THE 8085 MICROPROCESSOR	4	--	4	3	3	40	10	50	--	--		--	--	
8	15BSC308	DC	ELECTRONICS II: DIGITAL COMMUNICATION	4	--	4	3	3	40	10	50	--	--		--	--	
9	15BSC309	LE-I	LABORATORY OF ELECTRONICS-I	--	6	6	3	--	--	--	--	3	20	10	20	50	
10	15BSC310	SEM	SEMINAR	--	6	6	3	--	--	--	--	3	30		20	50	
			TOTAL	**24**	**24**	**48**	**30**				**300**					**200**	**500**

Curriculum Scheme of Third Year B.Sc. (Comp. Sci.) Semester VI

SR. NO.	SUBJECT CODE	SUBJECT SHORT NAME	NAME OF SUBJECT	TEACHING SCHEME (Lectures/week)			CREDIT	EXAMINATION SCHEME									GRAND TOTAL
								THEORY				PRACTICAL					
				Th.	Pr.	Total/ Week		Duration of Paper (Hrs)	MAX. MARKS			Duration of Exam (Hrs)	MAX. MARKS				
									Theory Exam	College Asses.	Total		Pract.	Viva	College Asses.	Total	
1	15BSC311	JAVA	COMPUTER SCIENCE I: PROGRAMMING IN JAVA	4	--	4	3	3	40	10	50	--	--		--	--	
2	15BSC312	ELECTIVE: MC NS ST	COMPUTER SCIENCE II: ELECTIVE: MOBILE COMPUTING NETWORK SECURITY SOFTWARE ENGINEERING & TESTING	4	--	4	3	3	40	10	50	--	--		--	--	
3	15BSC313	LCS-II	LABORATORY OF COMPUTER SCIENCE-II	--	6	6	3		--	--	--	3	20	10	20	50	
4	15BSC314	OR	STATISTICS I: OPERATION RESEARCH	4	--	4	3	3	40	10	50	--	--		--	--	
5	15BSC315	DE	STATISTICS II: DESIGN OF EXPERIMENT	4		4	3	3	40	10	50	--	--		--	--	
6	15BSC316	LS-II	LABORATORY OF STATISTICS-II	--	6	6	3	--	--	--	--	3	20	10	20	50	
7	15BSC317	8086µp	ELECTRONICS I: THE 8086 MICROPROCESSOR	4	--	4	3	3	40	10	50	--	--		--	--	
8	15BSC318	µc8051	ELECTRONICS II: MICROCONTROLLER 8051	4	--	4	3	3	40	10	50	--	--		--	--	
9	15BSC319	LE-II	LABORATORY OF ELECTRONICS-II	--	6	6	3	--	--	--	--	3	20		10	50	
10	15BSC320	PROJ	PROJECT	--	6	6	3	--	--	--	--	3	20	10	20	50	
			TOTAL	**24**	**24**	**48**	**30**				**300**					**200**	**500**

Syllabus of First Year B. Sc. (Comp. Sci.) Semester I

Subject Code	**15BSC101**
Subject Name	**Compulsory English-I**
Short Name	**ENG-I**
Total Lectures	**40**
Total Credits	**2**

Prerequisites:

- Students should have the basic knowledge of English language.
- They should know the competencies of English.

Objectives:

- To make the student competent in English language.
- To polish the reading and writing skills.
- To aim at enhancing the communication skill to face the requirements in future employability.
- The Communicative English course aims at training the would-be graduates in various levels of communication in English speech skills, oral skills and other related skills.

Sr. No.	Contents	Total Lectures
1	**Prose Passages:** 1. The Power of Prayer : Abdul Kalam 2. Rising Tide of Urban Chaos : Colin Legum 3. The Gold Frame : R.K.Laxman 4. Vivekananda : The Great Journey to the West : Romain Rolland 5. Good Manners : J.C.Hill	10
2	**Poems:** 1. The Village Schoolmaster - Oliver Goldsmith 2. Lucy - William Wordsworth 3. When I Set Out for Lyonnesse - Thomas Hardy 4. All in June -W. H. Davies.	10
3	**Grammar:** Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.	10
4	**Communication Skills:** Everyday English Preparing a CV and Writing Letters/ Story Writing.	10
	Text Books: 1. REALMS OF GOLD Publisher: Orient Blackswan Pvt. Ltd. Mumbai.	
	References: --	

Course Outomes :

1. Able to inculcate human values in the minds of students.
2. Ability to communicate with others in different situations.
3. Will be proficient in writing letters, application letters and CV's.
4. Gain an ability to strengthen English Grammar.

Pattern of
Question Paper for English subject
and
Distribution of Marks

Maximum Marks : 40 **Time: Three Hours**

Q.1: Prose Passages No. 1 to 5
There shall be five short answer questions .....05 marks

Q. 2: Prose Passages No. 1 to 5
There shall be five long answer questions. Out of these, students will have to answer any two questions of five marks each .....10 marks

Q. 3: Poems no. 1 to 4
There shall be four long-answer questions. Out of these students will have to answer any two questions of five marks each....10 marks

Q. 4: Grammar: Parts of Speech, Articles and Prepositions, Tenses, Transformation of Sentences.
There shall be five questions based on the prescribed grammar and usage.....05 marks
[Note: The paper setter shall have his/her discretion as regards selection]

Q. 5: There shall be two questions based on Everyday English – Dialogue Writing / Conversation/ Elaboration of Idea.
Part I.
Out of these students will have to answer any one.....05 marks

Q. 6: There shall be one question on preparing a CV for seeking a job.....05 marks
OR: Story Building.

Subject Code	**15BSC102**
Subject Name	**Marathi-I**
Short Name	**MAR-I**
Total Lectures	**40**
Total Credits	**2**

पूर्वापेक्षित

भाषा हे माहितीसंपादनाचे महत्वाचे साधन या दृश्टिने विद्यार्थानी मराठी या विषयाकडे बघावे. मातृभाषेच्या अभ्यासातून व्यक्तिच्या अस्तित्वाला अर्थ येतो तिच्या अधिष्ठानाशिवाय व्यक्तिचा अभ्यास व विकास अपूर्ण म्हणून महाविद्यालयीन स्तरावर मराठीवर प्रभुत्व असणे अपेक्षित आहे. आत्मचरित्र, काव्य, ललित या वाङ्मयीन प्रकारांचा परिचय असावा. तसेच पत्रलेखन व मुलभूत व्याकरणाचाही परिचय असावा. चांगली कल्पनाशक्ती असावी म्हणजे निबंध, पत्रलेखन, कथालेखन, या प्रकारात चांगल्या त–हेने उपयोग होतो.

उद्दिष्टये /हेतू

विज्ञानशाखेच्या बदलत्या अभ्यासक्रमानुसार बीएस्सी प्रथम वर्षाच्या मराठी विषयाच्या अभ्यासक्रमात वैचारिक साहित्याबरोबरच ललित, कविता, वैज्ञानिक कथा, व्यावहारिक मराठी याचा समावेश आहे. मराठीतील सामाजिक, वैज्ञानिक, पर्यावरणाविषयक संपन्न विचारधारेची विद्यार्थ्यांना ओळख व्हावी हा हेतू. विद्यार्थ्यांमधे मराठी साहित्याची गोडी निर्माणा व्हावी यासोबतच संत साहित्याचा त्याच्या सामाजिक दृष्टिकोनाचा परिचय करून देणे हा एक उद्देश भाषेवर प्रभुत्व मिळवायचे तर श्रवण, वाचन, लेखन कौशल्य आत्मसात केले पाहिजे मराठीच्या अभ्यासातून विद्यार्थ्यांना व्याक्तिमत्व विकास करता येईल मराठी विषयाचा अभ्यास आकलनासाठी व आनंददायी असावा.

घटक क्र.	घटक	एकुण लेक्चर
अ	**गद्य** (गुण 20) 1) पुरूष सूक्त : लक्ष्मण लोंढे 2) विज्ञानकथेतील सत्य आणि कथित : चंद्रकांत पाटील 3) येशूची लोकशिक्षणाची शैली : फ्रान्सिस द्रिब्रीटो 4) लोकभ्रम : विष्णूशास्त्री चिपळूणकर 5) महात्मा जोतीराव फुले : भा. ल. भोळे 6) गाडगेबाबांचे अखेरचे कीर्तन : गाडगेबाबा	15
ब	**पद्य** (गुण 10) 1) पसायदान : ज्ञानेश्वर 2) डोईचा पदर : जनाबाई 3) टिळा टोपी उंच दावी : तुकाराम 4) जैसा वृक्ष नेणे : नामदेव	15
क	**व्यावहारिक मराठी** (गुण 10) 1) कार्यालयीन पत्रव्यवहार 2) लेखन विषयक नियम 3) कथालेखन	10
	अभ्यासक्रमासाठी पाठयपुस्तक : 1) शलाका (प्रकाशक – ओरिएन्ट ब्लॅकस्वान प्रायव्हेट लिमीटेड) 2) सुलभ मराठी व्याकरण प्रकाशक मो. रा. वाळिंबे	

विषय परिणामः

1) वैचारिक पाठाच्या अभ्यासाने विद्यार्थ्यां मध्ये त्या लेखकांची पुस्तके वाचण्याची इच्छा जागृत होणे
2) विनंती अर्ज, तक्रार पत्र लिहीण्याचा आत्मविश्वास
3) मराठी संत साहित्या मध्ये रूची वाढते

मराठी प्रश्नप्रत्रिकेचा नमुना

वेळः 3 तास गुणः 40

पाठयपुस्तकातील घटकांवर प्रश्न व गुणविभागणी पुढीलप्रमाणे

प्रश्न 1	घटक अ दीर्घोत्तरी प्रश्न	(कोणताही एक)	गुण 10
प्रश्न 2	घटक अ लघुत्तरी प्रश्न	(कोणतेही दोन)	गुण 10
प्रश्न 3	घटक ब लघुत्तरी प्रश्न	(कोणतेही दोन)	गुण 10
प्रश्न 4	घटक क 1) कार्यालयीन पत्रव्यवहार		गुण 04
	2) लेखन विषयक नियम		गुण 03
	3) कथालेखन		गुण 03

Subject Code	**15BSC102**
Subject Name	**HINDI-I**
Short Name	**HIN-I**
Total Lectures	**40**
Total Credits	**2**

पूर्वापेक्षित:

महाविद्यालयीन स्तर पर हिन्दी विषय में प्रभुत्व अपेक्षित है। आत्मचरित्र, काव्य, ललित व वाङमय प्रकारों का परिचय होना चाहिये। पत्रलेखन व मूलभूत व्याकरण का भी परिचय होना आवश्यक है। तद हेतु अच्छी कल्पनाशक्ति अपेक्षित है। इसी प्रकार एक दुसरे से हिन्दी में संवाद करने का कौशल्य होना चाहिए।

उद्देश्य:

भारत एक बहुभाषी देश है। भारत में अनेक भाषा–भाषी लोग रहते है। इसे एक सूत्र में बॉधने के लिए हिन्दी सम्पर्क भाषा का काम करती है। हिन्दी दैनिक काम–काज में अपनाई जाने वाली भाषा राष्ट्रभाषा के रुप मे कार्यरत है। भारत में सभी भाषाओं की अगर गणना की जाती है तो हिन्दी ही सर्वाधिक बोली और समझी जाने वाली भाषा है। पश्चिमोत्तर भारत में तो हिन्दी का अधिकाधिक प्रयोग होता है। बंगाल, महाराष्ट्र, बम्बई, गुजरात आदि। भारत की कुल जनसंख्या 7. से 80 टक्के लोग हिन्दी भाषा समझते है, बोलते है, लिखते है। 14 सितम्बर 1949 को भारतीय संविधान सभा ने हिन्दी को भारत संघ की राजभाषा के रुप मे स्वीकार किया। संविधान के अनुच्छेद 343 के अनुसार संघ राज्य की राजभाषा हिन्दी और लिपि देवनागरी है।

बीएस्सी प्रथम वर्ष में हिन्दी विषय का समावेश किया गया है. हिन्दी के सामाजिक, वैज्ञानिक, इत्यादी विचारधारा की विद्यार्थियोंको पेहचान करवाना यह हेतू है। विद्यार्थियोंको हिन्दी साहित्य का महत्त्व समझ में आना चाहिये यह एक उद्देश। भाशापे प्रभुत्व मिलाना हो तो श्रवण, पठन, लेखन कौशल्य आत्मसात करना चाहिये।

अ. क्र.	ईकाई (पाठय पुस्तक की 3 ईकाई में विभाजित किया गया है।)	एकुण लेक्चर
1	**प्रथम ईकाई – गद्य विभाग** 1) करुणा (निबंध), आचार्य रामचन्द्र शुक्ल 2) बिच्छी बुआ (रेखाचित्र) कहानी, डॉ. लक्ष्मण सिंह विष्ट 'बटरोही' 3) विलायत पहुॅच ही गया (आत्मकदांश), महात्मा गांधी 4) अफसर (व्यंग्य), शरद जोशी 5) तीर्थयात्रा (कहानी), डॉ. मिथिलेश कुमारी मिश्र 6) बनी रहेगी किताबे (आलेख), डॉ. सुनिता रानी घोष 7) सडक पर दौडते ईहा मृग (निबंध), डॉ. श्याम सुन्दर दुबे	15
2	**द्वितीय ईकाई – पद्य विभाग** 1) भारत वन्दना (काव्य) सूर्यकांत त्रिपाठी 'निराला' 2) जाग तुझको दूर जाना (काव्य), सुश्री महादेवी वर्मा 3) बाल लिला (काव्य) सूरदासतीता 4) मनुष्यता (काव्य) , मैथिलीशरण गुप्त	15
3	**तृतीय ईकाई – व्यावहारिक भाषा, व्याकरण, प्रयोजन–मुलक हिन्दी, निबन्ध, पत्र लेखन** 1) भाषा की महत्ता और उसके विविध रुप 2) भाषा – कौशल 3) हिन्दी की शब्द सम्पदा 4) पारिभाषिक शब्दावली 5) वाक्य–संरचना और विराम चिन्ह 6) शब्द – संरचना– तत्सम, तत्भव, देशज, विदेशा 7) देवनागरी लिपि एवं वर्तनी का मानकरुप 8) श्रृतिसम या समश्रृत शब्द 9) अनुवाद–परिभाषा, प्रकार, महत्व, विशेषताऍ 10) साक्षात्कार – प्रयोजन और कौशल	10
	नियोजित पाठय पुस्तक : 1. ''हिन्दी भाषा संरचना'' मध्यप्रदेश हिन्दी ग्रंथ अकादमी भोपाल। 2. अस्मिता – जयभारती प्रकाशन – इलाहाबाद 3. हिन्दी भाषा और विज्ञान बोध (म.प्र.हिन्दी ग्रन्थ) अकादमी, रविन्द्रनाथ ठाकूर मार्ग – बानगंगा भोपाल – 462003 दुरभाष – 0755–2553084	
	सहायक पुस्तक सुची : 1. देवनागरी लिपी तथा हिन्दी वर्तनी का मानक रुप प्रकाशन केन्द्रीय हिन्दी निदेशालय माध्यमिक और उच्चतर शिक्षा विभाग मानव संसाधन विकास मंत्रालय पश्चिम खंड – 7 रामकृष्ण पुरम, नई दिल्ली – 110066	

2. प्रयोजन मुलक हिन्दी डॉ. राकेश कुमार पाराशर प्रकाशन– राष्ट्रभाषा प्रचार समिती हिन्दी नगर, वर्धा
3. हिन्दी रचना प्रबोध – डॉ.बच्चुलाल अवस्थी प्रकाशन– साहित्य भवन प्रा.लि.के.पी. कक्कड रोड, इलाहाबाद–2
4. मेगा हिन्दी शब्द कोष – संकलन एंव सम्पादन कर्ता पंडीत रविदत्त शास्त्री अरिहंत पब्लिकेशन इंडिया प्रा.लि.कालिन्दी, ट्रान्सपोर्ट नगर, मेरठ.250002 (उ.प्र.)
5. प्रयोजन मूलक हिन्दी और अनुवाद – प्रो. शंकर बुंदेले
6. अनुवाद भाषाएँ– समस्याएँ– एन.ई.विश्वनाथ, अमरज्ञान गंगा, चावडी बाजार, दिल्ली
7. कार्यालयीन अनुवाद की समस्या – डॉ.भोलानाथ तिवारी, कृष्ण कुमार रस्तोगी, अजीत लाल गुलाटी
8. हिन्दी में व्यवहारिक अनुवाद – डॉ.आलोक कुमार रस्तोगी सुमित पब्लिकेशन, दिल्ली–2
9. राष्ट्रीयकृत बॅको में हिन्दी – डॉ.शंकर बुंदेले, अमन प्रकाशन, कानपुर
10. अनुचिंतन – डॉ.शंकर बुंदेले
11. अनुसृजन – डॉ.शंकर बुंदेले

हिन्दी प्रश्न पत्रिका का स्वरुप

प्रथम सत्र

40 अंक

1) प्रथम ईकाई – दीर्घोत्तरी एक 10
   लघूत्तरी एक 03
2) द्वितीय ईकाई –दिर्घोत्तरी एक 10
   लघूत्तरी एक 03
3) तृतीय ईकाई –
   1) भाषा की महत्ता और उसके विविध रुप (2 अंक)
   2) वाक्य सरंचना और विराम चिन्ह (2 अंक)
   3) शब्द संरचना–तत्सम, तद्भव, देशज, विदेशा (2 अंक)
   4) श्रृतिसम भिन्नार्थ शब्द (2 अंक) देवनागरी लिपि एंव वर्तनी का मानक रुप
   5) साक्षात्कार– प्रयोजन और कौशल (2 अंक)
   6) अनुवाद– प्रकार, महत्व, परिभाषा विशेषता (2 अंक)

अंतर्गत गुण 10 अंक

1) लेखन – असायमेन्ट, शुध्द वाक्य रचना, विराम चिन्ह, मात्राएँ
2) वाचन – शुध्द उच्चारण, कहानी, रेखाचित्र, कविता पढना।बातमी तयार करना
3) उपस्थिति –

सुचनाएँ : 1) सभी प्रश्नों के अन्तर्गत विकल्प होंगे।
2) लघुत्तरी प्रश्न के उत्तर लगभग 10 पक्तीयों मे एवं दिर्घोत्तरी प्रश्न का उत्तर लगभग 50 पक्तीयों में अपेक्षित है।
3) जिस पाठ से दिर्घोत्तरी प्रश्न पुछे जाएंगे उनसे लघुत्तरी प्रश्न नही पुछे जाएंगे।

Subject Code	**15BSC103**
Subject Name	**Computer Science-I: Fundamentals of Computer**
Short Name	**FC**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :
No prerequisites required.

Objectives:
- To acquire the basic knowledge about computer system functions.
- To learn the basic knowledge about various components, capabilities and limitations of computer
- To understand the various hardware and software components of computer.

Units	Contents	Total Lectures
I	**Computer Basics:** Introduction, Definition of computer, Basic Computer Organization, characteristics, applications, Generations of computer, Classification of computers, ASCII code, EBCDIC code.	10
II	**Memory:** **Main Memory:** RAM, ROM, PROM, EPROM, EEPROM, cache memory **Secondary storage:** Magnetic tapes, Hard disk, Optical disks: CD, DVD. **Memory Storage Devices:** Flash drive(Pen Drive), Memory Card	10
III	**Input/ Output Devices:** **Input Devices:** Keyboard, Mouse, Trackball, Joystick, Light pen, Touch Screen, Scanner, MICR,OMR, Bar code Reader, Electronic Card Reader, **Output Devices:** Monitor, Printer and its types: Drum printer, Dot Matrix, Inject printer, Laser Printer, Plotter, Screen Image Projector	12
IV	**Software:** Relationship between hardware and software, System software, Application Software, Algorithm, Flowchart, **Computer languages:** Machine language, Assembly language, High level language, Assembler, compiler, linker, interpreter.	12
V	**Operating System:** Introduction, Main functions of Operating system, Introduction of Popular OS: UNIX, MS-DOS, Microsoft Windows, and Linux. Application Software Packages: Word Processing Package, Spreadsheet package	12
	Text Books: 1. Pradeep K Sinha, Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publications, New Delhi, India, (2011) 2. B. Ram,Computer Fundamentals Architecture and Organization, Forth Edition, New Age International (p) Limited, Publishers, New Delhi, India, (2007)	
	References : 1. V. Rajaraman, Fundamentals of Computers, Fifth Edition, PHI Learning Private Limited, New Delhi, India, (2010) 2. Sanjay Saxena, A First Course In computers, 2003 Edition, Vikas Publishing House PVT LTD, New Delhi, India, (2003)	

Coures Outcomes:
1. Students will be able to identify the components of personal computer systems.
2. Students will be able to compose, format and edit the documents in MS-OFFICE.
3. Students will get the knowledge of computer equipment both hardware and software.

Subject Code	**15BSC104**
Subject Name	**Computer Science-II: C Programming**
Short Name	**CP**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :

- The student should have the basic knowledge of mathematics.
- The student should be able to do computations.
- The students should posses the logical thinking ability.

Objectives:

- To build the basic skills of programming.
- To acquire the importance of C programming using various methodologies.

Units	Contents	Total Lectures
I	**C Fundamentals**: Introduction to Programming language, Structure of C Program, header file, Character set, keywords and identifiers, constants, variables, basic data types, symbolic constants. **Operators & Expressions:** Arithmetic, Relational, logical, assignment, Increment & decrement operator, conditional operator and Precedence of Operators.	10
II	**Control Statements :** **Decision Making:** if statement, if-else statement, nested if..else statement, switch, Goto. **Looping Statements:** for, while, do…while, nesting of loops, break and continue statements.	10
III	**Data Input and output:** Formatted I/O: printf(), scanf(). Unformatted I/O: getch(), putch(), getchar(), putchar(), gets(), puts(). **String Handling:** operations on strings: strlen(), strcpy(), strcmp(), strcat(). **Arrays:** Definition, one dimensional and two dimensional arrays, array declaration and initialization.	12
IV	**Functions:** Introduction, prototype declaration, definition of function, Function call. **Category of functions:** No arguments & no return values, arguments but no return values, arguments with return values, no arguments but return a value.	12
V	**Pointers:** Concept, declaring pointer variables, initialization of pointer variables, array of pointer. **Structures:** Introduction, defining a structure, declaring structure variables, accessing structure members.	12
	Text Books: 1. E Balgurusamy, Programming in ANSI C, fourth edition, Tata Mc Graw- Hill , New Delhi, India, (2008). 2. Yashwant Kanetkar, Let us C, 2nd edition, BPB publication, New Delhi, India, (1995).	
	References : 1. K.R.Venugopal, S.R. Prasad, Mastering C, Tata Mc Graw- Hill, New Delhi, India, (2008). 2. BYRON S Gottfried, Programming With C, Second Edition, , Tata Mc Graw-Hill, New Delhi, India, (2007).	

Course Outcomes:

1. Choose the Loops and decision making statements to solve a problem.
2. Implement different operations on array.
3. Students are able to use functions to solve given problems.
4. Implement pointers, structure and union.

Subject Code	**15BSC105**
Subject Name	**Laboratory of Computer Science-I**
Short Name	**LCS-I**
Total Lectures	**90**
Total Credits	**4**

Group	**Contents**	**Total Lectures**
A	Minimum 15 practical based on "C" Language covering all aspects of syllabus 1. Practical Based on structure of C program. 2. Practical Based on use of Operators. 3. Practical Based on the use of decision making statement. 4. Practical Based on the use of looping statement. 5. Practical Based on the use of data input output statement. 6. Practical Based on the use of string handling functions. 7. Practical Based on the use of array. 8. Practical Based on the use of pointers. 9. Practical Based on the use of structure. 10. Practical Based on the use of union.	
B	Minimum 5 practical based on Operating System functions and Application software packages 1. Practical Based on different flowchart using Paint. 2. Practical Based on different shapes and colors using paints. 3. Practical Based on study of Memory Unit. 4. Practical Based on use of Input devices 5. Practical Based on use of output devices 6. Practical based on study of different Operating systems. 7. Practical Based on formatting text using Word Processing Package 8. Practical Based on grammer using Word Processing Package 9. Practical Based on different formulae using Spreadsheet package 10. Practical Based on different graphs.	

Subject Code	**15BSC106**
Subject Name	**Statistics–I: Basic Statistics**
Short Name	**BS**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

According to S. G. Wells, "Statistical thinking one day will be necessary for ability to read and write as well as for better citizenship". So the subject Statistics is included as a major subject in almost all the curriculums of various faculties.

- The students should have basic knowledge of mathematics.
- He/she should be able to compute simple mathematical examples like computation of simple averages, derivatives, integrations etc.

Objectives:

- To explain the purpose of descriptive statistics.
- To distinguish between inferential and descriptive statistics.
- To explain the concept of diagrammatic representation of data.
- To read and interpret various types of graphs, charts and diagrams.
- To calculate the various types of averages like mean, median etc.

Units	Contents	Total Lectures
I	**Fundamental Statistics :** Introduction: Definition, meaning, Functions and limitation of statistics. Scope of statistics: In the field of Industry, Medical sciences, Agricultural science, Education, Management etc. Types of data: Qualitative and Quantitative data, nominal and ordinal data, discrete and continuous data, frequency and non frequency data.	12
II	**Presentation of data:** Collection of data: Primary and secondary data. Classification: Definition and rules of classification and its types. Tabulation: Meaning of Tabulation & its types, construction of table with one or more factor.	12
III	**Diagrammatic Representation of data :** Diagrammatic: Bar-Simple, Multiple, Sub-divided bar diagram. Graphical: Histogram, Frequency Polygon, Ogive Curves. Frequency Distribution.	12
IV	**Measures of Central Tendency:** Concept and its measures (Mean, Mode, Median, G.M., H.M) with its merits and demerits. Properties of A.M., Relation between mean, mode, median. Relation between A.M., H.M., G.M.	10
V	**Measures of Dispersion:** Range, Quartile deviation, mean deviation and its coefficients. Standard deviation, variance, properties of variance, merits & demerits of Measures of Dispersion.	10
	Books: 1. S.C .Gupta, V. K. Kapoor, Fundamentals of Mathematical statistics,11th edition Sultan Chand & Sons, New Delhi (2000). 2. Goon A.M., Gupta M.K., Das Gupta B., An outline of statistical theory, 4th edition, The World press, Calcutta (2003). 3. S.P.Gupta, Statistical methods 38th edition, Sultan Chand & Sons, New Delhi (2009).	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. J. Medhi, Statistical methods, an introductory text, New Age International,(1992). 3. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 4. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi (1955).	

Course Outcomes:

1. Choose the correct measure of statistics to solve the problem.
2. Implement different presentation tools practically.
3. Use diagrammatic techniques to solve given problem.

Subject Code	**15BSC107**
Subject Name	**Statistics–II: Probability and Theory of Attributes**
Short Name	**PTA**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The students must have basic knowledge of set theory such as union of set, intersection of set, complementation etc.
- Student must have knowledge of variables, types of variables, attributes etc.

Objectives:

- To be able to apply probability to solve day to day life problems.
- To study how to develop probability model and important concepts in probability.
- To study the theory of attributes and its applications.

Units	Contents	Total Lectures
I	**Theory of Probability:** Definition of 1) Random experiment 2) Trial & event 3) Types of events. Definition of Probability – Mathematical, Statistical Axiomatic approach of Probability, Theorems on Probability (Except Baye's theorem), Conditional Probability and simple problems on Probability.	10
II	**Discrete Random Variables :** Concept of random variable & its illustration by examples, Definition of Discrete random variable ,Probability distribution of Discrete random variable. Probability Mass function. Numerical problems on PMF. Expectation of Discrete random variable and its properties and their numerical problems.	12
III	**Continuous Random Variables and Mathematical expectation:** Concept and definition of Continuous random variable & its illustration by examples, Probability density function of continuous random variable. Numerical problems on PDF. Expectation of Continuous random variable and its properties and their numerical problems.	12
IV	**Generating function and Bivariate distribution:** Moments, Variance, co-variance, Moment generating function and their properties. Introduction to Bivariate probability distribution (Discrete and continuous) and their numerical problems. Marginal and Conditional distributions.	10
V	**Theory of attributes:** Definition of attributes, notations, classes and class frequencies, order of class and class frequencies. Consistency of data, conditions for consistency of data, simple numerical problems. Independence of attributes, criteria for independence. Association of attributes, Yule's coefficient of association, coefficient of colligation.	12
	Text Books: 1. S.C .Gupta, V. K. Kapoor: Fundamentals of Mathematical statistics, 11th edition Sultan Chand & Sons, New Delhi (2000).	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. J. Medhi, Statistical methods, an introductory text, New Age International,(1992). 3. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 4. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi(1955).	

Course Outcomes:

1. Choose the correct approach of probability to solve the problem.
2. Implement probability theory practically.
3. Use Mathematical expectation techniques to solve given problem.

Subject Code	**15BSC108**
Subject Name	**Laboratory of Statistics-I**
Short Name	**LS-I**
Total Lectures	**90**
Total Credit	**4**

Group	**Contents**	**Total Lectures**
A	1. Presentation of data by using frequency table. 2. Problems based on Classification of data 3. Problems based on Diagrammatic representation of data. 4. Problems based on Graphical representation of data. 5. Problems based on mean (By Direct and Indirect method) 6. Problems based on Median and Mode. 7. Problems based on Range and C.R. 8. Problems based on Quartile deviation. 9. Problems based on Standard deviation 10. Problems on mean deviation.	
B	1. Problems on Permutations 2. Problems on Combinations. 3. Evaluation of probabilities using Addition theorem. 4. Evaluation of probabilities using Multiplication theorem. 5. Problems on Axiomatic approach of probability. 6. Testing Association of Attribute by using Frequency method. 7. Testing Association of Attribute by using Proportion method. 8. Problems on Yule's coefficient of Association. 9. Problems on Yule's coefficient of Colligation. 10. Problems based on 9^2 table and Consistancy of data.	

Subject Code	**15BSC109**
Subject Name	**Electronics-I: Electronic Devices And Circuit Theory**
Short Name	**EDCT**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Basic concepts of electricity
- Basics of OHMs law

Objectives:
- To expose the students about basic concept of electronics.
- To understand working of electronic components.
- To expose the students about semiconductors used in ICS

Units	Contents	Total Lectures
I	**Electronic components**: Definition, types, identification and uses of electronic components: Resistors, Capacitors, Inductors, Switches, Transformers and Relays	10
II	**Basic network theorems:** Ideal Voltage and Current sources (Internal impedance of battery and its effect on its performance), Kirchoff's current and voltage laws, Thevenin, Norton theorems (Statement and simple numerical) (DC circuits only)	12
III	**Introduction to semiconductors:** Concept of energy band diagram (Conductor, Semiconductor, Insulator), Intrinsic and extrinsic semiconductor (P type, N type),depletion layer, Barrier potential, PN Junction diode, forward and reverse bias characteristics of diode, Avalanche and Zener effect; Zener diode.	12
IV	**Rectifiers and filters:** Construction and working of half wave, full wave and bridge rectifiers **Filters:** Idea of filter, types (RC filter, capacitor input filter, choke input filter, Pi filter) (introduction only)	10
V	**Special semiconductor diodes:** Theory, construction, working and applications of Schottky diode, tunnel diode, Varactor diode, PIN diode, LED, Photo diode.	12
	Text Books: 1. B. L. Theraja -Basic Electronics : (S. Chand and Company)	
	References: 1. Allen Mottershed, Electronic Devices and circuits, Prentice hall of India Pvt. Ltd. 2. R. G. Kale, U. K. Puranik, V. N. Pendse, Kitab Mahal, An Introduction to Electronics. 3. Grob, Basic Electronics ,Tata McGraw Hill 4. T. L. Floyd, Electronic Devices , Pearson Education Asia 5. Malvino, Electronic Principles ,Tata McGraw Hill 6. Madhuri Joshi, Electronic components and materials, Schroff pub. And distributors) 7. S. M. Dhir, Electronic components and materials, TMH 8. Van Valkenburg, Network analysis	

Course Outcomes:
1. Indentify and test basic electronic components.
2. Explain basic circuit concepts and responses.
3. Use diodes to design rectifiers and power supply circuits
4. Apply Electronics fundamentals in design and analysis of electronic circuits and applications.

Subject Code	**15BSC110**
Subject Name	**Fundamentals Of Digital Technique**
Short Name	**FDT**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic concepts of electricity and OHMs law.

Objectives:

- To expose the students about basic concept of electronics.
- To understand working of electronic components.
- To expose the students about semiconductors used in ICS.

Units	Contents	Total Lectures
I	**Number Systems and inter-conversions:** Decimal, Binary, Octal, Hexadecimal and their mutual conversion, sign magnitude number, 1's and 2's complement representation, addition and subtraction of binary numbers, addition and subtraction using 1's and 2's complement method, Codes- BCD, 8421.	12
II	**Logic gates:** OR, AND, NOT, NAND, NOR, XOR gates and their truth table, Boolean Laws, De Morgans and Duality theorems, use of NAND and NOR as universal building blocks	10
III	**Karnaugh Maps:** pair, quads, octets, minterm, max term in K Map, K-map for 2, 3, 4 variables, concept of SOP and POS, simplification of SOP and POS logic expressions using K-map	12
IV	**Combinational Logic Circuits:** Half Adder, full adder, half subtractor and full subtractor, Concept of Encoder, Concept of Decoder: BCD to seven segment converter, 4-bit Full Adder/ subtracter, Concept of multiplexer, 4:1 mux using gate, Concept of demultiplexer, 1:4 demux using gate	12
V	**Sequential Logic Circuits:** Construction, working of R-S, Clocked R-S, JK, D and T-type, JKMS Flip Flop, Concept of preset and clear terminals, Race around Condition in JK FF.	10
	Text Books: 1. R. P. Jain, Modern Digital Electronics, Tata Mc-Graw Hill 2. A. Anand Kumar, Fundamental of Digital Circuits, PHI	
	References: 1. A. P. Malvino, D. P. Leach, Digital principles and applications, McGraw Hill 2. V. S. Kale, Principles of digital Electronics M. B. Matsagar, Vision publication 3. Jain, Digital fundamentals Floyd, Pearson Publication 4. S. P. Bali, 2000 solved problems in digital Electronics, Tata McGraw Hill 5. Y. N. Bapat, Electronic circuits and systems Analog and digital, Tata McGraw Hill 6. B. S. Nair, Digital electronics and logic design, Prentice hall 7. Malvino, Brown, Digital computer electronics,Tata McGraw Hill 8. C. V. Dhuley and V. M. Ghodki, Fundamentals of Digital Electronics	

Course Outcomes:

1. Able to examine the structure of various number systems and its application in digital design.
3. The ability to understand, analyze and design various combinational and sequential logic circuits.
4. Ability to identify basic requirements for a design application and propose a cost effective solution.
5. The ability to identify and prevent various hazards and timing problems in a digital design.
6. To develop skill to build, and troubleshoot digital circuits.

Subject Code	**15BSC111**
Subject Name	**LABORATORY OF ELECTRONICS-I**
Short Name	**LE-I**
Total Lectures	**90**
Total Credits	**4**

Group	**List of Experiments**	**Total Lectures**
A	1. To verify resistance of resistor by color code method 2. Study of forward characteristics of silicon diode 3. Study of reverse characteristics of silicon diode 4. Study of forward characteristics of LED 5. Study of reverse characteristics of LED 6. Study of forward characteristics of zener diode 7. Study of reverse characteristics of zener diode 8. To verify Thevenins theorm 9. To verify Nortans theorm 10. To verify Kirchoffs current and voltage law	
B	1. Study of basic logic gates using ICS 2. Study of derived logic gates using ICS 3. Study of universal logic gates 4. Study of half adder and 3 bit full adder 5. Study of full subtractor 6. Study of 4 bit adder/subtractor 7. verify Demorgans theorms 8. Study of RS and clocked RS flip flop 9. Study of JK and clocked T flip flop 10. Study of D and clocked D flip flop	

Syllabus of First Year B. Sc. (Comp. Sci.) Semester II

Subject Code	**15BSC112**
Subject Name	**Compulsory English-II**
Short Name	**ENG-II**
Total Lectures	**40**
Total Credits	**2**

Prerequisites:

- Students should have the basic knowledge of English language.
- They should know the competencies of English.

Objectives:

- To make the student competent in English language.
- To polish the reading and writing skills.
- To aim at enhancing the communication skill to face the requirements in future employability.
- The Communicative English course aims at training the would-be graduates in various levels of communication in English speech skills, oral skills and other related skills.

Sr. No.	Contents	Total Lectures
1	**Prose Lessons Prescribed:** 1. With the Photographer – Stephen Leacock 2. A Talk on Advertising – Herman Wouk 3. Making a Contract – Philip Bingham 4. The Scientific Point of View – J. B. S. Haldane 5. The Sun, the Planets and Stars – C. Jones	10
2	**Poems Prescribed:** 1. The Best of School – D. H. Lawrence 2. Ballad of the Landlord – Langston Hughes 3. To the Indians Who Died in Africa –T. S. Eliot 4. Ecology – A. K. Ramanujan	10
3	**Grammar:** Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.	10
4	**Communication Skills**: Note-making and Reporting, Paragraph Writing.	10
	Text Books: 1. REALMS OF GOLD Publisher: Orient Blackswan Pvt. Ltd. Mumbai.	
	References: --	

Course Outomes:

- Able to bridge gap between the classroom and real life.
- Achieve fluency and accuracy of communication in English.
- Able to reveal undiscovered literary artifacts.
- Competence and confidence will be enhanced in making use of the English Language.

Pattern of
Question Paper for English subject
and
Distribution of Marks

Maximum Marks : 40 **Time: Three Hours**

Q.1: There shall be five short answer questions based on prescribed prose passages.....05 marks

Q. 2: There shall be five long answer questions based on prescribed prose passages. Out of these, students will have to answer any two questions of five marks each.....10 marks

Q. 3: There shall be four long-answer questions based on prescribed poems. Out of these students will have to answer any two questions of five marks each...10 marks

Q. 4: There shall be five questions of one mark each, from Grammar
Section-Parts of Speech, Use of articles and Prepositions, Tenses, Transformation of Sentences.... ....05 marks

Q. 5: There shall be one question either on Note-making or on Reporting
(Note: The paper setter shall have the discretion)..... 05 marks

Q. 6: There shall be one question on Paragraph Writing on topics of current relevance. Students will have to write a paragraph of about 200 words out of four given topics.....05 marks

Subject Code	**15BSC113**
Subject Name	**Marathi-II**
Short Name	**MAR-II**
Total Lectures	**40**
Total Credits	**2**

पूर्वापेक्षित :

भाषा हे माहितीसंपादनाचे महत्वाचे साधन या दृष्टिने विद्यार्थानी मराठी या विषयाकडे बघावे. मातृभाषेच्या अभ्यासातून व्यक्तिच्या अस्तित्वाला अर्थ येतो तिच्या अधिष्ठानाशिवाय व्यक्तिचा अभ्यास व विकास अपूर्ण म्हणून महाविद्यालयीन स्तरावर मराठीवर प्रभुत्व असणे अपेक्षित आहे. आत्मचरित्र, काव्य, ललित या वाङ्मयीन प्रकारांचा परिचय असावा. तसेच पत्रलेखन व मुलभूत व्याकरणाचाही परिचय असावा. चांगली कल्पनाशक्ती असावी म्हणजे निबंध, पत्रलेखन, कथालेखन, या प्रकारात चांगल्या त–हेने उपयोग होतो.

उद्दिष्टये /हेतू:

विज्ञानशाखेच्या बदलत्या अभ्यासक्रमानुसार बीएस्सी प्रथम वर्षाच्या मराठी विषयाच्या अभ्यासक्रमात वैचारिक साहित्याबरोबरच ललित, कविता, वैज्ञानिक कथा, व्यावहारिक मराठी याचा समावेश आहे. मराठीतील सामाजिक, वैज्ञनिक, पर्यावरणाविषयक संपन्न विचारधारेची विद्यार्थ्यांना ओळख व्हावी हा हेतू. विद्यार्थ्यांमधे मराठी साहित्याची गोडी निर्माणा व्हावी यासोबतच संत साहित्याचा त्याच्या सामाजिक दृष्टिकोनाचा परिचय करून देणे हा एक उद्देश भाषेवर प्रभुत्व मिळवायचे तर श्रवण, वाचन, लेखन कौशल्य आत्मसात केले पाहिजे मराठीच्या अभ्यासातून विद्यार्थ्यांना व्यक्तिमत्व विकास करता येईल मराठी विषयाचा अभ्यास आकलनासाठी व आनंददायी असावा.

घटक क्र.	घटक	एकुण लेक्चर
अ	**गद्य** (गुण 20) 1) स्टीफन हॉकींग : निवास पाटील 2) मला शब्द द्या : वि. वा. शिरवाडकर 3) आंबेडकरांचे ग्रंथप्रेम : भाा. भा. रेगे 4) विज्ञान तंत्रज्ञान आणि मराठी भाषा : जयंत नारळीकर 5) चिंतन : ए.पी.जे.अब्दुल कलाम 6) जगायचं कशासाठी ? : डॉ. निर्मलकुमार फडकुले	15
ब	**पद्य** (गुण 10) 1) विद्यार्थ्याप्रत : केशवसूत 2) लपे कर्माची रेखा : बहिणाबाई चौधरी 3) मेंढरं : विठ्ठल वाघ 4) संग्राम : यशवंत मनोहर	15
क	**व्यावहारिक मराठी** (गुण 10) प्रसारमाध्यमांसाठी लेखन 1) जाहिरात लेखन 2) बातमी लेखन 3) अपठित उता-यावरील प्रश्न	10
	अभ्यासक्रमासाठी पाठयपुस्तक: शलाका (प्रकाशक – ओरिएन्ट ब्लॅकस्वान प्रायव्हेट लिमीटेड) सुलभ मराठी व्याकरण प्रकाशक मो. रा. वाळिंबे	

विषय परिणाम:

1) वैचारिक लेखांमुळे वक्तृत्व स्पर्धेत विषय चांगल्या प्रकारे मांडु शकतात
2) जाहिरात व बातमी लेखन आत्मविश्वासाने करू शकतात
3) मराठी साहित्या मध्ये रूची वाढते

मराठी प्रश्नप्रत्रिकेचा नमुना

बी.एससी. भाग–1 सत्र–2 वेळः 3 तास गुण 40

या विषयाची एक प्रश्नप्रत्रिका राहील.

पाठयपुस्तकातील घटकांवर प्रश्न व गुणविभागणी पुढीलप्रमाणे

प्रश्न 1	घटक अ दीर्घोत्तरी प्रश्न	(कोणताही एक)	गुण 10
प्रश्न 2	घटक अ लघुत्तरी प्रश्न	(कोणतेही दोन)	गुण 10
प्रश्न 3	घटक ब लघुत्तरी प्रश्न	(कोणतेही दोन)	गुण 10
प्रश्न 4	घटक क 1) जाहिरात लेखन		गुण 05
	किंवा बातमी लेखन		गुण 05
	2) अपठित उताऱ्यावरील प्रश्न		गुण 05

Subject Code	**15BSC113**
Subject Name	**HINDI-II**
Short Name	**HIN-II**
Total Lectures	**40**
Total Credits	**2**

पूर्वापेक्षित:

महाविद्यालयीन स्तर पर हिन्दी विषय में प्रभुत्व अपेक्षित है। आत्मचरित्र, काव्य, ललित व वाङमय प्रकारों का परिचय होना चाहिये। पत्रलेखन व मूलभूत व्याकरण का भी परिचय होना आवश्यक है। तद हेतु अच्छी कल्पनाशक्ति अपेक्षित है। इसी प्रकार एक दुसरे से हिन्दी में संवाद करने का कौशल्य होना चाहिए।

उद्देश्य:

भारत एक बहुभाषी देश है। भारत में अनेक भाषा–भाषी लोग रहते है। इसे एक सूत्र में बॉधने के लिए हिन्दी सम्पर्क भाषा का काम करती है। हिन्दी दैनिक काम–काज में अपनाई जाने वाली भाषा राष्ट्रभाषा के रुप मे कार्यरत है। भारत में सभी भाषाओं की अगर गणना की जाती है तो हिन्दी ही सर्वाधिक बोली और समझी जाने वाली भाषा है। पश्चिमोत्तर भारत में तो हिन्दी का अधिकाधिक प्रयोग होता है। बंगाल, महाराष्ट्र, बम्बई, गुजरात आदि। भारत की कुल जनसंख्या 7. से 80 टक्के लोग हिन्दी भाषा समझते है, बोलते है, लिखते है। 14 सितम्बर 1949 को भारतीय संविधान सभा ने हिन्दी को भारत संघ की राजभाषा के रुप मे स्वीकार किया। संविधान के अनुच्छेद 343 के अनुसार संघ राज्य की राजभाषा हिन्दी और लिपि देवनागरी है।

बीएस्सी प्रथम वर्ष में हिन्दी विषय का समावेश किया गया है. हिन्दी के सामाजिक, वैज्ञानिक, इत्यादी विचारधारा की विद्यार्थियोंको पेहचान करवाना यह हेतू है। विद्यार्थियोंको हिन्दी साहित्य का महत्त्व समझ में आना चाहिये यह एक उद्देश। भाशापे प्रभुत्व मिलाना हो तो श्रवण, पठन, लेखन कौशल्य आत्मसात करना चाहिये।

अ. क्र.	ईकाई (पाठय पुस्तक की 3 ईकाई में विभाजित किया गया है।)	एकुण लेक्चर
1	**प्रथम ईकाई – गद्य विभाग** 1) अप्प दीपो भव (वकतृत्व कला) स्वामी श्रध्दानंद 2) भारत का सामाजिक व्यक्तित्व (प्रस्तावना) जवाहरलाल नेहरु 3) पत्र मैसूर के महाराजा को (पत्र लेखन) स्वामी विवेकानंद 4) योग की शक्ति (डायरी) डॉ.हरिवंशराय बच्चन 5) कोष के अखाडे में को पहलवान नही उतरना (साक्षात्कार) भाषा विद – डॉ.हरदेव बाहरी से प्रो.त्रिभुवननाथ शुक्ल 6) नीग्रों सैनिक से भेट (यात्रा–संस्मरण) डॉ.देवेंद्र सत्यार्थी 7) यदि बा न होती तो शायद गॉधी को यह उॅचाई न मिलती (साक्षात्कार) कथाकार – गिरीराज किशोर से सत्येन्द्र शर्मा	15
2	**द्वितीय ईकाई – पद्य विभाग** 1) स्वतंत्रता पुकारती (काव्य) जयशंकर प्रसाद 2) हम अनिकेतन (काव्य) बालकृष्ण शर्मा 'नवीन' 3) गुरु महिमा (काव्य) कवीरदास जी 4) भारत माता (काव्य) सुमित्रानंदन पन्त	15
3	**तृतीय ईकाई – निबन्ध, पत्र लेखन, सार – लेखन, भाव–पल्लवन, वार्ता लेखन** 1) पत्र–लेखन महत्व और उसके विविध रुप 2) निबन्ध लेखन एक कला एवं विविध रुप 3) सार–लेखन 4) भाव–पल्लवन 5) वार्ता लेखन	10
	नियोजित पाठय पुस्तक : 1. ''हिन्दी भाषा संरचना'' मध्यप्रदेश हिन्दी ग्रंथ अकादमी भोपाल। 2. अस्मिता – जयभारती प्रकाशन – इलाहाबाद 3. हिन्दी भाषा और विज्ञान बोध (म.प्र.हिन्दी ग्रन्थ) अकादमी, रविन्द्रनाथ ठाकूर मार्ग – बानगंगा भोपाल – 462003 दुरभाष – 0755–2553084	
	सहायक पुस्तक सुची : 1. देवनागरी लिपी तथा हिन्दी वर्तनी का मानक रुप प्रकाशन केन्द्रीय हिन्दी निदेशालय माध्यमिक और उच्चतर शिक्षा विभाग मानव संसाधन विकास मंत्रालय पश्चिम खंड – 7 रामकृष्ण पुरम, नई दिल्ली – 110066 2. प्रयोजन मुलक हिन्दी डॉ. राकेश कुमार पाराशर प्रकाशन– राष्ट्रभाषा प्रचार समिती हिन्दी नगर, वर्धा	

3. हिन्दी रचना प्रबोध – डॉ.बच्चुलाल अवस्थी प्रकाशन– साहित्य भवन प्रा.लि.के.पी. कक्कड रोड, इलाहाबाद–2
4. मेगा हिन्दी शब्द कोष – संकलन एंव सम्पादन कर्ता पंडीत रविदत्त शास्त्री अरिहंत पब्लिकेशन इंडिया प्रा.लि.कालिन्दी, ट्रान्सपोर्ट नगर, मेरठ.250002 (उ.प्र.)
5. प्रयोजन मूलक हिन्दी और अनुवाद – प्रो. शंकर बुंदेले
6. अनुवाद भाषाएँ– समस्याएँ– एन.ई.विश्वनाथ, अमरज्ञान गंगा, चावडी बाजार, दिल्ली
7. कार्यालयीन अनुवाद की समस्या – डॉ.भोलानाथ तिवारी, कृष्ण कुमार रस्तोगी, अजीत लाल गुलाटी
8. हिन्दी में व्यवहारिक अनुवाद – डॉ.आलोक कुमार रस्तोगी सुमित पब्लिकेशन, दिल्ली–2
9. राष्ट्रीयकृत बॅको में हिन्दी – डॉ.शंकर बुंदेले, अमन प्रकाशन, कानपुर
10. अनुचिंतन – डॉ.शंकर बुंदेले
11. अनुसृजन – डॉ.शंकर बुंदेले

हिन्दी प्रश्न पत्रिका का स्वरुप

द्वितीय सत्र

40 अंक

1) प्रथम ईकाई – दीर्घोत्तरी एक 10
लघूत्तरी एक 03

2) द्वितीय ईकाई –दिर्घोत्तरी एक 10
लघूत्तरी एक 03

3) तृतीय ईकाई –
1) निबन्ध लेखन एक कला/विविध विषयों पर निबन्ध 05
2) पत्र लेखन का महत्व एवं विविध रुप। 05
3) सार–लेखन, भाव–पल्लवन या वार्ता लेखन 04

अंतर्गत गुण 10 अंक

लेखन – असायमेन्ट में विविध विषयों पर निबन्ध एवं पत्र लेखन, डायरी लिखना

वाचन – वक्तृत्व कला का विकास, कहानी, नाटक पढना

उपस्थिति –

सुचनाएँ: 1) सभी प्रश्नों के अन्तर्गत विकल्प होंगे।
2) लघुत्तरी प्रश्न के उत्तर लगभग 10 पक्तीयों मे एवं दिर्घोत्तरी प्रश्न का उत्तर लगभग 50 पक्तीयों में अपेक्षित है।
3) जिस पाठ से दिर्घोत्तरी प्रश्न पुछे जाएंगे उनसे लघुत्तरी प्रश्न नही पुछे जाएंगे।

Subject Code	**15BSC114**
Subject Name	**Computer Science-III: Web Technology**
Short Name	**WT**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The student should have the basic Knowledge of computer for understanding concepts of web development.
- Basic ability of programming.

Objectives:

- To acquire the basic knowledge about internet.
- To acquire the basic knowledge about various components, capabilities and limitations of web programming.
- To get an understanding of the various scripting languages and style sheets.

Units	Contents	Total Lectures
I	**Internet and Web Technologies:** Introduction to Internet and web. Introduction to Web Technologies: HTML, JavaScript, CSS, XML, XHTML, AJAX, ASP.NET, PHP. Web Services.	10
II	**HTML**: Introduction to HTML, Editing tools. Document structure of HTML, HTML tags and attributes: Formatting tags in HTML, Headings in HTML, <BLOCKQUOTE>, <MARQUEE>**.** Lists in HTML Linking in HTML: tag and their attributes. Using Images in HTML : <IMG> tag and attributes, Using tables: <TABLE> Tag, Frames in HTML.	10
III	**Introduction to scripting**: **Java Script**: Basics, operators, data types, Control structures: If, If-Else, Switch-case, Looping structures: for, do-while, while Array: declaration allocation and accessing	12
IV	**VBScript**: Basics ,operators, data types, Control Structures: If, If Then Else, If Then Else-If, Select Case, Looping Structures: do, do-while, while wend, Array: declaration allocation and accessing	12
V	**Style sheet**: Advantages of Style Sheet, Types of Style Sheet **XML:** Introduction to XML: Basic concepts, structuring data and namespaces. Document Type Definitions and Schema. Document Object Model (DOM), DOM Methods.	12
	Text Books: 1. Deitel & Deitel, Internet & WWW: How to Program, Fourth Edition, Pearson Publications, (2009) 2. Monica D'Souza and Jude D'Souza, Web Publishing, Second Edition, Tata McGraw Hill, (2001).	
	References: 1. Kongent, HTML 5 Black Book, Second Edition, Dream Tech press, (2012).	

Course Outcomes:

1. Able to develop the basic structure of web page.
2. Able to develop static & dynamic web pages by the using Java Script.
3. Underatand and write well formed and valid XML documents.
4. Able to develop web pages using style sheet.
5. Analyze the web page and identify its elements and attributes.

Subject Code	**15BSC115**
Subject Name	**Computer Science-IV: Computer Networking**
Short Name	**CN**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic Knowledge of Computer is required.

Objectives:

- To acquire the basic knowledge about computer Networks, network devices and various media.
- To acquire the knowledge about various modulation types and switching techniques.
- To understand the various levels of OSI model and about Internet history and application.

Units	Contents	Total Lectures
I	**Introduction to Computer Network,** Advantages of computer network, Types of computer networks: LAN, MAN, WAN **Mode of Transmission:** Simplex, Half duplex, full duplex. Asynchronous and Synchronous transmission of data, Digital signal, Analog Signal	10
II	**Transmission Media:** Bounded media: Twisted pair cable, Coaxial cable, Fibre optic cable. **Unbounded Media:** Microwave, Satellite, Infrared, **Network Topology:** Bus, Ring, Star, Mesh	10
III	**Modulation:** Amplitude modulation, Frequency Modulation, Phase Modulation. **Multiplexing:** Multiplexers, Frequency Division Multiplexing, Time Division Multiplexing, PBX (Private Branch Exchange)	12
IV	**Switching Techniques:** Switching Concept, Circuit switching, packet switching, Message switching **Network Devices:** NIC, Hub, Bridges, Router, Switches, Gateways, modem and modem types	12
V	**OSI model and Protocols:** OSI Model, Transmission Control Protocol/Internet Protocol (TCP/IP) **Internet:** History, applications of Internet- WWW, E-mail, FTP, Telnet, Voice chat, Video conferencing.	12
	Text Books: 1. Jerry FitzGerald, Alan Dennis, Fundamentals of Business Data Communications, Tenth Edition, Wisley India Pvt Ltd. New Delhi, India(2009) 2. Michael A. Miller, Introduction to digital and data Communications, JAICO Publishing House, Mumbai, India(2006)	
	References: 1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition, Pearson Publications, New Delhi, India(2011) 2. Pradeep K Sinha, Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publications, New Delhi, India, (2011) 3. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition, Tata Mc Graw- Hill, New Delhi, India, (2008). 4. Uyless D. Black, data Communications and Distributed Networks, Third Edition, PHI Learning private Limited, New Delhi, India, (2009)	

Coures Outcomes:

1. Students will be able to identify networking models and use appropriate transmission modes.
2. Students will be able to use networking topologies.
3. Students will be able to identify the types of networking devices or switches and their functions.
4. Students will be able to use wireless network.
5. Students will be able to use various internet applications and protocols.

Subject Code	**15BSC116**
Subject Name	**Laboratory of Computer Science-II**
Short Name	**LCS-II**
Total Lectures	**90**
Total Credits	**4**

Group	Contents	Total Lectures
A	Minimum 10 practical based on "Web Technology" covering all aspects of syllabus 1. Practical based on all formatting tags. 2. Practical based on <IMG> tag and <TABLE> tag. 3. Practical based on control structures in Java Script. 4. Practical based on looping structures in Java Script. 5. Practical based on Arrays in Java Script. 6. Practical based on control structures in VB Script 7. Practical based on looping structures in VB Script. 8. Practical based on Arrays in VB Script. 9. Practical based on Style Sheet. 10. Practical based on XML.	
B	Minimum 10 case studies based on " Computer Networking" covering all aspects of syllabus 1. Case Study Based on different types of Networks 2. Case Study Based on different modes of transmission. 3. Case Study Based on Bounded transmission media 4. Case Study Based on Unbounded transmission media 5. Case Study Based on Network Topology. 6. Case Study Based on Modulation. 7. Case Study Based on Multiplexing Techniques 8. Case Study Based on switching techniques. 9. Case Study Based on network devices. 10. Case Study Based on OSI Model.	

Subject Code	**15BSC117**
Subject Name	**Statistics–III : Study of Some Descriptive Statistics**
Short Name	**SDS**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The students must have the basic knowledge of curves, types of variables, curve fitting using least square method, equation of straight line, equation of parabola etc.

Objectives:

- To understand the concept of skewness, kurtosis and their types.
- To understand the concept of Correlation, Regression and their types.

Units	Contents	Total Lectures
I	**Skewness:** Concept of skewness , its types(positive skewness and negative skewness), Karl Pearson's coefficient of skewness, Bowley's coefficient of skewness, Pearson's coefficient of skewness based on moments(β_1, β_2),some numerical problems on skewness. **Cumulants:** Definition and Property.	12
II	**Kurtosis:** Concept of Kurtosis, its types (Leptokurtic, Mesokurtic & Platykurtic), coefficient of kurtosis based on moments (γ_1, γ_2), some numerical problems on kurtosis. **Moments:** Concept, Relation between Moment about Mean and Arbitary Point, Effect of change in origin and scale, Sheppard's Correction, Charliers's checks.	12
III	**Correlation:** Concept of correlation, its types (positive correlation and negative correlation), Product moment correlation coefficient and its properties. Spearman's Rank correlation coefficient.	12
IV	**Regression :** Meaning, Definition, coefficient and its properties. Principle of least square. Fitting of linear regression x on y and y on x.	10
V	**Partial/ Multiple Correlation and Regression :** Concept of Partial and Multiple correlation, Concept of Partial and Multiple regression: Definition, coefficients and some important properties.	10
	Text Books: 1. S.C .Gupta, V. K. Kapoor, Fundamentals of Mathematical statistics,11th edition Sultan Chand & Sons, New Delhi (2000). 2. S.C. Srivastaya, Fundamental of statistics 1st edition, Anmol Publications Pvt. Limited (2006).	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. J. Medhi, Statistical methods, an introductory text, New Age International,(1992). 3. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 4. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt. Ltd., New Delhi(1955).	

Course outcomes:

1. Students will be able to identify the skewness, kurtosis and correlations of data.
2. Students will be able to fit regression models to the given data.
3. Students will get the knowledge of mathemathematical modeling and forecasting.

Subject Code	**15BSC118**
Subject Name	**Statistics–IV : Probability Distributions**
Short Name	**PD**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The student should be able to perform basic mathematical calculations.
- The student should posses the basic knowledge about Event and set theory.

Objectives:

- To get knowledge about the probability distribution and understand how probabilities are distributed.
- To understand the concepts of discrete and continuous probability distributions and computation of theoretical probabilities.
- To learn the difference between theoretical and experimental probabilities.

Units	Contents	Total Lectures
I	**Discrete probability distribution I:** Concept of probability distribution, its types (discrete and continuous). Standard Univariate distributions and their properties. Discrete uniform distribution –its definition, mean and variance.	10
II	**Discrete probability distribution II:** Bernoulli distribution –its definition, mean and variance. Binomial distribution- its definition, mean and variance, m.g.f., additive property, fitting of binomial distribution.	10
III	**Discrete probability distribution III:** Poisson distribution-its definition, mean and variance, fitting of Poisson distribution. Geometric distribution-its definition, mean and variance, m.g.f. Hyper geometric distribution-its definition, mean and variance.	12
IV	**Continuous probability distribution I:** Continuous Uniform distribution-its definition, mean and variance. Exponential distribution- its definition, mean and variance through m.g.f. Cauchy distribution-Definition.	12
V	**Continuous probability distribution II:** Normal distribution- its definition, mean and variance, m.g.f., area property, chief characteristics and importance of normal distribution. Gamma distribution- Definition, mean.	12
	Text Books: 1. S.C .Gupta, V. K. Kapoor, Fundamentals of Mathematical statistics,11th edition, Sultan Chand & Sons, New Delhi(2000). 2. R. S. N. Pillai, V. Bagavathi, Statistics theory and practice, 7th edition, Sultan Chand & Sons, New Delhi(2003).	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. J. Medhi, Statistical methods, an introductory text, New Age International,(1992). 3. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 4. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi(1955).	

Coures Outcomes:

1. Students will be able to use variou probability distributions.
2. Students will be able to implement discrete and continuous distributions.
3. Students will be use apply appropriate type of probability distribution.

Subject Code	**15BSC119**
Subject Name	**Laboratory of Statistics-II**
Short Name	**LS-II**
Total Lectures	**90**
Total Credits	**4**

Group	Contents	Total Lectures
A	1. Problems on Skewness 2. Problems on Kurtosis. 3. Problems on Product moment correlation. 4. Problems on Spearman correlation coefficient. 5. Problems on Spearman Rank correlation coefficient. 6. Fitting of linear regression. 7. Problems on Partial correlations. 8. Problems on Multiple correlations. 9. Problems on Partial regressions. 10. Problems on Multiple regressions.	
B	1. Calculation of mean, variance of Binomial distribution. 2. Calculation of mean, variance of Poisson distribution. 3. Calculation of coefficient of skewness & kurtosis for Binomial and Poisson distribution. 4. Fitting of Binomial distribution 5. Fitting of Poisson distribution 6. Problems on discrete Uniform distribution. 7. Problems on continuous Uniform distribution. 8. Problems on Exponential distribution. 9. Fitting of Normal distribution. 10. Problems on Area property of Normal distribution.	

Subject Code	**15BSC120**
Subject Name	**Electronics-III:Switching Devices And Measuring Instruments**
Short Name	**SDMI**
Total Lectures	**56**
Total Credits	**3**

Prerequisites

- Basic knowledge of electronics.
- Basic knowledge of components used in electronic devices.

Objectives

- To expose the students about basic concept of transistor and switching devices.
- To understand working of electronic measuring instruments.
- To expose the students about semiconductors used in ICS.

Units	Contents	Total Lectures
I	**Bipolar junction transistor:** The bipolar junction transistor: construction of B. J. T. , modes of B.J.T. (CE, CC, CB), α, β and their relationship, Input/output characteristics of BJT in CB mode and CE mode	10
II	**Field effect transistor:** Construction, working, characteristics and applications of JFET, MOSFET (depletion and enhancement type), parameters of JFET and their relationship	10
III	**Thyristors and UJT:** Construction, working, characteristics and applications of Silicon Controlled Rectifier, DIAC, TRIAC and UJT, UJT as relaxation oscillator	12
IV	**Measuring instruments:** Voltmeter, Ammeter, Ohmmeter, Multirange Voltmeter (AC and DC), Ohm per volt rating, loading effect, Multirange Ammeter, Series and Shunt type Ohmmeter, Multimeter,advandages disadvantages and applications of multimeter	12
V	**CRO:** Block diagram block diagram of CRO, CRT diagram, horizontal and vertical deflection systems, time base circuit using UJT, necessity and concept of delay circuit, application of CRO (voltage, frequency measurement only).	12
	Text Books: 1. A. K. Sawhney, Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai and Sons 2. B. L. Theraja, Basic Electronics, S. Chand and Company	
	References: 1. V. K. Mehta, Rohit Mehta, Principles of Electronics 2. S. G. Pimpale, Sushama Pimpale, Functional circuits in Electronics, Mcmillan India ltd. 3. Ryder, Electronics Fundamental and applications, PHI 4. M. K. Bagde, S. P. Singh, Kamal Singh, Elements of electronics, S.Chand and Co. 5. Gaikwad, Op-Amp and linear circuits, PHI 6. Khedkar, Electronic Instrumentation 7. N. C. Goyal, R. K. Khetan, Monograph on electronic design principles, Khanna Publisher 8. Bhargava, Kulshreshtha, Basic electronics and linear circuits, Gupta Technical education 9. A. P. Godse, U. P. Bakshi, EDC I EDC II, Technical Publishers Pune	

Course Outcomes:

1. Acquire knowledge about theory of operation of Semiconductor devices.
2. Gain knowledge of theory of operation of measuring instruments like CRO, Millimeter etc
3. Analyze the CC and CB configurations of bipolar junction transistor.
4. Explain the functioning of various solid-state devices, including bi-polar junction transistors, and field-effect transistors.

Subject Code	**15BSC121**
Subject Name	**Electronics-IV: Advance Digital Technique**
Short Name	**ADT**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- The student should know the basic knowledge of computer.
- Student should be aware of basics of binary numbers.

Objectives :
- To expose the students about sequential circuits used in computer ICs.
- To understand how logic circuit works inside microprocessor
- To expose the students to the concepts of digital systems

Units	Contents	Total Lectures
I	**Registers:** Buffer, construction and working of left shift, right shift, SISO, SIPO, PISO, PIPO Registers, applications of shift registers, Ring Counter, Johnson counters (Truth tables and timing diagrams) (4 bit)	10
II	**Counters:** Modulus of counter, 3bit asynchronous up counter. 3bit asynchronous down counter, 3bit asynchronous up/down counter, 4bit synchronous up counter. 4bit synchronous down counter, 4bit synchronous up/down counter, decade counter, applications of counter	10
III	**D/A and A/D converter:** Introduction, Weighted resistor and R-2R ladder D/A converter. A/D converter- Counter type, Successive-Approximation A/D converter, Specifications for D/A and A/D converter.	12
IV	**TTL Logic family:** Characteristics of digital ICs, construction and working of TTL NAND gate, Totem-pole output (construction and working),Tri-state TTL, Overview of TTL subfamilies.	12
V	**CMOS Logic family:** construction and working of CMOS NAND gates, Interfacing CMOS and TTL, Tristate logic-construction and working of TSL inverter, comparison of TTL and CMOS logic families.	12
	Text Books: 1. Modern Digital Electronics: R.P Jain(Tata Mc-Graw Hill) 2. Fundamental of Digital Circuits : A. Anand kumar (PHI)	
	References: 1. Digital principles and applications A.P.Malvino, D.P.Leach McGraw Hill. 2. Principles of digital Electronics M.B.Matsagar,V.S.Kale Vision publication 3. Digital fundamentals Floyd,Jain Pearson 4. 2000 solved problems in digital Electronics S.P.Bali Tata McGraw Hill 5. Electronic circuits and systems Analog and digital Y.N.Bapat Tata McGraw Hill 6. Digital electronics and logic design B.S.Nair Prentice hall 7. Digital computer electronics Malvino,Brown Tata McGraw Hill 8. Fundamentals of Digital Electronics C.V.Dhuley and V.M. Ghodki	

Course Outcomes:
1. Able to examine the structure of various registers and Counters, its application in digital design.
2. Achieve ability to understand, analyze and design various sequential circuits.
3. Ability to identify basic requirements for a design application and propose a cost effective solution using logic family.
4. Ability to understand, analyze and design various D/A and A/D converter circuits.
5. Able to identify and prevent various hazards and timing problems in a digital design.
6. Achieve skill to build and troubleshoot digital circuits.

Subject Code	**15BSC122**

Subject Name	**LABORATORY OF ELECTRONICS-II**
Short Name	**LE-II**
Total Lectures	**90**
Total Credits	**4**

Group	**Contents**	**Total Lectures**
A	1. Study of input characteristics of NPN transistor in CB mode 2. Study of output characteristics of NPN transistor in CB mode 3. Study of input characteristics of NPN transistor in CE mode 4. Study of output characteristics of NPN transistor in CE mode 5. Study of input characteristics of PNP transistor in CB mode 6. Study of output characteristics of PNP transistor in CB mode 7. Study of input characteristics of PNP transistor in CE mode 8. Study of output characteristics of PNP transistor in CE mode 9. Study of characteristics of N channel MOSFET 10. Study of characteristics of UJT 11. Study of characteristics of SCR 12. Study of CRO to measure AC/DC voltage and AC frequency	
B	1. Study of left shift register 2. Study of right shift register 3. Study of ring counter 4. Study of Johnson counter 5. Study of 4 bit ripple counter 6. Study of decade counter 7. Study of 4 bit synchronous counter 8. Study of up/down counter	

Syllabus of Second Year B. Sc. (Comp. Sci.) Semester III

Subject Code	**15BSC201**
Subject Name	**COMPUTER SCIENCE I:DATA STRUCTURE**
Short Name	**DS**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :

- The students should be able to do computations
- The students should posses the logical thinking ability

Objectives:

- To build the basic skills of programming
- Analyze algorithms to determine time and space complexity.
- Build and manipulate linear and non-linear data structure, including stack, Array, Linked list, Queues, Tree and Graphs.
- To acquire the ability to choose the appropriate data structure to use in solving typical computer science problem

Units	Contents	Total Lectures
I	**Introduction**: Data structure & their types, primitive Operations, Algorithms & Algorithms Notation, Time-Space Complexity. **Arrays :** Linear array and its Representation in memory, Primitive Operation on Linear Array, traversing linear arrays, inserting & deleting operations, Linear search and Binary search algorithms.	10
II	**Linked List:** Linked lists and their representation in memory, Primitive Operation on Linked list, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists	12
III	**Stack:** Definition, sequential and Linked representation in Memory. Primitive Operation on Stack, Arithmetic expressions: Polish notation: Infix, Postfix & Prefix operations using stack. **Recursion:** Recursion definitions & Their type, recursion for Tower of Hanoi	10
IV	**Queues:** Definition, Primitive Operation on Queues, Array Representation of Queues, linked lists representation of a queue. De-queue. Circular Queue, priority queue **Trees:** Definition, Tree terminology, Binary Trees	12
V	**Graph:** Definition, Graph terminology, sequential and Linked representation of Graph. **Sorting:** Bubble sort, selection sort, Insertion sorts. Merging &Merge sort, Radix sorts, Quick Sort	12
	Text Books : 1. Seymour Lipschutz: Data Structures, TMH Education Private Limited, New Delhi(2006) 2. S.B. Kishor: Data Structures, Third Edition, Dasganu Publications, Nagpur (2008) 3. G.S.Baluja: Data Structures Through C (A Practical Approach), GAGAN KAPUR FOR Dhanpat Rai & Co. (P) LTD. New Delhi.	
	References : 1. Langsam, Augestein & Tanenbaum, Data Structures using C & C ++, (PHI) 2. Tremblay and Sorenson, An Introduction to Data Structure With Applications, McGraw-Hill 3. E. Horowoitz, Sahani, Fundamentals of Data Structures, 2nd Edition, Galgotia	

Course Outcomes

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
2. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack
3. Acquire the knowledge about computational efficiency of the principal algorithms for sorting, searching.

Subject Code	**15BSC202**

Subject Name	**COMPUTER SCIENCE II : VISUAL BASIC.NET**
Short Name	**VB.NET**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :

- Students should be familiar Programming languages.
- Basic concepts related to Computer are required.

Objectives:

- To be able to design GUI based application.
- To be able to develop programming skill.

Units	**Contents**	**Total Lectures**
I	Introduction to .NET, 4.0.NET Framework features & architecture. Introduction to Visual Studio2010, Event Driven Programming, VB.NET Development Environment, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The VB.NET Language - data types, variables and its Scope.	12
II	Conditional statements, loop statements. Arrays, types of array, Sub procedure, Functions, Passing arguments by ref, Passing arguments by val. Msgbox & Inputbox, String manipulation.	10
III	Object Oriented Programming: Concepts of classes & objects, field, Properties, methods and events, Creating a class, Constructors and Destructors, Inheritance, Access modifiers, Overloading & Overriding.	12
IV	Working with Forms: Loading, showing and hiding forms, controlling one form within another. GUI Programming with Windows Form: working of basic controls-Textbox, Label, Button, Listbox, Combobox, Checkbox, PictureBox, Image Control, RadioButton, Timer.	10
V	Data Access with ADO.NET: What are Databases, Accessing Data with the Server Explorer, Architecture of Ado.net, Data providers, Ado.net objects: Connection, Command, DataReader. Data Controls: Repeator, Grid View, DetailView.	12
	Text Books : 1. Steven Holzner, Visual Basic.NET Programming Black Book PARAGLYPH PRESS Dreamtech Publications. 2. Visual Basic 2010 Programming Black Book, PLATINUM Edition, Dreamtech Press, KOGENT Learning Solution Inc. 3. Shirish Chavan, Visual Basic.NET PEARSON Education. 4. Michal Halvorsons, MICROSOFT VISUAL BASIC.NET STEP BY STEP, Prentice-Hall of India Private Limited, New Delhi	
	References : 1. Alisstair McMonnies, Object Oriented Programming in Visual Basic.NET, Pearson Education 2. Hamilton J.P., OOP with Visual Basic.NET, O'Reilly Media Inc. 3. Francesco Balena, Programming Microsoft Visual Basic.NET, Microsoft Press.	

Course Outcome :

1. Acquire the knowledge about .NET Framework and major enhancements to the new versions of Visual Basic.
2. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE)
3. Implement Object Oriented Features in VB.Net
4. Create applications using Microsoft Windows Forms
5. Create applications using ADO. NET technology

Subject Code	**15BSC203**

Subject Name	**Laboratory of Computer Science-I**
Short Name	**LCS-I**
Total Lectures	**90**
Total Credits	**3**

Group	Contents	Total Lectures
A	Minimum 15 practical based on Data Structures: 11. Practical Based on insertion of element in an array. 12. Practical Based on deletion of element from an array. 13. Practical Based on insertion of element in queue. 14. Practical Based on deletion of element from queue. 15. Practical Based on insertion of element in linked list. 16. Practical Based on deletion of element from linked list. 17. Practical Based on recursion. 18. Practical Based on recursion on string. 19. Practical Based on push operation. 20. Practical Based on pop operation. 21. Practical Based on traversing. 22. Practical Based on linear search. 23. Practical Based on binary search. 24. Practical Based on sorting. 25. Practical Based on tower of Hanoi.	45
B	Minimum 5 practical based on VB.Net: 1. Write VB.Net program for simple calculator. 2. Write a VB.Net program to determine whether an input number is an even number. 3. Write VB.Net program for Condtional if else. 4. Write VB.Net program for Select Case. 5. Write VB.Net program to Swap Two Numbers. 6. Write VB.Net program to demonstrate use of for loop. 7. Write a program to sort the numbers in an array. 8. Write VB.Net program to demonstrate string manipulation functions. 9. Write VB.Net program to demonstrate arguments passing mechanism. 10. Write VB.Net code to demonstrate classes and objects. 11. Write VB.Net program to demonstrate method overloading. 12. Write VB.Net code to demonstrate use of picture box. 13. Write VB.Net code to demonstrate use of timer. 14. Write a VB.Net program to demonstrate use of connected database objects. 15. Write VB.Net for Ado.Net controls.	45

Subject Code	**15BSC204**
Subject Name	**Statistics–I: Theory of Estimation**
Short Name	**TE**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The students must have basic knowledge of Probability theory.
- Student must have knowledge of various measures such as Measures of Central tendency, dispersion, etc.

Objectives:

- To be able to apply theory of estimation in day to day life problems.
- To study how to apply inferential statistics.
- To study the theory of testing of hypothesis and its applications.

Units	Contents	Total Lectures
I	**Basic theory of sampling:** Concept of Population & sample, Definition of a random sample, Concept of a statistic and its sampling distribution, random sampling from Binomial & Poisson distribution, Introduction to Normal distribution concept of standard normal variable & standard normal distribution, Independence of sample mean and variance in random sampling from a normal distribution (without derivation).	12
II	**Sampling Distribution-1:** Concept of Sampling Distribution, Concept of Standard Error and its applications, Introduction to Chi-square variable with 1 & n degrees of freedom, p.d.f. of chi-square distribution, mean & variance of chi-square distribution.	10
III	**Sampling Distribution-2:** Concept of Student's – t statistics & Fisher's – t statistics, student's – t distribution, Fisher's F – distribution. Relation between Chi-square, Student's – t and Fisher's – F distribution.	12
IV	**Introduction to Estimation**: Definition & concept of Estimation**,** Types of estimation: Point estimation and interval estimation, Definition of estimator and estimate, mean and variance of estimator, Concept and definition of Confidence interval, 95% confidence interval of mean and proportion, Determination of size of sample.	12
V	**Properties of good Estimator:** Important properties of good estimator Unbiasedness, Consistency, Efficiency & Sufficiency, Concept of Minimum variance unbiased estimator (MVUE), Cramer-Rao lower bound for variance.	10
	Text Books: 2. S.C .Gupta, V. K. Kapoor, Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics – E. Narayanan Nader. 3. Goon A. M., Gupta M. K., Das Gupta B., Fundamentals of Statistics, Vol. - I & II, The World press, Calcutta (1999). 4. Gupta and Mukhopadhyay P.P., Applied Statistics, Central Book Agency, S. Chand Publications.	
	References: 5. J. Medhi, Statistical methods, An introductory text, New Age International, (1992). 6. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 7. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt. Ltd., New Delhi (1955).	

Course Outcome :

1. Develop ability to recognized sample and population and it's difference.
2. Gain ability to recognize the application of estimation theory.
3. Able to use chi-square distribution, student-t distribution and F distribution

Subject Code	**15BSC205**
Subject Name	**Statistics–II: Vital Statistics**
Short Name	**VS**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The students must have basic knowledge of set theory such as union of set, intersection of set, complementation etc.
- Student must have knowledge of variables, types of variables, attributes etc.

Objectives:

- To be able to apply probability to solve day to day life problems.
- To study how to develop probability model and important concepts in probability.
- To study the theory of attributes and its applications.

Units	Contents	Total Lectures
I	**Census:** Definition, Population, Population census, Need of census, Methods of carrying out census-Defacto and Dejure, General idea of census in India, Defects of population census. **Sample Survey:** Definition, Errors in sample survey, Various stages in sample survey, Definition of Sampling, Advantages of sample survey over complete census.	12
II	**Indian official Statistical System:** Present official statistical system in Indian, Methods of collection of official statistics, its reliability and limitations, Principle Publications of Statistics such as population, agriculture, industry, transportation and communication.	10
III	**Demographic Methods:** Definition of vital statistics, Rates and Ratios of vital events, Methods of obtaining vital statistics-Registration method, Census method, Survey method, Analytical method. Uses of vital statistics. **Measures of Mortality:** CDR, SDR, IMR, Standardized death rates (Direct and Indirect), merits and demerits of all.	12
IV	**Measures of Fertility:** CBR, GFR, TFR, Age-SFR. Measurement of population growth, Crude rate of natural increase and vital index, GRR and NRR.	12
V	**Life Table:** Meaning, Notations and Terminology, Stationary Population, Stable Population, Main features , Various elements of life table and their relations, construction of life table, Probability of dying, Uses of life table.	10
	Text Books: 1. Shrivastava O.S.,"A Textbook of Demography", Vikas Publishing (1983). 2. J. Medhi, Statistical methods, an introductory text, New Age International, (1992). 3. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics –E. Narayanan Nader.	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 3.Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi(1955).	

Course Outcomes:

1. Acquire the understanding and Future scope of upcoming Census .
2. Students gains indepth knowledge of census theory
3. Gain knowledge of Demographic methods and measures of mortality and fertility.
4. Able to compare previous and upcomming census.
5. Knowledge to deal with the problems of census.

Subject Code	**15BSC206**

Subject Name	**Laboratory of Statistics-I**
Short Name	**LS-I**
Total Lectures	**90**
Total Credits	**3**

Group	Contents	Total Lectures
A	1. Drawing random samples from Binomial distribution. 2. Drawing random samples from Poisson distribution. 3. Drawing random samples from Normal distribution. 4. Computation of Standard error. 5. Computation of mean and variance of Estimator. 6. Estimation of confidence interval & Determination of sample size. 7. Computation of mean and variance of Chi-square distribution. 8. Computation of mean and variance of student-t distribution. 9. Computation of mean and variance of student-t distribution.	45
B	1. Computation of various measures of mortality. 2. Computation of Standardized death rates by Direct method. 3. Computation of Standardized death rates by Indirect method. 4. Construction of Life table. 5. Computation of GFR & CBR. 6. Computation of TFR & Age-SFR. 7. Computation of GRR. 8. Computation of NRR. 9. Computation of crude rate of natural increase & Pearle's Vital Index.	45

Subject Code	**15BSC207**
Subject Name	**Electronics-I: Study Of Opamp And Power Supply**
Short Name	**SOPS**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Basic concepts of electricity
- Basics knowledge of electronic components

Objectives:
- To expose the students about basic concept of operational amplifier
- To understand working of OPAMP used in electronic devices.
- To expose the students about IC 741 OPAMP

Units	Contents	Total Lectures
I	**Differential amplifier:** Introduction to DC amplifier, working of differential amplifier, Need of two power supplies, types of differential amplifier, differential mode gain, common mode gain, C.M.R.R.	10
II	**Basics of Operational Amplifier:** Circuit symbol of OP-AMP, Pin out and packaging of OP-AMP, block diagram of OPAMP, parameters of OP-AMP and characteristics of an ideal OP-AMP, open loop configuration, drawbacks of open loop configuration, closed loop OPAMP configuration	12
III	**Applications of Operational Amplifier:** OP AMP as an inverting amplifier, concept of virtual ground, non-inverting amplifier, unity gain amplifier, adder, subtractor, integrator, differentiator, comparator	12
IV	**Rectifiers and filters:** Construction working, efficiency, PIV and ripple factor of half wave, full wave and bridge rectifiers, comparison between rectifier **Filters**: Idea of filter, types of capacitive filter(introduction only)	10
V	**Regulators:** line regulation, load regulation, Zener regulator, Regulated power supply design using series pass transistor, General features of IC regulators, 78xx,79xx , LM 317, LM 317 as variable regulator,	12
	Text Books: 1. Sanjeev Gupta, Electronic Devices And Circuits, Dhanpat Rai publications 2. Ramakant Gayakwad,Op-amps and Linear Integrated Circuits, Prentice Hall publications 3. U.A.Bakshi, A.P.Godse,Basic Electronics Engineering,technical publication pune	
	References: 9. Allen Mottershed, Electronic Devices and circuits, Prentice hall of India Pvt. Ltd. 10. R. G. Kale, U. K. Puranik, V. N. Pendse, Kitab Mahal, An Introduction to Electronics. 11. Grob, Basic Electronics ,Tata McGraw Hill 12. T. L. Floyd, Electronic Devices , Pearson Education Asia 13. V. K. Mehta, Rohit Mehta, Principles of Electronics	

Course outcomes:
1. Ability to define significance of Op Amps and their importance
2. Able to apply op-amps fundamentals in design and analysis of op-amps applications.
3. Attain in-depth knowledge of charactristics and parameters of Op-Amp.
4. Use OP Amp as Summer, Subtractor, Differentiator, Intergrator, comparator and Unity gain amplifier
5. Ability to demonstrate facility at constructing and trouble shooting op amp circuits in the laboratory with proper use of test equipment.
6. Use diodes to design rectifiers and power supply circuits, an unregulated DC power supply, a regulated DC power supply, Voltage regulators.

Subject Code	**15BSC208**
Subject Name	**ELECTRONICS II:ELECTRONIC INSTRUMENTATION**
Short Name	**ET**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
The student should know the basic knowledge of instruments.
Student should be aware of basics of measuring instruments or devices.

Objectives :
- To aware the students about various terms related to instruments and instrumentation system.
- To understand how transducers works inside an instrumentation system.
- To expose the students about constructional and operational details of measuring instruments.

Units	Contents	Total Lectures
I	**Basics of instrumentation:** Block diagram of generalized instrumentation system, definitions of accuracy, precision, resolution, error, sensitivity. Concept of transducers(primary and secondary, active and passive, analog and digital), Electrical transducers, advantages, selection criteria of transducer	10
II	**Types of Transducers:** Resistive transducers (potentiometer), inductive transducer (LVDT), capacitive transducer(by changing distance), measurement of displacement using capacitive transducer (by changing dielectric)	10
III	**Temperature Measurements:** Resistive Thermometer, Thermister, Thermo couple : their types, Construction, use in measurement of temperature, advantages. Strain gauge, Infrared pyrometer and total radiation pyrometer.	12
IV	**Pressure Measurement:** Types of pressure measurement devices, Inductive, Capacitive transducer, piezoelectric transducer: construction, working. Measurement of low pressure: concept and working of thermocouple Vacuum gauge, pirani gauge, Ionization type vaccum gauge	12
V	**Measurement of Flow, Level And Humidity:** Flow Measurement: Using Ultrasonic, Electromagnetic and Hot wire anemometer. Level measurement: Resistive, using gamma rays, Ultrasonic method. Humidity measurement: Resistive transducer	12
	Text Books: 3. A.K. Sawhney, Electrical and Electronic Measurements and Instrumentation, (Dhanpat Rai and sons) 4. H.S. Kalsi, Electronic Instrumentation	
	References: 9. W. D. Cooper and A. D. Helfrick, Electronic instrumentation and Measurement Techniques, (Prentice Hall) 10. C. S. Rangan, G. R. Sharma, V. S. V. Mani, Instrumentation Deices and Circuits, (McGraw Hill) 11. R. S. Khandpur, Handbook of Biomedical Instrumentation, (Tata McGraw Hill Ltd.2003) 12. Design G. Haridasan, Biomedical Instrumentation- Principles, Measurements and (Vipul Prakashan, Mumbai)	

Course Outcomes:
1. Analyze the characteristics of different transducer for the measurement purpose of various physical quantity.
2. Design the basic building blocks of measurement/instrumentation system.
3. Making of the mini project for physical quantity measurement.

Subject Code	**15BSC209**
Subject Name	**LABORATORY OF ELECTRONICS-I**
Short Name	**LE-I**
Total Lectures	**90**
Total Credits	**3**

Group	List of Experiments	Total Lectures
A	1. Study of OPAMP as Inverting amplifier. 2. Study of OPAMP as Non-inverting amplifier. 3. Study of OPAMP as unity gain amplifier. 4. Study of OPAMP as an adder. 5. Study of OPAMP as a subtractor. 6. Study of half wave rectifier. 7. Study of full wave rectifier. 8. Study of bridge rectifier. 9. Study of zener diode as regulator. 10. Study of regulated power supply.	45
B	1. Study of generalized instrumentation system 2. To study the characteristics of Photo-voltaic cell. 3. To study the characteristics of Photo-conductive cell. 4. Measurement of displacement using LVDT. 5. Measurement of temperature by thermister. 6. Measurement of temperature by thermocouple. 7. Measurement of strain using strain gauge. 8. Measurement of Pressure using pressure gauge transducer. 9. Study of resistive transducer (Potentiometer). 10. Study of capacitive transducer.	45

Subject Code	**15BSC210**
Subject Name	**ENVIRONMENTAL STUDY**
Short Name	**EVS**
Total Lectures	**40**
Total Credits	**2**

Prerequisites :
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Objectives:
- To create awareness about environmental problems among the students.
- To impart basic knowledge about the environment and its applied problems.
- To develop an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

Units	Contents	Total Lectures
I	**The multidisciplinary nature of environmental studies:** Definition, Scope and importance, Need for public awareness. **Human population and the environment:** Population Explosion, Human Rights, Environment and Human Health, Women and Child Welfare Programme.	8
II	**Social Issues and The Environment:** From unsustainable development to sustainable development, Water conservation- Rain water harvesting, Watershed management, Global Warming, Acid-rain, Environment Protection Act, Air (Prevention and Control of pollution), Act, Wildlife protection Act.	8
III	**Natural Resources:** Renewable and non-renewable resources, Forest resources, Water resources, Mineral resources, Food resources, Land resources.	6
IV	**Ecosystem, Biodiversity and its conservation:** Ecosystem- Concept of ecosystem, Structure and functions of ecosystem, Structure and functions of ecosystem- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem, **Biodiversity:** Introduction- Definition, Genetic, Species and Ecosystem diversity, Values of biodiversity, Hot-spots of biodiversity, threats to biodiversity, Conservation of biodiversity: In-situ and Ex-situ conservation.	10
V	**Environmental Pollution:** Causes, effects and control measures of- Air pollution, Soil pollution, Water pollution, Noise pollution, Thermal pollution, Solid waste management.	8
	Text Books : 4. Prof. K. Gawai, Environmental studies, Sanskar publications. 5. Environmental studies: R. Rajgopalan, Oxford uni.press, New Delhi, 2005.	
	References : 1. Agarwal, K. C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner. 2. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R) 3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R. S., Marine Pollution, Clanderson Press Oxford (TB) 4. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p 5. De A.K., Environmental Chemistry, Wiley Eastern Ltd.	

Course Outcomes:
1. Students will gain knowdge of Ecosystem, Biodiversity and Environmental Pollution.
2. Ability to understand Causes, effects and control measures of Polluation.
3. Achieve awareness about Water conservation- Rain water harvesting, Watershed management, Global Warming, Acid-rain, Environment Protection Act, Wildlife protection Act.

Syllabus of Second Year B. Sc. (Comp. Sci.) Semester IV

Subject Code	**15BSC211**
Subject Name	**Computer Science I:Database Management Systems**
Short Name	**DBMS**
Total Teaching Hrs.	**56**
Total credits	**3**

Prerequisites :
- Students should have the basic knowledge of database.

Objectives:
- To develop problem solving abilities using relational database management systems.
- To learn basic principles of database management systems and relational database systems.
- To develop skills for project management and framework activity using relational database management system.

Units	Contents	Total Lectures
I	**Basic concept:** Database management System, Roles in database environment, Architecture of DBMS, Components of DBMS, Advantages and disadvantages, DBA and its Role. **Database Models**: Relational, Hierarchical, Network with its advantages and its disadvantages.	10
II	**Relational Model:** Relation, Domain & Attributes, Keys, Relational Algebra and Calculus, Entity Relationship Model, E-R Diagram , Functional dependency . **Normalization:** Introduction,1NF, 2NF, 3NF, BCNF.	10
III	**SQL:** Introduction, Basic Structure of SQL Query, Components of SQL, Datatypes, Operators. **DDL Commands:** CREATE, ALTER , DROP, DESCRIBE, TRUNCATE **DML Commands:** SELECT, INSERT, DELETE, UPDATE. Integrity constraint. **DCL** : GRANT, REVOKE, ROLLBACK, COMMIT	12
IV	**Functions**: Numeric Function, AVG, MAX, MIN, SUM, COUNT, GREATEST, LEAST, ABS, MOD, FLOOR, CEIL, TRUNK, SORT, SQRT, SIGN, SIN, COS, LOG, EXP. **Character Functions**: LENGTH, LOWER, UPPER, INITCAP, INSTR, SUBSTR, LPAD, RPAD, LTRIM, RTRIM, DECODE, SOUNDEX. **Joins**: EQUI JOIN, SELF JOIN, unions	12
V	**PL/SQL**: Introduction, Features, Block Structure, Constants and variables, data types, control structure. **Programming Cursor**: Concept of cursor, types of cursor, declaring cursor, opening and fetching cursors, cursor attributes, closing cursor.	12
	Text Books: 1. C.J.Date, An Introduction to Database management systems, Addison-Wesley publishing Company,(8^{th} edition),1981 2. Mujumdar & Bhattacharya, Database Management Systems, Published by Tata McGraw- Hill Education Pvt Ltd.,2004 3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Fifth Edition, McGrawHill Publication.	
	References: 1. Ramakrishnan, Gehrke, Database Management Systems Third Edition, McGrawHill Publication. 2. Ramez Elmastri, Shamkant B. Navathe, Fundamentals of Database Systems Fifth edition, Pearson Education.	

Course Outcomes:
1. Ability to describe data models and schemas in DBMS
2. Acquire knowledge about the features of database management systems and Relational database.
3. Able to use SQL; the standard language of relational databases.
4. Ability to understand the functional dependencies and design of the database.

Subject Code	**15BSC212**
Subject Name	**Computer Science-II: Object Oriented Programming**
Short Name	**OOP**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The student should have the basic knowledge of C Programming
- The student should be able to do computations.
- The students should posses the logical thinking ability.

Objectives:

- To build the basic skills of programming.
- To learn and implement the OOPs features.
- To acquire the importance of C++ programming using various methodologies.

Units	Contents	Total Lectures
I	**Introduction:** Basic Concepts of OOP, Comparison with POP, features and applications of OOP, Introduction of C++, structure of C++ program, tokens, keywords, identifiers and constants, basic data types & user defined data types, variables, declaration of variables. **Operators:** operators in C++, scope resolution operator, member dereferencing operator, type cast operator.	12
II	**Control statements:** if statement, if..else, nested if..else, switch,break, continue, do..while, while, for statements. **Functions:** Functions prototype, Function calling and returning and their types, call by reference, return by reference, inline functions, function overloading.	10
III	**Classes and objects:** Class specification, Creating objects, Accessing class member, Defining member functions, Arrays within class, Arrays of objects, friend functions. **Constructors:** Defining constructor, parameterized constructor, multiple constructor in a class, constructor with default argument, destructor.	10
IV	**Operator overloading:** Defining operator overloading, unary and Binary operator overloading, rules for overloading operators. **Inheritance:** Introduction, derived classes, Single inheritance, multiple inheritance, Hierarchical and Hybrid inheritance.	12
V	**Arrays and Pointers:** One-dimensional, two-dimensional arrays, Defining Pointers, Pointers to objects, this pointer. **Virtual function and Polymorphism**: Introduction, pointers to derived class, dynamic binding, concept of virtual function, pure virtual function, rules for virtual function.	12
	Text Books: 1. Object oriented Programming with C++ by E Balgurusamy, 5th edition, Tata Mc Graw- Hill, New Delhi, India, (2011). 2. Let us C++ by Yashwant Kanetkar, 2nd edition, BPB publication, New Delhi, India, (1999). 3. Mastering C++ by K.R.Venugopal, Rajkumar, T Ravishankar, Tata Mc Graw-Hill, New Delhi, India, (2009). 4. Object-Oriented Programming in C++ by Robert Lafore, 4th edition, Pearson education.	
	References: 5. The Complete reference C++ by Herbert Schildt. 6. Teach yourself C++ by AL Stevens, 4th edition, BPB publications.	

Course Outcome :

1. Implement Basic Concepts of Object oriented programming language
2. Attain knowledge about the programming structure of C++ language
3. Implement the concepts of Objects, Classes, Methods, Constructors and Destructors
4. To design complex classes: Friend Functions and Static member functions, Inline functions.
5. To implement Inheritance: Single Inheritance, Multiple Inheritance, Multi-level Inheritance, Hierarchical Inheritance and Hybrid Inheritance.
6. To implement the concepts of Arrays and Pointers.

Subject Code	**15BSC213**
Subject Name	**Laboratory of Computer Science-II**
Short Name	**LCS-II**
Total Lectures	**90**
Total Credits	**3**

Group	Contents	Total Lectures
A	Minimum 10 practical based on : 1. Practical based on basic DDL commands. 2. Practical based on basic DML commands 3. Practical based on Clauses[ORDER BY,GROUP BY,HAVING] 4. Practical based on Operators 5. Practical based on Views and Operations on Views 6. Practical based on Numeric functions 7. Practical based on Group functions 8. Practical based on Character functions 9. Practical based on Conversion functions 10. Write a program to display simple message in PL/SQL 11. Write a program greatest among two numbers in PL/SQL 12. Write a program to read a given number is even or odd in PL/SQL 13. Write a program for addition of two numbers in PL/SQL 14. Write a program for calculating simple interest in PL/SQL 15. Write a program to find area and circumference of circle in PL/SQL	45
B	Minimum 10 practical based on: 1. Practical based on structure of C++ program basics. 2. Practical based on use of Operators. 3. Practical based on the use of decision making statement. 4. Practical based on the use of looping statement. 5. Practical based on the use of data input output statement. 6. Practical based on Classes and Objects. 7. Practical based on the use of functions. 8. Practical based on the use of function overloading. 9. Practical based on the use of array and objects. 10. Practical based on Constructor and Destructors. 11. Practical based on the use of pointers. 12. Practical based on Operator Overloading. 13. Practical based on the use of inheritance. 14. Practical based on the use of polymorphism. 15. Practical based on virtual function.	45

Subject Code	**15BSC214**
Subject Name	**Statistics–I: Statistical Inference**
Short Name	**SI**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- The students must have basic knowledge of Probability Distribution.
- Student must have knowledge of theory of estimation & statistical inference etc.

Objectives:
- To be able to apply theory of Statistical inference in day to day life problems.
- To study how to apply small sample tests.
- To study the theory of non-parametric tests and its applications.

Units	Contents	Total Lectures
I	**Introduction to Testing of Hypothesis:** Introduction to Testing of Hypothesis, Concept of hypothesis, simple hypothesis and composite hypothesis, null and alternative hypothesis, one-tailed & two tailed alternative hypothesis, types of errors; p-values, level of significance, power of a test, Steps involved in Testing of Hypothesis.	10
II	**Large Sample Tests :**Introduction to Large Sample Tests with assumptions, Large sample test for population mean: 1) Test for single mean, 2) Test for significance of two population means, Large sample test for population proportion : 1) Test for single proportion, 2) Test for significance of two population proportions.	10
III	**Small Sample Tests:** Introduction to small sample tests, difference between large sample tests and small sample tests, Assumptions & limitations of small sample tests. **I)** Small sample tests based on Chi-square distribution : 1) Test for goodness of fit , 2) Test for independence of two attributes, i) for 2x2 contingency table, ii) for mxn contingency table, 3) Test for significance of population variance/S.D., **II)** Small sample tests based on student's – t distribution : 3. Test for single mean,2) Test for significance of two population mean, 3) Paired t- test, **III)** F-test significance of two Population Variance.	16
IV	**Non-Parametric Test-1 :**Introduction to Non-Parametric Tests, difference between Parametric tests and non-parametric tests, applications and uses of non-parametric tests, limitations of non-parametric tests, definition of order statistics, concept & definition of RUN, RUN test for univariate and Bivariate distributions.	10
V	**Non-Parametric Test-2:** Sign test for univariate and Bivariate distributions, Wilcoxon-Mann-Whitney test, Kolmogorov- SmirnovTest (one sample & two samples).	10
	Text Books: 1. Gupta and Mukhopadhyay P.P., Applied Statistics, Central Book Agency, S. Chand Publications. 2. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 3. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics –E. Narayanan Nader.	
	References: 1. J. Medhi, Statistical methods, an introductory text, New Age International. 2. Brase&Brase, Understandable Statistics, 11th edition, Cengage Learning. 3. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi (1955).	

Course Outcomes:
1. Ability to recognize the difference between parametric and non-parametric test.
2. Ability to recognize to set up the hypothesis and test it.
3. Ability to recognize the difference between the large sample test and small sample test.

Subject Code	**15BSC215**
Subject Name	**Statistics–II: Economic Statistics**
Short Name	**ES**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- The students must have basic knowledge of set theory such as union of set, intersection of set, complementation etc.
- Student must have knowledge of variables, types of variables, attributes etc.

Objectives:

- To be able to apply concept of Index No., Demand analysis to solve day to day life problems.
- To study how to develop Time series model and important concepts in Time series.
- To study the theory of Consumer behavior and its applications.

Units	Contents	Total Lectures
I	**Index number:** Meaning and importance of index number, Steps in construction of index number. Methods of construction of index number (Simple aggregate method or Weighted average method, Price relative (simple and weighted), Quantity relative), Problems involved in construction of index number. **Tests of index number:** Time reversal test and Factor reversal test. Uses of index number.	10
II	**Time Series I :** Meaning and definition of time series, Components, Models of time series, **Measurement of trend:** Graphical method, Method of Moving averages.	10
III	**Time Series II:** Measurement of seasonal variation, Depersonalization, Measurement of Cyclic variation(general idea), Time series in forecasting, Uses of time series analysis.	12
IV	**Demand Analysis:** Meaning and definition of demand analysis, Laws of demand and supply analysis, Income elasticity, Price and Cross elasticity (Equilibrium price), Parato Law of Income distribution.	12
V	**Theory of Consumer Behavior:** Introduction to theory of consumer behavior, Definition of Total, Marginal and Average Utilities, Relation among TU, MU, and AU, Maximization of Utility(Lagrangian Multiplier method of maximization), Law of diminishing marginal utility, Indifference curve approach(Properties).	12
	Text Books: 1. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt Ltd., New Delhi(1955). 2. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000). 3. 'Guide to current Indian Official Statistics', Central Statistical Organization, Govt. of India, New Delhi.	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. J. Medhi, Statistical methods, an introductory text, New Age International, (1992). 3. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014).	

Course Outcomes:

1. Students will acquire the detailed knowdge of Index numbers, Time series and Demand analysis.
2. Students will acquire knowledge about utility of trend analysis, demand analysis.
3. Students will be able to apply forecasting techniques of time series practically.

Subject Code	**15BSC216**
Subject Name	**Laboratory of Statistics-II**
Short Name	**LS-II**
Total Lectures	**90**
Total Credits	**3**

Group	Contents	Total Lectures
A	1. Large sample test for single mean. 2. Large sample test for two population means. 3. Large sample test for single Proportion 4. Large sample test for two population proportions. 5. Test of significance based on t-test. 6. Test of significance based on F-test. 7. Chi-square test for goodness of fit. 8. Chi-square test for Independence of attributes in contingency tables. 9. Run test and Sign test for univariate and Bivariate distributions. 10. Wilcoxon-Mann-Whitney test and Kolmogorov - Smirnov Test.	45
B	1. Construction of price index numbers. 2. Construction of quantity index numbers. 3. Applications of time reversal test. 4. Applications of factor reversal test. 5. Measurement of linear trend by Graphical Method. 6. Measurement of linear trend by Method of moving averages. 7. Measurement of linear trend by Method of Semi-averages. 8. Measurement of seasonal variations by Method of simple averages. 9. Measurement of seasonal variations by Ratio to moving average method. 10. Computation of Price Elasticity of Demand and Income Elasticity of Demand.	45

Subject Code	**15BSC217**
Subject Name	**ELECTRONICS I: STUDY OF AMPLIFIERS AND OSCILLATORS**
Short Name	**SAO**
Total Lectures	**56**
Total Credits	**3**

Prerequisites
- Basic knowledge of electronic components.
- Basic knowledge of semiconductor devices.

Objectives
- To expose the students about basic concept of amplifier and oscillators used in electronic devices.
- To understand working of amplifiers and oscillator.
- To expose the students about basic amplifier design.

Units	Contents	Total Lectures
I	**Small Signal BJT Amplifiers:** Single stage amplifier: Basic idea of amplifier, Construction and working of CB ,CE and CC amplifier, comparison of CB ,CE and CC amplifier with respect to gains, phase and input output resistance **Multi Stage Amplifier:** construction, working, frequency response, merits and demerits of RC coupled transistor amplifier, transformer coupled amplifier.	12
II	**Feedback Amplifier:** Concept and general theory of feedback, concept of positive and negative feedback, Types of negative feedback, Advantages of negative feedback, construction and working of Emitter follower, Darlington emitter follower.	10
III	**Power Amplifier :**Classification: Class A, Class B, Class C ,Class AB amplifiers, Class A - transformer coupled amplifier, Class-A push-pull amplifier and Class-B push-pull amplifier (Construction, working, efficiency, merits and demerits).	12
IV	**Sinusoidal oscillator:** Concept of oscillator, barkhausen criteria of oscillation, construction, working, merits and demerits of RC phase shift, Wien bridge, Colpitts, Hartley and Crystal oscillators.	12
V	**Multivibrators:** Basic concept of multivibrator, Construction working, frequency of oscillation, merits and demerits of Astable,monostable and bi-stable multivibrator, comparison between multivibrators, Construction and working of schmitt trigger	10
	Text Books: 1. Sanjeev Gupta, Electronic Devices And Circuits, Dhanpat Rai publications 2. V. K. Mehta, Rohit Mehta, Principles of Electronics 3. B. L. Theraja, Basic Electronics, S. Chand and Company	
	References: 1. Bhargava, Kulshreshtha, Basic electronics and linear circuits, Gupta Technical education. 2. G. Pimpale, Sushama Pimpale, Functional circuits in Electronics, Mcmillan India ltd. 3. Ryder, Electronics Fundamental and applications, PHI 4. M. K. Bagde, S. P. Singh, Kamal Singh, Elements of electronics, S.Chand and Co. 5. N. C. Goyal, R. K. Khetan, Monograph on electronic design principles, 6. A. P. Godse, U. P. Bakshi, EDC I EDC II, Technical Publishers Pune	

Course Outcomes:
1. Able to tell the significance of Amplifiers and their importance
2. Attain in-depth knowledge of Multistage voltage and power amplifiers
3. Able to demonstrate facility at constructing and trouble shooting amplifier circuits in the laboratory with proper use of test equipment.
4. Acquire knowledge about the basic concept of Oscillators, its types and applications.

Subject Code	**15BSC218**
Subject Name	**Electronics II: ANALOG COMMUNICATION**
Short Name	**AC**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic concepts of Analog Communications.

Objectives:

- Know different Electronic Communications System.
- Understand concept of modulation and demodulation of AM/FM.
- Understand the concept of optical fiber communication.

Units	Contents	Total Lectures
I	**Introduction to Electronic Communication:** Importance, Block diagram of Communication System, Types Of Electronic Communications, Simplex, Duplex – Full And Half, Applications of Communication System, Analog Communication System:Defination, advantages, disadvantages, applications.	10
II	**Modulation:** Defination, Need of Modulation, Types of Modulation, Theory of AM: Modulation Index, Theory of FM, problems	12
III	**Demodulation,Transmitters & Receivers:** Defination of Demodulation, diode detectors, Balanced Slope Detectors, AM & FM transmitters, **Receivers**:TRF Receivers, Superheterodyne receivers	12
IV	**Optical Fiber Communication System:** Introduction , Principle of Optical Fibers, Structure of Optical Fibers, Types of Optical Fibers:Single Mode & Multimode Fibers,Step index & Graded Index Optical fibers, Block diagram of Optical Communication System	12
V	**Optical Sources & Photo Detectors:** **Optical Sources**:**LED**: principle, construction, working & application , **LASER**:photon absorption ,Spontaneous Emmision,Stimulated Emmision, **Photo Detectors**: **PIN photodiode**: Construction & Working, Characteristics: Quantum Efficiency, Responsivity, **Avalanche Photodiode**: principle, construction, working.	10
	Text Books: 3. V Chandra Sekar, Analog Communication,Oxford University Press 4. Louis E Frenzel, Communication Electronics , TATA Mc-Graw Hill 5th Edition 5. George Kennedy, Bernard Davis, SRM Prasanna, Electronic communication Systems, TATA Mc-Graw Hill 5th Edition.	
	References: 9. Dennis Roddy, John Coolen, Electronic Communications Pearsons Prentice hall of India Pvt. Ltd. 10. Gerd Keiser , Optical Fiber Communications, Tata McGraw Hill 11. Sanjeev Gupta , Electronics Devices & Circuits, Dhanpat Rai publications 12. B.L.Theraja , Basic Electronics, S. Chand and Company 13. U.A.Bakshi,A.P.Godse, Basic Electronics Engineering,technical publication pune	

Course Outcomes:

1. Acquire knowledge of generalized communication system.
2. Attain in-depth knowledge of electronic communication system at the transmitter and receiving end.
3. Able to design the communication system for small or local area.

Subject Code	**15BSC219**
Subject Name	**Laboratory of Electronics-II**
Short Name	**LE-II**
Total Lectures	**90**
Total Credits	**3**

Group	List of Experiments	Total Lectures
A	1. Study of frequency response of single stage CE amplifier. 2. Study of frequency response of single stage CB amplifier. 3. Study of RC coupled amplifier. 4. Study of phase shift oscillator and calculation of frequency. 5. Study of Colpitts oscillator and calculation of frequency. 6. Study of Hartley oscillator and calculation of frequency. 7. Study of Wien Bridge oscillator and calculation of frequency. 8. Study of astable multivibrator. 9. Study of monostable multivibrator. 10. Study of bistable multivibrator.	45
B	1. Study of amplitude modulation. 2. Study of amplitude demodulation. 3. Study of frequency modulation. 4. Study of frequency demodulation. 5. Study of diode detector. 6. Study of fiber optic communication. 7. Study of Superheterodyne receicver. 8. Study of photo diode. 9. Study of PIN photo diode. 10. Study of LASER diode.	45

Subject Code	**15BSC220**
Subject Name	**DISASTER MANAGEMENT**
Short Name	**DMng**
Total Lectures	**40**
Total Credits	**2**

Prerequisites :
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Objectives:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Units	Contents	Total Lectures
I	**Introduction to Disasters:** Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks).	6
II	**Disasters:** Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, Climate change.	8
III	**Approaches to Disaster Risk reduction:** Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, states, Centre, and other stake-holders.	9
IV	**Inter-relationship between Disasters and Development:** Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation.	8
V	**Disaster Risk Management in India Hazard and Vulnerability profile of India Components of Disaster Relief:** Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy).	9
	Text Books: 1. Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi. 2. KapurAnu 2010: Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi.	
	References: 1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000 2. Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008 3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge. 4. Coppola P Damon, 2007. Introduction to International Disaster Management, 5. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines. 6. Cuny, F. 1983. Development and Disasters, Oxford University Press. 7. Document on World Summit on Sustainable Development 2002. 8. Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.	

Course Outcomes:

1. Acuire an understanding of vulnerabilities and to work on reducing disaster risks and to build a culture of safety.
2. Ability to understand Causes, effects and control measures of Disaster Management.

Note: There will be a Project Work (Field Work, Case Studies) for this subject. The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Project must be conceived creatively based on the geographic location and hazard profile of the region where the college is located.

Syllabus of Third Year B. Sc. (Comp. Sci.) Semester V

Subject Code	**15BSC301**
Subject Name	**COMPUTER SCIENCE I: SYSTEM ANALYSIS & DESIGN**
Short Name	**SAD**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :
- Knowledge and understanding of business systems.
- Knowledge of programming methodology and data processing.

Objectives:
- To study the requirements gathering, elicitation and analysis.
- To learn methods and techniques of systems development.
- To study the tools and techniques of system development, testing and maintenance.

Units	Contents	Total Lectures
I	**System development life cycle: -** Goals, system, computer base business system, personal traits of analyst, System life cycle, working with technology, Preliminary System Analysis, Goals and Review, fact finding and reviews.	12
II	**Detailed analysis:** review and assignment, feasibility study. **Modeling tools for system analyst:** Goals, role of data in business, modeling with DFD, DFD's With CASE. **Structural methodology:** Need relevant CASE technology	12
III	**Prototyping System analysis:** 3Gls, 4Gls, object oriented analysis. **System design:** guidelines for output design, formatting and designing report, data entry process, input design and data collection.	12
IV	**Software design:** program definition, module design. **Overview of implementation**: Scheduling and assigning a task, testing and training, system maintenance, management issue.	10
V	**Project Scheduling:** Introduction, What is project Management, Planning Tools, Project Management Software. **System Security**: Definition, Threats of System Security, Control Measures	10
	Text Books : 6. Elias M. Awad: Systems Analysis and Design, Second Edition, Galgotia Publications Pvt. Limited, New Delhi(2010) 7. Perry Edwards: Systems Analysis & Design, , Third Edition, McGraw Hill 8. Kendall & Kendall: Systems Analysis and Design, Seventh Edition, PHI Learning private Limited, New Delhi	
	References : 1. Gary B. Shelly, Thomas J. Cashman, Harry J, Rosenblatt: Systems Analysis and Design Methods, Cengage Learning India Private Limited, New Delhi(2009) 2. Jeffrey L. Whitten, Lonnie D. Bentley: Systems Analysis and Design Methods, Seventh Edition, Tata McGraw Hill Education Private limited, New Delhi(2009)	

Course Outcomes
1. Gain comprehensive theoretical knowledge as well as practical skills related to the system development process of information systems.
2. Ability to gather data to analyze and specify the requirements of a system.
3. Student are able to design system components and environments

Subject Code	**15BSC302**
Subject Name	**Operating System**
Short Name	**OS**
Total Teaching periods	**56**
Total Credits	**3**

Prerequisites :

- Basic knowledge about computer system.
- Knowledge of components and functions of computer.

Objectives:

- To acquire the basic knowledge about operating system.
- To study various components of operating system, capabilities and services of operating system.
- To study various types of operating system and their management and techniques.

Units	Contents	Total Lectures
I	**Operating System:** Introduction, Characteristics, User View, System View, Computer System Organization, Operating system Services, Types of O.S. Batch operating system, Time-sharing operating systems, Distributed operating System, Network operating System Real Time operating System, Online O.S.	12
II	**Process:** Concept, Process State, Process State Transition, Process Control block, Threads, Operation on Process: Creation, Termination, Inter Process Communication :Signal, Message	10
III	**Multithreading:** Motivation, Benefits, Multicore Programming Multithreading Models, Threads Issues **,Process Scheduling:** Concept, Scheduling Criterion, and Scheduling Algorithms: FCFS, Shortest Job First, Round -Robin Scheduling, HRRN	12
IV	**Process Coordination:** Process Synchronization concept, Critical section problem, Semaphore, Monitor **Deadlocks:** Concept, Characterization of Deadlocks, Strategies, Prevention, Avoidance, Detection and recovery from Deadlocks	10
V	**Memory Management:** Introduction, Hardware, Logical Versus Physical Address space ,Dynamic Loading, Linking, Shared Library, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation **Virtual Memory Management:** Background, Demand Paging scheme, Process Creation, Page Replacement Policies.	12
	Text Books : 1. Silberschatz, P.B. Galvin, Operating System Concepts, 7th Edition, Addison Education. 2. H. M. Dietel, Operating System, 3rd edition, Pearson Education, (2008). 3. Achyut S. Godbole, Operating system, Tata McGraw-Hill Education, (2005).	
	References : 1. William Stalling, Operating Systems: Internals and Design Principles, Prentice Hall. 2. Crowley, Operating Systems, Tata McGraw-Hill Education, (2001). 3. Peterson, Operating System concepts, 2nd edition, Addison-Wesley Longman Publishing Co., (1985). 4. M. Milankovic, Operating systems, McGraw-Hill. 5. S. Tananbum, Operating systems, Pearson Education	

Course Outcomes

1. Students are able to describe the general concept of Operating system.
2. Acquire an understanding of the concepts of process and thread provided in the modern operating system.
3. Attain the understanding of process scheduling in a multi-programming environment and implement a process scheduling algorithm.
4. Gain knowledge about memory management techniques, including virtual memory in the modern operating system.

Subject Code	**15BSC303**
Subject Name	**Laboratory of Computer Science-I**
Short Name	**LCS-I**
Total Lectures	**90**
Total Credits	**3**

Sr. No.	Practical Contents	Total Lectures
	Section A	
1	To prepare case study report for unit test and model test of B.Sc.	36
2	To prepare case study report for admission process of B.Sc. I Year.	
3	To prepare case study report for loan disbursement system of NSPS, HVPM.	
4	To prepare case study report for loan recovery system of NSPS, HVPM.	
5	To prepare case study report of library system of Degree College of Physical Education.	
6	To prepare case study report of Blood bank donation tracking system.	
7	To prepare case study report of video tape rental system.	
8	To prepare case study report of computerized Gas booking system.	
9	To prepare case study report of computerized medical shop system.	
10	To prepare case study report of social networking system.	
11	To prepare case study report of "Bhim App".	
12	To prepare case study report for "Bus pass system".	
	Section B	
1	Case Study on Windows Operating System.	54
2	Case Study on Linux operating system.	
3	Case Study on Batch operating system.	
4	Case Study on Time-sharing operating system.	
5	Case Study on Distributed operating System.	
6	Case Study on Network operating System.	
7	Case Study on Real Time operating System.	
8	Write Program For Creating New Procedure.	
9	Write Program To Implement Thread.	
10	Write Program To Implement Multi Threading Model.	
11	Write Program to Implement CPU scheduling policies SJF.	
12	Write Program to Implement CPU scheduling policies Priority.	
13	Write Program to Implement CPU scheduling policies FCFS.	
14	Write Program to Implement CPU scheduling policies Round-Robin Scheduling.	
15	Write Program to Implement Page Replacement Algorithms FIFO.	
16	Write Program to Implement Page Replacement Algorithms Optimal.	
17	Write Program to Implement Banker's algorithm.	

Subject Code	**15BSC304**
Subject Name	**Statistics-I : Statistical Quality Control**
Short Name	**SQC**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic knowledge of quality control.
- Knowledge of various techniques such as Graphical - Control Charts and Sampling Plans - Rectifying Sampling Inspection Plans, etc.

Objectives:

- To learn how to apply tools of statistical quality control in industrial research.
- To study how to apply industrial statistics.
- To study the theory of control charts and sampling inspection plans with their applications.

Units	Contents	Total Lectures
I	**Introduction to SQC:** Meaning and importance of SQC in industrial research and practice, Definition of SQC, Causes of variation in quality, Purpose of SQC (product control and process control), Control charts (Outline), 3-σControl Limits.	12
II	**Control Charts for Variables:** Tools for SQC (variables & attributes), control charts for variables, construction of control chart for mean ($\bar{x}$), range (R) and standard deviation (σ), Criteria for detecting lack of control in $\bar{x}$ and R charts, Natural tolerance limits and specification limits.	12
III	**Control Charts for Attributes:** Control charts for attributes (limitations over control charts for variables), Construction of control charts for fraction defective (p-chart), number of defectives (np-chart) and number defects per unit (c-chart), Applications of c-chart, Advantages and limitations of SQC, Uses of SQC.	12
IV	**Lot Quality:** Problem of lot acceptance, Stipulation of good and bad lots, Producer's risk, Consumer's risk, Concepts of ASN, ATI, AQL, RQL (LTPD), AOQL.	10
V	**Acceptance Sampling Plans:** Rectifying sampling inspection plans- single sampling plan and double sampling plan, Advantages of double sampling plan, Choice of sampling plan, Operating characteristic curve, construction of OC curve, shape of an ideal OC curve, OC curve for single sampling plan and double sampling plan.	10
	Text Books: 5. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics –E. Narayanan Nader. 6. Goon A.M., Gupta M.K., Das Gupta B.: Fundamentals of Statistics, Vol.-II, The World press, Calcutta (1999). 7. Srivastava S. C. and Srivastava Sanguya: Fundamental of Statistics, Central Book Agency, S. Chand Publications.	
	References: 8. Hooda: statistics for Business and Management, 3rd edition, Mackmillan publishers India Limited. 9. Grant Eugene L. and Leavenworth Richard S.: Statistical Quality Control, 7th edition, Tata McGrow-Hill. 10. Richard I. Levin and Rubin S. David: Statistics for Management, 7nd edition, Pearson Education, Inc. and Dorling Kindersley Publishing Inc.	

Course Outcomes

1. Students gain comprehensive theoretical knowledge as well as practical skills related to the SQC, Inventory management and sampling plans.
2. Student are able to plot the control charts of data to analyzed and specify the requirements of the industry.
3. Ability to design the process control and product control tools.

Subject Code	**15BSC305**
Subject Name	**Statistics–II: Sample Survey Analysis**
Short Name	**SSA**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Basic knowledge of concepts like: Population, Population census, Need of census etc.
- Knowledge of Probability, Probability distributions etc.

Objectives:
- To learn how to apply Sampling technique to solve day to day life problems.
- To study how to select proper sampling & develop sampling distributions.
- To study the theory of probability and non probability sampling & its applications.

Units	Contents	Total Lectures
I	**Introduction to sample survey :** Concept of sample survey, Parameter & Statistics, Sampling distribution, Standard error, The principle steps in sample survey, Principles of sample survey, sampling and non sampling errors, Sampling vs. Complete census, limitations of sampling, Types of sampling, Probability & non probability sampling.	10
II	**Simple random sampling:** Definition of SRS, concept of SRSWR & SRSWOR, Methods of selecting simple random sample- a) Lottery system method, b) Mechanical randomization or random numbers method, Notations & Terminology of SRS, Probability of a selecting any specified unit in the sample, SRS of attributes, some important results-a) Sample mean is an unbiased estimator of population mean, b) variance of sample mean, advantages & disadvantages of SRS.	14
III	**Stratified random sampling :** Definition , notations & terminology of Stratified random sampling, Allocation of sample size- a) Proportional allocation, b) Optimum allocation or Neyman allocation, Determination of number of strata, Construction of Strata, Practical difficulties in Stratification, Comparison of Stratified sampling with SRSWOR, Principal advantages of stratified sampling .	10
IV	**Systematic & Cluster sampling:** Definition, notations & terminologies of Systematic sampling, Variance of the estimated mean of systematic sampling, concept circular systematic sampling, merits & demerits of systematic sampling. Cluster sampling : Definition, notation of cluster sampling, Mean & variance of estimates in cluster sampling. Merits & demerits of cluster sampling.	12
V	**Non- Probability Sampling :** Concept & definition of non-probability sampling, some non probability sampling techniques- a) Quota sampling : definition, application, merits & demerits, b) Convenience sampling : definition, application, merits & demerits, c) Judge mental sampling : definition, application, merits & demerits, d) Snow ball sampling : definition, application, merits & demerits.	10
	Text Books: 4. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics –E. Narayanan Nader. 5. J. Medhi, Statistical methods, an introductory text, New Age International. 6. Shrivastava O.S. ,'A Textbook of Demography", Vikas Publishing (1983).	
	References: 1. Goon A.M., Gupta M.K., Das Gupta B., Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. Brase & Brase, Understandable Statistics, 11th edition, Cengage Learning, (2014). 3. Croxton F. E., Cowden D.J., and Kelin S., Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt. Ltd., New Delhi(1955).	

Course Outcomes
1. Students gain theoretical knowledge and practical skills related to sampling.
2. Ability to understand and use the various data collection techniques.
3. Implement the various sampling techniques practically.

Subject Code	**15BSC306**	
Subject Name	**Laboratory of Statistics-I**	
Short Name	**LS-I**	
Total Lectures	**90**	
Total Credits	**3**	
Sr. No.	**Practical Contents**	**Total Lectures**
	Section A	
1	Construction of control chart for variables ($\bar{X}$-chart).	45
2	Construction of control chart for variables (R-chart).	
3	Construction of control chart for variables (σ- chart).	
4	Construction of control chart for attributes (np-chart).	
5	Construction of control chart for attributes (p-chart).	
6	Construction of control chart for attributes (c-chart).	
7	Drawing OC curve for single sampling plan.	
8	Drawing AOQ and ATI curves for single sampling plan.	
9	Drawing OC curve for double sampling plan.	
10	Drawing AOQ curve for double sampling plan.	
	Section B	
1	Estimation of population mean using SRS.	45
2	Estimation of Population variance using SRS.	
3	Estimation of population mean using proportional allocation in Stratified sampling.	
4	Estimation of population variance using proportional allocation in Stratified sampling.	
5	Estimation of population mean using Neyman allocation in Stratified sampling.	
6	Estimation of population variance using Neyman allocation in Stratified sampling.	
7	Estimation of gain in precision due to Stratification.	
8	Estimation of population mean using Systematic sampling.	
9	Estimation of population variance using Systematic sampling.	
10	Comparison of Systematic sampling with Stratified & SRS for the population following linear trend.	

Subject Code	**15BSC307**
Subject Name	**ELECTRONICS I: THE 8085 MICROPROCESSOR**
Short Name	**8085 µP**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic concepts of Digital electronics.
- Basics knowledge of Programming.

Objectives:

- To learn Microprocessor.
- To understand working of 8085 Microprocessor.

Units	Contents	Total Lectures
I	**Introduction of microprocessor:** introduction, Historical background, Evolution of microprocessors, Microprocessor based personal computer system, Features of 8085 microprocessor.	10
II	**Architecture Of 8085 Microprocessor:** Bus organization of 8085,Pin diagram of 8085,Architecture of 8085[Block Diagram], Register organization.	10
III	**Addressing Modes and instruction format**: Register Addressing Modes, Immediate Addressing Modes, Direct Addressing Modes, Indirect Addressing Modes, Implicit Addressing Modes, Stack addressing modes, instruction format, opcode format.	12
IV	**Instructions Set and programming**: **Instructions**: Data transfer group, Arithmetic group, Logical group, Branching group, Stack & Machine Control Group. **Programming**: Addition, subtraction, comparison, multiplication and division, BCD and ASCII arithmetic, basic logic instructions, shift and rotate instructions, Data type conversion(BCD to ASCII and vice versa)	12
V	**Interrupts:** introduction and need of interrupt, hardware and software interrupts, Priorities of interrupts interrupt processing, Interrupts instructions (EI,DI,SIM,RIM,HLT)	12
	Text Books: 1. Barry B. Brey, The Intel Microprocessors, 6Th edition, Prentice hall, (2007) 2. B. Ram, Fundamental of Microprocessor and Microcomputer, 6th edition, Dhanpatrai Publication, (2006) 3. Atul P. Godse /Mrs. Deepali A. Godse, Microprocessor and Interfacing, 1st edition, Technical publication, Pune, (2009)	
	References: 1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with the 8085 , 5Th edition ,Prentice Hall, (2002) 2. Nagoorkani,8085 microprocessors & its application, 3rd edition, Tata McGraw-Hill Education,(2012)	

Course Outcomes:

1. Acquire knowledge about the basic concept of any processor/microprocessor.
2. Gain an understanding of the architecture of 8085 microprocessor and develop the logic for assembly level program execution.
3. Attain the capability to design and develop assembly level program.

Subject Code	**15BSC308**
Subject Name	**Electronics II: DIGITAL COMMUNICATION**
Short Name	**DC**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic concepts of Digital Electronics.
- Basic knowledge of various Electronic devices.

Objectives:

- To understand the principles and concept of various digital modulation techniques.
- To understand the various multiplexing technique and multiple Access Scheme.

Units	Contents	Total Lectures
I	**Introduction to Digital Communication:** Historical perspective of Digital Communication, Elements of digital communication system with its block diagram, Communication channels types and their characteristics (bit rate, bandwidth, repeater distance)applications, comparison of analog and digital communication system.	10
II	**Pulse Modulation Techniques:** Sampling process, SyQuest sampling theorem, **definitions & Generation**: PAM,PWM,PPM, Pulse code modulation (PCM): Transmitter and Receiver block diagram and its working, Advantages and disadvantages of PCM.	12
III	**Digital Modulation Techniques:** **Digital Signals :** Bit Interval(Tb),Bit Rate, Baud Rate **Amplitude shift keying (ASK):** Generation & waveforms, Advantages, disadvantages, applications. **Frequency shift keying (FSK):** Generation & waveforms, Advantages, disadvantages, applications. **Phase shift keying (PSK):** Generation & waveforms, Advantages, disadvantages, applications.	12
IV	**Multiplexing:** Concept, necessity, types of multiplexing, **Time Division Multiplexing (TDM):** Concept, Advantages & Disadvantages, Applications. **Frequency Division Multiplexing (FDM):** Concept, Advantages & Disadvantages, Applications. **Code Division Multiplexing (CDM):** Concept, Advantages & Disadvantages, Applications, Comparison between different types of Multiplexing.	12
V	**Multiple Access**: **Time Division Multiplexing Access (TDMA):** Concept, features, Advantages & Disadvantages, **Frequency Division Multiplexing Access (FDMA):** Concept, features, Advantages & Disadvantages**, Code Division Multiplexing Access (CDMA):** Concept, features, Advantages & Disadvantages**, Comparison** of different access Techniques.	10
	Text Books: 6. P. Ramakrishna Rao, Digital Communication, 1st edition ,Tata McGraw Hill,(2011) 7. Amitabh Bhattacharya ,Digital Communication, 1st edition ,Tata McGraw Hill,(2005) 8. Wayne Tomasi, Electronics Communication System, 5th edition Pearsons.	
	References: 1. Upen Dalal, Wireless Communication,1st edition Oxford Higher Education,(2009) 2. Simon Hykin, Communication System , 4th edition John Wiley & sons.,(2013) 3. John G. Proakis, Digital communication, 4thedition, McGraw Hill, (2003).	

Course Outcomes:

1. Acquire basic knowledge of generalized communication system.
2. Attain in-depth knowledge of Digital communication system at the transmitter and receiving end.
3. Ability to select the blocks in a design of digital communication system.
4. Ability to Design the communication system for small or local area.
5. Able to select the proper bit rate, baud rate, sampling rate for error free transmission.

Subject Code	**15BSC309**
Subject Name	**LABORATORY OF ELECTRONICS-I**
Short Name	**LE-I**
Total Lectures	**90**
Total Credits	**3**

Group	List of Experiments	Total Lectures
	Section A	
1	Write an 8085 ALP to copy content of one register to another.	50
2	Write an 8085 ALP for Addition of two 8 bit numbers.	
3	Write an 8085 ALP for Subtraction of two 8 bit numbers.	
4	Write an 8085 ALP for BCD Addition of two bytes.	
5	Write an 8085 ALP for BCD subtraction of two bytes.	
6	Write an 8085 ALP for Logical AND operation of two bytes.	
7	Write an 8085 ALP for Logical OR operation of two bytes.	
8	Write an 8085 ALP for Logical NOT operation and Logical XOR operation of two bytes.	
9	Write an 8085 ALP for Rotate Right without carry.	
10	Write an 8085 ALP for Rotate Right with carry.	
11	Write an 8085 ALP for Rotate Left without carry.	
12	Write an 8085 ALP for Rotate Right with carry.	
	Section B	
1	Observe the waveform of pulse code modulation.	40
2	Observe the waveform of pulse code demodulation.	
3	Observe the waveform of ASK modulation.	
4	Observe the waveform of ASK demodulation.	
5	Observe the waveform of FSK modulation.	
6	Observe the waveform of FSK demodulation.	
7	Observe the waveform of PSK modulation.	
8	Observe the waveform of PSK demodulation.	

Subject Code	**15BSC310**
Subject Name	**SEMINAR**
Short Name	**SEM**
Total Lectures	**--**
Total Credits	**3**

Prerequisites

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Objectives

- To learn new topics by self learning.
- To study and review the research papers, magazines, etc.
- To develop communication, interpersonal and presenting skills.

Synopsis format:

1. Abstract
2. Introduction
3. Data Analysis / Technology focus
4. Future scope
5. Conclusion
6. References

Seminar Report Format:

1. Abstract
2. Introduction
3. Data Analysis / Technology Focus
4. Applications
5. Advantages & Disadvantages
6. Future Scope
7. Conclusion
8. References

Rules:

1. Topic should be based on recent trends.
2. The topic may be out of the scope of syllabus.
3. Synopsis should submit the synopsis in the given format for approval by the department.
4. Synopsis should not exceed more than 2 pages, it should cover the summery of whole topic in brief.
5. Minimum 10-12 slides presentation should be prepared for seminar.
6. Seminar report should be duly signed by seminar guide.
7. It will be responsibility of guide and students to communicate about selection/rejection/preparation of the topic to each other.
8. Synopsis should be submitted within time span specified by Seminar In-charge.
9. Synopsis should be hand written.

Formatting Rules:

a. Paper size A4.
b. Margins all side 1 inch.
c. Line Spacing for final report 1.5
d. Font : Times New Roman
e. Size :
   i. 12 for Normal body of text in the seminar report
   ii. 14 for title and headings in the seminar report
   iii. 9 for footnote and style italic

Course Outcomes:

1. Ability to learn a new technology and formulate the contents for self learning.
2. Able to present the new topic and defend the questions rose.
3. Gain self confidence and stage daring.

Syllabus of Third Year B. Sc. (Comp. Sci.) Semester VI

Subject Code	**15BSC311**
Subject Name	**Computer Science I : Programming in Java**
Short Name	**JP**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Students should be familiar with Object Oriented concepts and Programming.
- Basic concepts of programming are required.

Objectives:

- To learn basics of java language.
- To implement classes, inheritance, interfaces and applets.
- To learn handling exceptions.

Units	Contents	Total Lectures
I	**Introduction to JAVA:** Introduction, Features, Java Virtual Machine(JVM), Java Development Kit(JDK),Data Types, Keywords, Operators & Expressions, Control Structures(if, if-else, switch statement)Looping Structures(for, while, do-while)	12
II	**Class & methods:** Introduction to class & objects, defining a class, Creating Objects, Method Overloading, Constructor, Constructor Overloading, Static variables & methods, new, delete & this keyword. Final variables, methods & classes, Abstract methods & class.	12
III	**Inheritance and Interfaces**: Introduction to Inheritance, types of Inheritance, Super & Extended Class, Overriding methods. Introduction to Interface, Defining & Implementing Interfaces, **Access specifiers:** public, private & protected, **Arrays:** basics, Single& Multi-dimensional.	12
IV	**Packages and Exception Handling:** Defining Packages, Importing Packages, API Packages. Concept of Exception & Exception Handling, Types of Exceptions, use of try-throw-catch mechanism, Multiple catch blocks, use of finally block.	10
V	**Applets and Graphics class:** Introduction to Applet, Applet Life Cycle, Difference between Application & Applet, Applet tag, Different Applet methods **Graphics class:** Working with Text, Drawing lines, Circles, Polygon, Rectangles, Ellipses, Circles, Arcs, working with Colors, Font.	10
	Text Books: 1. E. Balaguruswamy - Programming with Java (4/e) (Tata-McGraw Hill) 2. Herbert Schildt- The Complete Reference Java 2 (5/e) (Tata-McGraw Hill) 3. Y. Daniel Liang – Introduction to Java Programming (2/e) (PHI).	
	References: 1. Dietel & Dietel - "Java How to Program" Pearson Education. 2. Horstmann & Cornell - Core Java 2 (Vol-1) (Sun Microsystems) 3. S.Chavan - Programming in Java Shroff Publication.	

Course Outcomes:

1. Able to do Object Oriented Programming & implement Java Programming Constructs.
2. Able to implement exception handling and Input/Output operations.
3. Able to design the applications of Java & Java applet.

Subject Code	**15BSC312**
Subject Name	**Computer Science: Mobile Computing**
Short Name	**Elective: MC**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic concepts of Communication System & Networking.

Objectives:

- To introduce concept and working of mobile communication system.
- To learn and understand basic concepts of Mobile computing.

Units	Contents	Total Lectures
I	**Introduction:** Applications, Short History, Simplified Reference Model. **Wireless Transmission:** Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	10
II	**Medium Access Control:** Motivation for Specialized MAC, Introduction to : SDMA, FDMA, TDMA, CDMA Comparison of S/T/F/CDMA. **Introduction to Telecommunication Systems:** GSM, DECT, TETRA, UMTS and IMT-2000.	12
III	**Satellite & Broadcast Systems**: History, Applications, GEO, LEO, MEO, Routing, Localization, Handover. **Broadcast Systems**: Overview, Cyclical Repetition of Data, Digital Audio & Video Broadcasting, Convergence of Broadcasting and Mobile Communications.	10
IV	**Wireless LAN:** Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth. **Mobile Network Layer:** Mobile IP, DHCP, Mobile Adhoc Networks.	12
V	**Mobile Transport Layer:** Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks. **Support For Mobility:** File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0	12
	Text Books: 1. Jochen Schiller- Mobile Communication, 2nd Edition (Pearson Education) 2. Raj Kamal- Mobile Computing, 2nd Edition (Oxford University Press) 3. Gordan Stuber- Principles of Mobile Communication, 3rd Edition (Springer Publication) 4. Mazliza Othman- Principles of Mobile Computing & Communication, 2nd Edition (Auerbach Publications)	
	References: 1. Jerry D. Gibson- Mobile Communications Handbook, 3rd Edition (CRC Press Publication) 2. Tony Wakefield, David Bowler- Introduction to Mobile Communications, 2nd Edition (Auerbach Publications) 3. Yoshihiko Akaiwa- Introduction to Digital Mobile Communication, 2nd Edition (Wiley Series Publication) 4. Gottapu Sasibhushana Rao- Cellular Mobile Communications, 3rd Edition (Pearson Education)	

Course Outcomes:

1. Able to understand the basic concepts and principles in mobile computing and Telecommunication Systems
2. Able to identify the important issues of developing mobile computing systems and applications
3. Gain good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support;
4. Ability to understand the concept of Wireless Transmission, Satellite Transmission and broadcasting
5. Capable of organizing the functionalities and components of mobile computing systems into different layers.

Subject Code	**15BSC312**
Subject Name	**Computer Science: Network security**
Short Name	**NS**
Total Teaching Hrs.	**56**
Total credits	**3**

Prerequisites :

- Knowledge of Data Communication and Computer Networks.
- Basic concepts related to data and system security.

Objectives:

- To learn and implement basic security techniques.
- To use different methods in Cyber Crime and Networking.

Units	Contents	Total Lectures
I	**Introduction**: Security Services, Security attacks, Security mechanisms, A Model for Network security. **Cryptography techniques**: Plain text and Cipher text, substitution techniques and Transposition techniques**.**	12
II	**Finite Fields:** Groups, Rings and Fields, Modular Arithmetic, Euclidean Algorithm**. Introduction to Number theory:** Prime numbers, Fermat's and Euler's theorem.	10
III	**Overview of Symmetric key cryptography**: Symmetric cipher model, Stream cipher and Block Cipher, Data Encryption standard, Advanced encryption standard.	12
IV	**Overview of Asymmetric key cryptography:** RSA algorithm, Knapsack algorithm, Comparison of Symmetric& Asymmetric key cryptography. Message authentication codecs, Hash function and Digital Signatures.	10
V	**Internet-Security Protocols**: Secure socket layer(SSL)working, **IP Security Overview**: Applications and advantages, **Email Security** – Pretty good privacy, S/MIME, **System Security** – Intruders types, Virus, Worm, Trojan horse, Firewalls types and limitations.	12
	Text Books: 1. Atul Kahate, Cryptography and Network Security, 3 edition, Tata McGraw-Hill Education, 2003 2. William Stallings, Cryptography and Networking Security Principles & Practice, fourth edition 3. John F. Chavwan, The Fundamentals of New Security, Artch. House.	
	References: 1. Behrouz A. Forouzan, Cryptography & Network security, (TMH) 2. Charlie Kaufman, Radia Perlman and Mike Speciner, Network security private Communication in a public world, 2nd Edition, (LPE). 3. Juaniata, The Internet Security Guide Book.	

Course Outcomes:

1. Attain knowledge of networking and cryptographic techniques.
2. Gain awareness about Internet-Security Protocols and Email security.
3. Acquire knowledge of Virus, Worm, Trojan horse, Firewalls.

Subject Code	**15BSC312**
Subject Name	**Computer Science: Software Engineering and Testing**
Short Name	**ST**
Total Lectures	**56**
Total Credits	**3**

Prerequisites :

- Basic knowledge of System development life cycle.
- Programming constructs along with object oriented concepts.

Objectives:

- To provide an insight into the process of software development.
- To understand and practice the various fields such as analysis, design, development, testing of software engineering.
- To develop skill to develop software of high quality and high reliability.
- To acquire knowledge of different metrics related to software development.
- To learn testing technique to evaluate the software.

Units	Contents	Total Lectures
I	**Software**: Definition, characteristic, myths. Software engineering: Definition, layer, management, and phases in software engineering software process, project, Product: Introduction, process component and frame work.	12
II	**Software life cycle model**: Waterfall, prototyping, spiral incremental, RAD Software requirement: Introduction, Types, Feasibility Study, Requirement Elicitation, Requirement Analysis: Object Oriented modeling, Requirement Specification.	10
III	**Software design**: Concept, Principles and design model, data design, architectural design, component level design, GUI, object oriented design, Software design notation: flowchart, DFD, structure charts Software design reviews.	12
IV	**Software coding**: Feature, programming practices: top down, bottom up, structured, information hiding. Code verification techniques, coding tools. Software testing: basic, characteristics, strategies. Level of software testing.	10
V	**Testing Technique**: white box, black box and their comparison. Gray box testing. Testing tools, debugging processes Software Quality: Concept, Software Quality assurance activity, software reviews.	12
	Text Books : 1. Rohit Khurana," Software Engineering Principles and practice", Second edition, Vikas publishing house Pvt.Ltd,2010 2. Sommerville Pearson, "Software Engineering", Eight Edition, Pearson Education,2007 3. Pankaj Jalote," An integrated approach to Software Engineering", Third Edition, Narosa Publishing House, 2005	
	References : 1. Roger S. Pressman ,"Software Engineering : A Practitioner Approach", Seventh edition, McGraw Hill, 2010 2. Richard Fairley ,"Software Engineering Concept", Tata McGraw Hill Edition. 3. Hans van Vliet, "Software Engineering: Principles and Practice", 3rd edition, John Wiley & Sons, 2008.	

Course Outcomes

1. Ability to effectively apply software engineering practice over the entire system lifecycle. This includes requirements engineering, analysis, prototyping, design, implementation, testing, maintenance activities and management of risks involved in software and embedded systems.
2. Gain knowledge about classical and evolving software engineering methods and able to select appropriate methods for projects.
3. Apply basic software quality assurance practices to ensure that software designs, development, and maintenance meet or exceed applicable standards.
4. Attain fundamental concepts in software testing, including software testing objectives, process and methods.

Subject Code	**15BSC313**
Subject Name	**Laboratory of Computer Science-II**
Short Name	**LCS-II**
Total Lectures	**90**
Total Credits	**3**

Sr. No.	Practical Contents	Total Lectures
	Section A (Programming in Java)	
1	WAP in java to read a single digit no and print it in words using switch statement.	**60**
2	WAP in java for demonstrating if else statement.	
3	WAP in java for demonstrating ladder if statement.	
4	WAP in java for demonstrating nested if statement.	
5	WAP in java for demonstrating Arithmetic Operators.	
6	WAP in java for demonstrating Relational Operators.	
7	WAP in java for demonstrating Conditional Operators.	
8	WAP in java to demonstrate the use of method overloading.	
9	WAP in java to demonstrate the use of Constructor overloading.	
10	WAP in java to demonstrate the use of static members.	
11	WAP in java to demonstrate the use of single inheritance.	
12	WAP in java for implementing interfaces.	
13	WAP in java to demonstrate the use of method overriding.	
14	Create a package myshapes. Create classes Circle and Rect in it, import myshapes and its classes in the source file and get the output.	
15	WAP in java to demonstrate the use of simple try – catch .	
16	WAP in java to demonstrate the use of multiple catch statements.	
17	WAP in java to demonstrate use of throws statement.	
18	Create an applet for drawing symbol of Olympics.	
19	Create an applet for drawing a human face.	
20	Create an applet for drawing 10 concentric circles.	
	Section B (Mobile Computing)	
1	Write a program to implement calculator.	30
2	Write a program for conversion of temperature of Celsius to Fahrenheit.	
3	Write a program for use of button.	
4	Write a program for use of spinner.	
5	Write a program for use of control structures.	
6	To study simplified Reference model of Mobile Computing.	
7	To study cellular system.	
8	To study satellite system.	
9	To study Wireless LAN.	
10	To study Mobile Transport Layer.	
	Section B (Network security)	
1	Write a case study on OSI Security architecture.	30
2	Write a case study on Security Attacks.	
3	Write a case study on A model for Network Security.	
4	Write a case study on Data Encryption Standard.	
5	Write a case study on Public Key Cryptography.	
6	Write a case study on Kerberos.	
7	Write a case study on Web Security.	
8	Write a case study on System Security.	
9	Write a case study on Viruses and related threads.	
10	Write a case study on Firewall.	
	Section B (Software Engineering and Testing)	
1	Case study on software myths.	30
2	Case study on software process component.	
3	Case study on software life cycle.	
4	Case study on feasibility study.	
5	Case study on software data design.	
6	Case study on software design notation (flow chart).	
7	Case study on software coding.	
8	Case study on software code verification.	
9	Case study on software testing.	
10	Case study on software quality assurance.	

Subject Code	**15BSC314**
Subject Name	**Statistics-I : Operations Research**
Short Name	**OR**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Knowledge of statistical methods.
- Knowledge of statistical formulation, set theory, and probability.

Objectives:
- To learn application of LPP methods.
- To application of statistics for solving industrial problems.
- To learn and practice the theory and problems on linear programming.

Units	Contents	Total Lectures
I	**Linear Programming :** Elementary theory of convex sets, definition of LPP, Mathematical formulation of LPP, Examples of LPP, Terminology in LPP(objective function, constraints, solution, feasible and optimum solution, slack and surplus variables, non negative restrictions, etc.), Graphical method to solve LPP.	12
II	**Methods of LPP:** Computational procedure of simplex method (conditions of feasibility and optimality), Terminology in simplex method (associated cost vector, net evaluation, basic feasible solution, etc.), simplex algorithm, Artificial variable technique, Duality in LPP.	10
III	**Transportation Problem :** Definition and example of transportation problem, Mathematical formulation of TP, Various Methods to obtain initial basic feasible solution to TP(north-west corner rule, row minima method, column minima method, matrix minima method, Vogel's approximation method), Theorem of existence of feasible solution, Unbalanced TP.	12
IV	**Assignment Problem:** Definition and example of assignment problem, Mathematical formulation of AP, Assignment algorithm (Hungarian method), Unbalanced AP, Variations of AP (multiple optional solution and maximization case in AP).	10
V	**Sequencing Problem & Network Analysis:** Sequencing problem: Definition of sequencing problem, Terminology and notations in SP, sequencing problem of n-jobs with 2-machines (its mathematical formulation and algorithm).Network Analysis: Terminology in network analysis, CPM and PERT techniques (forward and backward pass methods and time estimates), Error in network, Rules of network construction and Fulkerson's rules of labeling.	12
	Text Books: 1. Kanti Swarup, P. K. Gupta, Man Mohan: Operations Research, 15th edition Sultan Chand & Sons, New Delhi (2010). 2. Hamdy A. Taha: Operations Research An Introduction, Pearson Education, Inc. and Dorling Kindersley Publishing Inc. (2007). 3. K. R. Kothari: An Introduction to Operations Research, 3rd edition Vikas Publishing House Pvt. Limited, New Delhi (2005).	
	References: 1. N. Ramnathan: Operations Research, Tech Max publications. 2. Paul A. Jensen, Janathan F. Bard: Operations Research, John Willy and Sons (2003). 3. E. Prem Kumar Gupta, Dr. D. S. Hira: S Chand Publication. 4. A. M. Natarajan, P Balasubramani, A. Tamilarasi: Operations Research, Pearson Education, Inc. and Dorling Kindersley Publishing Inc.	

Course Outcomes
1. Gain theoretical knowledge and practical skills related to OR.
2. Ability to understand the various techniques of OR.
3. Able to apply the LPP, TP, AP Sequencing and Networking tools practically.

Subject Code	**15BSC315**
Subject Name	**Statistics–II: Design of Experiment**
Short Name	**DOE**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Basic knowledge and concepts like Testing of hypothesis, etc.
- Knowledge of sampling distributions etc.

Objectives:
- To apply ANOVA technique to solve day to day life problems.
- To select proper Design for experimentation.
- To study the theory of ANOVA, DOE & its applications.

Units	Contents	Total Lectures
I	**Analysis of Variance-1:** Introduction to ANOVA, Assumptions for ANOVA test, Concept of One Way ANOVA, Mathematical model of one way classified data, ANOVA for Fix effect Model & Random effect model with assumptions for one way classified data, Concept of Critical difference or Least significance difference.	10
II	**Analysis of Variance-2 :** Concept of Two Way ANOVA, Mathematical model of Two way ANOVA with one observation per cell, ANOVA for Fix effect & Random effect model with assumptions for Two way classified data with one observation per cell, Concept of Two Way ANOVA with multiple but equal number of entries per cell, Mathematical model of Two way ANOVA with multiple but equal number of entries per cell, ANOVA for Fix effect & Random effect model with assumptions for Two way classified data with multiple but equal number of entries per cell.	14
III	**Design of Experiments:** Introduction to Design of Experiments, need for design of experiments, fundamental principles of design of experiments, uniformity trials, shape and size of plots and blocks. Concept of Completely Randomized Design (C.R.D.), Statistical analysis of CRD, Applications of CRD, Merits & Demerits of CRD.	10
IV	**Randomized Block Design & Latin Square Design:** Concept of Randomized Block Design, Statistical analysis of RBD, Applications of RBD, Merits & Demerits of RBD. Comparison of CRD with RBD in terms of efficiency. Concept of LSD, Statistical analysis of LSD, Applications of LSD, Merits & Demerits of LSD.	12
V	**Factorial Experiments:** Introduction of Factorial Experiments**,** Its purpose, need and advantage. Concept of 2^2 F.E., computation of main effects and interaction effects of 2^2 F.E., Concept 2^3 factorial experiments, computation of main effects and interaction effects, Yate's method up to three factors.	10
	Text Books: 1. S.C .Gupta, V. K. Kapoor: Fundamentals of Applied statistics, 11th edition Sultan Chand & Sons, New Delhi (2000), Statistics –E. Narayanan Nader. 2. J. Medhi, Statistical methods, an introductory text, New Age International, (1992). 3. Shrivastava O.S.: 'A Textbook of Demography", Vikas Publishing (1983).	
	References: 1. Goon A. M., Gupta M. K., Das Gupta B.: Fundamentals of Statistics, Vol.-I & II, The World press, Calcutta (1999). 2. Brase & Brase: Understandable Statistics, 11th edition, Cengage Learning, (2014). 3. Croxton F. E., Cowden D. J., and Kelin S.: Applied general Statistics, 2nd edition, Prentice-Hall of India Pvt. Ltd., New Delhi (1955).	

Course Outcomes
1. Gain theoretical knowledge and practical skills related to DOE.
2. Ability to understand the various Designs of experiment.
3. Able to apply the various Design and Factorial experimental techniques practically.

Subject Code	**15BSC316**
Subject Name	**Laboratory of Statistics-II**
Short Name	**LS-II**
Total Lectures	**90**
Total Credits	**4**

Sr. No.	Practical Contents	Total Lectures
	Section A	45
1	Problems on mathematical formulation of LPP.	
2	Solution of LPP by graphical method.	
3	Solution of LPP by simplex method.	
4	Problems on duality.	
5	Computation of initial basic feasible solution to transportation problem by north-west corner rule.	
6	Computation of initial basic feasible solution to transportation problem by row and column minima method.	
7	Computation of initial basic feasible solution to transportation problem by matrix minima method and Vogel's Approximation Method.	
8	Solution of assignment problem by Hungarian method.	
9	Solution of Sequencing problem- n jobs with 2 machines.	
10	Determination of CPM and PERT.	
	Section B	
1	ANOVA for One way classification for Fix effect modal.	45
2	ANOVA for One way classification for Random effect modal.	
3	ANOVA for Two way classification with one entry per cell for Fix effect modal.	
4	ANOVA for Two way classification with one entry per cell for Random effect modal.	
5	ANOVA for Two way classification with multiple but equal number of entries per cell.	
6	Analysis of Completely Randomized Design (CRD).	
7	Analysis of Randomized Block Design (RBD).	
8	Analysis of Latin Square Design (LSD).	
9	Analysis of 2^2 Factorial experiment.	
10	Analysis of 2^3 Factorial experiment.	

Subject Code	**15BSC317**
Subject Name	**Electronics-I: The 8086 Microprocessor**
Short Name	**8086µp**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:

- Basic knowledge of microcomputer system.
- Basics knowledge of microprocessor

Objectives:

- To expose the students to the concept of microprocessor
- To learn and practice assembly language programming
- To expose the students about working of 8086 microprocessor

Units	Contents	Total Lectures
I	**8086 Architecture :**Block diagram of 8086 microprocessor, BIU & EU, Registers of 8086 - general purpose register, pointer and index registers, segment registers, instruction pointer, status flag.	10
II	**Addressing modes and Data transfer instructions:** **Addressing modes:** Data addressing modes, program memory addressing mode. **Data transfer Instructions:** MOV, PUSH/POP, load effective address, IN, OUT.	12
III	**Arithmetic, bit manipulations and program transfer instructions:** Addition, subtraction, comparison, multiplication and division, BCD and ASCII arithmetic, basic logic instructions, shift and rotate instructions, Data type conversion (BCD to ASCII and vice versa).	10
IV	**Program control, String instructions and Programming:** Conditional jump, Unconditional jump, CALL and RET instructions, Flag manipulation instruction and other control instructions, String handling instructions. **Programming:** Program for addition, subtraction, multiplication, division, data movements, ASCII to binary and binary to ASCII conversion, program for factorial, Search for largest number, smallest number, occurrences of given number	12
V	**8086 Hardware Specification:** Minimum and maximum modes (concepts only), Pin configuration, Function of each pin. **Interrupts:** hardware and software interrupts, interrupt vector table, interrupt processing.	12
	Text Books: 1 Barry B. Brey, The Intel Microprocessors, 6Th edition, Prentice hall, (2007). 2. B. Ram, Fundamental of Microprocessor and Microcomputer, 6th edition, Dhanpatrai Publication, (2006). 3. Atul P. Godse /Mrs.Deepali A. Godse, Microprocessor and Interfacing, 1st edition, Techinal publication, Pune, (2009).	
	References: 1. James L. Antonakos, The Pentium Microprocessor, 1st edition, Prentice hall, (1997). 2. Douglus V Hall, Microprocessor and Interfacing, 2nd edition, Glencoe, (1992). 3. K. M. Bhurchundi, A. K. Ray, Advanced Microprocessors & Peripherals, 3rd edition, Tata Mcgraw hill, (2013).	

Course Outcomes:

1. Acquire knowledge of advanced processor/microprocessor basic concepts.
2. Ability to understand the architecture of 8086 microprocessor and develop the logic for assembly level programming.
3. Design and develop the projects using the assembly level programming skill.

Subject Code	**15BSC318**
Subject Name	**Electronics II: Microcontroller 8051**
Short Name	**µc8051**
Total Lectures	**56**
Total Credits	**3**

Prerequisites:
- Basic knowledge of Microprocessor
- Basics knowledge of assembler

Objectives:
- To expose the students to the Microcontroller and embedded system
- To learn and understand working of 8051 microcontroller.

Units	Contents	Total Lectures
I	**Architecture Of 8051:**Introduction of Microcontroller, Comparison of Microprocessor and Microcontroller, Overview of 8051 family ,Block diagram of 8051 Microcontroller registers organization, internal RAM and ROM Organization of 8051	10
II	**Addressing Modes And Instruction Set :** Different addressing modes of 8051 , Classification of 8051 Instructions , Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions	10
III	**Assembly language Programming:** introduction to Assembler, assembler directives, and Assembly language programming examples: 8 bit Addition ,8 Bit Multiplication and Division ,Biggest Number / Smallest Number ,Swapping of two numbers ,Time delay routines	12
IV	**Timer And I/O Port Programming**: Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming. 8051 Timers, Timer 0 and Timer 1 registers ,Different modes of Timer, (simple programs)	12
V	**Interrupts:** Introduction to Interrupts, Steps in Executing an Interrupt, Internal timer and external hardware interrupts, Interrupt enable register Interrupt vector table	12
	Text Books: 1. M. A. Mazadi, J. C. Mazadi ,The 8051 Microcontroller and Embedded Systems 2nd edition, (Pearson Education, Asia),(2007) 2. Kenneth J. Ayala ,The 8051 Microcontroller architecture, Programming & Applications,3rd edition, Cengage Learning,(2004) 3. D. A. Godse, A. P. Godse, Microprocessor, microcontroller & applications, 3rd edition, Technical Publications,(2008)	
	References: 14. R. Theagarajan, Microprocessor and Microcontroller, 2ndedition, Sci Tech Publication, Chennai, (2004) 15. Scott MacKenzie, The 8051 Microcontroller, 3rd edition, Prentice Hall, (1999)	

Course Outcomes:
1. Gain basic knowledge of microcontroller.
2. Ability to understand the architecture of 8051 microcontroller and develop the logic for assembly level programming.
3. Design and develop the projects using the assembly level programming skill.
4. Awareness of microcontroller's importance in designing embedded application
5. Develop interfacing to real world devices

Subject Code	**15BSC319**
Subject Name	**LABORATORY OF ELECTRONICS-II**
Short Name	**LE-II**
Total Lectures	**90**
Total Credits	**3**

Group	List of Experiments	Total Lectures
	Section A	50
1	Write an 8086 ALP for Addition of two 8 bit numbers.	
2	Write an 8086 ALP for Addition of two 16 bit numbers.	
3	Write an 8086 ALP for Subtraction of two 8 bit numbers.	
4	Write an 8086 ALP for Subtraction of two 16 bit numbers.	
5	Write an 8086 ALP for BCD Addition of two bytes.	
6	Write an 8086 ALP for BCD Subtraction of two bytes.	
7	Write an 8086 ALP for Multiplication of two 8 bit numbers.	
8	Write an 8086 ALP for Logical AND operation of two bytes.	
9	Write an 8086 ALP for Logical OR operation of two bytes.	
10	Write an 8086 ALP for Logical NOT operation and Logical XOR operation of two bytes.	
11	Write an 8086 ALP for Rotate Right without carry.	
12	Write an 8086 ALP for Rotate Left without carry.	
	Section B	
1	Write an 8051 ALP to add two 16-bit numbers.	40
2	Write an 8051 ALP to subtract two 16-bit numbers.	
3	Write an 8051 ALP for BCD Addition of two bytes.	
4	Write an 8051 ALP for Multiplication of two 8 bit numbers.	
5	Write an 8051 ALP for division of two 8 bit numbers.	
6	Write an 8051 ALP for delay subroutine.	
7	Write an 8051 ALP to take input byte from one port and output it to other port.	
8	Write an 8051 ALP to send hex values for ASCII characters of 0, 1, 2, 3, 4, 5, A, B, C, and D to port P1.	

Subject Code	**15BSC320**
Subject Name	**PROJECT**
Short Name	**PROJ**
Total Lectures	**90**
Total Credits	**3**

Prerequisites

- Preliminary knowledge of research methodology.
- Knowledge about Statistical methods/ Electronics devices/ Computer technology and application domain in which seminar will be developed.
- Good knowledge of subject domain.

Objectives

- To give the students hands on experience of real life system development life cycle involving deadlines and team work.
- To make the students apply the Statistical/ Electronic/ Computer technologies learnt during the program.
- To provide the experience in analyzing, designing, implementation and evaluating information systems by following proper documentation process.

Rules for Project Work :

A student will be examined in the course "Project Work" as given below:

1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct task and care should be taken to see the progress of individual.
2. Students should take guidance from a guide and prepare a Project Report on "Project Work" in 3 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs, experimental setup and methodology.
4. The project report will be duly accessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department.
5. The project report should be prepared in a format prescribed by the College, which also specifies the contents and methods of presentation.

General Instruction Regarding Preparation of Project Report :

TYPING :

(a) The typing shall be standard 12 pts in double spacing using only
(b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
(c) Paper A4 size Paper

COPIES :

Two hard-bind copies (As per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVER PAGE :

PROJECT REPORT
ON
NAME OF THE PROJECT
BY
NAME OF STUDENT

GUIDED BY
NAME OF THE GUIDE

PROGRAMME NAME & CLASS

Department of Science
Degree College of Physical Eucation
Shree H. V. P. Mandal, Amravati.

ACADEMIC SESSION

Report format for Software Development Projects:	**Report format for Statistic and Electronic Projects:**
1 Blank Page at beginning Title Page Certificate from Guide	1 Blank Page at beginning Title Page Certificate from Guide

Acknowledgement Index with printed Page Numbers CHAPTER 1 : INTRODUCTION 1.1 Existing System and Need for System 1.2 Proposed System 1.3 Scope of Work 1.4 Operating Environment – Hardware and Software CHAPTER 3 : ANALYSIS & DESIGN 3.1 User Requirements 3.2 Software Requirements 3.3 System Flow 3.4 Module Flow 3.5 Module Document 3.6 Input Document 3.7 Computational Method Document (If methods are used) 3.8 Output Document 3.9 Data Flow Diagram (DFD) 3.10 Functional Decomposition Diagram (FDD) 3.11 Entity Relationship Diagram (ERD) 3.12 Data Dictionary 3.13 Table Design 3.14 Menu Tree 3.15 Menu Screens 3.16 Input Screens 3.17 Report Formats CHAPTER 4: IMPLEMENTATION & RESULTS 4.1 Input Forms with Data 4.2 Output Reports with Data 4.3 Sample Code CHAPTER 5: CONCLUSION AND FUTURE SCOPE 5.1 Drawbacks and Limitations 5.2 Conclusion 5.3 Proposed Enhancements REFERENCES 1 Blank Page at the end.	Acknowledgement Index with printed Page Numbers CHAPTER 1 : INTRODUCTION 1.1 Introduction of the topic 1.2 Existing System/ Methods/ Models 1.3 Need for System/ Methods/ Models 1.3 Proposed System/ Methods/ Models 1.4 Scope of Work 1.5 Operating Environment - Population/ Electronic technology CHAPTER 2 : PROBLEM DEFINITION 2.1 Review of Related Work 2.2 Problem Definition / Hypothesis CHAPTER 3 : EXPERIMENT DESIGN & METHODOLOGY 3.1 Experiment Design 3.2 Methodology / Hypothesis CHAPTER 4: RESULT ANALYSIS 4.1 Data Sheets 4.2 Graphs & Tables/ Test of hypothesis 4.3 Sample Code (For Electronics) CHAPTER 5: CONCLUSION AND FUTURE SCOPE 5.1 Applications 5.2 Issues and Limitations 5.3 Conclusion 5.4 Future Scope REFERENCES 1 Blank Page at the end.

Course Outcomes

1. Learn proper project documentation.
2. Ability to implement the commercial or research project.
3. Ability to commissioning of the developed software.
4. Presentation and marketing skills for the developed application.