JAMIA HAMDARD

(KANNUR CAMPUS-KERALA)

UGC-LEARNING OUTCOMES-BASED CURRICULUM

FOR

BACHELOR OF COMPUTER APPLICATION

(BCA)

Byelaws for B.C.A. under LOBC w.e.f. 2022 Admission

Contents

Vision of the School

VISION: To be a leading and vibrant institution of excellence in quality education with management, commerce, humanities, scientific and technical development and research for achieving the national goals of a self-reliant, technologically strong and modern India and building an integrated modern system of education, in accordance with the New Education Policy for better future for all.

Mission of the School

MS1: To offer programmes in consonance with National policies for nation building and meeting global challenges.

MS2: To undertake collaborative assignments and projects which offer opportunities for long-term interaction with academia and industry.

MS3: To foster a collaborative academic environment for the promotion of critical and creative thinking.

MS4: To cater to the needs of industry and requirement of competitive examinations for Government Service, PSUs, Private Sector and Abroad Jobs by regular revision of syllabi.

MS5: To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

VISION & MISSION STATEMENTS OF DEPARTMENT

VISION: To attain global recognition in Computer Science education and training to meet the growing needs of the IT industry and society.

MISSION STATEMENTS

MS1: To impart quality education through well-designed curriculum in tune with the challenging software needs of the industry.

MS2: To generate new knowledge and develop new technologies in the thrust areas of Computer Science.

MS3: Students are empowered to pursue a career in any software development industry; start an entrepreneurial venture or pursue a career in academics and research field.

MS4: Apart from regular lectures, presentations and assignments, we also organize workshops and lectures on recent IT technologies, conducted by industry professionals. Students Projects and assignments undergo verification & validation standards by faculty and industry experts.

PROGRAMME EDUCATIONAL OBJECTIVES /QUALIFICATION DESCRIPTORS

Qualification Descriptor for BCA:

Upon the completion of BCA, students should will be able to:

QD-1: Demonstrate a proficiency in area of Computer Science in general and understanding the fundamental principles of Computer Science and its connections with other disciplines.

QD-2: Apply Computer Science knowledge and skills for identifying problems and issues in new /unfamiliar contexts to solve complex problems with well-defined solutions.

QD-3: Use the skills in Computer Science to collect relevant quantitative and /or qualitative data, analysis and evaluation using the methodologies as appropriate in Computer Science for formulating solutions.

QD-4: Communicate the results of studies undertaken in Computer Science accurately in a range of different contexts using the main concepts, constructs and techniques. Skills and tools in areas related to computer science and current developments in the academic field of study.

QD-5: Demonstrate responsible behavior and ability to engage in the intellectual life of the educational institution, and participate in up-to-date knowledge gaining in IT industry. Procedural knowledge that creates different types of professionals related to Computer Science,including research and development, teaching and industry, government and public service.

Mapping Qualification Descriptors (QDs)with Mission Statements (MS)

	MS-1	MS-2	MS-3	MS-4
QD-1	3	3	3	3
QD-2	2	3	3	2
QD-3	3	2	2	2
QD-4	2	3	3	2
QD-5	1	2	3	2

PROGRAMME OUTCOMES/PROGRAMME LEARNING OUTCOMES

After completing this Course, the students should be able to …

PLO-1: Disciplinary Knowledge: Apply the knowledge of basic, advanced Computer Science Concepts to solve complex research and enterprise related queries in IT industry.

PLO-2: Communication Skills: Identify, formulate and obtain solutions to the challenging problems in the interdisciplinary fields of Computers using principles of Computer Science. Communicate effectively with a range of audiences.

PLO-3: **Critical Thinking and Problem Solving**: Design and develop software for applications in science and technology and for organizational needs, on the basis of programming languages and concepts of Computer Science. Analyze, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

PLO-4: **Analytical Reasoning**-Demonstrate the ability to evaluate the reliability and relevance of evidence, identify logical flaws in the arguments of others, analyze and synthesize data from a variety of sources, and draw valid conclusions.

PLO-5: **Research Related Skills**-Demonstrate in-depth knowledge of a particular subject area and broad knowledge of other areas in Computer Science.

PLO-6: **Collaboration/Cooperation/Team Work**-Work effectively as part of a team to develop and deliver quality software artifacts.

PLO-7: **Information/Digital Literacy**-Demonstrate capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis. Apply knowledge of computing and mathematics within technical domains.

PLO-8: **Leadership Readiness/Qualities**-Acquire knowledge in leading a Team where he is responsible for their team's execution, the quality they produce, the speed and quality which they produce, but most importantly, they are responsible for the team's culture, environment, and overall growth of the members on it.

PL0-9: **Multicultural Competence**-Demonstrate knowledge of the values and beliefs of multiple cultures and a global perspective, effectively engage in a multicultural society.

PLO-10: Community Engagement-Demonstrate responsible behavior and ability to engage in the intellectual life of the educational institution, and participate in community and civic affairs.

PL0-11: Moral and Ethical Awareness /Reasoning: Demonstrate the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data.

PLO-12: Self Learning and Lifelong Learning-Recognize the need for, and engage in independent and life-long learning in the updating context of software development.

PROGRAMME SPECIFIC OUTCOMES (PSO) for BCA

After the completion of BCA, the graduates should be able to:

PSO1: Acquire fundamental knowledge in problem solving, general computing and comprehensive knowledge in Computer Science.

PSO2: Use and Apply appropriate current technologies, techniques and modern tools necessary for computing practice.

PSO3: Analyze a Software problem, design, implement a solution and evaluate the proposed solution to ensure that it meets customer needs and Software standard.

PSO4: Assess security, privacy, quality and cost parameters in developing software systems.

Mapping of Program Learning Outcomes (PLOs)with Qualification Descriptors(QDs)

	QD-1	QD-2	QD-3	QD-4	QD-5
PLO-1	3	3	3	2	2
PLO-2	2	2	3	3	2
PLO-3	1	2	2	2	2
PLO-4	1	3	3	2	2
PLO-5	1	2	3	2	3
PLO-6	1	2	2	2	2
PLO-7	3	3	3	3	3
PLO-8	2	2	3	3	2
PLO-9	1	2	2	2	2
PLO-10	1	2	3	3	2
PLO-11	1	2	2	2	2
PLO-12	3	3	3	3	3
PSO-1	3	3	3	3	3
PSO-2	3	3	3	2	2
PSO-3	2	3	2	2	2
PSO-4	2	2	2	2	2

Appendix I

Programme Details

Semester	Course Code	Course Title	Sessional Marks	End Semester Marks	Total Marks	Allotted Credits
Semester1	**BCA-101**	Communication Skills in English	25	75	100	2
	BCA-102	Additional Language1 - (Arabic/Hindi/Malayalam)	25	75	100	2
	BCA-103	Fundamentals of Computer and HTML	25	75	100	4
	BCA-104	Office Automation and HTML Lab	25	75	100	2
	BCA-105	Mathematical Foundation for Computer Application	25	75	100	6
					500	**16**
Semester2	**BCA-201**	Environmental Science	25	75	100	2
	BCA-202	Additional Language11 - (Arabic/Hindi/Malayalam)	25	75	100	2
	BCA-203	C Programming &Unix	25	75	100	4
	BCA-204	C Programming Lab	25	75	100	2
	BCA-205	Discrete Mathematics	25	75	100	6
					500	**16**
Semester 3	**BCA-301**	C++ & Data Structures	25	75	100	4
	BCA-302	Software Engineering	25	75	100	6
	BCA-303	C++ & Data Structures Lab	25	75	100	2
	BCA-304	Data Communication and Networks	25	75	100	6
	BCA-DSE-	***Any One from*** ELECTIVE 2	25	75	100	6
	BCA-SEC-	***Any One from*** ELECTIVE 3	25	75	100	2
					600	**26**
Semester 4	**BCA-401**	Java Programming	25	75	100	4
	BCA-402	Database Management Systems	25	75	100	4
	BCA-403	Java Programming & DBMS Lab	25	75	100	4
	BCA-DSE-	***Any One from*** ELECTIVE 2	25	75	100	6
	BCA-DSE-	***Any One from*** ELECTIVE 2	25	75	100	6
	BCA-SEC-	***Any One from*** ELECTIVE 3	25	75	100	2
					600	**26**
Semester 5	**BCA-501**	Visual Programming using C#	25	75	100	4
	BCA-502	Web Programming	25	75	100	4
	BCA-503	Visual & Web Programing Lab	25	75	100	4
	BCA-504	Operating Systems	25	75	100	6
	BCA-GE-	***Any One from*** ELECTIVE 1	25	75	100	6
	BCA-DSE-	***Any One from*** ELECTIVE 2	25	75	100	6

					600	**30**
Semester 6	**BCA-601**	Python Programming	25	75	100	4
	BCA-602	Python Programming Lab	25	75	100	2
	BCA-603	System Software	25	75	100	6
	BCA-604	Project/Dissertation	50	150	200	6
	BCA-DSE-	***Any One from*** ELECTIVE 2	25	75	100	6
					600	**24**
					3400	**138**

Appendix II

List of Electives Offered

Elective 1: Generic Electives

List of Generic Electives offered by BCA		Credits
BCA-GE1	Fundamentals of Computer and HTML	6
BCA-GE2	C Programming &Unix	6
BCA-GE3	Java Programming	6
BCA-GE4	Python Programming	6
List of Generic Electives offered by BA(English)		
BAEN-GE1	Studies in Prose	6
BAEN-GE2	Studies in Poetry	6
BAEN-GE3	Postcolonial Literatures	6
BAEN-GE4	American Literature	6
List of Generic Electives offered by BBA		
BBA-GE1	Human Resource Management	6
BBA-GE2	Legal Aspects of Business	6
BBA-GE3	Management Science Aspects and Application	6
BBA-GE4	Managerial Economics	6
List of Generic Electives offered by B. Com (Finance)		
BCMF-GE1	Financial Markets and Service	6
BCMF-GE2	Goods and Services Tax	6
BCMF-GE3	Advanced Accounting	6
BCMF-GE4	Investment Management	6
List of Generic Electives offered by B. Com(CA)		
BCMC-GE1	Management Concepts	6

BCMC-GE2	Financial Accounting	6
BCMC-GE3	Office Automation Tools	6
BCMC-GE4	Financial Management	6
List of Generic Electives offered by BSc Psychology		
BSPS-GE1	Introduction to Psychology	6
BSPS-GE2	Cognitive Processes	6
BSPS-GE3	Psychology of Individual Difference	6
BSPS-GE4	Lifespan Development 1	6

Elective 2: Discipline Specific Elective Courses (DSE)

Discipline Specific Elective Courses (DSE)		Credits
BCA-DSE1	Computer Organization	6
BCA-DSE2	Microprocessor	6
BCA-DSE3	Computer Oriented Statistics	6
BCA-DSE4	Artificial Intelligence	6
BCA-DSE5	Introduction to Cloud Computing	6
BCA-DSE6	Introduction to Mobile computing	6
BCA-DSE7	Security in Computing	6
BCA-DSE8	Cyber Crimes and Cyber Laws	6
BCA-DSE9	Android Programming	6
BCA-DSE10	Computer Graphics	6
BCA-DSE11	Theory of Computation	6
BCA-DSE12	Introduction to Data Science & Big Data	6

Elective 3: Skill Enhanced Compulsory Courses (SEC)

Skill Enhancement Compulsory Courses (SEC)		Credits
BCA-SEC1	Numerical Methods	2
BCA-SEC2	Digital Systems	2
BCA-SEC3	Linux System Administration	2
BCA-SEC4	Fundamentals of Financial Accounting	2
BCA-SEC5	Data Analysis using Spreadsheet	2
BCA-SEC6	Operations Research	2

Rules and Regulations of BCA

Department of Computer Science

Appendix III

DEPARTMENT OF COMPUTER SCIENCE

ADMISSION AND EXAMINATION BYELAWS

For

Bachelor of Computer Application (B.C.A)

1. **Programme:** Bachelor of Computer Application (B.C.A)
2. **Duration:** Three years, each year having two semesters. It will be a fulltime programme.
3. **Medium of Instruction and Examinations:** English
4. **Eligibility for Admission:**

   A candidate seeking admission to the programme must have:

   - Passed 10+2 examination or equivalent (with Mathematics or Computer Science/Computer Application as one of the subjects) from a recognized institution with minimum 55% marks.
   - The admission will be based on marks of qualifying examination.

5. **Course Period**

1st Year	Semester-I	July to Mid-November
	Semester-II	December to April
2nd Year	Semester-III	June to November
	Semester-IV	December to April
3rd Year	Semester-V	June to November
	Semester-VI	December to April

During an academic year, a candidate shall be enrolled only for one course of study and shall not appear at any other examination of this or any other University.

The semester-wise course outline, total marks allocated to each paper, internal assessment and semester examinations marks for all specialization, list of electives and the syllabus are enclosed in Appendix I, II & III resp. Detailed course content of the syllabus shall be prescribed by the School Board and shall be reviewed periodically.

During the final year, every candidate should have to undertake a major project work (Sixth Semester) under the supervision of a faculty member.

The School Board, depending on circumstances prevailing in the market, may change any paper and increase or decrease the number of optional papers.

6. Attendance

a) All students must attend every lecture delivered, however, to account for the late joining or other such contingencies, the attendance requirement for appearing in the semester examinations shall be a minimum of 75% of the total classes actually held.
b) In order to maintain the attendance record of a course, a roll call will be taken by the subject teacher in every scheduled lecture.
c) Attendance on account of participation in the prescribed functions of NCC, NSS, Inter-University sports, educational tours/field work assigned by the university to students shall be credited to the aggregate, provided the attendance record, duly counter signed by the officer in-charge, is sent to the Course Co-Ordinator within two weeks' time after the function/activity.
d) The subject teacher will consolidate the attendance record for the lectures for each student. The statements of attendance of students shall be displayed on the Department's Notice Board by the teacher concerned at the beginning of the following month and consolidated attendance before the conclusion of each semester as given in the University Academic Calendar. A copy of the same shall be sent to the Course Co-Ordinator for record. Notices displayed on the Notice Board shall be deemed to be a proper notification, and no individual notice shall be sent to students.
e) If a student is found to be continuously absent from the classes without information for a period of 30 days, the teacher in charge shall report it to the Course Co-Ordinator, who will inform the Director. Director will issue a notice to such student, as to why his/ her admission should not be cancelled. The Director will take a decision on cancellation of admission within 30 days of issue of the notice. A copy of the order shall be communicated to the student.
f) A student with less than 75% attendance of the lectures in each course shall be detained from appearing in the semester examination of that course. The Course Co-Ordinator concerned may consider application for the condonation of shortage of attendance up to 5% on account of sickness or any other extra ordinary circumstances, provided the medical certificate duly certified by registered Medical Practitioner, had been submitted within 7 days of the recovery from the illness.
A student detained on account of attendance will be re-admitted to the same class in the next academic year on payment of current fees except Enrolment and identity card fees.

7. Scheme of Examination

Each paper shall carry 100 marks. Of these, 75 marks shall be for semester examination and 25 marks for internal assessment (for both theory and practical)

Major Project shall carry 200 marks. Of these, internal assessment would be 50 marks and external assessment would be 150 marks.

8. Internal Assessment

Internal assessment for 25 marks in respect of theory papers will be based on written tests, assignments, seminar/viva and attendance. The breakup is as follows: 10 marks for Sessional (two sessional of 5 marks each). 5 for seminar/viva, 5 for assignments and 5 for attendance.

- The evaluation shall be done by the subject teacher and marks will be notified within a week of such test.
- There shall be two written tests in each course in a semester. The test will be conducted as per the academic calendar, individual faculty member to announce the date for tests or conduct them as per academic calendar.
- The teacher concerned shall maintain records of marks of various components of evaluation for each student and the same will be notified at the end of the semester.
- The internal assessment marks shall be submitted by Course Co-Ordinator to the Chief Superintendent, Examinations at the end of the semester.
- A candidate who has to reappear (as an ex-student) in the semester examination of a course will retain the marks of internal assessment.
- A student who will be required to seek re-admission, for whatever reason, will have to appear for internal assessment and tests afresh.

9. Semester Examinations

a) The Semester examinations shall be held at the end of each semester as notified in the academic calendar. **There shall be supplementary examination**. **But for practical examination there shall not be supplementary examination.** Candidates shall appear in the examination of their uncleared practical papers in the next semester examination of the same paper along with other students of junior batch. Thus, the uncleared papers of Semester - I shall be cleared in Semester- III and those of Semester - II in Semester-IV. Semester-III in Semester-V and Semester-IV in Semester-VI. Likewise, the examination of uncleared papers of semester V and VI would be taken up by the student next year along with the junior batch.

b) The duration of semester examinations of each theory paper will be 3 hours.

c) The question papers shall be set by either an external or an internal examiner duly appointed by the School Board and approved by the Vice Chancellor.

d) The papers set by the examiners shall be moderated by a panel of moderators constituted by the School Board at the time of approving the panel of examiners.

e) Every candidate shall have to prepare project studies /dissertation (Major Project) in the final year. The subject of project/dissertation shall be approved on the recommendations of the supervisor and the Course Co-Ordinator.

f) All students shall be required to be present at the time of project presentation. Their attendance will be taken into account while awarding marks for presentation.

g) A student shall be required to maintain record of periodic progress in the project in a diary. He / she should be in constant touch with his/her supervisor and obtain his/her signature in the diary regularly. There would be continuous appraisal of the project which will carry 50 marks for Major Project as a part of internal assessment.

h) The minimum pass marks shall be 40% (grade P) in each theory/ Internship and viva-voce (combined examination).

Division of Marks (Lab Examination)

1.Minor Program -20 Marks

(Code writing-10 marks, Successful Compilation-5 marks, Result-5 marks)

2.Major Program -25 Marks

(Code writing-15 marks, Successful Compilation-5 marks, Result-5 marks)

3.Viva Voce-15 Marks
4.Lab Record-15Marks

PROJECT/DISSERTATION

a. Each student of the final semester will have to go for Dissertation/ Projects work (in the sixth Semester) in the department under the guidance of one or two faculty members.

b. There shall be a mid-term evaluation of the progress and the internal supervisors will conduct it.

c. All the candidates shall submit 3 hard copies of the project report that are duly approved and signed by internal supervisor(s).
d. An external examiner, appointed for the purpose, shall evaluate the project report.
e. The Head of the Department shall fix a date and time for viva-voce examinations, on receipt of the evaluation-report of the project reports from the external examiner (within 15 days of the submission).
f. Head of the department shall forward the compiled total marks (awarded in internal assessment, Project Report and Viva-Voce Examination), in the project of each of the candidate, to the Chief Superintendent of Examination.

10. Promotion Criteria

A student will be required to clear minimum 40% of his/her papers in a semester examination to be eligible for promotion to the next semester. A student may appear in the supplementary examination after each semester examination and can have a choice to appear in the backlog papers in the supplementary examination or in the subsequent regular semester examination. A student detained due to shortage of attendance will repeat his/her paper in the subsequent semester concerned (even/odd).

The following grading system under 10 points scale will be adopted

Letter Grade*	**Grade Point****
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4

F (Fail)	0
Ab (Absent)	0

*__Letter Grade__: It is an index of the performance of students in a said course. Grades are denoted letters viz, O, A+, A. B+, B, C, P and F

**__Grade Point:__ It is numerical weight allotted to each letter grade on a 10-point scale.

Converting the marks into letter grades

Table for pass marks 40

Letter Grade	Grade Point	Range of Percentage of Marks
O (Outstanding)	10	90 and above to 100 (90-100)
A+ (Excellent)	9	80 and above and less than 90 (80<90)
A (Very Good)	8	70 and above and less than 80 (70<80)
B+ (Good)	7	65 and above and less than 70 (65<70)
B (Above Average)	6	55 and above and less than 65 (55<65)
C (Average)	5	50 and above and less than 55 (50<55)
P (Pass)	4	40 and above and less than 50 (40<50)
F (Fail)	0	00 and above and less than 40 (00<40)
Ab (Absent)	0	--

A student obtaining Grade ‘F’ shall be considered failed and will be required to reappear in the examinations.

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all courses taken by student and the number of credits of all the courses undergone by a student.

SGPA (Si)=∑ (Ci x Gi) / ∑Ci where Ci is the number of credits of the of ith course and Gi is the Grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of programme. i.e. CGPA=∑(Ci x Si)/ ∑ Ci where Si is the SGPA of the ith semester and Ci is the total number of credits that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Formula for Conversion of CGPA into percentage of Marks.

The Percentage equivalent to the CGPA shall be obtained by using the following formula. **Equivalent Percentage of CGPA=CGPA x 10**

Classification of Results

The following formula may be considered for adoption by the University for the award of class/division

Table for pass marks 40

Range of CGPA	**Division/Class**
CGPA of 7.5 and above and upto 10	I Division with Distinction
CGPA of 6.00 and above and less than 7.50	1 Division
CGPA of 5.00 and above and less than 6.00	II Division
CGPA of 4.00 and above and less than 5.00	III Division

11. Span Period

A student must complete all the requirements of BCA degree within a period of five years from his/ her admission. In a genuine case, if only dissertation is left to be cleared, permission may be granted to submit it even beyond the period of five years with prior approval of the Vice Chancellor.

12. Credit System

Credits are a value allocated course units to describe the student workload required to complete them. They reflect the quantity of work each course requires in relation to total quantity of work required to complete a full semester/ year of academic study at the institution i.e lectures, practical work, seminars, private work in the laboratory, library or at home and examination or other assessment activities.

The following is the list of subjects, wherein the core subjects are compulsory. The students are given choice to choose GE (Generic Elective Course) as Elective1, DSE (Discipline Specific Elective Courses) as Elective II and SEC (Skill Enhancement Course) as Elective III subject as

specialization according to his preference. In the Generic Elective Course a student is given chance to choose a subject from the generic elective courses offered by other departments.

The grade awarded to a student in any particular course will be based on his/her performance in sessional and final examinations.

For Example

Semester – I

Course Name	**Subject Credits**	**Marks**	**Grade Awarded**	**Grade Point**	**Points Secured**
Communication Skills in English	2	72	A	8	16
Additional Language-1(Arabic/Hindi/Malayalam)	2	65	B+	7	14
Fundamentals of Computer and HTML	4	55	B	6	24
Office Automation and HTML Lab	2	62	B	6	12
Mathematical Foundation for Computer Application	6	71	A	8	48
Total	**16**			**35**	**114**

Total credits = 16, Points secured = 114, SGPA = 114/16 =7.13

Semester-II

Course Name	**Subject Credits**	**Marks**	**Grade Awarded**	**Grade Point**	**Points Secure**
Environmental Science	2	50	C	5	10
Additional Language - II (Arabic/Hindi/Malayalam)	2	62	B	6	12
C Programming &Unix	4	76	A	8	32
C Programming Lab	2	55	B	6	12
Discrete Mathematics	6	61	B	6	36
Total	**16**			**31**	**102**

Total credits = 16, Points secured = 102, SGPA = 102/16=6.38, CGPA= 216/32 =6.75

COURSE DESIGN

JAMIA HAMDARD KANNUR CAMPUS

COMPUTER SCIENCE DEPARTMENT

Course Code & Title : BCA-101: COMMUNICATION SKILLS IN ENGLISH
Credits : 2
Total Hours : 75

After completion of this Course, the student should be able to:

CLO-1: Develop a deep understanding of the fundamentals of communication.

CLO-2: Give a foundation of English Language**.**

CLO-3: Acquaint the students with the basics of English grammar.

CLO-4: Enable the students to enrich their vocabulary and writing skills.

CLO-5: Encourage learner autonomy through pair and group activities.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	3	2	2	2	2	--	1	1	1	2	3	2	2	2	2
CLO-2	3	3	1	1	2	2	--	1	1	1	2	3	2	2	2	2
CLO-3	3	3	1	2	2	2	--	1	1	1	2	3	2	2	2	2
CLO-4	3	3	1	1	2	2	--	1	1	1	2	3	2	2	2	2
CLO-5	3	3	1	2	2	2	--	1	1	1	2	3	2	2	2	2

SYLLABUS

UNIT I: Phonetics Basics (20 Hours)

Received Pronunciation – Sounds: Vowels/Diphthongs, Consonants – Syllables – Transcription of Words- Weak Forms

UNIT II: English Language (20 Hours)

Parts of Speech – Articles – Modals – Sentence Types – Subject-Verb-Concord – Tenses – Voice – Reported Speech – Clauses – Tag Questions – Punctuation – Common Errors - Jumbled Sentences

UNIT III: Vocabulary & Writing Skills: (20 Hours)

Word Formation – Synonyms, Antonyms – Homonyms, Homophones – One Word Substitution

Personal Letters – Official Letters–Covering Letter–
Bio-data – Curriculum Vitae

UNIT IV:

(A) Communication (15 Hours)

Communication: An Overview – Definition & Process – Features – Importance – Forms – Barriers – Remedies – Non verbal communication – Body Language – Paralinguistic Features – Proxemics/Space Distance – Haptics.

B) Group Discussion – Facing Interviews

References:

1.Kumar, Sanjay, and Pushpa Lata. *Communication Skills*. OUP, 2011.
2.Raman, Meenakshi, and Sangeeta Sharma. *Communication Skills*. OUP, 2011.
3.Wood, F.T. *A Remedial English Grammar for Foreign Students*. Macmillan, 1965.
4.Choili, Mark. Towards Academic English. CUP, 2007.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Tittle : BCA -102 Additional Language-I (Arabic)
Credits : 2
Total Hours : 75

After completion of this course, students should be able to:

CLO-1: To understand the distinct features of Arabic prose & poetry literature from

classical period to modern period .
CLO-2: To understand the basic characteristics of traditional and modern literature in Arabic
CLO-3: To realize the beauty of the language & the moral language values in Arabic poems and prose literature maintain the good perspective.
CLO-4: To aware of the literary works of eminent scholars and writers.
CLO-5: Understand the stories and accept messages.
Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and

Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--

SYLLABUS

Module I (20 Hours)
الآيات والآحاديث

تبارك الله أحسن الخالقين
فمن رغب عن سنتى فليس منّي
أوصانى ربي
من الحكمة

Module II (20 Hours)
مقالة والحكاية

التواضع تاج المروءة
خطبة حجّة الوداع

Module III (15 Hours)
السيرة والشعر

مولانا أبو الكلام آزاد

ترجمة أحمة شوقي
شعر الثعلب والديك
الإمام الشافعى
الرضاء بقضاء الله

Module IV (20 Hours)

القصة والمذكرة رحلة

إبليس ينتصر
انا عاجز عن الشكر
رحلة إلى ماليزيا

Book for Reference

1) THABASSUM - Dr. A. Mohammed
2) Literature Reader - Dr. Abdul Majeed. T
3) Al-Khawathir - Dr. Abdul Azeez. M

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-102: ADDITIONAL LANGUAGE-1(Hindi)
Credits : 2
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: Understanding the basic grammar of Hindi Language.
CLO-2: Develop communicative skills in Hindi.
CLO-3: Understanding correct usage of Hindi grammar
CLO-4: To understand the link between translation theory and translation practice.
CLO 5: Understand the stories and accept messages

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO
CLO-1	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--

SYLLABUS

UNIT 1(20 hrs)

व्याकरण- संज्ञा- सर्वनाम- लिंग-वचन-पुरूष-विशेषण-क्रिया-काल-कारक- लोकोक्तियाँ-मुहावरे।

UNIT II(20 hrs)

औपचारिक एवं अनौपचारिक पत्र लेखन-व्यावसायिक पत्र-शिकायती पत्र-आवेदन पत्र

वार्तालाप-समकालीन विषयों पर आधारित

UNIT III (15hrs)

अनुवाद- आवशयकता और महत्व-समाचार पत्रों के लेख का अनुवाद-किसी परिच्छेद का हिन्दी से अग्रेजी में तथा अग्रेजी से हिन्दी अनुवाद

UNIT IV(20 hrs)

ज्ञानरंजन-पिता

यशपाल-सच बोलने की भूल

उदयप्रकाश-अपराध

उषा प्रियंवदा-वापसी

References:

1.सामान्य हिन्दी व्याकरण तथा रचना - श्रीकृष्ण पाण्डेय, लोकमंगल प्रकाशन

2.कथा मंजरी – महेंद्र कुलश्रेष्ठ राजपाल प्रकाशन, संस्करण 2016

3. सुबोध हिन्दी व्याकरण तथा रचना, श्रीकृष्णा पाण्डेय, लोकमंगल प्रकाशन।

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-102: ADDITIONAL LANGUAGE -1(Malayalam)

Credits : 2

Total Hours : 75

After completion of this course, the student should be able to:

CLO-1: Understand the story content and structure in depth.
CLO-2: Acquaint the students with different thoughts and style of Malayalam Fiction.
CLO-3: Understand the Malayalam Poetry.
CLO-4: Help students to develop their creative thinking and writing.
CLO-5: Analyze and know about Folklore

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	2	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	2	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	2	--	--	---	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	2	--	--	--	--	--	2	2	2	2	2	--	--	--	--

UNIT– I (20 Hours)

കവിത

1. സൂര്യകാന്തി – ജി.ശങ്കരക്കുറുപ്പ്
2. പഴഞ്ചൊല്ല് – സച്ചിദാനന്ദൻ
3. കുട്ടമ്മാൻ – എം.ആർ.രേണുകുമാർ
4. വൈക്കോൽ ഷാവ – ലോപ.ആർ

UNIT-2(20 Hours)

കഥ

1. ചോലമരങ്ങൾ – കെ.സരസ്വതി അമ്മ
2. ചാത്തുക്കുട്ടിയുടെ അമ്മ – യു.എ.ഖാദർ
3. പറുദീസാഷ്ടം – സുഭാഷ് ചന്ദ്രൻ
4. മോഹമഞ്ഞ – കെ.ആർ.മീര

UNIT-3 (15 Hours)

ആത്മകഥ

കൽക്കാടുകൾക്കിടയിൽ എന്റെ ജീവിതം

– കല്ലേൻ പൊക്കുടൻ

UNIT-4(20 Hours)

നോവൽ

പ്രേമലേഖനം - ബഷീർ

References

1. സൂര്യകാന്തി - ജി.ശങ്കരക്കുറുപ്പ് (ജി യുടെ തെരെഞ്ഞെടുത്ത കവിതകൾ)
2. പഴഞ്ചൊല്ല് - സച്ചിദാനന്ദൻ
3. കുട്ടമ്മാൻ - എം.ആർ.രേണുകുമാർ
4. വൈക്കോൽ പാവ - ലോപ.ആർ(വൈക്കോൽ പാവ,ഡി.സി.ബുക്സ്)

ചോലമരങ്ങൾ - കെ.സരസ്വതി അമ്മ

ചാത്തുക്കുട്ടിയുടെ അമ്മ - യു.എ.ഖാദറിന്റെ കഥകൾ)

മോഹമഞ്ഞ - കെ.ആർ.മീര (കറന്റ് ബുക്സ്)

പറുദീസാഷ്ടം - സുഭാഷ് ചന്ദ്രൻ

പ്രേമലേഖനം - ബഷീർ (ഡി.സി.ബുക്സ്)

Teaching-learning strategies:

This paper presents an overview of the basics of Malayalam Language. Various learning strategies will be used to enhance the understanding of basic grammar and communication skills in Malayalam. The curriculum will be delivered through different pedagogical methods such as lectures, classroom discussions, and videos.

Assessment methods:

Assessment methods such as formative and summative assessments, seminar presentations and viva voce will be used to evaluate the students.

Course Code &Title: BCA-103 : FUNDAMENTALS OF COMPUTER AND HTML

Credits :4

Total Hours :75

After completion of this course, the student should be able to:

CLO-1: To Identify various components of the Computer System**.**

CLO-2: To demonstrate theoretical aspects of the computer.

CLO-3: To attain knowledge in operating system concepts and network concepts

CLO-4: To understand and practice markup languages

CLO 5: To Develop web pages

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	2	1	2	3	2	1	1	1	3	3	2	1	3
CLO-2	3	2	2	2	1	2	1	2	1	2	3	3	3	2	2	2
CLO-3	3	3	3	2	1	2	2	2	2	2	2	2	2	3	3	3
CLO-4	2	2	2	3	1	3	3	2	1	3	2	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	3	1	1	2	2	2	2	2	2

SYLLABUS

Unit 1(20 Hours): Introduction to Computer: Computer Characteristics, Concept of Hardware, Software, Evolution of computer and Generations, Types of Computers – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer.Functional Block Diagram of Computer. CPU, ALU, Memory Unit, Bus Structure of Digital Computer – Address, Data and Control Bus. **Computer Memory:** Memory Concept, Memory Cell, Memory Organization, Semiconductor Memory – RAM, ROM, PROM, EPROM, Secondary Storage Devices

Unit 2(20 Hours): Computer Language and Software: Machine Language, Assembly Language, High Level Language, Assembler, Compiler, Interpreter. Software – System and Application Software. **Operating System:** Operating System, Evolution of Operating System. Functions of Operating System. Types of Operating Systems. Introduction and Features of Windows and LINUX OS.
Networking: Concept, Basic Elements of a Communication System, Data Transmission Media, Topologies, Types of Networks.

Unit –3(20 Hours): Introduction to internet and web, An overview of internet programming –WWW design issues. Introduction to HTML-structure of HTML, tags, attributes, syntax of tags, starting and ending tags, html doc elements-<html>, <title>, <body>, physical style tags, listing, labeling, grouping, <img>-<a>

Unit – 4(15 Hours): Table tags-<tr>,<td>,<th> attributes-height, width, row span, Col span, border, color. Form-tag, attributes-type-passwd, submit, radio, check, method, action. Frame-<frame>, <frameset>,<iframe>,<noframe> and other important tags and attributes.

Textbooks:

1.Introduction to information technology, Second Edition, V. Rajaraman, PHI
2.Introduction to Information Technology, ITL Education Solutions Limited, Pearson
3.Fundamentals of Computers-Fifth edition- Rajaraman, PHI
4.O'reilley HTML-Definitive Guide
5.Tata McGraw Hill, Complete reference HTML-

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Practicals- it is expected to practice programs in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-105: MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATION

Credits : 6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Explain various fundamental concepts of Mathematics.
CLO-2: Demonstrate an understanding of relations and functions and determine their properties.
CLO-3: Realize the importance of integration and matrices.
CLO-4: Attain knowledge in Differentiation.
CLO-5: To build mathematical foundations that are essential requirement in understanding various concepts related to computer science

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO 1	PL0 2	PL0 3	PL0 4	PL0 5	PL0 6	PL0 7	PL0 8	PL0 9	PLO 10	PLO 11	PLO 12	PS O1	PS O2	PS O3	PS O4
CLO-1	3	2	2	2	1	--	3	--	--	--	--	2	--	--	--	3
CLO-2	3	2	2	2	3	2	1	2	1	2	3	3	---	--	--	--
CLO-3	3	3	3	2	2	2	3	2	2	3	2	3	--	--	--	--
CLO-4	2	2	2	3	3	3	3	2	1	3	2	2	--	--	--	--
CLO-5	1	2	2	1	2	3	2	3	1	1	2	2	--	--	--	--

SYLLABUS

Unit – 1(20 Hours)
Sets and related operations: Cardinality, Union, Intersection, Complement, Difference, Symmetric Difference, Cartesian Product, subset, superset, power set, Venn diagram, Algebra of Sets, Duality. Properties of operators: commutative, associative, distributive. De Morgan's law. Standard sets.
Relations and their properties: Properties of relation: reflexive, irreflexive, symmetric, asymmetric, antisymmetric, transitive. Matrix of relations, relations represented as digraph. Equivalence relation, partition and equivalence class.

Unit – 2(15 Hours)
Functions and its properties: Types of functions: One-to-one, onto, into, everywhere defined, Domain and range. Invertible functions. Composition of functions.
Differentiation: Limits, Differentiation from 1st Principle, Differentiation of Important Functions, Chain Rule, Product Rule, Quotient Rule, Differentiation of a Function of Function.

Unit-3(20 Hours)

Integration: Integral as Antiderivative, Indefinite Integral and Constant of Integration, Elementary Standard Results, Methods of Integration: Integration through Partial Fractions, Integration by Substitution, Definite Integral.

Unit-4(20 Hours): Matrices: Matrix definition, Order of a Matrix, Types of Matrices, Addition and Multiplication of Matrices, Transpose of a Matrix, Linear System of Equation and Solutions using Gauss Elimination, Gauss Jordan and Gauss Seidel Method.

Text Books:

1.Ralph P Grimaldi, Discrete and Combinatorial Mathematics: An applied introduction (Fourth Edition), Pearson Education, 2004.

References:

1. Thomas Koshy, Discrete Mathematics with Applications, Academic Press/Elsevier, 2005
2. Tremblay, J P & Manohar, Discrete and Mathematical Structures with Applications to Computer Science, McGraw Hill Book Company.
3. Kolman B & Busby R C, Discrete and Mathematical Structures for Computer Science, Prentice Hall of India.
4.Higher Engineering Mathematics-B.S. Grewal
5.Higher Engineering Mathematics-John Bird, Elsavier
6.Skills in Mathematics: Algebra-S.K. Goyal

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Problems- it is expected to practise numerical problems in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-201 : ENVIRONMENTAL SCIENCE
Credits : 2
Total Hours : 75

After completion of this course, the student should be able to:

CLO-1: To understand complex environmental issues.
CLO-2: To master the core concepts and methods of ecology and environmental problem solving.
CLO-3: To envisage exposing students to the real situations in their surroundings and to help them connect, aware, appreciate and be sensitized towards the prevailing environmental issues.
CLO-4: To make them aware if the different types of pollutions and different measures to control it.
CLO-5: To impart basic knowledge about the environment and its allied problems.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	3	-	-	2	-	-	2	2	2	2	-	-	-	-	-
CLO-2	3	3	-	-	2	-	-	2	2	2	2	-	-	-	-	-
CLO-3	3	3	-	-	2	-	-	2	2	2	2	-	-	-	-	-
CLO-4	3	3	-	-	2	-	-	2	2	2	2	-	-	-	-	-
CLO-5	3	3	-	-	2	-	-	2	2	2	2	-	-	-	-	-

SYLLABUS

Unit 1 (30 Hours):

Brief discussion on the components of the environment- Effect of environmental degradation with example and effect on population- Brief outline of the Environment (Protection) Act 1986 should be discussed including effect on companies- contravention- penalties and return requirement. Relevance of environment legislation to Business Enterprise- Legislation vs. Social obligation of business. - Role of NGOs like green peace in Environmental Protection-Ecology- Brief outline on Elements of Ecology- Brief discussion on Ecological balance and consequences of change- principles of environmental impact assessment- Environmental Impact Assessment report (EIA)- Requirement of Environmental Impact Assessment report for startup manufacturing enterprise

Unit 2 (20 Hours):

Air Pollution and Control- Brief Outline of Atmospheric composition- Brief understanding of energy balance- climate- weather- dispersion- Sources and effects of pollutants in the industrial context- primary and secondary pollutants- acid rain- greenhouse effect- depletion of ozone layer- global warming- standards and control measures required by industry in compliance to The Air (Prevention and Control of Pollution) Act 1989

Unit 3(15 Hours):

Water Pollution and Control: Brief Discussion on Hydrosphere- natural water- pollutants: their origin and effects- river/lake/ ground water pollution- The financial implication of water pollution control and steps required to be taken by industry e.g., Sewage treatment plant- water treatment plant- Standards and control in relation to the effect of legislation by Central and State Boards for prevention and control of Water Pollution

Unit 4(10 Hours):

Land Pollution: Brief understanding of lithosphere- Pollutants (municipal- industrial. commercial- agricultural- hazardous solid waste); their original effects- collection and disposal of solid waste- recovery & conversion methods in relation to an industrial enterprise with discussion about the financial implication in a business enterprise

References:

1. Environmental Science: Cunningham- TMH
2. Environmental Studies: A.K. De&A.K.De- New Age International
3. Environmental Pollution Control Engineering: C.S. Rao- New Age International
4. Environmental Management: N.K. Oberoi- EXCEL BOOKS
5. Ecosystem Principles & Sustainable Agriculture: Sithamparanathan- Scitech

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Tittle : BCA -202Additional Language II (ARABIC)
Credits :2
Total Hours :75

After completion of this course, students should be able to:

CLO-1: Use simple words and phrases to communicate on everyday situations.

CLO-2: Understand and use key expressions and common phrases in communications.

CLO-3: Oral and writing skills of communications

CLO-4: Familiarize with basics of interpersonal interactions in Arabic

CLO-5: Understanding correct usage of Arabic grammar

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--

SYLLABUS

Module I (20 Hours)تحيّات وتعارف

كيف تقدّم نفسك ؟

تقديم الآخرين

من أيّ بلد أنتم ؟

أيّ مطعم هذا ؟

هل تشربون قهوة ؟

Module II (20 Hours)

لمحات عن الترجمة

أهمية االترجمة

أنواع الترجمة

خطوات الترجمة الناجحة

الترجمة إلى اللغة العربية

الترجمة إلى اللغة الإنجليزية

Module III (15 Hours)

التعابير الأساسية

أسئلة مفيدة

جمل شائعة

الحياة الإجتماعية

Module IV (20 Hours)

المرسلات

الرسالة : أنواعها وأجزاؤها

الرسالة والشهادات

السيرة الذاتية

شهادة الخبرة

References:

1) A HAND BOOK OF COMMERCIAL ARABIC - DR. ABOOBACKER. K.P
2) BUSINESS COMMUNICATION IN ARABIC - ABDUL RAZAK

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-202 : ADDITIONAL LANGUAGE-11(HINDI)
Credits :2
Total Hours :75
After completion of this course, the student should be able to:

CLO-1: Understand the story content and structure in depth
CLO-2: To acquaint the students with different thoughts and style of Hindi fiction.
CLO-3: Understand the Hindi poetry.
CLO-4: To help students develop their creative thinking and writing.
CLO-5: Analyze drama in the modern context

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10	PL11	PL12	PS1	PS2	PS3	PS4
CLO-1	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	3	--	--	---	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	3	--	--	---	--	--	2	2	2	2	2	--	--	--	--

SYLLABUS:

UNIT I(20 hrs) :

अपना अपना भागय- जैनेंद्र

आकाश दीप – जयशंकर प्रसाद

ईदगाह-प्रेमचंद

यही सच है- मन्नु भण्डारी

UNIT 2(20hrs) :

गीत फरोश- भवानी प्रसाद मिश्र

मोतीराम -धूमिल

जूही की कली – सूर्यकांत त्रिपाठी निराला

बच्चे काम पर जा रहे हैं-राजेश जोशी

UNIT 3(15 hrs):

भोलाराम की जीव – हरिशंकर परसाई

ठकुरी बाबा-महादेवी वर्मा

UNIT 4(20 hrs) :

आधे अधूरे -मोहन राकेश

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Problems- For practical courses like Accounting, Research Methodology etc., it is expected to conduct numerical problems in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-202: ADDITIONAL LANGUAGE-11(MALAYALAM)

Credits : 2

Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Understand the story content and structure in depth.

CLO-2: Acquaint the students with different thoughts and style of Malayalam Fiction.

CLO-3: Understand the Malayalam Poetry.

CLO-4: Help students to develop their creative thinking and writing.

CLO 5: Analyze and know about Folklore.

Mapping of Course Learning Outcomes (CLOs) with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012	PS01	PS02	PS03	PS04
CLO-1	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-2	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-3	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-4	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--
CLO-5	3	3	--	--	--	--	--	2	2	2	2	2	--	--	--	--

Unit-1(20 Hours)

യാത്രാവിവരണം

ഭക്തപുരവും പട്ടണും - എസ്.കെ.പൊറ്റക്കാട്

Unit-2(20 Hours)

ലേഖനം

1. ധർമ്മയുദ്ധത്തിന്റെ പര്യവസാനം - കുട്ടികൃഷ്ണമാരാർ
5. കാളിദാസനും കാലത്തിന്റെ ദാസൻ - ജോസഫ് മുശ്ശേരി
6. നമ്മുടെ അുക്കള തിരിച്ചു പിടിക്കുക - സാറാജോസഫ്
7. ടാഗോറും ഗാന്ധിജിയും - പ്രൊഫ.എസ്.ഗുപ്തൻ നായർ

Unit-3(15Hours)

തിരക്കഥ

ഒരു വടക്കൻ വീരഗാഥ

Unit-4(20 Hours)

മാപ്പിള ഫോക്ലോർ

മാപ്പിളകലകൾ

ബദറുൽ മുനീർ - ഹുസ്നുൽ ജമാൽ

- മോയിൻകുട്ടി വൈദ്യർ

References

1. **മാപ്പിള ഫോക്ലോർ - മുഹമ്മദ് അഹമ്മദ്**

2. **ഒരു വടക്കൻ വീരഗാഥ – എം.ടി.**
3. **മലയാള സിനിമ പിന്നിട്ട വഴികൾ – എം.ജയരാജ്**

Teaching-learning strategies:

This paper presents an overview of the basics of Malayalam Language. Various learning strategies will be used to enhance the understanding of basic grammar and communication skills in Malayalam. The curriculum will be delivered through different pedagogical methods such as lectures, classroom discussions, and videos.

Assessment methods:

Assessment methods such as formative and summative assessments, seminar presentations and viva voce will be used to evaluate the students.

Course Code &Title: BCA-203:C PROGRAMMING & UNIX

Credits :4

Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Explain problem solving strategies.
CLO-2: Draw a flowchart for a given problem.
CLO-3: Write an algorithm for a given problem.
CLO-4: Recognize and incorporate programming elements such as loops, decision making,functions, arrays, strings.
CLO-5: Recognize and incorporate programming elements such as structures, pointers and files into applications that solve real world problems.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit –1 (15 Hours)

Programming Language, Types, Algorithms and Flowcharts. Basic structure of C program, executing a C program, character set, C tokens, keywords, identifiers, constants, data types, declaration of variables, arithmetic operators, logical operators, relational operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, precedence and order of evaluation. Type conversion in expression. Managing input output operation: reading a character, writing a character, formatted input output.

Unit – 2(20 Hours)

Branching Constructs: if, if-else, nested if, else if ladder, switch statement, goto statement. Looping statement: while, do…while, for loop. Break and continue statement; Arrays: one dimensional, two dimensional, is initializing arrays, multidimensional arrays. Strings: declaration and initialization, reading and writing, string handling function.

Unit – 3(20 Hours)

Functions: Library and user defined functions, defining a function, calling a function, parameter passing techniques, scope and life time of variables in function, recursive functions, arrays and functions. Structure and union: definition, giving values to members, initialization, array within structure, structure within structure, union.

Unit -4(20 Hours)

Pointers: accessing the address of the variable, declaration and initialization of the variable, accessing a variable through its pointer, pointer arithmetic, pointers and arrays, pointer and character string, pointer and functions. File management: defining and opening a file, closing a file, input and output operations on a file, error handling, random access file, command line arguments. Dynamic memory allocation functions: malloc (), calloc (), free (), realloc ().

Unix and Linux. Basic commands in Unix: current working directory-referring home directory-creating new directories, copying files, moving files, deleting files and directories.cat, more-online help: man.

Text Books:

1. E. Balagurusamy, 3rd edition, ANSI C, McGraw-Hill Publication
2. Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall PTR (1988), The C Programming Language, 2nd Edition.

References:

1. V. Rajaraman, PHI, Computer Basics and C Programming, 2008
2. Ashok N. Kamthane, 1st edn, Pearson Education., Programming with ANSI and Turbo C,
3. Yeshvanth Kanethkar, 3rd Edn, Let us C, BPB.
4., NIIT, Programming with C in Linux, PHI.
5. Noel Kalicharan, C by Example, Cambridge University press.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4. it is expected to practise computer programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-205 : DISCRETE MATHEMATICS
Credits :6
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: Understand the basics of Prepositional Calculus
CLO-2: Attain knowledge in Lattices and Boolean Algebra
CLO-3: Acquire deep knowledge in Graph theory
CLO-4: Recognize the different types of trees and associated algorithms
CLO 5: Learn the fundamentals of Discrete structures

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	2	1	--	3	--	--	--	--	2	--	--	--	3
CLO-2	3	2	2	2	3	2	1	2	1	2	3	3	---	--	--	--
CLO-3	3	3	3	2	2	2	3	2	2	3	2	3	--	--	--	--
CLO-4	2	2	2	3	3	3	3	2	1	3	2	2	--	--	--	--
CLO-5	1	2	2	1	2	3	2	3	1	1	2	2	--	--	--	--

SYLLABUS

Unit-1(15 Hours):

Prepositional Calculus: Statements, Logical Operations, Truth Table of Logical Identities, Equivalence of Logical Identities, Tautologies and Contradiction Negation De Morgan's Law, Conditional and Biconditional Logical Inference, Predicate and Quantifiers, Methods of Proof.

Unit-2(20 Hours):

Lattices and Boolean Algebra: Lattices and Algebraic System Principle of Duality, Basic Properties of Algebraic Systems Defined by Lattices, Distributive Lattices and Complemented Lattices, Boolean Lattices and Boolean Algebra, Boolean Function and Boolean Expressions.

Unit-3(20 Hours):

Graph: Introduction, Graph and Multigraphs, Indirected and Undirected Graph, Connected and Disconnected Graph, Degree of a Vertex, Bipartite Graph, Complete Bipartite Graph. Sub Graph, Isomorphic Graph, Paths and Circuits, Shortest Path in a Weighted Graph, Dijkstra's Algorithm, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits.

Unit-4(20 Hours):

Tree: Definition, Properties, Pendant Vertices, Centre of a Tree, Rooted and Binary Trees, Spanning Trees, Algorithms, BFS and DFS, Fundamental Circuits, Spanning Trees of a Weighted Graph, Kruskal's Algorithm.

References:

1. Elements of Discrete Mathematics TATA MCGRAW – HILL Edition
2. J.K. Tremblay and R Manohar, Discrete Mathematical Structures with applications to Computer Science- MCGRAW HILL INTERNATIONAL Edition
3.Kolman, Busby, Ross, Discrete mathematical Structures — Pearson Education

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Problems- it is expected to practise numerical problems in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-301: C++ & DATASTRUCTURES

Credits : 4
Total Hours : 75

At the end of the course students will be able to:

CLO-1: Apply fundamental object-oriented concepts in problem solving.
CLO-2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations.
CLO-3: Implementation of data structures.
CLO-4: Use various data structures for sorting and searching.
CLO-5: Analyze the stack, queue, linked list data structures.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit - 1 (15 Hours): Basic concepts of OOP; Structure of C++ program. Specifying a class; Defining member functions; making an outside function inline; nesting of member functions; private member functions; memory allocation for objects; static data members; static member functions; arrays of objects; objects as function arguments; Local classes.

Unit - 2 (20 Hours): Constructors and destructors: Constructors; Parameterized constructors; Multiple constructors; multiple constructors in a class; constructors with default arguments; dynamic initialization of objects; copy constructor; Destructors. Operator overloading – definition; overloading unary operators; overloading binary operators; manipulation of strings using operators; rules for overloading operators.

Unit -3 (20 Hours): Inheritance – defining derived classes; single inheritance; making a private member inheritance; multilevel inheritance; multiple inheritance; hierarchical inheritance; hybrid inheritance; virtual base classes; abstract classes; constructors in derived classes; Nesting of classes. Pointers; Pointers to objects; Pointers to derived classes; virtual functions; pure virtual functions.

Unit-4 (20 Hours): Search: Linear and Binary search; Sort: Insertion, bubble, selection, quick and merge sort; Stack: Operations on stack; array representation. Application of stack- Postfix expression evaluation. ii. Conversion of infix to postfix expression. Conversion of infix to prefix expression. Queues: Operation on queue. Array Implementation; Limitations; Circular queue; Dequeue and priority queue. Application of queue: Linked list – Comparison with arrays; representation of linked list in memory. Major types-Singly linked list, Circular linked list, Double linked list, Circular Double linked list.

Text books:

1.E. Balagurusamy; Object Oriented Programming with C++.

2.Data Structures and Algorithms: Concepts, Techniques and Applications; GAV Pai, Mc Graw Hill, 2008

References:

1. Bjarne Stroustrup,The C++ Programming Language
2. Ashok N. Kamthane, Object Oriented Programming with ANSI & Turbo C++, Pearson Education
3. Yashwant Kanetkar, Let us C++, BPB
4. M.T. Somashekara, Programming in C++, Prentice Hall of India, New Delhi
5. Data Structures, Lipschutz, Mc Graw Hill
6. Classic Data structures, Samanta, Second Edition, PHI

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Problems- it is expected to practise computer programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Title : BCA-302: SOFTWARE ENGINEERING
Credits : 6
Total Hours : 75

After completion of this course, the student should be able to:

CLO1: Understand the various Software Development Methodologies.
CLO2: Apply Requirement Engineering.
CLO3: Analyze Software Projects.
CLO4: Design Software Projects.
CLO-5: Study the various phases of a S/W Development Project

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	1	1	--	2	3	2	2	2	--	3	1	2	3	3
CLO-2	3	2	2	1	2	2	3	2	1	1	2	3	3	2	2	2
CLO-3	3	2	2	2	2	2	3	2	2	2	--	2	2	3	--	--
CLO-4	3	2	2	3	2	2	3	2	1	3	2	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	3	1	1	2	2	2	2	2	2

SYLLABUS

UNIT-1(20 Hours): Software- Types of software-The dual role of software- Differences between software and hardware-Legacy software- Software myths. **Software Engineering**-Definition-Objectives and needs of Software Engineering- Characteristics of a good software engineer-Importance of software engineering- A layered technology- A process framework-Capability Maturity Model Integration (CMMI).**Software Development Life Cycle (SDLC) -** Need of SDLC- SDLC life cycle.**SDLC Models**- Prescriptive Process Models (Waterfall model, V model, RAD model) – Incremental Process model (Agile model) - Evolutionary Process Models (Prototype model, spiral model).

UNIT-2(15 Hours): Software Requirements – Functional and non-functional requirements – User requirements – System requirements- Domain requirements. **Requirement Engineering** – Definition, Tasks, Requirement engineering Process (Feasibility Study, Requirement Elicitation and analysis, Software Requirement Specification, Software requirement validation, Software requirement management) - Eliciting requirements.**Analysis Model**- Elements of analysis model.**UML models –** Structural Diagram (Class diagram, Object diagram) – Behavioral Diagram (Use case diagram, Sequence diagram, Communication diagram), State Diagram.**Analysis Modelling Concepts**- Flow oriented Modelling (Data Flow Diagram) – Class based modelling – data modelling – Scenario based modelling.

UNIT-3(20 Hours): Design concepts – design models – quality guidelines – design principles – quality attributes – design concepts. **Architecture** – Why is architecture important? – Architectural styles. **Component Level Design** – Definition- Class based component Design and principles. **Interface Design** – Typical design errors – Golden rules – User interface design models.

UNIT-4(20 Hours): Software Configuration Management – Why do we need configuration management? – Tasks in SCM process – Participants of SCM process – SCM plan – SCM tools – SCM repository. **Testing** – Difference between testing and debugging, what testing shows? – Who tests the software? – Testing strategy (for object oriented and conventional software) – Strategic issues- Testing fundamentals - Types of testing – Unit Testing, Integration testing, System Testing, User Acceptance testing, Black box and white box testing – Test case design.

Text Books:

1. Software Engineering a Practitioner's Approach, Roger S Pressman, 6th edition. McGraw-Hill International Edition.
2. Software Engineering, Ian Somerville, 7th edition, Pearson education.

References:

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Problems- it is expected to practise diagrams related to software development in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Title : BCA-304: DATA COMMUNICATION AND NETWORKS

Credits :6

Total Hours :75

After completion of this course, the student should be able to:

CLO1: Understand fundamentals of data communication.
CLO2: Analyze the layer technology
CLO3: To familiarize with OSI and TCP/IP reference model.
CLO4: To learn various Routing Algorithms.
CLO5: Attain the knowledge about various protocols used in Communication.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	--	--	--	---	3	1	1	2	2	3	1	2	--	---
CLO-2	3	2	2	2	3	2	1	2	1	2	3	3	3	2	2	2
CLO-3	3	--	--	----	---	---	3	--	--	--	--	---	2	--	--	--
CLO-4	3	--	---	---	---	---	3	---	--	---	--	--	2	--	--	--
CLO-5	3	2	1	--	--	--	3	--	--	---	---	2	2	--	--	--

SYLLABUS

Unit – 1(18 Hours): Introduction to data communication: important elements /components of data communication, Data transmission- Analog, Digital. Transmission modes: simplex, Half Duplex, Duplex. Transmission Techniques: Parallel Transmission, Serial Transmission, Digital modulation and multiplexing: Baseband-Transmission, Broadband Transmission, FDM, TDM, CDM. Transmission media-Guided and Unguided media. Switching.

Unit- 2(19 Hours): Reference models, the OSI reference model, TCP / IP reference model. Comparison between OSI and TCP IP models.

Data Link Layer, Design issues, Services to network layer, Framing- character count, character stuffing, bit stuffing, and physical layer coding violation. Error control, flow control, Error detection and correction, Elementary data link protocols- unrestricted simplex protocol, simplex stop and wait protocol, simplex protocol for a noisy channel.

Unit – 3(19 Hours): Network layer, design issues, services to the transport layer, routing algorithms- adaptive, non-adaptive algorithms, optimality principle, Dijkstra's shortest path routing algorithm, flow-based routing, hierarchical routing, congestion control algorithms – the leaky bucket algorithm, the token bucket algorithm.

Unit – 4(19 Hours): Transport layer, design issues, connection management-addressing, establishing and releasing connection, transport layer protocols- TCP, UDP. Application Layer, DNS, E-mail, www, HTTP.

Network Security: Basics of Cryptography, plain text, cipher text, Encryption, Decryption. Confidentiality: Basics of symmetric key ciphers, Traditional symmetric key ciphers, Substitution, Transportation. .

References:

1.B Forousan, Introduction to data communication and networking
2.A S Tanenbaum. Computer Networks.
3.Data communication and Networks, Achyut S. Godbole, TMH

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
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3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-401: JAVA PROGRAMMING
Credits : 4
Total Hours : 75

After completion of this course, the student should be able to:

CLO-1: Understand the concepts of object-oriented programing paradigms and develop skills using Java.
CLO-2: Knowledge about JVM architecture
CLO-3: Implement the designed classes using object-oriented programming language.
CLO-4: Provide an overview of characteristics of Java Applets, Exceptions, Events, Multithreading etc.
CLO-5: Getting the knowledge of File Handling

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit – 1(18 Hours):

Introduction to Java programming: Java technology; history; java as a newparadigm; features of java; Applications and applets (Simple examples); Java Development Kit Java Language fundamentals: Building blocks; Data types; variable declarations; wrapper classes; Operators and assignment; control structures; arrays; strings; String buffer classes.

Unit – 2(20 Hours):

Java as an OOP Language: Defining classes; Modifiers; Packages; Interfaces. Exception handling: Basics; handling exceptions in java; (Try, catch, finally, multiple catch, nested try, throw); Exception and inheritance; Throwing user defined exceptions; Advantages of exception handling. Multithreading: Overview, Creating threads, thread life cycle, priorities and scheduling, synchronization, Thread Groups, Communication of threads, Sample programs.

Unit- 3(18 Hours):

Files and I/O streams: Overview; Java I/O; file streams; FileInputStram and FileOutputStream; Filter Streams; RandomAccessFile; Serialization. Applets: Introduction; Application vs. applets; Applet lifecycle; Working with Applets; The HTML APPLET tag; the java. Applet Package; Sample programs.

Unit – 4(19 Hours):

The Abstract Window Toolkit: - Basic classes in AWT; Drawing with Graphics class; Class hierarchy; Event handling; AWT controls (Labels, Buttons, checkbox, radio buttons; choice control; list, textbox, scroll bars); Layout Managers.

Text book:

1. Radha Krishna, Object Oriented Programming through JAVA, University Press.

References:

1. E. Balaguruswami, Programming with java: 3rd Edn, A primer, McGraw Hill.
2. Schildt, Java 2 The complete Reference, McGraw Hill

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Problems- it is expected to do Java programs in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
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4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-402: DATABASE MANAGEMENT SYSTEMS
Credits : 4
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Explain the various database concepts and the need for database systems.
CLO-2: Identify different entities and relationship between them.
CLO-3: Represent the given system using ER diagram.
CLO-4: Convert an ER diagram to a database schema.
CLO-5: Formulate queries in Relational Algebra, SQL to manipulate the database.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit – 1(18 Hours): Introduction – purpose of Database systems. View of Data, data Models, Database structure, DBA, Data Base Users.

Unit – 2(19 Hours):E-R model, Basic concepts; design issues; Mapping Constraints; Keys; Primary, Foreign, candidate, E-R diagram; Weak entity set; Extended E-R features. Normal forms – 1NF, 2NF, 3NF and BCNF; functional dependency, Normalization.

Unit-3(19 Hours):SQL: database languages; DDL; create, alter, Drop, DML, insert into, Select, update, Delete. DCL commands, DQL, TCL, Data types in SQL; Creation of database and user.

Developing queries and sub queries; join operations; Set operations; Integrity constraints, views, Triggers, functions and Sequences.

Unit-4(19 Hours): Relational model – Structure of Relational database. Relational Algebra; Fundamental operations; Relational calculus; Tuple and domain calculus. Transaction management and Concurrency control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Text books:

1. Silber Schatz, Korth and Sudarshan, 5th Edn, Database system concepts; McGraw Hill.
2. Gehani, the database book: Principles and Practice Using MySQL; University Press.

Reference:

E. Navathe, 4th edn, Fundamentals of Database systems, Pearson Education

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Problems- it is expected to practise queries, functions and triggers in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

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4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Title : BCA-501: VISUAL PROGRAMMING USING C#
Credits :4
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Understand code solutions and compile C# projects within the .NET framework
CLO-2: Design and develop professional console and window-based .NET application.
CLO-3: Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application.
CLO-4: Construct classes, methods and assessors, and instantiate objects.
CLO-5: Understand and implement string manipulation, events and exception handling within .NET application environment.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

UNIT-1 (20 Hours): .Net Framework – Common Language Runtime – Framework Class Library.**C#** - What is C#? – C# History – Features – Compare C# and java – Structure of C# program – Comments - C# variable – Data types – Boxing and unboxing – Operators – Keywords – Implicit and explicit conversion. **C# control structures** – Conditional statements – Looping statements – Jumping statements. **C# functions** – Predefined functions (Write (), WriteLine (), Read (), ReadiLine (), Read Key ()) -Function syntax – Types of function – Parameter passing mechanism – Recursion – function overloading.

UNIT-2(20 Hours): C# arrays – Advantages – Types of arrays – traversal using foreach loop – passing array to function – Multidimensional array – Jagged arrays – C# params – Array class – Array List class - Command Line Arguments.**C# strings** – String types – String class – StringBuilder class. **Object Oriented Programming Concepts –** Class – Object – Constructor – Destructor – Abstraction – Encapsulation- Inheritance – Polymorphism- this variable – static variable – base variable - static class – C# enumerator – Structure – Properties – Sealed class – Abstract – Interface.

UNIT-3(20 Hours): Namespaces – Access modifiers – Exception handling – Checked and unchecked - C# Serialization – Deserialization – Multithreading.

UNIT-4(15 Hours): Windows Forms Application – Customizing the form – controls – events – Examples.

ADO.Net – Architecture – Classes. Assemblies – Versioning – Attributes – Reflection – Remoting – Marshalling.

Text Book:

1. Programming in C# A Primer, E BALAGURUSAMY, McGraw hill education, 2019.

References:

1.A Textbook on C# Paperback – S. Thamarai Selvi and R. Murugesan- 1 January 2003, Pearson Education India,

2.C# and .Net Programming (English, Paperback, Thamaraiselvi. K, M. Jansi Rani, Karthick. V, Dr. Rinesh. S, Uma Priyadarsini. P.S), Publisher: Charulatha Publications Private Limited, 2019.

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4.Problems- it is expected to do programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

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2.Problem based assignments shall be part of evaluation of the students.

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4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-502: WEB PROGRAMMING
Credits :4
Total Hours :75

After completion of this course, the student should be able to:

CLO1: To attain the knowledge of working of client server system in the internet
CLO2: To introduce the concept of client side and server-side scripting
CLO3: To attain skills in web development.
CLO4: To understand basic features of JavaScript and PHP
CLO5: To learn to implement features of web programming languages in real life scenarios

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit – 1(10hrs): The Hypertext Transport Protocol - URLs, Elements of a URL, Absolute and relative URLs, HTTP-Request and Response Cycle, Browser Request- Request headers, Request Methods, Server Responses, Status line, Server headers, Proxies.

Unit – 2(25hrs): JavaScript- Introduction, data types, variables, for\in statement, Objects-Creating Objects- object literals, creating objects with new. Arrays - Creating Arrays, Reading and Writing Array Elements- Array length, Array methods. Functions- defining functions, invoking functions, client-side JavaScript, embedding JavaScript in html, <script>, event handlers, JavaScript in URL. Client-side object hierarchy, window object, document object, navigator object, location object, history object, date object, math object, screen object – dialog boxes

Unit – 3(20hrs):PHP: Introduction to PHP, Server-side scripting, Role of Web Server software, escaping into PHP, including files, comments, variables, data types, constants, echo and print, Branching, Looping, break and continue. PHP functions: function definition, formal and actual parameters, variable number of arguments, default argument, call-by-value, call-by-reference, variable function name, function and variable scope. PHP Arrays: Associative versus Vector arrays, array () construct, list () construct, simple functions for inspecting arrays, functions for iterating over arrays, array_walk (). PHP super global Arrays.

Unit – 4(20hrs): Strings in PHP, String functions: Simple inspection, comparison and searching functions, Substring and string replacement functions, Case functions, escaping functions. Object Oriented PHP – Defining classes, constructor function, inheritance, overriding functions, chained subclassing, public, private and protected members, interfaces, abstract classes, simulating method overloading, serialization, introspection functions. Cookies and session: IP address, hidden variable, setcookie (), deleting cookies, reading cookies, session functions, using $_SESSION

Text Books:

1.O'Reilly- CGI Programming with Perl
2.O'Reilly- JavaScript-Definitive Guide
3.Tim Converse & Joyce Park, PHP6 And MySQL Bible, Wiley

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Assessment methods:

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Course Code &Title : BCA-504: OPERATING SYSTEMS
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CO1: Explain the role of operating system.
CO2: Describe process management and process coordination.
CO3: Implement various CPU scheduling algorithms and compare their performance.
CO4: Explain deadlock handling.
CO5: Describe features of Virtual memory.
CO6: Implement various Memory Allocation algorithms.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit-1(18 Hours): Introduction and Generation of Operating System, Types of Operating system, Function of Operating system. Kernel, Types of Kernels (Monolithic/Macro Kernel and Micro / Exo-Kernel), Client-Server Model, Virtual Machines, Shell. **Process Concepts:** Definitions of Process, The Process Model, Process States, Process State Transition, The Process Control Block, Operations on Processes (Creation, Termination, Hierarchies, Implementation), Cooperating Processes, System Calls (Process Management, File Management, Directory Management).

Unit-2(19 Hours):Threads: Definitions of Threads, Types of Thread Process (Single and Multithreaded Process), Benefits of Multithread, Multithreading Models (Many-to-One-Model, One-to-One Model, Many-to-Many Model **.Process Scheduling:** Basic Concept, Type of Scheduling (Pre-emptive Scheduling, Nonpreemptive Scheduling, Batch, Interactive, Real Time Scheduling), Scheduling Criteria or Performance Analysis, Scheduling Algorithm (Round-Robin, First Come First Served, Shortest-Job- First, Shortest Process Next, Shortest Remaining Time Next, Real Time, Multiple Queue, Multilevel Feedback Queue); Some Numerical Examples on Scheduling.

Unit-3(19 Hours):Inter-Process Communication and Synchronization: Introduction, Race Condition, Critical Regions, Avoiding Critical Region: Mutual Exclusion and Serializability; Mutual

Exclusion Conditions, Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded Buffer), Serializability: Locking Protocols and Time Stamp Protocols; Classical IPC Problems (Dinning Philosophers Problems, The Readers and Writers Problem, The Sleeping Barber's Problem).Deadlocks –Deadlock handling techniques.
Memory management: Single contiguous allocation –Partitioned allocation –Relocatable partitioned – Paging – Demand paging – Segmentation – Segmentation and demand paging, virtual memory

Unit-4(19 Hours): Input/Output Device Management-Principle of I/O Devices, Device Controllers, Memory Mapped I/O, Direct Memory Access; Disk Scheduling: Seek Time, Rational Delay, Transfer Time; Disk Scheduling Algorithms: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, Lock Scheduling. **File** Concept: File Naming, File Type, File Access, File Attributes, File Operation and File Operation and File Descriptors: Directories: Single-Level Directory Systems, Hierarchical Directory Systems, Path Names, Directory Operation; **Security Management**-introduction, Security Problems, User Authentication: Passwords, password Vulnerabilities, Encrypted password, One Time Password and Biometrics password; User Authorization, Program Threats: Trojan Horse, Trap Door, Stack and Buffer Overflow; System Threats: Worms, Viruses, Denial of Services.

Text Books:

1.Stuart E Madnick and John J Donovan, "Operating Systems", Tata McGraw-Hill,2005
2.Dhamdhere, "Systems Programming and Operating Systems", 2nd Revised Edn, TMH
3.A. S. Tanenbaum, "Modern Operating systems"; PHI

Teaching-Learning Strategies:
1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
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3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:
Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
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Course Code &Title : BCA-601: PYTHON PROGRAMMING
Credits :4
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: To understand why Python is a useful scripting language for developers.
CLO-2: To learn how to design and program Python applications.
CLO-3: To learn how to use lists, tuples, and dictionaries in Python programs.
CLO-4: To learn how to identify Python object types.
CLO-5: Attain knowledge in Database Connection.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit-1(20 Hours):

Basic Elements and Control Statements: Features of Python, Different Methods to Run Python, Basic Elements (Objects, Expressions, Numerical Types, Strings, Variables), Comments, Indentation in Python, Input and Output in Python, import function, Operators in Python, Branching (if, else, elif), Iteration (while, for), range and enumerate functions, Tuples, Lists, Sets, Dictionaries, Built-in methods of lists, sets and dictionaries, Mutable and Immutable Objects.

Unit-2(20 Hours):

Functions, Modules and Exception Handling: Functions Definition, Function Calling, Function Arguments (Required, Keyword, Default), Recursion, Modules, Built-in Modules,
Creating Modules, File Handling (Opening, Closing, Writing, Reading), Exceptions, Built-in Exceptions (Index Error, Overflow Error, Zero Division Error, Runtime Error), Exception Handling.

Unit-3(20 Hours):

Object Oriented Programming, Arrays and Data Visualization: Class Definition, Object Creation, Built-in Attribute Methods, Object Oriented Programming Features of Python.
Arrays in Python, Numpy Module, ndarray, Creating Arrays (array, zeros, ones, empty, linspace, arrange, random), Two-Dimensional Array, Indexing, Slicing, Iterating, Copying, Splitting, Shape Manipulation (reshape, transpose, resize), Arithmetic Operations on Arrays. Data Visualization in

Python matplotlib Module, pyplot, plot (), 54 scatter, bar charts, Formatting, figure (), subplot (), text (), xlabel (), ylabel (), title (), Plotting Simple Mathematical Functions (sin x, x2).

Unit -4(15 Hours):

Connecting to Database: Connecting to a Database, Basic Operations on Database (Create, Insert, Update, Delete), Fetching Data from a Database, Transaction Control. GUI Programming: GUI Programming using Tkinter, Tkinter Widgets (Label, Message, Entry, Text, Button, tkMessagebox, Radio Button, Check button, List box, Menu, Menu button, Scale, Scrollbar, Canvas), Layout Managers.

Text Books:

1. Dr. Jeeva Jose, Taming Python by Programming, Khanna Publishing
2. John V. Guttag, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI (2016)

Teaching-Learning Strategies:

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2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4. it is expected to practise programs in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-603: SYSTEM SOFTWARE

Credits :6

Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Understand the language processing methods and tools
CLO-2: Explain the data structures of language processor
CLO-3: Get deep knowledge on compilers, interpreters, loaders and linkers
CLO-4: Cover important topics of macros
CLO -5: Acquaint good knowledge on software tools, programming, environment, user interface, editors etc.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit -1 (18 Hours):
Introduction – Evolution – Language processing activities – Fundamentals of language processing and specification – Development tools – Data structures for language processing

Unit -2(19 Hours):
Scanning and parsing – Elements of ALP – Assembly scheme – Pass structure of assemblers – Two pass assembler – Single pass assembler. Macros: Definition and call – Expansion – Nested macro calls - Advanced macro facilities – Macro preprocessor.

Unit -3 (19 Hours);
Compiler: Compilation – Memory allocation – Compilation of expressions and control structures – Code optimization – Interpreters.

Unit -4(19 Hours):
Linker: Design – Relocation and linking – Self relocating programs Loader – Software tools – Editor – Debug monitor –Programming environment – User interface

Text Book:
D M Dhamdhere, “Systems Programming and Operating Systems”, Tata McGraw-Hill

Reference:
John J Donovan, “Systems Programming”, Tata McGraw-Hill

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Assessment methods:

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2.Problem based assignments shall be part of evaluation of the students.
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4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA- 604: PROJECT/DISSERTATION
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Develop a software project.
CLO-2: Master any front end and back-end software(s)
CLO-3: To equip the students with Computer Applications
CLO-4: To develop the software development skill Prerequisites Advanced programming knowledge
CLO-5: Software Projects in any platform using any language of student's choice.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

Aim

To equip the students with Computer Applications

Objectives of the Course

To develop the software development skill Prerequisites Advanced programming knowledge

Course Outline

Software Projects in any platform using any language of student's choice

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4. it is expected to practise software development in the class.
5.Encourage group learning- Role plays, group discussions support group learning.

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

ELECTIVE -1: GENERIC ELECTIVES

Course Code &Title : BCA-GE1: FUNDAMENTALS OF COMPUTER AND HTML
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Identify various components of the Computer System**.**
CLO-2: understand theoretical aspects of the computer.
CLO-3: understand the operating system concepts and network concepts
CLO-4: To understand and practice markup languages
CLO 5: Develop web pages

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	2	1	2	3	1	--	--	1	3	3	2	1	3
CLO-2	3	2	2	2	1	2	1	1	--	--	1	3	3	2	2	2
CLO-3	3	3	3	2	1	2	2	1	--	---	1	2	2	3	3	3
CLO-4	2	2	2	3	1	3	3	1	--	--	1	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	1	--	--	1	2	2	2	2	2

SYLLABUS

Unit 1: Introduction to Computer (19 Hours): Computer Characteristics, Concept of Hardware, Software, Evolution of computer and Generations, Types of Computers – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer.Functional Block Diagram of Computer. CPU, ALU, Memory Unit, Bus Structure of Digital Computer – Address, Data and Control Bus. **Computer Memory:** Memory Concept, Memory Cell, Memory Organization, Semiconductor Memory – RAM, ROM, PROM, EPROM, Secondary Storage Devices.

Unit 2: Computer Language and Software (19 Hours): Machine Language, Assembly Language, High Level Language, Assembler, Compiler, Interpreter. Software – System and Application Software. **Operating System:** Operating System, Evolution of Operating System. Functions of Operating System. Types of Operating Systems. Introduction and Features of Windows and LINUX OS. **Networking:** Concept, Basic Elements of a Communication System, Data Transmission Media, Topologies, LAN, MAN, WAN.

Unit –3(18 Hours): Introduction to internet and web, An overview of internet programming –WWW design issues. Introduction to HTML-structure of HTML, tags, attributes, syntax of tags, starting and

ending tags, html doc elements-<html>, <title>, <body>, physical style tags, listing, labeling, grouping, <img>-<a>

Unit – 4(19 Hours): Table tags-<tr>, <td>, <the> attributes-height, width, row span, Col span, border, color. Form-tag, attributes-type-passwd, submit, radio, check, method, action. Frame-<frame>, <frameset>, <iframe>, <noframe> and other important tags and attributes.

Textbooks:

Introduction to information technology, Second Edition, V. Rajaraman, PHI
Introduction to Information Technology, ITL Education Solutions Limited, Pearson
Fundamentals of Computers-Fifth edition- Rajaraman, PHI
O'Reilly HTML-Definitive Guide
Tata McGraw Hill, Complete reference HTML-

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Problems- it is expected to practise programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-GE2:C PROGRAMMING & UNIX
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Explain problem solving strategies.
CLO-2: Draw a flowchart for a given problem.
CLO-3: Write an algorithm for a given problem.
CLO-4: Recognize and incorporate programming elements such as loops, decision making, functions, arrays, strings.
CLO-5: Recognize and incorporate programming elements such as structures, pointers and files into applications that solve real world problems.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit –1 (18 Hours): Programming Language, Types, Algorithms and Flowcharts. Basic structure of C program, executing a C program, character set, C tokens, keywords, identifiers, constants, data types, declaration of variables, arithmetic operators, logical operators, relational operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, precedence and order of evaluation. Type conversion in expression. Managing input output operation: reading a character, writing a character, formatted input output.

Unit – 2(19 Hours): Branching Constructs: if, if-else, nested if, else if ladder, switch statement, goto statement. Looping statement: while, do…while, for loop. Break and continue statement; Arrays: one dimensional, two dimensional, is initializing arrays, multidimensional arrays. Strings: declaration and initialization, reading and writing, string handling function.

Unit – 3(19 Hours): Functions: Library and user defined functions, defining a function, calling a function, parameter passing techniques, scope and life time of variables in function, recursive functions, arrays and functions. Structure and union: definition, giving values to members, initialization, array within structure, structure within structure, union.

Unit -4(19 Hours): Pointers: accessing the address of the variable, declaration and initialization of the variable, accessing a variable through its pointer, pointer arithmetic, pointers and arrays, pointer and character string, pointer and functions. File management: defining and opening a file, closing a file,

input and output operations on a file, error handling, random access file, command line arguments. Dynamic memory allocation functions: malloc (), calloc (), free (), realloc ().
Unix and Linux. Basic commands in Unix: current working directory-referring home directory-creating new directories, copying files, moving files, deleting files and directories.cat, more-online help: man.

Text Book:

1.E. Balagurusamy, 3rd edition, ANSI C, McGraw-Hill Publication
2.Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall PTR (1988), The C Programming Language, 2nd Edition.

References:

1. V. Rajaraman, PHI, Computer Basics and C Programming, 2008
2. Ashok N. Kamthane, 1st edn, Pearson Education., Programming with ANSI and Turbo C,
3. Yeshvanth Kanethkar, 3rd Edn, Let us C, BPB.
4. NIIT, Programming with C in Linux, PHI.
5. Noel Kalicharan, C by Example, Cambridge University press.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4. it is expected to develop computer programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-GE3: JAVA PROGRAMMING
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: To understand the concepts of object-oriented programing paradigms and develop skills using Java.
CLO-2: Knowledge about JVM architecture
CLO-3: Implement the designed classes using object-oriented programming language.
CLO-4: Provide an overview of characteristics of Java Applets, Exceptions, Events, Multithreading etc.
CLO-5: Getting the knowledge of File Handling

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit – 1(18Hours):

Introduction to Java programming: Java technology; history; java as a newparadigm; features of java; Applications and applets (Simple examples); Java Development Kit Java Language fundamentals: Building blocks; Data types; variable declarations; wrapper classes; Operators and assignment; control structures; arrays; strings; String buffer classes.

Unit – 2(19 Hours):

Java as an OOP Language: Defining classes; Modifiers; Packages; Interfaces. Exception handling: Basics; handling exceptions in java; (Try, catch, finally, multiple catch, nested try, throw); Exception and inheritance; Throwing user defined exceptions; Advantages of exception handling. Multithreading: Overview; Creating threads; thread life cycle; Priorities and scheduling; synchronization; Thread groups; communication of threads; Sample programs.

Unit- 3(19 Hours):

Introduction; Application vs. applets; Applet lifecycle; Working with Applets; The HTML APPLET tag; the java. Applet Package; Sample programs.

Unit – 4(19 Hours):

The Abstract Window Toolkit: - Basic classes in AWT; Drawing with Graphics class; Class hierarchy; Event handling; AWT controls (Labels, Buttons, checkbox, radio buttons; choice control; list, textbox, scroll bars).

Text book:

1. Radha Krishna, Object Oriented Programming through JAVA, University Press.

References:

1. E. Balaguruswami, Programming with java: 3rd Edn, A primer, McGraw Hill.

2. Schildt, Java 2 The complete Reference, McGraw Hill

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4. it is expected to do Java programs in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-GE4 : PYTHON PROGRAMMING
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: To understand why Python is a useful scripting language for developers.
CLO-2: To learn how to design and program Python applications.
CLO-3: To learn how to use lists, tuples, and dictionaries in Python programs.
CLO-4: To learn how to identify Python object types.
CLO-5: Attain knowledge in Database Connection.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	1	---	1	1	--	--	3	---	1	1	--	3	2	2	3	3
CLO-2	2	--	--	1	2	1	3	--	--	--	--	2	3	2	2	2
CLO-3	2	--	--	1	2	2	3	--	--	--	--	2	2	3	2	2
CLO-4	3	2	2	3	3	3	3	2	1	--	2	2	3	2	2	3
CLO-5	3	2	2	2	2	2	3	--	1	1	1	2	2	2	2	2

SYLLABUS

Unit-1(19Hours):
Basic Elements and Control Statements: Features of Python, Different Methods to Run Python, Basic Elements (Objects, Expressions, Numerical Types, Strings, Variables), Comments, Indentation in Python, Input and Output in Python, import function, Operators in Python, Branching (if, else, elif), iteration (while, for), range and enumerate functions, Tuples, Lists, Sets, Dictionaries, Built-in methods of lists, sets and dictionaries, Mutable and Immutable Objects.

Unit-2(18 Hours):
Functions, Modules and Exception Handling: Functions Definition, Function Calling, Function Arguments (Required, Keyword, Default), Recursion, Modules, Built-in Modules, Creating Modules, File Handling (Opening, Closing, Writing, Reading), Exceptions, Built-in Exceptions (Index Error, Overflow Error, Zero Division Error, Runtime Error), Exception Handling.

Unit -3(19 Hours):
Object Oriented Programming, Arrays and Data Visualization: Class Definition, Object Creation, Built-in Attribute Methods, Object Oriented Programming Features of Python. Arrays in Python, Numpy Module, ndarray, Creating Arrays (array, zeros, ones, empty, linspace, arrange, random), Two-Dimensional Array, Indexing, Slicing, Iterating, Copying, Splitting, Shape Manipulation (reshape, transpose, resize), Arithmetic Operations on Arrays. Data Visualization in Python matplotlib Module, pyplot, plot (), 54 scatter, bar charts, Formatting, figure (), subplot (), text (), xlabel (), ylabel (), title (), Plotting Simple

Mathematical Functions (sin x, x2)

Unit-4(19 Hours):

Connecting to Database: Connecting to a Database, Basic Operations on Database (Crater, Insert, Update, Delete), Fetching Data from a Database, Transaction Control. GUI Programming: GUI Programming using Tkinter, Tkinter Widgets (Label, Message, Entry, Text, Button, tkMessagebox, Radio Button, Check button, List box, Menu, Menu button, Scale, Scrollbar, Canvas), Layout Managers.

Text Books:

1. Dr. Jeeva Jose, Taming Python by Programming, Khanna Publishing
2. John V. Guttag, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI (2016)

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4. it is expected to do programs in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

ELECTIVE -11: DISCIPLINE SPECIFIC ELECTIVE COURSE

Course Code &Title : BCA-DSE1: COMPUTER ORGANIZATION
Credits :6
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: To understand data representation and hardware operation in digital computers
CLO-2: To understand organization and architecture of central processing unit
CLO-3: To review the concepts of pipelining and RISC processors
CLO-4: To understand input output and memory organization in a computer
CLO-5: To introduce the concept of parallel processing and multiprocessing

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	--	--	2	1	---	3	--	2	--	--	3	1	2	--	---
CLO-2	3	--	--	2	1	---	3	--	2	--	2	3	3	2	2	2
CLO-3	3	3	3	2	2	2	2	2	2	--	1	2	2	3	3	3
CLO-4	2	2	2	3	3	3	3	2	1	--	1	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	3	1	--	1	2	2	2	2	2

SYLLABUS

Unit – 1(10 hrs.): Data Representation: Number System- Decimal, Binary, Octal, Hexadecimal. Number system conversion. Compliments - 9's, 10's, 1's and 2's compliment. Representation of signed numbers. Fixed point representation, Floating point representation. Codes - Decimal codes- BCD, 2421, excess-3, gray code. Alphanumeric code - ASCII, EBCDIC. Unicode.

Unit – 2(15 hrs.): Basic Computer Organization and Design: Block diagram of a digital computer, Computer registers. Computer Instructions, Timing and Control – Instruction cycle - Fetch & Decode – Register Reference Instructions – Memory Reference Instruction. Micro Programmed Control: Control Memory – Address sequencing.

Unit – 3(25 hrs.): Central Processing Unit – General Register Organization – Stack Organization – Instruction Formats – Addressing modes – Data Transfer and Manipulations – Data transfer instructions, Data manipulation instructions – Program Control – Subroutine call and return, Program interrupt, types of interrupts. Reduced Instruction set computer (RISC). Pipeline and vector processing: Parallel processing- pipelining- general considerations - instruction pipeline- pipeline conflicts- data dependency –handling of branch instruction- RISC pipeline- vector processing - Array processor-attached array processor- SIMD array processor.

Unit – 4(25 hrs.): Input-output organization: Peripheral Devices- Input-output interface- I/O Bus and Interface Modules- I/O versus memory bus-Isolated versus memory-mapped I/O- Asynchronous Data Transfer- Strobe control handshaking- modes of transfer- Programmed I/O- Interrupt Initiated I/O- DMA. Input-output processor (IOP) Memory Organization: Hierarchy – Main memory – Auxiliary Memory –Associative Memory – Cache memory – Mapping. Multiprocessors – Characteristics of multiprocessors - Inter connection structures.

Text Books:

1. M.Morris Mano, Computer system Architecture –PEARSON Third Edition
2. Thomas L Floyd, Digital Fundamentals – PEARSON Tenth Edition
3. Leach and Malvino, Digital Principles and Applications - TMH 7th edition

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-DSE2: MICROPROCESSOR
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Familiarize with the fundamentals of Microprocessor**.**
CLO-2: Understand the architecture of 8086 Microprocessor.
CLO-3: To study the assembly language programming using concepts like Stack, Assembler directives, Subroutines, Macros.
CLO-4: To understand the concepts of interrupts details of 8086.
CLO-5: Advance knowledge about different Microprocessor.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	1	1	1	3	1	1	--	1	3	1	2	3	3
CLO-2	3	2	2	1	1	1	3	1	1	--	1	3	3	2	2	2
CLO-3	3	3	3	1	1	1	3	1	2	--	1	2	2	3	3	3
CLO-4	2	2	2	3	1	1	3	1	1	--	1	2	3	2	2	3
CLO-5	1	2	2	1	2	1	3	1	1	--	1	2	2	2	2	2

SYLLABUS

Unit - 1 (18 Hours): Introduction to the microprocessor and computer: Internal processor architecture, Functional block diagram, Bus, Clock signals, addressing modes

Unit- 2(19 Hours): Programming 8086: Data movement instructions, Arithmetic and logic instructions, program control instructions, string instructions, programming techniques, examples, Modular programming: stacks, subroutines, Macros.

Unit – 3(19 Hours): Assembler Directives: Data Definition and Storage Allocation, Program Organization, Alignment, Program End, Value Returning Attribute, Procedure Definition, Macro Definition, Data Control, Branch Displacement, Header File, Inclusion, Target Machine Code Generation Control Directives

Unit – 4(19 Hours): Interrupts and interrupt routines, I\O interface and programming: Fundamental I\O considerations, Data transfer schemes-Programmed I\O, Interrupt I\O, DMA, System bus structure, Minmax Modes, Application of 8259, 8255,8251,8257,8253. Introduction to other 16-bit 32 bit processors: 80286, 386, 486, Pentium and Pentium Preprocessor.

References:

1. K.R Venugopal, Microprocessor X6 Programming, BPB
2. Peter Abel, IBM PC Assembly Language and programming, Prentice Hall
3. Interfacing, S\W application, Prentice Hall
4. Mohammed Rafiqussaman, Microprocessor and microcomputer-based system design
5. Yu-Chang Liu & Glenn A Gibson," Microcomputer systems: the 8086\8088 Family: Architecture, Programming and design", PHI
6. Badri Ram," Advanced Microprocessors and interfacing", TMH
7. Douglas V Hall, "Microprocessors and Interfacing-Programming and Hardware", 2nd edition Tata Mc Graw Hill 2002
8. A.K. Ray and K.M. Bhurchand, "Peripherals-Architecture Programming and Interfacing", Tata Mc Graw Hill 2002

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE3 : COMPUTER ORIENTED STATISTICS
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Understand the basic concepts of Statistics
CLO-2: Gain knowledge in the probability theory
CLO-3: Learn random variables and probability distributions
CLO-4: Demonstrate sampling distributions
CLO-5: Achieve information in computer-oriented statistics

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	1	1	1	3	1	--	2	3	1	2	3	3
CLO-2	3	2	2	2	1	1	1	2	1	--	3	3	3	2	2	2
CLO-3	3	3	3	2	1	1	1	2	2	--	2	2	2	3	3	3
CLO-4	2	2	2	3	1	1	1	2	1	--	2	2	3	2	2	3
CLO-5	1	2	2	1	1	1	2	3	1	--	2	2	2	2	2	2

SYLLABUS

Unit - 1 (20 Hours): Basics statistics: Measures of central tendencies – Mean, Median, Mode, Geometric mean and Harmonic mean. Measures of dispersion – Range, quartile deviation, Lorenz curve. Mean deviation and standard deviation. Curve fitting- Principles of least squares, fitting of straight lines. Correlation (Bivariate case only) Pearson's coefficient of correlation. Rank correlation and Regression analysis

Unit – 2(19 Hours): Probability theory: Random experiment. Sample point, sample space, events, union, intersection and compliment of events. Different approaches of probability, frequency approach to probability, statistical regularity. Classical definition, numerical examples

Unit - 3 (18 Hours): Random variables and probability distribution, Discrete and continuous random variables- density function- distribution- density function- change of variable in univariate case. Bivariate distributions definition of bivariate distribution, marginal and conditional distributions, independence of two variables. Mathematical expectation- elementary properties, raw and central moments, moment generating functions, standard distributions- Binomial, Poisson, Normal. Sampling distributions, the distribution of mean samples from a Normal population, Definition and statement of the form of the distributions- Chi-square and F and use of their tables

Unit – 4(18 Hours): Estimation of parameters, Desirable properties of point estimates, Maximum likelihood estimator, Interval estimation, Interval estimates of mean and variance of Normal population and proportion of Binomial population, Testing of hypothesis, General principles of testing, Two types of errors, Neyman- Pearson approach

Textbooks:

1. Hogg R V Craig A T – "Introduction to Mathematical Statistics", Macmillan Publishing Co. Int
2. Freund J E, Waple R E – "Mathematical Statistics", Prentice Hall of India Pvt.Ltd.
3. Miller I Freund J E – "Probability and Statistics for Engineers", Prentice Hall of India Pvt. Ltd.
4. Levin R I, "Statistics for Management", Prentice Hall of India Pvt. Ltd

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Problems- it is expected to do numerical problems in the class.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-DSE4: ARTIFICIAL INTELLIGENCE
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Attain the knowledge about the importance of AI.
CLO-2: Understand about AI techniques.
CLO-3: Evaluate the performance of various Searching algorithms.
CLO-4: Create AND/OR Graphs.
CLO-5: Apply Search and Control Strategies.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	1	2	2	2	--	--	1	3	1	2	3	3
CLO-2	3	2	2	2	3	2	1	2	---	--	1	3	3	2	2	2
CLO-3	3	3	3	2	2	2	2	2	--	--	1	2	2	3	3	3
CLO-4	2	2	2	3	3	3	3	2	--	--	1	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	3	--	--	1	2	2	2	2	2

SYLLABUS

Unit-1(18 Hours): Introduction to Artificial Intelligence: Definition, AI Applications, AI representation, Introduction to representation and search. The Propositional calculus, Predicate Calculus, Using Inference Rules to produce Predicate Calculus expressions, Application.

Unit-2(19 Hours): Introduction to structure and Strategies for State Space search, Graph theory, Strategies for State Space Search: Data-Driven and Goal-Driven Search, Implementing Graph Search, Depth-First search, Breadth-First Search, Depth-First search with Deepening, using the State Space to Represent Reasoning with the Predicate calculus:(Sate space description of a Logical System, And/or Graphs).

Unit-3(19 Hours): Heuristic Search: introduction, Hill-Climbing and Dynamic Programming, The Best-first Search Algorithm, Implementing Heuristic Evaluation functions, Heuristic Search and Expert system, Admissibility, Monotonicity and Informedness, Using Heuristics in Games.

Unit-4 (19 Hours): Control and implementation of State space search: Recursion based search, Pattern directed search, Production Systems. Knowledge intensive problem solving: Overview of Expert System Technology, Rule Based Expert system, Model -Based, Case-Based and Hybrid Systems (Introduction to Model based reasoning, Introduction to Case Based Reasoning, Hybrid design), introduction to LISP.

Text book:

1. George F Luger, Artificial Intelligence – Structures and Strategies for Complex problem solving, 5thEdn,

References:

1. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PH
2. E. Rich, K. Knight, S B Nair, Artificial intelligence, 3rdEdn, McGraw Hill.
3. 2. S. Russel and p. Norvig, Artificial intelligence – A Modern Approach, 3rdEdn, pearson D W Patterson

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE5: INTRODUCTION TO CLOUD COMPUTING
Credits :6
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: Understand the concepts, characteristics, delivery models and benefits of cloud computing
CLO-2: To cover basic principles of cloud computing
CLO-3: To develop Cloud computing architectures over Virtualized Data Centers
CLO-4: Cloud Security and Trust Management, Data Security in the cloud
CLO 5: Capable of using Common standards in Cloud Computing

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	1	1	1	1	2	2	1	--	--	3	1	2	3	3
CLO-2	3	2	1	1	1	1	1	2	1	--	--	3	3	2	2	2
CLO-3	3	3	1	1	1	1	2	2	2	--	--	2	2	3	3	3
CLO-4	2	2	1	1	1	1	3	2	1	--	--	2	3	2	2	3
CLO-5	1	2	1	1	1	1	2	2	1	--	--	2	2	2	2	2

SYLLABUS

Unit-I (18 hour): Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

Unit-2(19 Hours): Virtual Machines and Virtualization of Clusters and Data Centers, Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation. **Case studies**: Xen Virtual machine monitors- Xen API. VMware - VMware products-Vmware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

Unit-3(19 Hours): Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management

Unit-4(19 Hours): Cloud Security and Trust Management, Data Security in the Cloud: An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud Crypt DB: Onion Encryption layers- DET, RND, OPE, JOIN, SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management. **Common Standards in Cloud Computing**: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

References:

1) John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.

2) Kai Hwang. Geoffrey C. Fox, Jack J. Dongarra, “Distributed and Cloud Computing from Parallel Processing to the Internet of Things”, Elsevier, 2012.

3) Rajkumar Buyya, James Broberg and Andrzej M. Goscinski,” Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley *Publishing* ©2011

4) Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, “CryptDB: Protecting Confidentiality with encrypted Query Processing”23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.

5) A Fully Homomorphic Encryption Scheme, Craig Gentry, September 2009.
6) David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA- DSE6: INTRODUCTION TO MOBILE COMPUTING
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: learn the concepts of Mobile communication and Computing Technologies
CLO-2: Understand mobile OS concepts
CLO-3: Develop and deploy effective mobile applications
CLO-4: Evaluate the effectiveness of different mobile computing frameworks.
CLO 5: Describe how mobile technology functions to enable other computing technologies.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	1	1	--	2	--	1	1	2	3	1	2	3	3
CLO-2	3	2	2	1	3	--	1	--	1	1	3	3	3	2	2	2
CLO-3	3	3	3	1	2	--	2	--	2	1	2	2	2	3	3	3
CLO-4	2	2	2	1	3	--	3	--	1	1	2	2	3	2	2	3
CLO-5	1	2	2	1	2	--	2	--	1	1	2	2	2	2	2	2

SYLLABUS

Unit-1 (18 hours): Introduction and applications of mobile computing, Wireless transmission: Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Medium Access Control, SDMA, FDMA, TDMA, CDMA, Comparisons.

Unit-2 (19 Hours): Telecommunication system, GSM, DECT, TDMA, TETRA, UMTS & IMT-2000. Satellite systems: Applications, Basics, routing, localization, Handover.
Broadcast systems: Cyclic representation of data, Digital audio Broad casting, Digital video Broadcasting, Convergence of Broadcasting and mobile communication.

Unit-3 (19 Hour): Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11, HIPERLAN, Bluetooth.

Unit- 4 (19 Hour): Mobile IP, Dynamic Host Configuration Protocol, Mobile Adhoc Networks, Mobile Transport Layer, Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks, Performance Enhancing Proxies. Operating Systems for Mobile Devices: Features of Windows CE, Palm OS, Symbian Os, Java Card support for Mobility: File systems, WWW, Wireless Application Protocol.

References:

1. Jochen M. Schiller, Mobile Communications, 2nd edition, Pearson Education, India 2003.
2. Hansmann, Merk, Nicklous, Stober, Principles of Mobile Computing, 2nd edition Springer International edition, 2003.
3. Dharma P. Agarwal, Qing An Zeng, Introduction to wireless and Mobile systems, 2nd edition Thomas
India 2007.
4. Frank Adelstien, Sandeep K.S. Gupta, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hill, 2005.
5. Ivan Stojmenovic, Handbook of Wireless and Mobile Computing, Wiley India, 2006.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE7 : SECURITY IN COMPUTING
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Analyze and resolve security issues in networks and computer systems
CLO-2: Develop policies and procedures to manage enterprise security risks.
CLO-3: Identify cryptography techniques
CLO-4: Attain knowledge in security of Databases.
CLO-5: Undertand the different techniques to secure the network

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	1	--	--	2	1	--	--	2	3	1	2	3	3
CLO-2	3	2	2	1	--	--	2	1	--	--	3	3	3	2	2	2
CLO-3	3	3	2	1	--	--	2	1	--	--	2	2	2	3	3	3
CLO-4	2	2	2	1	--	--	2	1	--	--	2	2	3	2	2	3
CLO-5	1	2	2	1	--	--	2	1	--	--	2	2	2	2	2	2

SYLLABUS

UNIT - I (18 Hours): ELEMENTARY CRYPTOGRAPHY

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates

UNIT - II (19 Hours): PROGRAM SECURITY

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code –Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors

UNIT- III (19 Hours): SECURITY IN NETWORKS

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec –Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security– Firewalls – Intrusion Detection Systems – Secure e-mail.

UNIT- IV (19 Hours): SECURITY IN DATABASES

Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency –Monitors – Sensitive Data – Types of disclosures – Inference.

Textbooks:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.
2. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2004.
3. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.

References:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall, 2010.
2. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, Mc Graw Hill Osborne Media,
2009.
3. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-Wesley, 2002.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE8 : CYBER CRIME AND CYBERLAWS
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1-Knowledge of Cyber World and Cyber Law in general
CLO-2-Attain the various aspects of cyber crimes
CLO-3-Understand the problems relating to e-commerce transactions
CLO-4-study the Intellectual Property issues in IT Act
CLO-5-learn International Perspective in Cyber Law

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	--	--	1	2	2	3	--	--	2	3	1	2	3	3
CLO-2	3	2	--	--	1	2	1	2	--	--	3	3	3	2	2	2
CLO-3	3	3	--	--	1	2	2	2	--	--	2	2	2	3	3	3
CLO-4	2	2	--	--	1	3	3	2	--	--	2	2	3	2	2	3
CLO-5	1	2	--	--	1	3	2	3	--	--	2	2	2	2	2	2

SYLLABUS

Unit-1(18 Hours): Introduction to Cyber Law- Evolution of Computer Technology, emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace- Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

Unit-2(19 Hours): Information technology Act- Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

Unit-3(19 Hours): Cyber law and related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Law Relating to Employees and Internet, Alternative Dispute Resolution, Online Dispute Resolution (ODR).

Unit-4(19 Hours): Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paperless contracts E-Commerce models- B2B, B2C, E security. Application area: business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends

Text Books:

1 Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher

2 Information Security policy &implementation Issues, NIIT, PHI

References:

1 Cyber CRIME notorious Aspects of the Humans & net Criminals activity in Cyber World
Barna Y Dayal D P Dominant Publisher
2 Cyber Crime Impact in the new millennium, Marine R.C. Auther press
3 Spam Attack, Cyber Stalking & abuse, Barna Y, Dayal D P Dominant publisher
4 Frauds & Financial criouses in Cyber space, Barna Y, Dayal D P, Dominant publisher
5 Information Security, NIIT: PHI

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
5.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE9 : ANDROID PROGRAMMING
Credits : 6
Total Hours : 75

After completion of this course, the student should be able to:

CLO-1: Install and configure Android application development tools.
CLO-2: Design and develop user Interfaces for the Android platform.
CLO-3: Save state information across important operating system events.
CLO-4: Apply Java programming concepts to Android application development.
CLO-5: Explain and use key Android programming concepts

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	--	2	2	--	--	--	2	3	1	2	3	3
CLO-2	3	2	2	2	--	2	1	--	--	--	3	3	3	2	2	2
CLO-3	3	3	3	2	--	2	2	--	--	--	2	2	2	3	3	3
CLO-4	2	2	2	3	--	3	3	--	--	--	2	2	3	2	2	3
CLO-5	1	2	2	1	--	3	2	--	--	--	2	2	2	2	2	2

SYLLABUS

Unit – 1(18 Hours): Background, Introduction to Android Programming – Native Android Applications, Android SDK features, Development Framework. Developing for Android, Developing for Mobile Devices, Android Development Tools.

Unit -2(19 Hours): Android Applications – Introduction to Application Manifest, Manifest Editor. Android Application Life Cycle- Application Priority, Process States, Externalizing Resources. User Interface Design, Elements, Layout. Common Application Programming Interfaces. Intents, Broadcast Receivers, Adapters and Internet.

Unit -3(19 Hours): Data Storage, Retrieval and Sharing - Saving Data, Saving and Loading Files, Databases in Android, Introducing Content Providers. Location based Services - Setting up Emulator, Location Provider. Using Geocoder, Proximity alerts. Maps – Creating Map Based Services, Example. Introducing Services, Background worker Threads, Using Alarms.

Unit- 4(19 Hours): Networking and Web- Peer – to Peer Communication – Instant Messaging, SMS. Accessing Android Hardware – Media API's, Camera, Sensor Manager, Accelerometer and Compass, Telephony, Bluetooth. Managing Network and Wi – Fi Connections. Controlling Device Vibration.

Text Book

1.Reto Meier, Professional Android Application Development., Wrox Publications 2009. Second Edition

References:

1.Shane Conder, Lauren Darcey, Android wireless application development., Addison Wesley Publications 2010 Second Edition.
2.James Steele, Nelson, The Android Developer's Cookbook: Building Applications with the Android SDK. To Addison Wesley Publications 2010 First Edition.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE10: COMPUTER GRAPHICS
Credits :6
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Understand basic concepts of graphics input output devices.
CLO-2: To learn about line, circle and filling algorithms.
CLO-3: Learn in detail about 2D viewing pipelines.
CLO-4: Review of selected fundamental algorithms in Graphics.
CLO-5: Attain the knowledge about geometric transformation.
CLO-6: Familiarization with 3D viewing and Projection.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	1	1	1	1	2	1	--	--	2	3	1	2	3	3
CLO-2	3	2	1	1	1	1	2	1	--	--	3	3	3	2	2	2
CLO-3	3	3	1	1	1	1	2	1	--	--	2	2	2	3	3	3
CLO-4	2	2	1	1	1	1	3	1	--	--	2	2	3	2	2	3
CLO-5	1	2	1	1	1	1	2	1	--	--	2	2	2	2	2	2

SYLLABUS

UNIT-1(18 Hours):
Applications of Computer Graphics-Computer Aided Design, Presentation Graphics, Computer Art, Entertainment, Education and Training, Visualization, Image Processing, Graphical User Interface. Video Display Devices-CRT, DVST, Flat Panel Displays. Raster Scan Systems, Random Scan Systems, Input and Output Devices-Keyboard, Mouse, Trackball and Spaceball, Joystick, Data Gloves, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems, Printers, Printers and Plotters, Graphics Software.

Unit -2(19 Hours):
Points and Lines, Loading the frame buffer, Line drawing algorithms- DDA, Bresenham's, Circle generating algorithm- Bresenham's, Mid-Point., Filled Area Primitives- Scan Line Polygon Fill Algorithm, Inside Outside Tests, Scan Line Fill of Curved Boundary Areas, Boundary Fill Algorithm, Flood Fill Algorithm, Pixel Addressing and Object Geometry-Screen Grid Coordinates, Maintaining Geometric Properties of Displayed Objects, Antialiasing.

Unit-3(19 Hours):
The viewing pipeline, Window to viewpoint coordinate transformation, Clipping Operations, Point Clipping, Line Clipping- Cohen Sutherland Line Clipping, Polygon Clipping- Sutherland Hodgeman Polygon Clipping, Text Clipping

Unit 4 (19 Hours):
Basic Transformation- Translation, Rotation, Scaling, Matrix representation and homogeneous coordinates, Composite transformation, Translations, Rotations, Scaling, General Pivot Point Rotation, General Fixed-Point Scaling, General Scaling Directions, Concatenation Properties, Other Transformations- Reflection and Shear.3Dviewing-parallel projection, Perspective projection.

TextBook:
1.Computer Graphics C Version: Donald Hearn and M. Pauline Baker
Reference:
2.Computer Graphics Principles and Practices: Foley, Van Dam, Feiner and Hughes.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-DSE11: THEORY OF COMPUTATION
Credits : 6
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: To illustrate finite state machines to solve problems in computing.
CLO-2: To familiarize Regular grammars, context frees grammar.
CLO-3: To use basic concepts of formal languages of finite automata techniques.
CLO-4: To Design Finite Automata for different Regular Expressions and Languages.
CLO 5: To solve various problems of applying normal form techniques, push down automata and Turing Machines.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	1	2	2	--	--	--	1	3	1	2	3	3
CLO-2	3	2	2	2	3	2	1	--	--	--	1	3	3	2	2	2
CLO-3	3	3	3	2	2	2	2	--	--	--	1	2	2	3	3	3
CLO-4	2	2	2	3	3	3	3	--	--	--	1	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	--	---	--	1	2	2	2	2	2

SYLLABUS

Unit 1(18 Hours): Introduction to the Theory of computation and Finite Automata: Mathematical preliminaries and notation, Proof techniques, Three basic concepts: languages, grammar & automata. Some applications. **Finite automata:** Deterministic Finite Acceptors, Nondeterministic Finite Acceptors, Equivalence of deterministic and nondeterministic finite acceptors, Reduction of the number of states in finite automata.

Unit 2(19 Hours): Regular Languages and Regular grammars: Regular expressions, connection between regular
expressions and regular languages, regular grammars.
Properties of Regular Languages: closure properties of regular languages, identifying non regular language.
Context-free grammars & languages Context-free grammars, parsing and ambiguity.

Unit 3(20 Hours): Simplification of Context free Grammars and Normal forms: methods of transforming grammars, two important normal forms. **Pushdown automata for context-free languages** Non deterministic pushdown automata, PDA and context-free languages, deterministic pushdown automata and deterministic context-free languages.

Unit 4(18 Hours): Properties of Context-Free Languages: pumping lemmas for context free languages and linear languages, closure properties for context-free languages. **Turing machine** Standard Turing machine, combining Turing machines for complicated tasks, Turing's thesis

Text Book:

1. An introduction to Formal Languages and Automata, Peter Linz, 4thedn, Narosa publishing House.

References:

1. John C Martin, Introduction to Languages and the Theory of Automata, McGraw Hill 1997
2. Mishra &Chandrasekharan, Theory of Computer Science: Automata, Languages and Computation, 3rd edn, PHI
3. Hopcroft, Motwani and Ullman, Introduction to automata theory, Languages and Computation, 3rdEdn, Pearson

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.
2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.
3.Assignments- Assignments shall be part of evaluation of the students.
4.Encourage group learning- Role plays, group discussions support group learning.
6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:
1.Time constrained test papers will be conducted for the students.
2.Problem based assignments shall be part of evaluation of the students.
3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.
4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title: BCA-DSE12: Introduction to DataScience &BigData
Credits :6
Total Hours :75

After completion of this course, the student should be able to:
CLO-1: Recognize the Data Science process
CLO-2: Analyze Data Mining process
CLO-3: Attain knowledge in Big Data and its importance
CLO-4: Realize the importance of Data
CLO 5: Demonstrate machine learning in Data Analytics

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	1	2	2	3	--	--	2	3	1	2	3	3
CLO-2	3	2	2	2	3	2	1	2	--	--	3	3	3	2	2	2
CLO-3	3	3	3	2	2	2	2	2	--	--	2	2	2	3	3	3
CLO-4	2	2	2	3	3	3	3	2	--	--	2	2	3	2	2	3
CLO-5	1	2	2	1	2	3	2	3	--	--	2	2	2	2	2	2

SYLLABUS

Unit-1: Introduction to Data Science (20 Hours): Definition, benefits and uses of data science and big data. **Facets of Data:** Structured data, unstructured data, natural language, machine generated data, network data, audio, images and video streaming data.
Data science process: overview of data science process, defining the goal, retrieving data, data preparation, data exploration, build the models, cleaning and transforming data, presentation and automation.

Unit-2(20 Hours):DATA: Definition, characteristics of data, classification of digital data.
The Data Science Fundamentals: Distributed file system, data integration frame work, machine learning framework, system deployment, security. **Data Mining**: definition, languages for data science, collection data –hunting, logging, scraping,cleaning data –error vs. artifacts, data compatibility, dealing with missing values, outlier detection.

Unit-3(20 Hours):BIG DATA: Definition, Evolution of big data and its importance, four V's in big data, Drivers for Big data, Big data analytics, Big data applications, designing data architecture, Big data Vs Little data

Unit-5(15 Hours): Machine Learning: Definition, Applications of machine learning in data science, Types of Machine Learning (Degree) - supervised learning, semi supervised learning, un-supervised learning, Linear regression, Decision Tree classifier – constructing decision Tree, Bayes - Naive Bayes

Textbooks:

1.Introducing Data Science by Davy Cielen, Arno D.B. Meysman and Mohamed Ali, Published by Manning

2.Steven S. Skiena, The Data Science Design Manual, Published by Springer. Nature.

References:

1.Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from TheFrontline. O'Reilly.

2.Jure Leskovek, Anand Rajaraman and Jeffrey D. Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

ELECTIVE -111: SKILL ENHANCED COMPULSORY COURSE

Course Code &Title: BCA-SEC1: NUMERICAL METHODS

Credits :2

Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions
CLO-2: Apply numerical methods to obtain approximate solutions to mathematical problems
CLO-3: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations
CLO-4: 4Analyse and evaluate the accuracy of common numerical methods
CLO 5: Have knowledge in Numerical Differentiation

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	1	3	2	1	--	1	--	--	--	2	3	1	2	3	3
CLO-2	3	1	2	2	1	--	1	--	--	--	3	3	3	2	2	2
CLO-3	3	1	3	2	1	--	1	--	--	--	2	2	2	3	3	3
CLO-4	2	1	2	3	1	--	1	--	--	--	2	2	3	2	2	3
CLO-5	1	1	2	1	1	--	1	--	--	--	2	2	2	2	2	2

SYLLABUS

Unit I: (15 Hours)

Numeric solutions of polynomial and transcendental equations: bisection method – Regular flasi method – Newton Raphson method – fixed point method of iteration – Rates of convergence of these methods. Solution of system of algebraic equations: exact methods – Crout's triangularization method – iterative methods: Gauss Siedel and Relaxation method.

Unit II: (15 Hours)

Finite Differences: Differences – operators- forward and backward differences tables – Differences of polynomial – Factorial polynomial – Error propagation in difference table. Interpolation (for equal intervals): Newton's forward and backward formulae equidistant terms with one or more missing values – central differences and central differences table

Unit III:(22 Hours)

Interpolation (for unequal intervals): Divided differences – properties – relations between divided differences and forward differences – Newton's divided differences formula – Lagranges formula and inverse interpolation.

Unit IV:(23 Hours)

Numerical differentiation: Newton's forward & backward formulae to computer the derivates Derivatives using Starlings formulae – to find maxima and minima of the function given the tabular values. Numerical integration: Newton – Cote's formula – Trapezoidal rule – Simpson's 1/3rd and 3/8th rules – Gaussian quadrature. Numerical solutions of ordinary differential equations- single step methods – Taylor series method – Euler's method – modified Euler's method – Picard's iteration method – Runge Kutta methods (2nd and 4th order formulae)

Text Books:

1. Gerald, Applied Numerical Analysis, Addison Wesley.

2. Froberg CE,'Introduction to Numerical Analysis', Addison Wesley.

References:

4. P. K Kandasamy, K. Thilakavathi, Gunavathi "Numerical Methods". Sultan Chand and Sons & Company Ltd. New Delhi. Revised edition 2005.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.It is expected to conduct numerical problems in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-SEC2: DIGITAL SYSTEMS
Credits :2
Total Hours : 75

After completion of this course, the student should be able to:

CLO-1: To Understand functionality of logic gates
CLO-2: To have knowledge about simplification of Digital circuits.
CLO-3: To have strong knowledge about data processing circuits.
CLO-4: To understand some commonly used sequential and combinational circuits
CLO-5: To understand basics of counter design

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	2	2	1	2	2	1	--	--	2	3	1	2	3	3
CLO-2	3	2	2	2	1	2	1	1	--	--	3	3	3	2	2	2
CLO-3	3	3	2	2	1	2	2	1	--	--	2	2	2	3	3	3
CLO-4	2	2	2	1	1	3	3	1	--	--	2	2	3	2	2	3
CLO-5	1	2	2	1	1	3	2	1	--	--	2	2	2	2	2	2

SYLLABUS

Unit – 1(20 Hours)

Digital and Analog Quantities- Binary digits, logic levels and Digital Wave forms - Digital Logic - Basic Gates - NOT, OR, AND- Universal gates- NOR, NAND-Exclusive OR, Exclusive NOR gates- Combinational Logic Circuits - Standard Forms of Boolean Expression – SOP and POS, implement sop and pos equation using logic circuits. Karnaugh Map two variable, three variable, four variable, pair quad octet, overlapping groups, redundant groups, map rolling, don’t care condition - Karnaugh map simplification (up to 4 variable) SOP & POS method.

Unit – 2(20 Hours)

Data Processing Circuits - Multiplexers (4-to-1, Nibble, 16-to-1) Demultiplexer(1-to16) Decoder (1-of-16, 3-to-8, BCD-to-Decimal) Encoder (Decimal-to-BCD), Parity generators and checkers. Magnitude Comparator. Arithmetic Building Blocks: Adder- half adder, full adder, subtractor – half subtractor, full subtractor, Adder Subtractor, Arithmetic Logic Unit.

Unit -3(20 Hours)

Sequential circuit- Difference between combinational and sequential circuit Flip-Flops: Basic flip flop circuit- Clocked RS, D, JK, T flip flops Master Slave flip flop. Registers: Types of registers - serial-in-

serial-out, serial-in-parallel-out, parallel-in-serial-out, parallel-in-parallel-out. Universal shift register. Application of shift registers- ring counter- Johnson counter.

Unit – 4(15 Hours)

Counters- Asynchronous counter (ripple counter) – A 2-bit asynchronous Binary counter, A 3-bit asynchronous Binary counter, Asynchronous Decade counters. Synchronous counters – A 2-bit synchronous Binary counter, A 3-bit synchronous Binary counter, A 4-bit synchronous Decade counter, Up/Down Synchronous Counters. Design of Synchronous Counters (Examples 3-bit gray code counter, counter with irregular binary count sequence, 3-bit up/down counter with a gray code sequence.)

Text Books:

Leach and Melvino, Digital Principles and Applications - TMH 7th edition

Thomas L Floyd, Digital Fundamentals – PEARSON Tenth Edition

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-SEC3: LINUX SYSTEM ADMINISTRATION
Credits :2
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: To understand the features and benefits of Linux operating system
CLO-2: To learn essential commands in Linux
CLO-3: To gain knowledge about user and group management.
CLO-4: To get deep understanding about Linux administration tasks
CLO-5: To understand service configuration and storage management in Linux

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	1	1	--	2	2	--	--	--	2	3	1	2	3	3
CLO-2	3	2	1	1	--	2	1	--	--	--	3	3	3	2	2	2
CLO-3	3	3	1	1	--	2	2	--	--	--	2	2	2	3	3	3
CLO-4	2	2	1	1	--	3	3	--	--	--	2	2	3	2	2	3
CLO-5	1	2	1	1	--	3	2	--	--	--	2	2	2	2	2	2

SYLLABUS

UNIT- I (18 hrs)

Features and benefits of Linux- basic concepts of multi user system-open source, freedom-Linux-components of Linux, types of users in Linux, types of files. Introduction-login, password, creating an account, shell and commands, logout, changing password-files and directories-pathname-directory tree-types of shell-wild cards-hidden files- looking at files:

UNIT- II (19 hrs)

Vi editor-different modes-command mode, insert mode, last line mode- redirecting input/output-filter, pipes, file permissions, user, group, changing file permissions -mounting floppy, HDD, CDROM-file systems-structure of /etc/fstab- Bourne shell scripts: script execution-variables and parameters, if, for, case, while constructs.

UNIT - III (19 Hours)

Linux Administration: Introduction-various parts of the OS-kernel, system program, application program, system calls-important parts of the kernel boot process: booting-LILO boot process, /etc/ lilo.conf, GRUB, /etc/grub.conf-run levels-GUI, X windows- rc files, startup scripts.

UNIT- IV (19 Hours)

Major services in Linux system: init, /etc/inittab file -login from terminal3, syslog-periodic command execution: at and cron, crontab file System configuration files:/etc/sysconfig/.....files, keyboard, mouse etc System security: password, /etc/passwd file-shadow password, /etc/shadow-file permissions,

chmod and umask-adding and deleting users-host security, tcp wrappers, /etc/host.allow,/etc/host. Deny. System Maintance: tmpwatch-logrotate-basic system backup and restore operation-Basic shell configuration for bourne and bash shell: /etc/profile, ~/. bashrc, ~/.bash profile.Linux Installation: Partitioning, MBR, SWAP, filesystem managing-different packages,rpm-installation of packages-starting and stopping different services.

** Comparative study of major features of Linux and windows.

References:

1. Unix in a nutshell, by Daniel Gilly, O'Reilly & Associates
2. Unix Shell Programming, Yeshwanth kanethkar
3. Linux Administration handbook, Nemeth, PHI
4. Essential System Administration, O'Reilly & Associates.
5. Red Hat Linux Bible
6. A user guide to the Unix system, Thomas, Yates Tata McGraw Hill

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA –SEC4: FUNDAMENTALS OF FINANCIAL ACOUNTING
Credits :2
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Enable the students to combine practice and theoretical knowledge of financial accounting.
CLO-2: Help the students be active learners and develop awareness of emerging trends in financial accounting.
CLO-3: provide decision making skills to the students in the financial analysis context.
CLO-4: will have the ability to identify and analyze financial accounting problems and opportunities in real life situations.
CLO 5: expected to gain the ability of using accounting information as a tool in applying solutions for managerial problems.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	2	3	2	--	1	--	--	--	--	2	3	1	2	3	3
CLO-2	3	2	2	2	--	1	--	--	--	--	3	3	3	2	2	2
CLO-3	3	3	3	2	--	1	--	--	--	--	2	2	2	3	3	3
CLO-4	2	2	2	3	--	1	--	--	--	--	2	2	3	2	2	3
CLO-5	1	2	2	1	--	1	--	--	--	--	2	2	2	2	2	2

SYLLABUS

Unit – 1(18 Hours)

Principles of accounting – Some fundamentals concepts and conventions – Systems of accounting double entry principles – Advantages of Double entry system – personal, real, nominal accounts. Cash book-forms of cash books- subdivisions of Journal- Ledgers –limitations of financial accounting-Trial balance – Final accounts - Trading P/L A/c- Balance sheet

Unit- 2(19 Hours)

Invitation to management accounting: Analysis and interpretation of trading accounts and financial statements – Horizontal Vertical analysis – Common size Balance sheet –common size income statement – comparative income and balance sheet –trend analysis.

Unit- 3(19 Hours)

Ratio analysis: uses of ratios in interpreting trading accounts and financial statements –different types of ratios – Liquidity ratios –turnover ratios-activity ratios –solvency ratios

Unit - 4 (19 Hours)

Fund flow statement –schedule of changes in working capital –fund from operation- cash flow statement- cash from operating activities –cash from financing activities –cash from investing activities .Marginal costing- Breakeven point – cost volume profit analysis- margin of safety –standard costing analysis of variance-material-labour-O/H-sales variables-Budget and Budgetary control-different types of budgets- master budget- sales budget-production budget-flexible budget-cash budget advantages-preparation

TextBook:

1. Pandey I.M "Financial Management" Vikas publishing house
2. Kellock.J "elements of Accounting" Heinmann

References:

1. S.N Maheshwari "advanced Accountancy" Vikas publishing house
2. A. Vinod "cost and Management accounting"-Calicut University central co-operative stores

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code &Title : BCA-SEC5:DATA ANALYSIS USING SPREADSHEET
Credits :2
Total Hours :75

After completion of this course, the student should be able to:

CLO-1: Handle and process the data using excel.
CLO-2: Perform the analysis with analysis tool pack in excel.
CLO-3: Customize menus and toolbars in excel.
CLO-4: Understand and apply various functions available in excel.
CLO-5: Acquire knowledge in spreadsheet's editing and format options.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	1	3	2	1	2	2	3	--	--	2	3	1	2	3	3
CLO-2	3	1	2	2	3	2	1	2	--	--	3	3	3	2	2	2
CLO-3	3	1	3	2	2	2	2	2	--	---	2	2	2	3	3	3
CLO-4	2	1	2	3	3	3	3	2	--	--	2	2	3	2	2	3
CLO-5	1	1	2	1	2	3	2	3	---	--	2	2	2	2	2	2

SYLLABUS

Unit 1(20 Hours): Types of Software: System software, Application software, commercial, open source, domainand free ware software. **Microsoft Excel: Fundamentals of Excel:** Features of MS-Excel, Excel Program Screen, the Ribbon, Officebutton and Quick Access tool bar, Worksheets, rows, columns, cells.

UNIT- II (20 Hours): Worksheet basics: Creating a new workbook, opening a Workbook, saving a Workbook,Workbooks, Entering labels, values, and formulas in worksheet.
Editing a worksheet: Editing cell contents - cutting, copying and pasting cells – Find andReplace - Undo, inserting rows and columns, Deleting rows and columns.
Formatting Options: Adjusting row height and column width - Formatting cell values,conditional formatting

UNIT -I11(20 Hours): Formulas and Functions: **Formulas:** Enter and edit formula in Excel, operators used informula, cell references in formula
Functions: Definition, Inserting a function in Excel, Types of functions in Excel:Mathematical, Statistical, Logical, Text, Date & Time functions
Working with Data ranges: Sorting: Sorting on single column, sorting on multiple columns,Filtering: Filtering data using AutoFilter

UNIT-IV (15 Hours): Working with Charts: Different types of charts, creating a chart, Parts of chart, changing charttype, changing chart options. **Analyzing and Organizing Data:** Data Validation,

Scenarios, Subtotals. **Working with PivotTables:** Creating a PivotTable, Specifying PivotTable data, Working withPivotTable Layout

Text Books:

1.Fundamentals of Computers by Reema Thareja from Oxford University Press

2.Microsoft Excel 2007, Custom Guide Inc, 2007

References:

1.Microsoft Office 2007 Fundamentals, 1st Edition by Laura Story, Dawna Walls

2.Working in Microsoft Office – Ron Mansfield - TMH.

3.MS Office 2007 in a Nutshell –Sanjay Saxena – Vikas Publishing House.

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4.Encourage group learning- Role plays, group discussions support group learning.

5.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.

Course Code & Title : BCA -SEC6: OPERATIONS RESEARCH
Credit : 2
Total Hours :75
After completion of this course, the student should be able to:

CL0-1: Basic mathematical knowledge
CL0-2: To get knowledge about decision making
CL0-3: To get a general knowledge in solving linear programming problems.
CL0-4: Be able to select methods for solving linear programming problems.
CL0-5: Cast minima/maxima problems into optimization framework.

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs)and Program Specific Outcomes (PSOs)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PSO1	PSO2	PSO3	PSO4
CLO-1	3	--	3	2	1	--	--	3	--	--	2	3	1	2	3	3
CLO-2	3	--	2	2	3	--	--	2	--	--	3	3	3	2	2	2
CLO-3	3	--	3	2	2	--	--	2	--	--	2	2	2	3	3	3
CLO-4	2	--	2	3	3	--	--	2	--	--	2	2	3	2	2	3
CLO-5	1	--	2	1	2	--	--	3	--	--	2	2	2	2	2	2

SYLLABUS

UNIT-1(20 Hours):

Operation research and LPP: Operation Research and Decision making- Advantages of O.R approach in decision making,-Application of O.R- Advantages and disadvantages of O.R.

UNIT -2(20 Hours):

LPP: Introduction -mathematical formulation the problem - canonical and standard forms of LPP. Simplex method- artificial variable technique - Big M and two-phase method - problem of degeneracy - concept of duality - dual simplex method.

UNIT – 3(20 Hours):

Transportation model - North West corner rule - Least cost method - Vogel's approximation method - loops in transportation table - Degeneracy in transportation table.

Assignment model: Mathematical formulation of the problem - assignment algorithm impossible algorithms - travelling salesman problem.

UNIT -4(15 Hours):

Network Scheduling: Concept of network - basic components, -PERT and CPM, -Rules of network construction, maximal flow problem- project scheduling critical path calculations- advantages of network (PERT/CPM).

Textbook

1. Operation Research, Kanti Swarup, Gupta P.K Man Mohan, Sultan Chand & Sons

References:

1. Operation Research: An Introduction, Tahah. A, McMillan 1982
2. Operations Research, Prof. K. Venugopal, Calicut University Central Co-Operative Stores

Teaching-Learning Strategies:

1.Effective classroom teaching- A teacher shall ensure effectiveness in classroom in applying classroom teaching.

2.Seminars- A seminar on topics can enhance qualitative understanding of the topics.

3.Assignments- Assignments shall be part of evaluation of the students.

4. it is expected to conduct numerical problems in the class.

5.Encourage group learning- Role plays, group discussions support group learning.

6.Increase questioning ability (ask students to frame all possible questions in a chapter and give answers).

Assessment methods:

Progress towards achievement of learning outcomes will be assessed using the following:

1.Time constrained test papers will be conducted for the students.

2.Problem based assignments shall be part of evaluation of the students.

3.Oral Presentations (seminar presentation): A seminar on different topics can enhance the qualitative understanding of the topic and communication skill.

4.Viva voce is conducted in order to increase the answering ability of students.