

**IIMACHAL PRADESH TECHNICAL UNIVERSITY HAMIRPUR**



# **Syllabus**

*for*

## **BCA (Bachelor of Computer Applications) (Honours/Research)**

As per National Education Policy (NEP-2020)

w.e.f. the Academic Year 2023-2024

  
Dean - Academic  
H.P. Technical University  
Hamirpur - 177 001, HP

## 1. Preamble

BCA is named as Bachelor's of Computer Applications. Computer Applications has been evolving as an important branch of science and technology in the last two decade and it has carved out a space for itself just like computer science and engineering. Computer applications spans theory and more application and it require thinking both in abstract terms and in concrete terms. The ever-evolving discipline of computer application has strong connections to other disciplines. Many problems in Science, Engineering, Health Care, Business, and other areas can be solved effectively with computers and its applications, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering. Universities and other HEIs have introduced programmes of computer application. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavor has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.

BCA Degree (Honor's/Research) is aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS or MCA leading to research as well as R&D, can be employable at IT industries or can adopt a business management career.

BCA Degree (Honor's/Research) aim at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of BCA, graduate students can fetch employment directly in companies as Programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

## 2. Program Objectives (POs)

BCA comprises of the core subjects like Database System, Computer Architecture and System, networking, and data structures, core programming languages like C, C++, Java, web programming, Android, and Python. Students also get exposure to advanced topics like cyber security, mobile software, IoT, data science etc. Elective papers help students to have an exposure in IoT, image Processing Big Data and Information Security related subjects. Program has been designed not only to make students job ready but also dedicated to create an entrepreneurship skills and competency amongst them through the process of innovation. Apply the knowledge of mathematics and computing fundamentals to various real-life applications for any given requirement. Design and develop applications to analyse and solve all computer science related problems. This is accomplished through the following learning goals and objectives:

- **Knowledge of mathematics and computing fundamentals.** Apply the knowledge of mathematics and computing fundamentals to various real-life applications for any given requirement.
- **Design and develop applications.** Design and develop applications to analyse and solve all computer science related problems.
- **Effective Communication.** Students will use various forms of business communication, supported by effective use of appropriate technology, logical reasoning, and articulation of ideas. Graduates are expected to develop effective oral and written communication especially in business applications, with the use of appropriate technology (business presentations, digital communication, social network platforms and so on).
- **Leadership and Teamwork.** Students will acquire skills to demonstrate leadership roles at various levels of the organization and leading teams. Graduates are expected to collaborate and lead teams across organizational boundaries and demonstrate leadership qualities, maximize the usage of diverse skills of team members in the related context.
- **Global Exposure and Cross-Cultural Understanding.** Graduate will be able to demonstrate a global outlook with the ability to identify aspects of the global business and Cross -Cultural Understanding.
- **Integrate and apply efficient tools.** Integrate and apply efficiently the contemporary IT tools to all computer

applications.

- **Designing innovative methodologies.** Create and design innovative methodologies to solve complex problems for the betterment of society.
- **Applying inherent skills.** Apply the inherent skills with absolute focus to function as a successful entrepreneur.
- **Social Responsiveness and Ethics.** Students will demonstrate responsiveness to contextual social issues/problems and exploring solutions, understanding ethics, and resolving ethical dilemmas. Demonstrate awareness of ethical issues and can distinguish ethical and unethical behaviours.

### 3. Program Learning Outcomes (PLOs)

**BCA Degree(3 Years):** The present Curriculum Framework for BCA degrees is intended to facilitate the students to achieve the following objectives.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems, and applications such as algorithms, data structures, data handling, data communication and computation.
- To develop the ability to use this knowledge to analyse new problems in the application domain.
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems.
- To learn skills and tools like mathematics, statistics, and electronics to find the solution, interpret the results and make predictions for the future developments.
- To formulate, model, design solutions, procedure and use software tools that solve real world problems and evaluate.

**BCA Degree(Honours/Research- 4 Years):** The BCA Degree (Honours/Research) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation.

- Apply standard MATLAB / R Programming practices and strategies in real -time software /Research project development.
- Design and develop computer programs/computer -based systems / Research in the areas related to AI, Neural Networks, Machine Learning, Cloud Computing / IoT MOOC (Massive Online Open Course), Major & Minor Projects.
- Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
- The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
- The ability to work independently on a substantial software project and as an effective team member.

### 4. Curriculum Structure

BCA Degree (Honor's/Research) will have a curriculum with Syllabi consisting of following type of courses:

- **Core Course:** A course, which should compulsory be studied by a candidate as a core requirement is termed as a Core Course.
- **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

- **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.
- **Generic Elective (GE) Course:** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.
- **Ability Enhancement Courses (AEC):** Life Skills and Mentoring.
- **Mandatory Course (MC):** Energy and Environment, Holistic Health and Yoga.
- **Foundation Course (FC):** Communication Skills, Universal Human Values and Awareness About Himachal Pradesh.
- **Skill Enhancement Courses (SEC):** These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

## 5. Scheme of Examination

The pass percentage in each subject will be 40%.

- **Theory Examination**  
Irrespective of credits, each paper will be of 100 marks (60 marks for theory exam and 40 marks for internal assessment) and duration of paper will be 3 hours.
- **Practical Examination**  
Each paper will be of 100 marks (60 marks for external practical exam and 40 marks for internal assessment) and duration of paper will be 3 hours.
- **Project Report/Dissertation**  
The Project Report/Dissertation will be evaluated by the internal panel and external examiner from the panel approved by the university authority/evaluation branch, HPTU, Hamirpur. The Head of the Department will assign a guide/supervisor to each candidate for his/her project/Dissertation work. The candidate shall be required to maintain his/her project diary (logbook) of work in the organization or under the Guide. Each student will be required to give presentations on his/her project work/Dissertation work. Each student is required to submit three copies of his/her project reports to the Department after completion of the project work, which will be evaluated by external examiner. Most of the students are expected to work on a real-life project/Research, preferably in some industry/Research and Development Laboratories/Educational Institution/Software Company. The student can formulate a project problem/Research problem with the help of her/his Guide and submit the synopsis/Research proposal of the same in the college within 10 days at the starting of Major Project. Approval of the Synopsis /Research proposal is mandatory which will be evaluated by an internal examiner appointed by respective college Principal or Director or university. If approved, the student can commence working on it and complete it by using the latest versions of the software packages/Research Tools for the development of the project/Dissertation.
- **Instruction for paper setter**  
In each theory paper, nine questions are to be set. Two questions are to be set from each Unit and the candidate is required to attempt at least one question from each unit. Question number nine will be compulsory, which will be of short answer type questions with 6 to 8 parts, covering entire syllabus. In all, five questions are to be attempted. The question paper for the end semester examination may have any one of the following patterns:  
**Section A (UNIT I)** Two questions of long answer type of which one is to be attempted for 10 Marks.  
**Section B (UNIT II)** Two questions of long answer type of which one is to be attempted for 10 Marks.  
**Section C (UNIT III)** Two questions of long answer type of which one is to be attempted for 10 Marks.

**Section D**(UNIT IV) Two questions of long answer type of which one is to be attempted for 10 Marks.

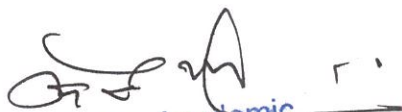
**Section E**(Compulsory) 8 to 10 short answer type questions for 2.5 to 2 marks each and total for 20 Marks.

**Total marks (A + B + C + D+ E) 10+ 10 + 10 +10+20 = 60 marks**

### End Semester Examination (ESE)

For the theory course, the question paper for the final examination will consist of five sections-A, B, C, D & E. Sections A, B, C, D will have two questions each from the corresponding units I, II, III & IV of the syllabus. Section E will be compulsory and will have short answer type questions covering the whole syllabus. Each question will be of 10 or 5,5 or 6,4 marks. The candidates will attempt five questions in all, i.e.one question each from sections A, B, C, D and the compulsory question from section E. The question paper is expected to contain problems with a minimum weightage of 25% of the total marks from each unit.

#### Template for End Semester Examination (4,3,2 credits)

<b>Roll No:....</b>	<b>Total Pages.....</b>
<b>Month-Year (June-2023)</b>	
<b>BCA Examination</b>	
<b>Code</b>	
<b>Title</b>	
<b>Semester-X (NEP)</b>	
<b>Time: 3 Hours</b>	<b>Max. Marks: 60</b>
<i>The candidates shall limit their answers precisely within the answer book (40 pages) issued to them and no supplementary/continuation sheet will be issued.</i>	
<b>Note:</b> Attempt five questions in all by selecting one question from each section A, B, C and D. Section-E is compulsory.	
	SECTION – A (1x10 or 5,5 or 6,4)
1.	
2.	
	SECTION – B (1x10 or 5,5 or 6,4)
3.	
4.	
	SECTION – C (1x10 or 5,5 or 6,4)
5.	
6.	
	SECTION – D (1x10 or 5,5 or 6,4)
7.	
8.	
	4
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9 (a-f)

SECTION – E (Compulsory)  
(10×2=20)

## Periodical Examination (PE)

During one semester, there will be two periodical examinations for theory and practical subjects. The question paper will consist of three sections A, B and C having a total of 20 marks. Section A will be compulsory and will have short answer type questions consisting of five parts, each with one mark covering the syllabus mentioned. Sections B and C will contain descriptive type questions of five and ten marks respectively. Sections B and C will have two questions and the candidates will attempt three questions in all, i.e., one question each from sections B and C. Section-A is compulsory.

### Template for Periodical Examination (4,3,2 credits)

Roll No:.....	Total Pages.....
<b>Month-Year (June-2023)</b>	
<b>BCA Examination</b>	
<b>Code</b>	
<b>Title</b>	
<b>Semester-X (NEP)</b>	
<b>Time: 1.5 Hours</b>	<b>Max. Marks: 20</b>
<b>Note:</b> Attempt three questions in all by selecting one question from each section B and C. Section-A is compulsory.	
<b>SECTION – A (Compulsory)</b>	
(8x1=8)	
1.	(a-e)
<b>SECTION – B</b>	
(6)	
2.	
3.	
<b>SECTION – C</b>	
(6)	
4.	
5.	

## 6. Purposed Subject Code System

Each subject code is denoted by alpha-numerals, alphabets before hyphen indicates course name and four numerals after hyphen indicates level, semester, and subject number respectively.

- For Example: BCA-6209
- First three alphabets “BCA” is degree indicator.
- First number “6” defines the Level. 6 for level 6 subject and 7 for level 7.
- Second number “2” defines the semester.
- Third and fourth number are for subject number.

## 7. Assessment & Evaluation

- **IA-Internal Assessment (Theory)**

Periodical Examination (PE) -I and Periodical Examination (PE) -II = Weightage of **20** Marks (Average of PE-I and PE-II)

Teacher's Assessment (Assignment Discussion/ Presentation /Overall behaviour) = 15 Marks

Attendance = 05 Marks

Sr. No.	Percentage of Lecture Attended	Marks Awarded
1	From 75% to 80%	01
2	Above 80% to 85%	02
3	Above 85% to 90%	03
4	Above 90% to 95%	04
5	Above 95%	05

Total (IA) = 10 + 10 + 15 + 5 = 40 for all courses

- **IA-Internal Assessment (Practical)**

Periodical Examination (PE) (Written/Presentation & Viva-Voce) = **20**

Teacher's Assessment (Lab performance /Work Performance + Report/File Work) = **15**

Attendance = **05**

- **EA-External Assessment (Theory)**

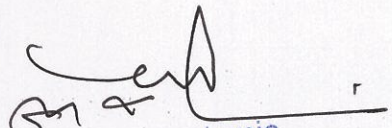
ESE-End-Semester Examination = 60 for all courses

*Total marks for theory evaluation = (20 + 15 + 05 + 60 =100) for all courses.*

- **External Assessment (Practical)**

ESE-End-Semester Examination (written script, performance, External viva-voce etc.) = **60**

*Total marks for practical evaluation = 20+20+60 =100*

  
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**Template for- IA-Internal Assessment (Theory)**  
**HIMACHAL PRADESH TECHNICAL UNIVERSITY**  
**Bachelor of Computer Applications , School of Computer Science & Engineering**  
**AWARD SHEET THEORY (INTERNAL ASSESSMENT)**

Name of the Institution:			Distribution of Marks				Total Marks	
Programme:			Periodical Examinations		Teacher Assessment Assignment discussion/ presentation/ Quizzes/Overall	Attendance		
Subject:	Sub. Code:		1 <sup>st</sup> Periodical Examination	2 <sup>nd</sup> Periodical Examination				
Branch:	Semester:							
MAX. MARKS:		MIN. MARKS:		10	10	15	05	40
Sr. No.	University Roll No.	Name of Student		10	10	15	05	40

Name of Internal Examiner	Head of Dept	Head of the Institution
Signature.....	Signature.....	Signature.....
Date.....	Date.....	Date.....

  
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**Template for-IA-Internal Assessment (Practical/Project/Seminar/Viva-Voce)**  
**HIMACHAL PRADESH TECHNICAL UNIVERSITY**  
**Bachelor of Computer Applications , School of Computer Science & Engineering**  
**AWARD SHEET PRACTICAL (INTERNAL ASSESSMENT)**  
**(Practical/Project/Seminar/Viva-Voce)**

Name of the Institution:			Distribution of Marks				Total Marks
Programme:			Periodical Examination		Teacher's Assessment Lab /work performance Report/File work	Attendance	
Subject:	Sub. Code:		Written/Presentation	Viva-voce			
Branch:	Semester:						
MAX. MARKS:			MIN. MARKS:				
Sr. No.	University Roll No.	Name of Student	10	10	15	05	40
Name of Internal Examiner			Head of Deptt.		Head of the Institution		
Signature.....			Signature.....		Signature.....		
Date.....			Date.....		Date.....		

*\*Note: The distribution of marks for Institutional training, Internship, Survey, SWAYAM, MOOCs, NPTEL courses (if any) would be same as above.*

**Template for-External Examination**  
**(Practical/Project/Seminar/Viva-Voce)**  
**HIMACHAL PRADESH TECHNICAL UNIVERSITY**  
**Bachelor of Computer Applications, School of Computer Science & Engineering**  
**(Practical/Project/Seminar/Viva-Voce)**

Name of the Institute: .....

Programme: .....

Subject Name..... Subject Code:.....

Branch: ..... Semester .....

Max Marks ..... Min. Marks:.....

Sr. No.	University Roll No.	Name of Student	Marks in Figure	Marks in Words

Name of Internal Examiner:..... External Examiner.....

Signature..... Signature.....

Date..... Date.....

*\*Note: The distribution of marks would be on the basis of Work done/Task performance (20 marks), Performance (written/presentation) (20 marks) and viva-voce (20 marks), total=60 marks.*

  
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## 8. Overall General Instructions

- Each paper will be of 100 marks (60 marks for external and 40 marks for internal) and the duration of paper will be 3 hours. The candidate shall be declared to have passed the examination if the candidate secures not less than 24 marks in the End Semester Examinations of each paper and secures not less than 16 marks in the Internal Assessment (IA) and overall aggregated marks is 40 in both the external and internal taken together.
- Each theory lecture per hour will be considered as one credit and two practical hours as one credit. For each theory course of 04 credits, there will be 4 lecture hours of teaching per week and for each theory course of 02 credits, there will be 2 lecture hours of teaching per week. For each practical course of 02 credits, there will be 04 lecture hours of teaching per week and for practical course of 04 credits, there will be 08 lecture hours of teaching per week. For the other course categories, the lecture hours per credit would be same as those of having theory subjects.
- In each semester, the students are required to perform at least ten experiments out of the listed experiments.
- For Seminar, Industrial Training, Research Project, Summer Internship, Survey, SWAYAM, MOOC, NPTEL; the internal and external assessment shall be same as that of theory/practical courses i.e., 100 (60 % ESE & 40 % IA) marks.
- The distribution of internal & external assessment for Project work, Seminar and other course categories will be same as that of Core Compulsory course/Discipline Specific Courses and also as per the format mentioned above. (Read all the instructions mentioned in each course content semester-wise)
- Teaching hours per semester for each 04-credit theory course will be minimum 60 hours and of 02 credit theory course will be minimum 30 hours.
- For Research project, Seminar/SWAYAM/MOOC/NPTEL/Industrial Internship/Survey, the time frame for the duration of classes, examination, format for writing the report and evaluation system will be as per the format given as well as may be decided by the Department/University itself or organizing/host/collaborative institutions time to time after the approval from BoS.
- On the basis of the interest/availability of the students from other departments, any other relevant course for the Inter-Departments Course (ID) may be offered at the spot after the approval from Authority/Department.
- Students having the attendance below 75% in each course will not be allowed to appear in the final examination. The students having attendance lying between 70-75% may be allowed to submit the examination form and finally to appear in the examinations only after the approval from the Dean/concerned authority. Similarly, the students having attendance lying between 65-70% may be allowed to submit the examination form and finally to appear in the examinations only after the approval from the Vice-Chancellor only on the request basis.
- For Theory examinations (Internals), two examinations; Periodical Examination-I and Periodical Examination-II will be conducted and for the practicals and other course categories, only one periodical examination will be conducted-as the internal examination along with other parameters as mentioned in the instructions (mentioned above).
- Both the periodical examinations are mandatory. If, in any case, the student is not able to appear in any of the above examinations, then the option of Make-up Examination will be given to the student. For that, he/she has to report before that examination to the concerned teacher/head of the department. Within 3 days, he/she has to submit the documents related to the cause and finally get permission from the concerned Authority. After getting the permission, the student has to appear in the examination within 10 days with the weightage of 80% only. For example, if the student scoring 15 marks with the weightage of 100%, then he/she will be given 12 marks (80% weightage).
- Keeping in view the guidelines of NEP-2020, BCA is made inter- departmental in nature. It has been made

mandatory by the university for the students at the UG level to opt at least one course of minimum 2 credits in first year.

- Duration: One year divided into two semesters.
- Medium of instruction: English and Passing Standard: As mentioned in the Ordinance.
- In regard to maintain the record of the answer-sheets, after the completion of one year, all the used answer-sheets of internal examinations, project reports, practical note-books etc. would be allowed to disposed off.
- In regard to maintain the lab equipments, if any of the equipments not working properly may be allowed to send to the concerned companies (within and out-side the state) for repairing and may be allowed to disposed off/write off the damaged/old/not-in-use items like books, equipments, furniture and other appliances after the approval from the concerned authorities.

  
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**Scheme of Teaching and Examination  
Bachelor of Computer Applications(BCA)**

**Semester-I**

Subject Code	Course Type	Subject Title/Subject Name	Periods			Credits	Evaluation Scheme				Total	
			L	T	P		ESE	Internal Assessment				
								PE	TA	A		Total
BCA-5101	DSC	Computers Fundamentals & Information Technology	4	0	0	4	60	20	15	05	40	100
BCA-5102	DSC	Office Automation Tools	4	0	0	4	60	20	15	05	40	100
BCA-5103	DSC	Desktop Publishing and Designing	4	0	0	4	60	20	15	05	40	100
BCA-5104	GE	Basic Electronics	4	0	0	4	60	20	15	05	40	100
BCA-5105	SEC	Digital Marketing	2	0	0	2	60	20	15	05	40	100
ENV-101	MC	Introduction to Environmental Sciences	2	1	0	3	60	20	15	05	40	100
HS-111	FC	Communication Skills	3	0	0	3	60	20	15	05	40	100
<b>Labs</b>												
BCA-5106P	DSC LAB	Lab -I : Office Automation Tools Lab	0	0	2	1	60	20	15	05	40	100
BCA-5107P	DSC LAB	Lab-II :Desktop Publishing and Designing Lab	0	0	2	1	60	20	15	05	40	100
HS-111P	FC	Lab-III: Communication Lab	0	0	2	1	60	20	15	05	40	100
<b>Total</b>			<b>23</b>	<b>1</b>	<b>6</b>	<b>27</b>	<b>600</b>	<b>200</b>	<b>150</b>	<b>50</b>	<b>400</b>	<b>1000</b>

<b>Legend:</b>	DSC- Discipline Specific Core	GE – Generic Elective
	AEC- Ability Enhancement Compulsory	SEC - Skill Enhancement Course
	VAC – Value Addition Course	T-Tutorial
	L-Lecture	PE-Periodical Examination
	P-Practical	TA-Teacher's Assessment
	ESE-End Semester Examination	A - Attendance
	DSE- Discipline Specific Electives	C- Compulsory
	MC-Mandatory Course	FC- Foudation Course

Scheme of Teaching and Examination Bachelor of Computer Applications(BCA)												
Semester-II												
Subject Code	Course Type	Subject Title/ Subject Name	Periods			Credits	Evaluation Scheme					Total
			L	T	P		ESE	Internal Assessment				
								PE	TA	A	Total	
BCA-5201	DSC	Computer Architecture	4	0	0	4	60	20	15	05	40	100
BCA-5202	DSC	Database Management System	4	0	0	4	60	20	15	05	40	100
BCA-5203	DSC	Programming in C	4	0	0	4	60	20	15	05	40	100
BCA-5204	GE	Fundamentals of Accounting	3	1	0	4	60	20	15	05	40	100
BCA-5205	VAC	Digital Empowerment	2	0	0	2	60	20	15	05	40	100
BCA-5206	SEC	Advance Spreadsheet Tools	2	0	0	2	60	20	15	05	40	100
UHV-111	MC	Universal Human Values and Awareness about Himachal - Pradesh	3	0	0	3	60	20	15	05	40	100
<b>Labs:</b>												
BCA-5207P	DSC LAB	Lab- IV: DBMS Lab	0	0	2	1	60	20	15	05	40	100
BCA-5208P	DSC LAB	Lab- V: Programming in C Lab	0	0	2	1	60	20	15	05	40	100
HS-122P	MC	Lab-VI: Holistic Health and Yoga	0	0	2	1	60	20	15	05	40	100
<b>Total</b>			<b>21</b>	<b>1</b>	<b>6</b>	<b>26</b>	<b>600</b>	<b>200</b>	<b>150</b>	<b>50</b>	<b>400</b>	<b>1000</b>

**Undergraduate Certificate** will be awarded after completing first two semesters with minimum of 53 Credits provided all electives passed and successful completion of 10 Credit bridge course of two-month duration.

Bridge Course				
Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks
BCA-5209	C	Training/ Internship Report and Viva-Voce	6	100
BCA-5210	C	MOOC/NPTEL/ Swayam Certification/ Online Certification	4	100
<b>Total</b>			<b>10</b>	<b>200</b>

**Note:** The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 5 the candidate will have core knowledge of Computer basics.

MOOC /NPTEL/ Swayam Certification/ Online Certification		
Subject Code	Course Type	Subject Title/ Subject Name
BCA-5210(A)	C	Basic of IT
BCA-5210(B)	C	Essential of Python
BCA-5210(C)	C	PC Hardware & Networking

**Scheme of Teaching and Examination**  
**Bachelor of Computer Applications(BCA)**

**Semester-III**

Subject Code	Course Type	Subject Title/ Subject Name	Periods			Credits	Evaluation Scheme					Total
			L	T	P		ESE	Internal Assessment				
								PE	TA	A	Total	
BCA-6301	DSC	Operating System	4	0	0	4	60	20	15	05	40	100
BCA-6302	DSC	Data Structure	4	0	0	4	60	20	15	05	40	100
BCA-6303	DSC	Python Programming	4	0	0	4	60	20	15	05	40	100
BCA-6304	GE	Mathematics-I	3	1	0	4	60	20	15	05	40	100
BCA-6305	SEC	Graphics Design & Animation	2	0	0	2	60	20	15	05	40	100
IKS-311	MC	Indian Knowledge System	2	0	0	2	60	20	15	05	40	100
<b>Labs:</b>												
BCA-6306P	DSC LAB	Lab -VII :Data Structure Lab	0	0	2	1	60	20	15	05	40	100
BCA-6307P	DSC LAB	Lab- VIII : Python Programming Lab	0	0	2	1	60	20	15	05	40	100
<b>Total</b>			<b>19</b>	<b>1</b>	<b>4</b>	<b>22</b>	<b>480</b>	<b>160</b>	<b>120</b>	<b>40</b>	<b>320</b>	<b>800</b>



**Scheme of Teaching and Examination  
Bachelor of Computer Applications(BCA)**

**Semester-IV**

Subject Code	Course Type	Subject Title/ Subject Name	Periods			Credits	Evaluation Scheme				Total	
			L	T	P		ESE	Internal Assessment				
								PE	TA	A		Total
BCA-6401	DSC	Software Engineering	4	0	0	4	60	20	15	05	40	100
BCA-6402	DSC	Web Technology (HTML, XHTML, CSS)	4	0	0	4	60	20	15	05	40	100
BCA-6403	DSC	Java Programming	4	0	0	4	60	20	15	05	40	100
BCA-6404	GE	Mathematics-II	3	1	0	4	60	20	15	05	40	100
BCA-6405	AEC	Environmental Sciences	2	0	0	2	60	20	15	05	40	100
BCA-6406	VAC	Ethics and Culture	2	0	0	2	60	20	15	05	40	100
<b>Labs:</b>												
BCA-6407P	DSC LAB	Lab -VII :Java Programming Lab	0	0	2	1	60	20	15	05	40	100
BCA-6408P	DSC LAB	Lab -VIII : Web Technology Lab	0	0	2	1	60	20	15	05	40	100
<b>Total</b>			<b>19</b>	<b>1</b>	<b>4</b>	<b>22</b>	<b>480</b>	<b>160</b>	<b>120</b>	<b>40</b>	<b>320</b>	<b>800</b>

**Undergraduate Diploma** will be awarded after completing four semesters with minimum of 97 Credits provided all electives passed and successful completion of 10 Credit bridge course of two-month duration.

**Bridge Course**

Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks
BCA-6409	C	Training/ Internship Report and Viva-Voce	6	100
BCA-6410	C	MOOC /NPTEL/ Swayam Certification/ Online Certification	4	100
<b>Total</b>			<b>10</b>	<b>200</b>

**Note:** The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 6 the candidate will have core knowledge of Computer Programming with its specialization.

**MOOC /NPTEL/ Swayam Certification/ Online Certification**

Subject Code	Course Type	Subject Title/ Subject Name
BCA-6411(A)	C	Data Analytics with Python
BCA-6411(B)	C	Back End Web Development
BCA-6411(C)	C	Server Side Programming using JSP

  
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Scheme of Teaching and Examination Bachelor of Computer Applications(BCA)												
Semester-V												
Subject Code	Course Type	Subject Title/ Subject Name	Periods			Credits	ESE	Evaluation Scheme				Total
			L	T	P			Internal Assessment				
								PE	TA	A	Total	
BCA-7501	DSC	Computer Networks	4	0	0	4	60	20	15	5	40	100
BCA-7502	DSC	Data Warehouse and Mining	4	0	0	4	60	20	15	5	40	100
BCA-7503	DSC	Advance Java (Servlet & JSP)	4	0	0	4	60	20	15	5	40	100
BCA-7504	GE	Mathematics-III	3	0	0	3	60	20	15	5	40	100
BCA-7505	SEC	Cloud Computing	2	0	0	2	60	20	15	5	40	100
BCA-7506	DSE	DSE - I	4	0	0	4	60	20	15	5	40	100
<b>Labs:</b>												
BCA-7507P	DSC LAB	Lab- IX: Computer Graphics Lab	0	0	2	1	60	20	15	5	40	100
BCA-7508P	DSC LAB	Lab- X: Advance Java (Servlet & JSP) Lab	0	0	2	1	60	20	15	5	40	100
<b>Total</b>			<b>21</b>	<b>0</b>	<b>4</b>	<b>23</b>	<b>480</b>	<b>160</b>	<b>120</b>	<b>40</b>	<b>320</b>	<b>800</b>

**Departmental Electives University Wide Courses**

**Discipline Specific Electives- I**

Sr. No.	Course Type	Course Code	Course Title
1.	DSE	BCA- 7506(A)	Numerical Methods
2.	DSE	BCA- 7506(B)	Computer Graphics
3.	DSE	BCA- 7506(C)	Multimedia Technology
4.	DSE	BCA-7506(D)	Microprocessors and Microcontrollers

Scheme of Teaching and Examination Bachelor of Computer Applications(BCA)												
Semester-VI												
Subject Code	Course Type	Subject Title/ Subject Name	Periods			Credits	ESE	Evaluation Scheme				Total
			L	T	P			Internal Assessment				
								PE	TA	A	Total	
BCA-7601	DSC	Analysis and Design of Algorithms	4	0	0	4	60	20	15	5	40	100
BCA-7602	DSC	Artificial Intelligence	4	0	0	4	60	20	15	5	40	100
BCA-7603	DSC	Android Programming	4	0	0	4	60	20	15	5	40	100
BCA-7604	DSC	Distributed System	3	0	0	3	60	20	15	5	40	100
BCA-7605	SEC	Image Processing	2	0	0	2	60	20	15	5	40	100
BCA-7606	DSE	DSE - II	4	0	0	4	60	20	15	5	40	100
<b>Labs:</b>												
BCA-7607P	DSC LAB	Lab- XI : Analysis and Design of Algorithms Lab	0	0	2	1	60	20	15	5	40	100
BCA-7608P	DSC LAB	Lab- XI: Android Programming Lab	0	0	2	1	60	20	15	5	40	100
<b>Total</b>			<b>21</b>	<b>0</b>	<b>4</b>	<b>23</b>	<b>480</b>	<b>160</b>	<b>120</b>	<b>40</b>	<b>320</b>	<b>800</b>

#### Departmental Electives University Wide Courses

##### Discipline Specific Electives- II

Sr. No.	Course Type	Course Code	Course Title
1.	DSE	BCA- 7606(A)	Information Security (Part-I) Computer and Information Security
2.	DSE	BCA- 7606(B)	Data Analytics (Part-I) Simulation and Modeling using MATLAB
3.	DSE	BCA- 7606(C)	Mobile Computing (Part-I) Mobile Computing and Wireless Networks
4.	DSE	BCA- 7606(D)	Compiler Design

Bachelor's Degree (BCA) will be awarded after completing six semesters with minimum of 143 Credits provided and successful completion of 10 Credit bridge course of two-month duration.

Bridge Course				
Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks
BCA-7609	C	Training/ Internship Report and Viva-Voce	6	100
BCA-7610	C	MOOC/NPTEL/Swayam Certification/ Online Certification	4	100
<b>Total</b>			<b>10</b>	<b>200</b>

  
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**Note:** The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 7 the candidate will have core knowledge of Computer applications with its specialization.

<b>MOOC /NPTEL/ Swayam Certification/ Online Certification</b>		
<b>Subject Code</b>	<b>Course Type</b>	<b>Subject Title/ Subject Name</b>
BCA-7610 (A)	C	Big Data Analytics
BCA-7610 (B)	C	Image and speech recognition
BCA-7610 (C)	C	Multimedia Programming using Android

<b>Scheme of Teaching and Examination</b>												
<b>Bachelor of Computer Applications(BCA)</b>												
<b>Semester-VII</b>												
<b>Subject Code</b>	<b>Course Type</b>	<b>Subject Title/ Subject Name</b>	<b>Periods</b>			<b>Credits</b>	<b>ESE</b>	<b>Evaluation Scheme</b>				<b>Total</b>
			<b>L</b>	<b>T</b>	<b>P</b>			<b>Internal Assessment</b>				
								<b>PE</b>	<b>TA</b>	<b>A</b>	<b>Total</b>	
BCA-8701	DSC	Internet of Things (IoT)	4	0	0	4	60	20	15	5	40	100
BCA-8702	DSC	Web Technologies (Node.js and MongoDB)	4	0	0	4	60	20	15	5	40	100
BCA-8703	DSE	DSE - III	4	0	0	4	60	20	15	5	40	100
BCA-8704	DSE	DSE - IV	4	0	0	4	60	20	15	5	40	100
BCA ID	ID	Inter Departmental Elective	2	0	0	2	60	20	15	5	40	100
<b>Labs:</b>												
BCA-8705P	DSC LAB	Lab- XIII: Data Analysis usingR-Tool Lab	0	0	2	2	60	20	15	5	40	100
BCA-8706P	DSC LAB	Lab- XIV : Minor Project	0	0	6	6	60	20	15	5	40	100
<b>Total</b>			<b>18</b>	<b>0</b>	<b>8</b>	<b>26</b>	<b>420</b>	<b>140</b>	<b>105</b>	<b>35</b>	<b>280</b>	<b>700</b>

**Departmental Electives University Wide Courses  
Discipline Specific Electives-III**

Sr. No.	Course Type	Course Code	Course Title
1.	DSE	BCA- 8703(A)	Information Security (Part-II) Network and Web Security
2.	DSE	BCA- 8703(B)	Data Analytics (Part-II) Data Analysis using R-Tool
3.	DSE	BCA- 8703(C)	Mobile Computing (Part-II) Mobile Architecture and Security
4.	DSE	BCA- 8703(D)	Software Quality Assurance

**Discipline Specific Electives- IV**

Sr. No.	Course Type	Course Code	Course Title
1.	DSE	BCA- 8704(A)	Information Security (Part-III) Mobile and Cloud Security
2.	DSE	BCA- 8704(B)	Data Analytics (Part-III) Big Data Analysis
3.	DSE	BCA- 8704(C)	Mobile Computing (Part-III) Programming for Mobile Devices
4.	DSE	BCA- 8704(D)	Theory of Computation

**Inter - Departmental Electives University Wide Course**

Basket of Inter- Departmental Elective courses-choose Any one (Only for the students of other Departments e.g. the students of BCA will not opt the Inter-Departmental Elective Course offered by the same department )			
Sr. No.	Subject Code	Title of Subject/Subject Name	Credit
1	BCA ID (i)	Cyber security	2
2	BCA ID (ii)	Information Technology Trends	2
3	BCA ID (iii)	Computer and Information Security	2
4	BCA ID (iv)	Open Source Technologies	2

  
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**Scheme of Teaching and Examination**  
**Bachelor of Computer Applications(BCA)**

**Semester-VIII**

<b>Course Code</b>	<b>Course Type</b>	<b>Subject Title/ Subject Name</b>	<b>Credits</b>	<b>Total Marks</b>
BCA-8801 (A)	DSC	<b>Project Design &amp; Implementation (Industrial / In-House)</b>	<b>20</b>	
		(A). Synopsis		50
		(B). Mid Project Report		50
		(C). Project Seminars		50
		(D). Major Project Progress Report		50
		(E). Major Project Report		100
		(F). Major Project Viva-Voce		100
<b>Total</b>				<b>400</b>
<b>or</b>				
BCA-8801 (B)	DSC	<b>Research (Industrial / In-House)</b>	<b>20</b>	
		(A). Synopsis		50
		(B).Mid Research Report		50
		(C).Research Work Seminars (02)		50
		(D).Research Work Report		50
		(E). Research Work Report		100
		(F). Research Work Viva-Voce		100
<b>Total</b>				<b>400</b>

BCA-5101 Computer Fundamentals & Information Technology							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

### Course Objectives (COs)

The main objective of this course is to provide conceptual knowledge about fundamentals of Computers, I/O devices, storage devices, memory, computer Software and type of programming Languages.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Fundamentals of Computers:</b> Characteristics, Evolution, Capabilities and Limitations Generations of Computers. <b>Types of Computers:</b> Micro, Mini, Main Frame, Supercomputers, Block Diagram of Computer, Instruction Set, Registers, Processor Speed, Type of Processors.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>I/O Devices:</b> Introduction & Types of I/O devices, Input Devices: Keyboard, Mouse, Touch Screens, Joystick, Electronic Pen, and Trackball. <b>Scanning Devices:</b> Optical Scanners, OCR, OMR, Bar Code Readers, MICR, Digitizer, Electronic card reader, Image Capturing Devices-Digital Cameras. <b>Output Devices:</b> Monitors CRT, LCD/TFT, Printers- Dot matrix, Inkjet, Laser, Plotters- Drum, Flatbed, Screen image projector.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Memory:</b> Main Memory, RAMS, ROM, EPROM, PROM, Cache Memory. <b>Secondary Storage Devices:</b> Magnetic Tape, Magnetic Disks Internal & External Hard Drives, Floppy Disks, Optical Disks-CD, VCD, CD-R, CD-RW, DVD, Flash Memory, USB Drives.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Computer Software:</b> Software and its Need, Types of software System Software, Application Software, System software, Utility Program. Programming Languages: Types of Computer Languages, their Merits and Demerits Assemblers, Compilers and Interpreter, computer virus and its types, antivirus.	

### Course Learning Outcomes (CLOs)

- Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices.
- Understand the concept of input and output devices of Computers.
- Understand an operating system and its working, and solve common problems related to operating systems.
- Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.

### Suggested Readings

- Fundamentals of Computer, JB Dixit, Luxmi Publications.
- S.K. Gandhi, Pawan Thakur "Basic Computer Engineering", Satya Prakashan, New Delhi.

### Further References

- Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
- Fundamentals of Computer, JB Dixit, Luxmi Publications.

BCA-5102 Office Automation Tools							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide conceptual as well as practical knowledge of apply Word Processing Tools including Document Formatting, Using Graphics, Working with Macro and Mail Merge, Apply Spread Sheet Tools including Worksheet formatting, Using Functions, Graphics and Charts, Create effective Presentation Using Animation and Transition.

<b>Unit I</b>	<b>15 Lectures</b>
<b>DOS &amp; Windows:</b> History and Version of DOS, Internal Command: DIR, DATE, TIME, CLS, CD, RD, MD, PATH, TYPE, DEL, ECHO, COPY, REN, PROMPT, VOL, VER etc. External Command: ATTRIB, CHKDSK, DISKCOPY, DISKCOMP, XCOPY, TREE, DELTREE, DOSKEY, FORMAT, FIND, SORT, FDISK, MORE, SYS etc. Concept of Files & Directories, Wild card characters. <b>Windows:</b> Definition, Benefits, Features & Uses of Windows, Control Panel, Accessories, Task Bar, My Computer, Recycle bin.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>MS Office:</b> Elements, Introduction to Office & Features, MS-Word: Definition, Benefits, Features & uses of Word, Menus, Toolbars, Cursor, Short Cut & Hot keys, Editing Text, Opening, Creating, saving, Printing, Editing Files, Formatting text, Find and replace, Tables and Columns, Spell check, Thesaurus, File protection, Mail Merge, Macros.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>MS Excel:</b> Definition, Benefits, Features & Uses of MS Excel, Worksheets, Formatting Worksheets and Restricting Data, Calculating with Formulas and Functions, Ranges, Auto fill, Data (Sort, Filter, Validation, Subtotal), Viewing and Manipulating Data with Charts and PivotTables, Print, Goal seek, Scenario, Macros, Creating Excel Databases.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>MS – Power Point:</b> Definition, Benefits, Features & Uses of Power Point, Menus, Toolbars, Creating and Editing Slides, adding graphics, Multimedia, and Special Effects to Slides, Insert (Picture, Slide & Text), Master Slide, Views, Animation, Action Buttons.	

#### Course Learning Outcomes (CLOs)

- The students will be able to perform documentation, accounting operations and presentation skills.

#### Suggested Readings

- PC Software – R.K Taxali
- S.K. Gandhi, Pawan Thakur “Basic Computer Engineering”, Satya Prakashan, New Delhi.

#### Further References

- Microsoft Office - The Complete Reference .
- Microsoft Office - Fundamentals By Laura Story, Dawna Walls.



BCA-5103 Desktop Publishing and Designing							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

### Course Objectives (COs)

The main objective of this course is to creation of electronic forms of information such as documents, presentations, brochures, books, or even website content using computer programs. It allows an amalgamation of various tasks that are generally performed independently at printing presses such as layouts, typesetting, graphic design etc.

<b>Unit I</b>	<b>15 Lectures</b>
<b>D.T.P For Publications:</b> Introductions to Printing, Types of Printing, Offset Printing, Working of offset Printing, Transparent Printout, Negative & Positives for Plate were making, Use of DTP, Importance, Advantage of D.T.P, Mixing of graphics & Image in a single page production, Laser printers - Use, Types, Advantage of laser printer in publication.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Page Layout:</b> Different page format / Layouts, News paper page format, Page orientations, Columns & Gutters, Printing in reduced sizes. <b>Introductions To Page Maker:</b> Page Maker Icon and help, Tool Box, Styles, Menus etc., Different screen Views, Importing text/Pictures, Auto Flow, Columns.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Advance features:</b> Master Pages and Stories, Story Editor, Menu Commands and short-cut commands, Spell check, Find & Replace, Import Export etc., Fonts, Points Sizes, Spacing etc., Installing Printers, Scaling (Percentages), Printer setup Use of D.T.P. in Advertisements, Books & Magazines, News Paper, Table Editor.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Adobe Photoshop:</b> Introduction to Adobe Photoshop & Documents, Various Graphic Files and Extensions, Vector Image and Raster Images, Various Colour Modes and Models, Introduction to Screen and Work Area, Photoshop Tools & Palettes ,Use of Layers & Filters, Working with Images.	

### Course Learning Outcomes (CLOs)

- The students would be to learn the basics of printing,page layouts and different page orientations .
- Learn the advance features of DTP in Books, magazines and the proficient working in Adobe Photoshop.

### Suggested Readings

- Page Maker 4.0 & 5.0 By B.P.O. Publications.
- Prakhhar Complete Course For DTP (Coreldraw, Pagemaker, Photoshop).

### Further References

- Vishnu Priya Singh, Meenakshi Singh, "DTP Course Book", Computech Publications Ltd., New Delhi.
- Satish Jain, DTP (Desktop Publishing) Training Guide, BPB Publication.

  
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BCA-5104 Basic Electronics							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to understand Data Representation for Digital Logic, Basic Blocks of Digital Logic Understand the Fundamental Organization of a Digital Computer, Design Simple Combination, Sequential Circuits and Examine the Basics of General Programming.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Data Representation:</b> Data Types and Number Systems Binary Number System Octal & Hexa- Decimal Number System Fixed Point Representation 1's & 2's Complement. <b>Binary Fixed:</b> Point Representation Arithmetic Operation On Binary Numbers Overflow & Underflow Floating Point Representation Codes ASCII EBCDIC Codes Gray Code Excess-3 & BCD Error Detection & Correcting Codes Binary Storage and Registers.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Boolean Algebra and Digital Logic Circuits:</b> Logic Gates and OR NOT Gates and Their Truth Tables NOR, NAND & XOR Gates Boolean Algebra Basic Definition and Properties Basic Boolean Law's Demorgan's Theorem Map Simplification Minimization Techniques. <b>K Map:</b> Two Three and More Variables Maps Sum of Product & Product of Sums.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Combination Circuits:</b> Half Adder & Full Adder, Full Subtractor, and Decimal Adder Code Conversion Multilevel NAND and NOR Circuits Multiplexers and Demultiplexers, RAM and ROM Working & Circuit.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Sequential logic:</b> Flip-Flops – RS, D, JK & T Flip-Flop and Triggering in flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, flip flop excitation tables, Design procedure and design of counters. Design with equations.	

#### Course Learning Outcomes (CLOs)

- The students will be able to study basics of semiconductor & devices and their applications in different areas.
- Analyze output in different operating modes of different semiconductor devices.

#### Suggested Readings

- M. Morris Mano-Computer System Architecture Revised 3rd Edition Pearson Publication.
- Digital Electronics by Anil Kumar Maini publisher :Wiley and Sons.

#### Further References

- Morris Mano-Digital Logic and Computer Design.
- Modern Digital Electronics by R. P. Jain publisher Tata Mcgraw-Hill education.

BCA-5105 Digital Marketing							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

### Course Objectives (COs)

The main objective of this course is to apply and analyse digital marketing activities in achieving business objectives, to develop skills relevant to marketing campaigns for enhancing business reach, to examine marketing metrics and collect consumer data using digital media and to improve the brand identity and develop the customer base using real-world techniques.

<b>Unit I</b>	<b>08 Lectures</b>
<b>Introduction to Digital Marketing:</b> Digital vs. Traditional Marketing, Digital Marketing Channels, ROI between Digital and traditional marketing, Creating an initial digital marketing plan and Content Management. <b>Search Engine Basics:</b> Search Engines and Websites, Difference between Blog, Portal and Website, Static and Dynamic Websites.	
<b>Unit II</b>	<b>08 Lectures</b>
<b>Keyword Research:</b> Keyword Research, Types of Keywords, Business Analysis & Categorization, Google Keyword Planner, Market Research and Analysis, New Keyword Ideas and Finalizing the Keywords List. <b>Optimization Techniques:</b> Website Speed, the Domain name in SEO, URL Optimization, Title and Meta Tag Optimization, Sitemaps Generation, Using Robot.txt in Site URL, Redirecting Techniques.	
<b>Unit III</b>	<b>08 Lectures</b>
<b>Search Engine Optimization:</b> Local SEO, Importance of Local SEO, Local SEO Ranking Signals, Local SEO Negative Signals, Citations and Local Submissions, Website Position Analysis and Website Monthly Reports. <b>Paid Marketing Techniques:</b> Google Account setup, Account Structure, Campaigns settings, Ad Group setup, Keyword Match Types, Keyword Research Tools and Understanding Ad Auction.	
<b>Unit IV</b>	<b>08 Lectures</b>
<b>Display Advertising:</b> Benefits of Display Advertising, creating a Display Campaign, Bidding Strategies, Targeting Option in Display Network, Examples of Good and Bad Ads, Display Ad Builder and Conversion Tracking. <b>Social Media Marketing:</b> Introduction to SMM, Facebook Marketing, Facebook Advertising and Email Marketing..	

### Course Learning Outcomes (CLOs)

- The students will be able to learn about digital marketing including topics like SEO, Social media marketing etc.

### Suggested Readings

- Ryan, D. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.

### Further References

- The Beginner's Guide to Digital Marketing. Digital Marketer. Pulizzi, J. Epic Content Marketing, Mcgraw Hill Education.

  
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ENV-101 Introduction to Environmental Sciences							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	1	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide knowledge about the components of environment and their inter-relatedness. It provides understanding of all the resources available, their origin, the ways to conserve them for sustainable future, understand various measures undertaken by Government and laws related to protection of environment.

<b>Unit I</b>	<b>09 Lectures</b>
<b>Introduction to environmental sciences:</b> Definition, types: natural and anthropogenic environment, components: biotic and abiotic components, multidisciplinary nature of environmental studies, scope and importance of environmental sciences, environmental education, need for public awareness.	
<b>Unit II</b>	<b>09 Lectures</b>
<b>Ecology and ecosystem:</b> Definition, types of ecosystem: forest ecosystem, grassland ecosystem, desert ecosystem aquatic ecosystem, wetland ecosystem, tundra ecosystem, structure of ecosystem: physical components: atmosphere, hydrosphere and lithosphere and living components: producers, consumers and decomposers. Function of ecosystems: food chain, food web. Ecological pyramids.	
<b>Unit III</b>	<b>09 Lectures</b>
<b>Environmental pollution:</b> Introduction, pollutants, sources of pollutants: point and non-point sources, air pollution: origin, sources, adverse effects, and preventive measures related to air pollution, Bhopal gas tragedy. Water pollution: origin, sources, adverse effects and preventive measures related to water pollution, Minamata disease, ganga river pollution, soil pollution origin, sources, adverse effects and preventive measures related to soil pollution. Noise pollution: origin, sources, adverse effects and preventive measures related to noise pollution.	
<b>Unit IV</b>	<b>09 Lectures</b>
<b>Global environmental issues:</b> Greenhouse effect: cause, effect and greenhouse gases like carbon dioxide, methane, cfc, climate change: introduction, causes: volcanoes, deforestation, mining, fossil fuels, overexploitation of natural resources, industrialization. Ozone depletion, ozone depleting substances: cfc, halons, hydro fluoro carbons.	

#### Course Learning Outcomes (CLOs)

- The students will be able to discover knowledge in ecological perspective and value of environment.
- Understand the significance of various natural resources and their management.
- Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
- Understand environmental laws and sustainable development.

#### Suggested Readings

- Moaveni, S., Energy, Environment and Sustainability, Cengage(2018)
- Down to Earth, Environment Reader for Universities, CSE Publication(2018)
- Chapman, J.L. and Reiss, M.J., Ecology Principles and Application, Cambridge University Press (LPE) (1999).
- Eastop, T.P. and Croft, D.R., Energy Efficiency for Engineers and Technologists, Longman and Harrow (2006).

#### Further References

- O'Callagan, P.W., Energy Management, Mc Graw Hill Book Co.Ltd.(1993).

HS-111 Communication Skills							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
3	0	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

### Course Objectives (COs)

The main objective of this course is to identify deviant use of English both in written and spoken forms and understand the importance of writing in academic life. It reorganizes and corrects the errors of usage to write simple sentences without committing errors of spelling and grammar and to understand and appreciate English spoken by people from different regions.

<b>Unit I</b>	<b>09 Lectures</b>
<b>Essentials of communication:</b> The meaning, types & process of communication, Barriers to communication and removal of these barriers, Shannon & Weaver model of communication, Berlos' model of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness, Types of information- order, advice, suggestion, motivation, persuasion, warning and education. Mass Communication –function of mass communication – Media of mass communication, Advantages and disadvantages of social media.	
<b>Unit II</b>	<b>09 Lectures</b>
<b>Essentials of Grammar:</b> Types of sentences: Declarative Sentence, Imperative Sentence, Interrogative Sentence, Exclamatory Sentence, simple, compound & complex sentences, conversion of one type of sentence into other, Parts of speech, Tenses, articles and prepositions, Modal Auxiliaries Types of diction, ways to improve diction, Paragraphwriting.	
<b>Unit III</b>	<b>09 Lectures</b>
<b>Technical Communication:</b> Report writing: Characteristics of a good report, parts & types of reports, drafting of reports. Business letters: planning a business letter, parts of a letter, classification of business letters – inviting and sending quotations, letter placing orders, letter of complaint, letter of adjustment, and letter of Job, letter negotiating a job offer and Resume writing, Drafting memorandum, notices, agenda and minutes of meeting, preparing effective e-mail messages and power-point presentations.	
<b>Unit IV</b>	<b>09 Lectures</b>
<b>Soft skills &amp; personality development:</b> Soft skills: Classification of soft skills, Delivering effective presentations, Capturing audience, Impromptu speech, speech initiators, telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis., body language, Types of interviews, preparing for a job interview, Strategies for managing emotions & controlling stress.	

### Course Learning Outcomes (CLOs)

- The students will be able to develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
- Understand and practice different techniques of communication.
- Practice and adhere to the 7Cs of Communication.
- Familiarized with different types of communication. Understand and practice interview etiquettes.

### Suggested Readings

- Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press.
- Effective Communication and soft Skills, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.
- Communicative English for Engineers and professionals, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.

### Further References

- Business Communication: Theory and Application by R.W. Lesikar and John.D. Pettit, All India Traveller Bookseller.

<b>BCA-5106P Lab - I: Office Automation Tools Lab</b>							
<b>Teaching Scheme</b>			<b>Credit</b>	<b>Marks Distribution</b>			<b>Duration of End Semester Examination</b>
<b>L</b>	<b>T</b>	<b>P</b>		<b>C</b>	<b>Internal Assessment</b>	<b>End Semester Examination</b>	
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>Maximum Marks: 40</b>	<b>Maximum Marks: 60</b>	<b>100</b>	<b>3 Hours</b>
				<b>Minimum Marks: 16</b>	<b>Minimum Marks: 24</b>	<b>40</b>	

**Course Objectives (COs)**

The main objective of this course is to cover practical implementation part of BCA-5102.

**Total Lab Hours: 40(Max)**

**List of suggested practical:**

1. Create, save, print a document file and create header and footer in MS- Word.
2. Create the Timetable of BCA department.
3. Create and remove a Macro in MS-Word.
4. Design a birthday invitation to your friends using mail merge in MS- Word.
5. Create an Advertisement, Prepare a Mark Sheet of your class subjects and prepare a Salary Slip of an employee.
6. Prepare a bar chart, pie chart for analysis of Election Results and prepare a generic Bill of a Super Market.
7. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance.
8. Create a worksheet on Students list of any 4 faculties and perform following database functions on it. (i). Sort data by Name (ii). Filter data by Class (iii). Subtotal of no. of students by Class.
9. Design a presentation learnshow to save it in different format, copying and opening an existing presentation.
10. Design a presentation learns insertion of movie, animation and sound.
11. Design a presentation to demonstrate verbal (sounds, language, and tone of voice).
12. Design a presentation learnsnon-verbal (facial expressions, body language, and posture) .
13. Design a presentation to demonstrate written (journals, emails, blogs, and text messages) .
14. Design a presentation illustrating aural visual (signs, symbols, and pictures)

BCA-5107P Lab -II: Desktop Publishing and Designing Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives (COs)**

The main objective of this course is to cover practical implementation part of **BCA-5103**.

**Total Lab Hours: 40**

**List of suggested practical:**

1. Creating templates/master page for the given layout (setting grid, margin and columns)
2. Importing, linking and saving files for text and graphics.
3. Creating Title page
4. Creating style sheets and Table of Content.
5. Designing Letter head.
6. Designing Leaflet/Pamphlet.
7. Designing Envelop
8. Designing Invitation card / greeting card
9. Designing Bills / Vouchers
10. Designing an Advertisement

  
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HS-111P Communication Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P	C	Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 40 Minimum Marks: 16	Maximum Marks: 60 Minimum Marks: 24	100 40	3 Hours

#### Course Objectives (COs)

The main objective of this course is to cover practical implementation part of HS-111.

<b>Unit I</b> <b>Learning correct pronunciation:</b> Organs of speech, IPA symbols (consonant & vowel sounds), classification of consonants as per place & manner of articulation. finding out the correct pronunciation of words with the help of a dictionary, phonetic transcription of words presented orally, conversion of words presented through IPA symbols into normal orthography, syllable division and stress marking (in words presented in IPA form). Intonation (rising & falling tone).
<b>Unit II</b> <b>Listening Skills:</b> Listening with a focus on pronunciation (ear-training), stress and intonation; the students will be exposed, to the following varieties of English during listening practice: Standard Indian, British and American. Learning the differences between British & American pronunciation, Listening practice of the dialogues and speeches in British & American English.
<b>Unit III</b> <b>Speaking Skills:</b> Delivering impromptu speeches, reading aloud of dialogues, poems, excerpts from plays, Situational conversations: Introducing oneself, describing a person, place, situation and event, giving instructions, making inquiries – at a bank, post-office, air-port, hospital, reservation counter etc. Mock interviews and group discussions.
<b>Unit IV</b> <b>Writing Skills:</b> Identifying common mistakes made by students in written communication and improving them, writing emails: sending and responding to emails, preparing and delivering power -point presentations, answering comprehension, translation practice (Hindi to English & vice-versa).



BCA-5201 Computer Architecture							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

**Course Objectives (COs):**The main objective of this course is to provide conceptual as well as practical knowledge about computer system architecture, instruction format and actual data processing inside CPU. After completing the course the student should be able to understand all the components of computer system, as well as the organization of these components inside computer system, various data processing mechanisms used inside CPU.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Basic Computer Organization and Design:</b> Instruction Code, Operation Code, Stored Program Concept, Registers and memory of Basic Computer, Common Bus System for Basic Computer, Instruction Format, Control Unit of Basic Computer, Control Timing Signals, Determining Type of Instruction. <b>Microprogrammed Control:</b> Control Word, Microprogram, Control Memory, Control Address Register, Sequencer, Address Sequencing, Conditional Branch, Mapping of Instructions	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Central Processing Unit:</b> Major Components of CPU, CPU Organization, Instruction Formats, Addressing Modes, Data Transfer and manipulation, Program Control, Subroutine Call and Return, Types of Interrupt, RISC vs CISC, Pros and Cons of RISC and CISC.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Pipelining :</b> Concept and Demonstration with Example, Speedup Equation, Floating Point addition and Subtraction with Pipelining, Instruction Level Pipelining: Instruction Cycle, Three & Four- Segment Instruction Pipeline, Pipeline Conflicts and Solutions. <b>Input-Output Interface:</b> I/O Bus and Interface Modules, I/O vs. Memory Bus, Isolated vs. Memory-Mapped I/O.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Memory Organization:</b> Memory Hierarchy, Main Memory, RAM and ROM Chips, Memory address Map, Auxiliary Memory. <b>Associative Memory:</b> Hardware Organization, Match Logic, Read Operation, Write Operation. <b>Cache Memory:</b> Locality of Reference, Hit & Miss Ratio, Mapping.	

#### Course Learning Outcomes (CLOs)

- The students will be able to learn about digital marketing including topics like SEO, Social media marketing etc.

#### Suggested Readings

- M. Morris Mano, "Computer System Architecture", Prentice-Hall of India, Pvt. Ltd. Further References.

#### Further References

- William Stallings, "Computer Organization and Architecture", Prentice-Hall of India.
- Vincent P. Heuring and Harry F. Jordan, "Computer System Design and Architecture", Prentice-Hall of India, Pvt. Ltd.

  
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BCA-5202 Database Management System							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide conceptual as well as practical knowledge of Database, various methodologies and applications software used for data base management. After completing the course the student should be competent in data base handling, able to design and manage database for real life problems and the student should be proficient in query handling.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction To Database System :</b> Data - Database Applications - Evolution of DB & DBMS - Need for data management, Introduction and applications of DBMS, File systems versus Database systems, Data Models, DBMS Architecture, Data Independence, Data Modeling using Entity- Relationship Model, Enhanced ER Modeling.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Relational Database Concept:</b> Introduction to relational database, Structure of Relational Database, Relational model terminology domains, Attributes, Tuples, Relations, relational DB schema. <b>Relational algebra:</b> Basic operations selection and projection, Set Theoretic operations Union, Intersection, set difference and division. <b>Types of Database languages:</b> DDL, DML, DCL, TCL, Oracle: Oracle product details, Structured query language (SQL), Using Oracle.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Relational Database design:</b> Functional Dependency, definition, trivial and nontrivial FD. <b>Normalization:</b> 1NF, 2NF, 3NF, Decomposition using FD dependency preservation, BCNF, Multi valued dependency, 4NF, Join dependency and 5NF.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Concurrency Control:</b> Definition of concurrency, lost update, dirty read and incorrect summary problems due to concurrency. <b>Concurrency Control Techniques:</b> Overview of Locking, 2PL, Timestamp ordering, Recovery concepts, Shadow paging, system failure, Backup and Recovery Techniques.	

#### Course Learning Outcomes (CLOs)

- The students will be able to understand the core terms, concepts, and tools of relational database management systems.

#### Suggested Readings

- Desai, B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
- Elimsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.

#### Further References

- Date C.J., "An Introduction to Database Systems", Narosa Publishing House, New Delhi.
- Ullman, J.D, "Principals of Database Systems", Galgotia Publications, New Delhi.

BCA-5203 Programming in C							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

### Course Objectives (COs)

The main objective of this course is to provide Understanding of C programming language and trace the execution of programs written in C language. Writing the C code for a given problem and Performing input / output operations using programs in C.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction to C Programming:</b> Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. <b>C Programming Basic Concepts:</b> C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants. <b>Input and output with C:</b> Formatted I/O functions and Unformatted I/O functions .	
<b>Unit II</b>	<b>15 Lectures</b>
<b>C Operators &amp; Expressions:</b> Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity Evaluation of arithmetic expressions; Type conversion. <b>Control Structures:</b> Decision making Statements - Simple if, if_else nested if_else, else_if ladder Switch Case, goto, break & continue statements; Looping 12 19 Statements - Entry controlled and exit controlled statements, while, do-while, for loops, Nested loops.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Derived data types in C:</b> Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation Strings: Declaring & Initializing string variables.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Pointers in C:</b> Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers. <b>User defined data types</b> Structures and Unions.	

### Course Learning Outcomes (CLOs)

- The students will be able to analyze problems efficiently and develop comprehensive logic to solve it.
- To develop good algorithms and flowcharts to solve problems.

### Suggested Readings

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

### Further References

- P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB).
- E. Balaguruswamy: Programming in ANSI C (TMH).
- Kamthane: Programming with ANSI and TURBO C (Pearson Education).

  
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BCA-5204 Fundamentals of Accounting							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The basic objective of the course is to equip the students with the understanding of accounting rules and double entry system. The course is designed so that the students can understand the scientific and preparation of transaction with relevant interpretation. The course also provides students with knowledge on preparation of cash, flow statements and company accounts.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction to Accounting:</b> Understanding the meaning, nature, functions and usefulness of accounting, branches of accounting, accounting equation, accounting concepts and Generally Accepted Accounting Principles. An overview of Indian and US GAAP. Introduction to IFRS.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Recording of Transactions:</b> Concept of double entry. Understanding the Accounting cycle. Preparation of voucher, journal, ledger and trial balance and numerical on the same. Subsidiary Books Preparation of subsidiary books including purchase book, sales book, purchase returns book and sales return books and numerical on the same. Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, double column cashbook, triple column cashbook and petty cash book.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Financial Statements:</b> Preparation of trading account, manufacturing account, profit and loss account and balance sheet along with adjustments and numerical on the same.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Company Accounts:</b> Introduction to shares, characteristics and types of shares no numerical on the same. Accounting for debentures: Classification of Debentures. Differentiate Debentures from shares. Numerical on issue of debentures for cash and for consideration other than cash.	

#### Course Learning Outcomes (CLOs)

- The students will be able to acquire conceptual knowledge of basics of accounting.
- Identify events that need to be recorded in the accounting records.

#### Suggested Readings

- J.R. Monga, Financial Accounting.
- Jain & Narang, Advanced Accountancy.

#### Further References

- R.L Gupta & M. Radhaswamy, Advanced Accountancy.
- Sultan Chand & Sons S.N. Maheshwari, Advanced Accountancy.

BCA-5205 Digital Empowerment							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

This course is designed to understand the digital world and need for digital empowerment. It provides awareness about Digital India. It explores, communicate, and collaborate in cyberspace and imparting awareness on cyber safety and security.

<b>Unit I</b>	<b>08 Lectures</b>
<b>Digital inclusion and Digital Empowerment:</b> Needs and challenges, Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services), e-Health Campaigns, Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, Education.	
<b>Unit II</b>	<b>08 Lectures</b>
<b>Communication and Collaboration in the Cyberspace:</b> Electronic Communication, electronic mail, blogs, social media, Collaborative Digital platforms, Tools/platforms for online learning, Collaboration using file sharing, messaging, video conferencing.	
<b>Unit III</b>	<b>08 Lectures</b>
<b>Towards Safe and Secure Cyberspace:</b> Online security and privacy, Threats in the digital world: Data breach and Cyber Attacks, Blockchain Technology, Security Initiatives by the Govt of India.	
<b>Unit IV</b>	<b>08 Lectures</b>
<b>Ethical Issues in Digital World:</b> Netiquettes, Ethics in digital communication, Ethics in Cyberspace.	

#### Course Learning Outcomes (CLOs)

- The students will be able to use ICT and digital services in daily life.
- Develop skills to communicate and collaborate in cyberspace using social platforms, teaching/learning tools.

#### Suggested Readings

- K. S. Vijaya Sekhar, G. P. Sahu, Prabhu Gollamudi, Digital Empowerment A Cornerstone For eGovernance, BS Publication.
- Arpan Kumar Kar, Shuchi Sinha, M. P. Gupta, Digital India: Reflections and Practice, Springer Publication.

#### Further References

- Dr. S. Saileela and Dr. S. Kalaivani, Education on Digital Cultural and Social Media.

  
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BCA-5206 Advance Spreadsheet Tools							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

This course is designed to develop students IT skills that are a pre-requisite today's work environment. The Objective of this course is to Make meaningful representations of data in the form of charts and pivot tables. It provides understanding Draw analysis on data using spreadsheets and use interpretation to make decisions and manage data for generating queries, forms and reports in a database.

<b>Unit I</b>	<b>08 Lectures</b>
<b>Spreadsheet Calculations:</b> Introduction to the range, absolute and relative references, formulas and functions, calculation across sheets. <b>Data Analysis:</b> find and replace functions, text functions, filtering, sorting conditional formatting. <b>Spreadsheet Printing:</b> introduction, print preview and adjustments, orientation, margins and scale, headers and footers	
<b>Unit II</b>	<b>08 Lectures</b>
<b>Charts and Graphs:</b> basic chart types, move and resize charts, change chart styles and types, Modification chart elements. <b>Elementary Modelling:</b> IF statement analysis, nested if, COUNTIF and COUNTIFS, SUMIF and SUMIFS, AVERAGEIF and AVERAGEIFS. <b>Lookup Functions:</b> Vlookup, Hlookup, Index and match function.	
<b>Unit III</b>	<b>08 Lectures</b>
<b>Pivot Table and its Applications:</b> introduction to pivot table, filter data using slicers in multiple pivot table, visualize aggregate data using pivot table. <b>VBA Macros programming:</b> create and record a macro in a spreadsheet, MsgBox, declaring variables, writing a subroutine and function in VBA. IF Then statement, Case statement, For loop, While loop and Do until, worksheet and range object.	
<b>Unit IV</b>	<b>08 Lectures</b>
<b>Sensitivity Analysis:</b> goal seek, data table, scenario Analysis. Simulation and Optimization: Monte Carlo simulations, introduction to solver, linear programming for optimization, Intrinsic value calculation models.	

#### Course Learning Outcomes (CLOs)

- The students will be able to make meaningful representations of data in the form of charts and pivot tables.
- Draw analysis on data using spreadsheets and use interpretation to make decisions.
- Generate word documents with appropriate formatting, layout, proofing.
- Manage data for generating queries, forms, and reports in a database.

#### Suggested Readings

- Microsoft Excel 2016 Data Analysis and Business Modeling Wayne L. Winston, PHI.
- Microsoft Excel 2016 Bible, John Walkenbach, Wiley.

#### Further References

- Microsoft Office 2013 Digital Classroom by Walter Holland and the AGI Creative Team, Wiley.
- Access 2010 Bible, Michael R. Groh, Wiley India Edition.

UHV-111 Universal Human Values and Awareness about Himachal-Pradesh							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
3	0	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is, to aware the students about human values and professional ethics and also aware them about their various social and professional responsibilities. After completing the course the student should be aware about their social and professional responsibilities towards, self, society and nature.

<b>Unit I</b>	<b>09 Lectures</b>
<b>Introduction to Value Education:</b> Difference between moral and human values. Five core human values: Truth, Righteous conduct, Peace, Love and Non-violence. Classification of moral values, Value crisis in contemporary Indian society at different levels: Individual, family, Society, and culture. Values in Indian constitution: Justice, liberty, equality and fraternity, Fundamental Rights under Indian constitution: Fundamental duties of Indian citizens.	
<b>Unit II</b>	<b>09 Lectures</b>
<b>Harmony with the self, family &amp; society:</b> Understanding Human being as the Coexistence of the Self and the Body, Program to ensure the health of the body Distinguishing between the Needs of the Self and the Body, living in harmony with the self, family & society, steps to achieve self-discipline. Noble Eightfold Path: Right Understanding, Thought, Speech, Action, Livelihood, Effort, Mindfulness, and Concentration.	
<b>Unit III</b>	<b>09 Lectures</b>
<b>Understanding Mental health &amp; emotional well-being:</b> Characteristics of a mentally healthy person, causes of mental-health issues in contemporary society, possible solutions to improve mental health. Emotional intelligence: elements of emotional intelligence, Advantages of higher emotional intelligence & improving emotional intelligence, Maslow's hierarchy of needs & self-actualization.	
<b>Unit IV</b>	<b>09 Lectures</b>
<b>Awareness about Himachal Pradesh:</b> General knowledge including the knowledge of different places of historic, national and cultural importance & tourist attraction, hydro power projects, industries, highways, educational and other institutions of the state, knowledge about the famous personalities from the state, current affairs of Himachal Pradesh, history of Himachal- from medieval to present time, Geography including the weather, borders, rivers, mountain-ranges, passes, peaks, knowledge of customs and culture of HP: including the costumes, customs, fairs and festivals etc.	

#### Course Learning Outcomes (CLOs)

- Understand the significance of value inputs in a classroom and start applying them in their life and profession.
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual etc..

#### Suggested Readings

- The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

#### Further References

- M. Govindarajan, S. Senthikumar, M.S. Natarajany, "Professional Ethics and Human Values", PHI.



BCA-5207P Lab -IV: DBMS Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-5202.

**Total Lab Hours: 40(Max)**

**Suggested List of Practical Topics:**

1. Data Definition Language

(a). Create (b). Alter (c). Drop

2. Data Manipulation Language

(a). Insert (b). Select (c). Delete (d). Update

3. Clauses

(a). Where (b). Having (c). Order By (d). Group By (e). Exists (f). In (g). Not in (h). Any

4. Arithmetic and Aggregate Operators

5. Sub queries

6. Data Control Language

7. Transaction Control Language

8. Views & Triggers



BCA-5208P Lab -IV: Programming in C Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-5203.

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

1. Data Types, Input/output Functions
2. Formatted input/ Output function
3. Unformatted Input/Output functions
4. C Operators
5. C Expressions
6. Control structures
7. Arrays
8. Strings
9. Pointers
10. Structure and Union

  
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HS-122P Holistic Health and Yoga							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):**

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

1. Introduction of Yoga, Different Definitions of Yoga. General Guidelines for Yogic Practices
2. Traditional Schools of Yoga: Bhakti yoga, karma yoga, Gyana yoga, Hatha yoga, Mantra yoga, Laya yoga, Raja yoga) Ashtanga Yoga of Sage Patanjali.
3. Concept of Shatkriyas: Dhauti, Basti, Neti, Nauli, Trataka and Kapalbhathi. Shatkriyas (Cleansing Process): Jala neti, Sutra neti. Kunjala, Vastra Dhauti, Danda Dhauti, kapalbhathi, Surya namaskar.
4. Concept of Surya namaskar: Introduction, Technique, benefit, precaution.
5. Concept of Asanas Introduction, Types, Technique, benefit, precaution, Asanas: Standing Poses: Tadasana, Kati chakrasana, tiryak tadasana, vrikshasana, veer bhadrasana, garudasana, trikonsana, Sitting Poses: Padmasana, Swastikasana, Vajrasana, Bhadrasana, Gomukhasana, Mandukasana, Singhasana.
6. Concept of Pranayama: Introduction, Types, Technique, benefit, precaution.
7. Meditation: Concept, technique, benefit, and precaution. Dhyana: Shoola Dhyana, Jyoti Dhyana, Sukshama Dhyana, (According to Gheranda Samhita). Mantra Chanting- Omkar (Pranav Jaap), Gayatri Mantra, Maha Mrityunjaya Mantra, Shanti Mantr.
8. Lying Down Poses: Spine Position: uttanpadasana, Pawan muktasana, Naukasana, markatasana, halasana, sarvangasana, matsyasana, setubandhasana, chakrasana and shavasana. Prone Position: Bhujangasana, Shalabhasana, Dhanurasana, Vipreet naukasana.

**Suggested Readings**

- BKS Iyengar (2012), Light on Yoga
- Basvaraddi & S.P.Pathak (2016), Yogic Suksham Vyayam Evem Sthula
- Vyayam Swami Satyananda Saraswati (2012), Asana Pranayama Mudra
- Modern Trends and Physical Education by Prof. Ajmer Singh.

BCA-5209 Training/Internship Report and Viva							
Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	2 Months	6	40	60	100	3 Hours

**Instructions:** For External Examiner: 60% marks (60 marks) will be awarded based on practical implementation and Internship Report in final practical examination and remaining 40% marks (40 marks) will be awarded based on viva-voce and written script.

BCA-5210 MOOC/NPTEL/Swayam Certification/Online Certification							
Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	2 Months	4	40	60	100	3 Hours

**Instructions:** For External Examiner: 60% marks (60 marks) will be awarded based on practical implementation and Internship Report in final practical examination and remaining 40% marks (40 marks) will be awarded based on viva-voce and written script.



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BCA-5210(A) Basic of IT							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to introduce the components of computers. To introduce basic concepts of software. To introduce the general structure of the CPU. To introduce the elementary concepts of word processing, Excel and Power Point Presentation.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction to Computer:</b> Computer Characteristics, Concept of Hardware, Software, Evolution of computer and Generations, Type of Computer – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer, Limitations of Computer Application of Computer in Various Fields. <b>Structure and Working of Computer:</b> Functional Block Diagram of Computer. CPU, ALU, Memory Unit, Bus Structure of Digital Computer – Address, Data and Control Bus.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Input/Output Devices:</b> Input Device – Keyboard, Mouse, Scanner, MICR, OMR. Output Devices – VDU, Printers – Dot Matrix, Daisy-wheel, Inkjet, Laser, Line Printers and Plotters. <b>Computer Memory:</b> Memory Concept, Memory Cell, Memory Organization, Semiconductor Memory – RAM, ROM, PROM, EPROM, Secondary Storage Devices – Magnetic Tape, Magnetic Disk (Floppy Disk and Hard Disk.), Compact Disk.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Computer Language and Software:</b> Algorithm, Flowcharts, Machine Language, Assembly Language, High Level Language Assembler, Compiler, Interpreter. Characteristics of Good Language. Software- System and Application Software. <b>Operating System</b> Operating System, Evolution of Operating System. Functions of Operating System. Types of Operating Systems. Detailed Study of Windows Operating System. Introduction and Features of LINUX OS.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Networking:</b> Concept, Basic Elements of a Communication System, Data Transmission Media, Topologies, LAN, MAN, WAN Internet <b>MS Office:</b> Introduction to MS Office, Components and Features. <b>MS Word:</b> Creating Letter, Table, Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, Auto Text, Inserting Picture, Word Art. <b>MS Excel</b> Introduction to Excel, Sorting, Queries, Graphs, Scientific Functions. <b>PowerPoint:</b> Introduction to PowerPoint, Creation of Slides Inserting Pictures, Preparing Slide Show with Animation. <b>MS Access:</b> Creation and Manipulation of Files.	

#### Course Learning Outcomes (CLOs)

- The students will be able to learn about the fundamentals of computers. Explain the working of the CPU and other components of the motherboard.

#### Suggested Readings

- Computer fundamentals by P. K. Sinha, BPB Publication.
- MS –Office, Dr. S. S. Srivastava, Published by Laxmi Publication.

#### Further References

- Computer fundamentals and Programming in C, Reema Thareja, OXFORD University Press.
- Office 2019: In Easy Step, Michal Price, BPB Publication.

BCA-5210(B) Essential of Python							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide conceptual as well as practical knowledge of Python. After completing the course, the student can develop web solution software for real life problems.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Python Concepts:</b> Origin, Comparisons, Comments, Variables and Assignment. Identifier, Operators, Built-in- functions, Number and Strings. Sequence: Strings, String –operator and functions, Special features of strings, Memory management, Program and examples. <b>Conditional and Loops:</b> If Statement, else Statement, else –if Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Object and Classes:</b> Classes in Python, Principles of object orientation, Creating classes, Instance Methods, Class Variables, Inheritance, Polymorphism, Type identification, Python Libraries.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Lists and Sets:</b> Built-in-functions, list type built-in-methods, Tuples, Tuple operators, special features of Tuples. <b>Set:</b> Introduction, accessing, built-in-methods (add,update,clear,copy,discard,remove), Operations( Union,Intersection,Difference). <b>Dictionaries:</b> Introduction, built-in functions, built-in methods, Dictionary keys,sorting and looping, nested dictionaries.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Files:</b> Fileobjects, File built-in function, File built-in methods, File built-in attributes. Standard files, command line arguments, file system, file execution, persistent storage module. <b>Exceptions:</b> Exceptions in python, detecting & handling, Exception as a string, raising an Exceptions, assertions, standard Exceptions. <b>Database Interaction:</b> SQL database connection using python, creating & searching tables, reading & sorting Config. information on database. Programming using database connection.	

#### Course Learning Outcomes (CLOs)

- The students will be able to create your first program in Python IDLE
- Implement OOPs concepts in your programming.
- Use Arrays, and Data structures. Create an application with the support of graphics in Python.

#### Suggested Readings

- James Payne, “Beginning Python Using python 2.6 and Python 3.1 “, Wiley Publication
- “Learning Python”, 5th edition, O’Reilly Publication.

#### Further References

- Paul Berry,2011, “Headfirst Python”. O’REILLY Media, Inc
- Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with Python”.

  
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BCA-5210(C) PC Hardware & Networking							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to understand about introduction of computer and Basic Networking concepts. Introduction to various networking devices. Network basic and configuration. Introduction to servers and network security.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction about Computer.</b> Basics of computer. Organization of computer. Software and hardware. Input/output devices. <b>Basic networking concepts</b> Network topologies: LAN, WAN, MAN, PAN, CAN. Networking Model. The OSI model, TCP/IP Model, Network adapters. <b>Introducing protocols.</b> Cabling and troubleshooting.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Introduction to various networking devices:</b> Routers, Switches, Modems, Hubs etc. Wired and Wireless technology. Inside the PC: Opening the PC and identification. Study of different blocks, Assembling and disassembling.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Network basic and configuration:</b> Setting IP addresses, Sharing files and folders. Network troubleshooting. PING test, ipconfig. <b>Introduction to servers and network security,</b> Types of servers: Files servers, Email Servers, Proxy servers.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Basics of Internet and Intranet:</b> Types of Internet connections, Dialup, Broadband, Leased Line, Wi-Fi, Wi-Max, 2G, 3G, 4G, WWW, E-mails, Search Engines, Social Networking. Cloud application. Audio-video Conferencing. Voice over Internet Protocol (VOIP). Recovery and backup. Essential security measures.	

#### Course Learning Outcomes (CLOs)

- The student will be able to know the Basic of Computer assembling and trouble shooting.
- Have brief knowledge of Computer networking and trouble shooting.

#### Suggested Readings

- Windows XP Complete Reference. BPB Publications.
- MS Office XP Complete BPB Publication.
- MS Windows XP Home Edition Complete, BPB publication.

#### Further References

- I.T .Tools and Applications, by A. Mansoor, Pragya Publications, Matura.

Model Question Papers

[Total No. of Questions = 9]

[ Total No. Pages =1]

BCA 2nd Semester Examination

Computer Architecture

BCA- 5201

Time: 3 Hours

Max.Marks:60

*The candidates shall limit their answer precisely within the answer book (40 pages) issued to them and no supplementary/ continuation sheet will be issued.*

Note: Attempt 5 questions in all. Question no.9 in section E is compulsory. Rest attempt one each from section A, B, C and D.

SECTION-A

- Q1. (a) Why NAND and NOR gates are called universal gates?  
(b) Distinguish between 1's and 2's complements. (5x2=10)

or

- Q2. (a) What is multiplexer? Explain 4-to-1 multiplexer.  
(b) What is Error-Detecting codes? (5x2=10)

SECTION-B

- Q3. Write short note on:  
(a) Memory Reference Instructions.  
(b) Instruction Cycle. (5x2=10)

or

- Q4. (a) What is a bus? Explain various types of buses.  
(b) Differentiate between hardwired control and microprogrammed control. (5x2=10)

SECTION-C

- Q5. What is Instruction Pipeline? Explain in detail. (10)

or

- Q6. Explain the following:  
a) Addressing modes.  
b) Parallel Processing (5x2=10)

SECTION-D

- Q7. (a) What is handshaking mode of data transfer?  
(b) What is Associative Memory? Explain in detail. (5x2=10)

or

- Q8. (a) Differentiate between Cache Memory and Virtual Memory.  
(b) What is DMA? (5x2=10)

**SECTION-E**

**Q9. Explain the following:**

- (a) What do you mean by flip-flop?
- (b) Define the truth table.
- (c) Assembler
- (d) CISC
- (e) Associative mapping
- (f) Priority interrupt
- (g) Memory Bus
- (h) Cache Memory
- (i) Locality of Reference
- (j) Hit and Miss Ratio

**(10x2=20)**



BCA-6301 Operating System							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to understand the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security. The goal of the programming assignments is to give students some exposure to operating system.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction:</b> Application programs and system programs; functions of an operating system; classification of operating systems-Multi-user, multiprogramming, multiprocessing, time sharing, multi-threaded. <b>Processes and Threads:</b> Program vs. Process; Process context, address space, identification, transition, state and management. Thread management-benefits, applications of threads.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>CPU Management:</b> Objectives, Pre-emptive vs. Non-pre-emptive, context switching, scheduling schemes; multi-processor scheduling, thread scheduling. <b>Inter-process Communications:</b> Introduction, message passing model, shared memory model. .	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Memory Management:</b> Introduction, Static and Dynamic Memory, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; <b>Virtual memory:</b> basic concepts of demand paging, performance, page replacement. Thrashing.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>File Management:</b> Basic concepts file operations, access methods, directory structures and management, remote file systems; file protection. <b>Protection and Security:</b> Need, environments: software, hardware, unauthorized use, denial of services, access control and authentication.	

#### Course Learning Outcomes (CLOs)

- The student will be able to understand Operating System concepts ,Process Management,Conditions for deadlock, recovery of deadlock and deadlock avoidance I/O scheduling, Device Controller, DMA File allocation and Free Space Management

#### Suggested Readings

- Stallings W., "Operating systems" 2/e, Prentice Hall, 1995.
- Silberschatz A., Galvin P.B, "Operating System Concepts" 5/e, Addison-Wesley Publishing Company, 1998.
- Deitel H.M., "Operating System" 2/e Addison-Wesley Publishing Company 1990

#### Further References

- Tanenbaum A.S., "Modern Operating Systems", 2/e, Prentice Hall of India, New Delhi, 2002.
- Chandra P., Bhatt P., "An Introduction to Operating Systems Concept", Prentice Hall of India,2006.

  
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BCA-6302 Data Structure							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions and to efficiently implement the different data structures and solutions for specific problems.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction:</b> Basic Terminology, Elementary Data Organization, Structure Operations, Algorithm, Complexity and Time-Space trade-off. <b>Arrays:</b> Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address Calculation, Application of Arrays	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Stacks:</b> Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. <b>Queues:</b> Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. <b>Linked list:</b> Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly Linked List, Linked List in Array.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Trees:</b> Basic terminology, Binary Trees, Binary tree representation, Array and Linked Representation of Binary trees, Types of Binary Tree, Traversing Binary trees, Binary Search Tree (BST), Insertion and Deletion in BST, AVL Trees, Huffman algorithm. <b>Graphs:</b> Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Searching and Hashing:</b> Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies. <b>Sorting:</b> Insertion Sort, Bubble Sorting, Selection Sort, Quick Sort, Merge Sort, Heap Sort,	

#### Course Learning Outcomes (CLOs)

- The student will be able to understand efficient data structures and apply them to solve problems.

#### Suggested Readings

- Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., Introduction to Algorithms, MIT Press, 2010.
- Goodrich, M.T., Tamassia, R. and Mount, D.M., Data Structures and Algorithms in C++, John Wiley & Sons, 2016.

#### Further References

- Lipschutz, S., Schaum's Outline of Theory and Problems of Data Structures, McGraw-Hill, 2014
- Thareja, R., Data Structures using C, Oxford University Press, 2014

BCA-6303 Python Programming							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will covered the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide conceptual as well as practical knowledge of Python. After completing the course the student can develop web solution software for real life problems.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction To Python:</b> Installation and Working with Python, Basics, Operators, Data Types , Python String, List And Dictionary Manipulations, Conditional and looping.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Python Object Oriented Programming:</b> class, object and instances Constructor, class attributes and destructors , Real time use of class in live projects ,Inheritance , overlapping and overloading operators, Multithreading Python File Operation : Reading config files in python ,Writing log files in python ,Understanding read functions, read(), readline() and readlines(),Understanding write functions, write() and writelines() ,Manipulating file pointer using seek ,Programming using file operations.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Python Exception Handling:</b> Avoiding code break using exception handling Safe guarding file operation using exception handling, Handling and helping developer with error code ,Programming using Exception handling, GUI Programming: Creating GUI component, Python Database Interaction SQL Database connection using python Creating and searching tables ,Reading and storing config information on database ,Programming using database connections .	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Web Programming,</b> Contacting User through Emails Using Python Installing smtp python module, Sending email, Reading from file and sending emails to all users addressing them directly for marketing. <b>Python Libraries:</b> Introduction to Scipy, Numpy and Matplotlib Libraries.	

#### Course Learning Outcomes (CLOs)

- The student will be able to Create program in Python IDLE and Implement OOPs concepts inprogramming

#### Suggested Readings

- James Payne, “Beginning Python Using python 2.6 and Python 3.1 “, Wiley Publication
- “Learning Python”, 5th edition, O'reilly Publication.

#### Further References

- Paul Berry,2011,“Head First Python”. O'REILLY Media, Inc.
- Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving With Python”.

  
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BCA-6304 Mathematics-I							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The objective of this course is to introduce the students to the fundamental concepts and topics of set theory, Rectangular and Co-ordinates and functions, whose knowledge is important in other computer science courses

<b>Unit I</b>	<b>15 Lectures</b>
<b>Set Theory:</b> Sets, Description of a Set, Types of Sets, Subsets, Power Set, Venn Diagrams, Operation on Sets (Union, Intersection and Difference), Laws of Set Theory, Cartesian product of sets, Relations, Functions, Some functions and their graphs (Identity, Polynomial, Modulus function and greatest integer function). One-One and onto functions.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Introduction to logic,</b> Propositions and compound propositions: Basic logical operations (Conjunction, Disjunction, Negation), Propositions and truth tables, Tautologies and contradiction, Logical equivalence, Conditional and biconditional statements.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Recursion :</b> Introduction to Recursion, Recurrence Relation, Solving Recurrence Relation, Linear Homogenous Recurrence Relation with constant coefficient and their solution. Graph: Introduction and Basic terminology, Graphs, Multigraphs, Degree of a vertex, Handshaking theorem, Sub graphs, Homeomorphic and Isomorphic graphs.	
<b>Unit IV</b>	<b>15 Lectures</b>
Eulerian Graphs, Hamiltonian Graphs, Euler theorem, Planar Graphs, Maps, Regions, Euler Formula, Non-planar graphs, Kuratowski's Theorem (without proof). Graph coloring, Chromatic Number of a Graph, Introduction to Tree, Rooted Tree, Binary Tree	

#### Course Learning Outcomes (CLOs)

Students will be able to perform operations on matrices and sparse matrices and compute the Trigonometric Functions and values of Limits and Continuity, Derivative of Functions.

#### Suggested Readings

- Systematic Modern Mathematics- L.R. Dhanda, G.K. Saini and Suranjan Saha, Kalyani Publishers.
- Introduction to Analytic Number Theory-Tom M. Apostol, Narosa Publishing House, New Delhi
- Elements of Number Theory-John Stillwell, Springer Publisher

#### Further References

- Number Theory -Shailesh A. Shirali and C.S. Yogananda, Universities Press

BCA-6305 Graphics Design & Animation							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

### Course Objectives (COs)

The objective of this course is to introduce the students to the fundamental concepts and topics of graphic design and Animation, whose knowledge is important in other computer science courses

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction to basic elements of graphic design:</b> Line, Space, Colour, Forms, Type: typeface, typeface family etc.-Typeface as a graphical element- selection of a type family in design Basic principles of design: balance, proportion, rhythm, emphasis, unity etc. Laws of perception -Gestalt theory: similarity, proximity, continuity, closure etc. Scale and proportion in design-Mathematical ratios and proportional systems: Fibonacci numbers, TheGoldenRatio.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Concepts of visual design:</b> Design methodology, problem-solving -Visual structure and visual Interest, visual analysis and refinement of visual representations. <b>Exercise based on nature study:</b> Patterns, colour schemes, shapes etc. from nature	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Introduction to Different Drawing Materials and Tools</b> - Dry Media (Pencils, Charcoals, Chalks, Crayons, Pastels, Erasers, Smudging Tools) - Wet Media (Dip Pens, Disposable and Cartridge Pens – Brushes) – Inks (Water Based, Alcohol Based, Indian/Chinese Ink) – Paints (Water Based, Acrylic, Oil) - Drawing Surfaces – (Papers – Newsprint, Watercolor Paper, Charcoal Paper, Canvas) - Tools for Erasing and Sharpening – Palettes – Knives - E .	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Drawing from Observation</b> –Still-life Drawing – Use of Basic Shapes and Forms – Sketching Poses –Study of Live Models - Rapid Sketching from Live Models - Attitude - Gestures - Line Drawing - Quick Sketches - Thumbnails - Stick Figures - Line of Action – Balance – Rhythm – Positive and Negative Spaces - Silhouettes - Caricaturing Fundamentals – Exaggeration	

### Course Learning Outcomes (CLOs)

- The students will be able to learn basic about graphic and visual design and its tools .

### Suggested Readings

- The Elements of Graphic Design: Space, Unity, Page Architecture, and Type: Alexander W. White.
- Exploring the Elements of Design : Mark A. Thomas, Poppy Evans

### Further References

- Exploring the Elements of Design : Mark A. Thomas, Poppy Evans
- The Art of Pictorial Composition : Wolehonok

  
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IKS-311 Indian Knowledge System							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

To equip the students with the knowledge and understanding related to Indian knowledge systems, origin, evolution and the approaches used in ancient and modern times

<b>Unit I</b>	<b>08 Lectures</b>
<b>Bhāratīya Civilization and Development of Knowledge System</b> :Genesis of the Bharatbhumi and Civilization ,Discovery of the Saraswatī River, The Saraswatī-Sindhu civilization, Traditional knowledge system, The ancient education system, Brief introduction of the Takṣaśilā University, The Nālandā University, Knowledge export from Bharata	
<b>Unit II</b>	<b>08 Lectures</b>
<b>Art, Literature and Scholars</b> :Natraja- A masterpiece of Bhartiya Art, Introduction to Vedas and Vedic Literature, Life and works of Agastya, Vālmiki, Patañjali, Vedvyāsa, Loapmudra, Maitreyi, Gārgī, Caraka, Suśruta, Kaṇāda, Kauṭilya, Pāṇini, Āryabhaṭa, Varahmihira, Bhāskarācārya.	
<b>Unit III</b>	<b>08 Lectures</b>
<b>Engineering Science and Technology</b> : Engineering, science and technology in the Vedic Age, Post-Vedic period, History of Mathematics in Bharata, Concepts of Zero, History and Culture of Astronomy in India, Kerala School of Astronomy and Mathematics.	
<b>Unit IV</b>	<b>08 Lectures</b>
<b>Cultural Heritage and Indian Traditional Practices</b> : Temple architecture in ancient India, Fairs and festivals, Yoga, Āyurveda, Integrated approach to healthcare, Agriculture in Ancient India, Approaches and strategies to the protection and conservation of environment.	

#### Course Learning Outcomes (CLOs)

- The students will be able to understand and appreciate the rich heritage that resides in our traditions.

#### Suggested Readings

- Bhag Chand Chauhan, IKS: The Knowledge of Bharata, Garuda Prakashan, 2023.
- Pradeep Kohle et. Al. Pride of India- A Glimpse of India's Scientific Heritage edited by Sanskrit Bharati, 2006.

#### Further References

- Suresh Soni, India's Glorious Scientific Tradition, Ocean Books Pvt. Ltd., 2010.

BCA-6306P Lab -VII: Data Structure Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-6302.

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

1. Array
2. Stack
3. Link Lists (linear, circular, doubly linked, inverted)
4. Queues (Simple, Circular Queue, Priority Queue)
5. Different Trees, Binary Search Trees
6. Graph Implementation, Graph traversals
7. Different File Organization
8. Sorting and Searching

  
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<b>BCA-6307P Lab -VIII: Python Programming Lab</b>							
<b>Teaching Scheme</b>			<b>Credit</b>	<b>Marks Distribution</b>			<b>Duration of End Semester Examination</b>
<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Internal Assessment</b>	<b>End Semester Examination</b>	<b>Total</b>	
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>Maximum Marks: 40</b>	<b>Maximum Marks: 60</b>	<b>100</b>	<b>3 Hours</b>
				<b>Minimum Marks: 16</b>	<b>Minimum Marks: 24</b>	<b>40</b>	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-6303

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

1. Operators, Data Types, Python String, Conditional and looping
2. Object Oriented Programming
3. File Operation
4. Exception Handling
5. GUI Programming
6. Web Programming
7. Python Libraries
8. Python Database Interaction SQL Database

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BCA- 6401 Software Engineering							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

#### Course Objectives (COs)

The objective of this course is to get the basic knowledge and understanding of the analysis and design of complex systems. And ability to apply software engineering principles and techniques.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction:</b> Evolving Role of Software, Software Engineering, Changing nature of Software, Software Myths, Terminologies, Role of management in software development Software Process and desired Characteristics, Software Life Cycle Models: Build & Fix Model, Water Fall Model, Incremental Process Model, Evolutionary Process Models, Unified Process, Comparison of Models.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Agile Methodology:</b> Agile Modeling, Its use and advantages, Scrum, Advantages and disadvantages of agile Modeling. Software Architecture: It's Role, Views, Component & Connector View and its architecture style, Architecture Vs Design, Deployment View & Performance Analysis, Documentation, Evaluation. Software Project Planning: Size estimation, Cost Estimation, COCOMO, COCOMO – II, Software Risk Management.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Function Oriented Design:</b> Design principles, Module level Concepts, Notation & Specification, Structured Design Methodology, Verification. Object-Oriented Design: OO Analysis & Design, OO Concepts, Design Concepts, Noun Phrase Analysis, Sequence & Collaboration Diagram, CRC cards, UML – Class Diagram, Other diagrams & Capabilities	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Coding: Programming Principles &amp; Guidelines,</b> Coding Process, Refactoring, Verification. Software Metrics: What & Why, Token Count, Data Structure Metrics, Information Flow Metrics, Object-Oriented Metrics, Use Case Oriented Metrics, Web Engineering Project Metrics, Metric Analysis. Software Maintenance & Certification: Maintenance, Maintenance Process and Models, Estimation of Maintenance Costs, Regression Testing, Reverse Engineering, Software Re engineering.	

#### Course Learning Outcomes (CLOs)

- The students will be able to understand software lifecycle development models. Ability to understand and apply software testing techniques.

#### Suggested Readings

- Pankaj Jalote, —An Integrated Approach to Software Engineering, Narosa Publishing House.

#### Further References

- K.K. Aggrawal and Yogesh Singh, —Software Engineering, New Age International (P) Ltd.

  
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BCA- 6402 Web Technology (HTML, XHTML, CSS)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

To provide conceptual as well as practical knowledge of web-development Languages and web-designing tools.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction to Internet:</b> Client-Server Technology, World Wide Web, Webservers, Web Browsers, Web Hosting, Email. Internet Protocols: FTP, HTTP, HTTPS. HTML: Document Structure, html elements, tags and attributes Basic elements (html, head, title body, p, heading, marquee behavior) Basic text formatting, List (ordered and unordered), Hyper linking; handling images, audio and videos; table elements; Form elements.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Styling Pages (CSS):</b> Introduction to CSS; types of CSS (CSS-1, CSS-2, CSS3), applying CSS (inline, embedded, external). CSS Properties: Text properties, font-properties, border properties. Selectors, universal, element selector, class selector, ID Selector, decedent selector, pseudo selector	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Introduction to Java Script:</b> Basic functions (alert, confirm, prompt), adding javascript in page body. Document object model (DOM), Defining and calling functions: variables, operators, control structures. JavaScript Events, Predefined objects (String, date, math, array, window).	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Advance features:</b> Validating form using JavaScript, Enhancing form with javascript, Focusing on form element, Auto-tabbing between fields, disabling text input, Case Conversion.	

#### Course Learning Outcomes (CLOs)

- The students will be able to learn about basic HTML ,CSS and the behaviour of web pages.

#### Suggested Readings

- Robert Sebesta, "Programming with World Wide web" Pearson.
- John Duckett, "Beginning with HTML, XHTML, CSS and JavaScript" Wiley Wrox

#### Further References

- Deitel and Deitel, "XML How to Program", Pearson.
- Shroff, "Dreamweaver CS6 the Missing Manual", Publishers and Distributors

BCA- 6403 Java Programming							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will be covered the whole syllabus.

### Course Objectives (COs)

To provide conceptual as well as practical knowledge of Object-Oriented Programming approach along with Java programming language tools.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction:</b> Object Oriented Programming, History and Basics of Java, JDK, JRE, JVM, Java Data Types, Operator, basic of Java and its fundamentals, conditional & looping, working with arrays and strings, String, String Buffer, and String Builder classes. Introduction of Classes: Fundamental of Classes and Methods, Constructors, Overloading Methods.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Extending Classes and Inheritance:</b> Fundamental of Inheritance, Type of Inheritance, Interfaces, implementing multiple inheritance using interface, built in package, creating own package. Exception Handling: Exception Handling basics, try, catch and finally, throw and throws clause. Multithreading Programming: implementing multithreading, life cycle of a thread.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Working with Abstract Windows Toolkit:</b> Creating GUI in Java Using AWT, Working with Frame and Text, GUI Components, Menus and Layout Managers. Java Swings: Java Foundation Classes, Hierarchy of Java Swing classes, Swing components.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Event Handling:</b> Introduction, Event Classes, and Listener Interfaces. Accessing Databases with JDBC: Installing MySQL, Setting up a MySQL User Account, Manipulation Databases with JDBC.	

### Course Learning Outcomes (CLOs)

- The students will be able to learn about object-oriented programming language and database programming using java.
- To handle abnormal termination of program using exception handling.
- To design user interface using swing.
- To develop applications using multithreading

### Suggested Readings

- R. Nageswara Rao, "Core Java an integrated approach", Dreamtech Press.
- Paul Deitel, Harvey Deitel, "Java How to Program", PHI New Delhi.

### Further References

- The Complete Reference JAVA by Herbert Schildt, TMH Publication.
- Beginning JAVA, Ivor Horton, WROX Public.

  
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BCA- 6404 Mathematics-II							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

To acquaint students for the study of certain algorithms that uses numerical approximation for the problems of mathematical analysis. Also, the use of Computer Algebra Systems (CAS) by which the intractable problems can be solved both numerically and analytically.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Equation:</b> Order, degree, solution and formation of a differential equation. Standard techniques of solving linear differential equations with constant coefficients, Cauchy's and Legendres.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Complex numbers:</b> Introduction, Complex numbers and their representation in a plane. Argand diagram, algebra of complex numbers, modulus and arguments of a complex number, square root of a complex number and cube roots of unity, triangle inequality, De-Moivre's theorem, roots of complex numbers.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Primes:</b> Introduction, Primarily testing, Factorization, Chinese Remainder Theorem, Quadratic congruence, Exponentiation and Algorithm.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Numerical Differentiation, Integration and ODE Numerical differentiation:</b> First and second order derivatives; Numerical integration: Trapezoid rule, Simpson's rule; Extrapolation methods: Richardson extrapolation, Romberg integration; Ordinary differential equation: Euler's method, Modified Euler's methods (Heun and Mid-point).	

#### Course Learning Outcomes (CLOs)

- Students will be able to find the consequences of finite precision and the inherent limits of numerical methods. Appropriate numerical methods to solve algebraic and transcendental equations. How to solve first order initial value problems of ODE's numerically using Euler methods.

#### Suggested Readings

- Chapra, Steven C. (2018). Applied Numerical Methods with MATLAB for Engineers and Scientists (4th ed.). McGraw-Hill Education.
- Fausett, Laurene V. (2009). Applied Numerical Analysis Using MATLAB. Pearson. India.

#### Further References

- Jain, M. K., Iyengar, S. R. K., & Jain R. K. (2012). Numerical Methods for Scientific and Engineering Computation (6th ed.). New Age International Publishers. Delhi.

BCA- 6405 Environmental Sciences							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

- The objective of this course is to study the current environmental issues and associated problems.

<b>Unit I</b>	<b>15 Lectures</b>
<b>Introduction:</b> Multidisciplinary nature of environmental studies, Scope and importance, Concept of sustainability and sustainable development, Land resources: Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on the environment, forests, biodiversity and tribal populations.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Water:</b> Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water, Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs. <b>Ecosystem:</b> Structure and function of ecosystem, Energy flow in an ecosystem	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Levels of biological diversity:</b> Genetic, species and ecosystem diversity, Biogeographic zones of India, Biodiversity patterns and global biodiversity hot spots, India as a mega diversity nation, Endangered and endemic species in India. <b>Threats to biodiversity:</b> Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions,	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Environmental pollution:</b> Types, causes, effects and controls; Air pollution, Ill-effects of Fireworks. <b>Environmental pollution:</b> Types, causes, effects and controls: water, soil and noise pollution, Nuclear hazards and human health risks, Pollution case studies. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness	

#### Course Learning Outcomes (CLOs)

- The students will be able to illustrate the basic knowledge of the environment and its various components.
- Devise new approaches to reduce various types of environmental pollution.
- Identify the environmental policies and practices.

#### Suggested Readings

- Text Book of Environmental Studies By D. Dave And S. S. Katewa, Cengage Learning.

#### Further References

- Perspective in Environmental Studies By Anubha Kaushik, C P Kaushik, New Age International Publishers.

  
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BCA-6406 Ethics and Culture							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The Learning Objectives of this course are to help students explore ethical and cultural dimensions of their lives. It provides a forum for students to pause, revisit their assumptions and beliefs, and become mindful of their thoughts, emotions and actions. It gives the students an opportunity to express themselves and inquire into their decision making processes.

<b>Unit I</b>	<b>15 Lectures</b>
<b>The Basis of Ethics</b> • Getting to Know Each Other • What to Expect from the Course? • Recognition of Our Common Humanity • Empathy, Compassion and Justice	
<b>Unit II</b>	<b>15 Lectures</b>
<b>The Role of Intelligence</b> , Reason and Emotions • Discernment: What Is The Right Thing To Do? • The Art of Conflict Resolution • Destructive and Constructive Emotions • The Need for Emotional Balance	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Cultivating Inner Values-</b> Ethics in the World of Work and Play • Training the Mind: Mindfulness and Kindness • Meditation • Discovering your Vocation and Interests • Self-discipline, Integrity, Commitment, Creativity • Work-Life Balance	
<b>Unit IV</b>	<b>15 Lectures</b>
Striving for a Better World I Outreach Activities • Means and Ends • Debate and Dialogue • Culture as Shared Values • Creating and Sustaining Ethical Cultures: The Role of Philosophy, Religion, Literature, Theatre, Cinema, Music, Media • Outreach Activities	

#### Course Learning Outcomes (CLOs)

- The student will be able to explore perspectives on ethics in thoughts, words and actions. It evolves ethical decision making practices, understand the need for an ethical society and culture.

#### Suggested Readings

- Aristotle. Nichomachean Ethics. London: Penguin Classics, 2004
- Swami Vivekananda. The Complete Works of Swami Vivekananda. Advaita Ashrama, 2016

#### Further References

- Panch Parmeshwar in English translation as The Holy Panchayat by Munshi Premchand
- The Silas Marner by George Eliot

BCA-6407P Lab -VII: Java Programming Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-6403

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

**Topics:**

1. Operators, Control Structure and looping, Array and String
2. Classes and Methods, Constructors, Overloading Methods
3. Exception Handling
4. Extending Classes and Inheritance
5. Working with Abstract Windows Toolkit
6. Java Swings
7. Multimedia Applications
8. Event Handling
9. Event Classes and Listener Interfaces
10. Accessing Databases with JDBC



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BCA-6408P Lab -VIII: Web Technology Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	2	1	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Course Objectives(COs):** The main objective of this course is to cover practical implementation part of BCA-6402

**Total Lab Hours: 40 (Max)**

**Suggested List of Practical Topics:**

**Topics:**

1. Basic to design Form in HTML
2. Styling Pages using CSS
3. Design form in JavaScript
4. Validation using javascript
5. Event handling using javascript
6. Defining and calling functions
7. Predefined objects in javascript

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BCA-6409 Training/Internship Report and Viva							
Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P		Sessional	End Semester Exam	Total	
0	0	2 Months	6	40	60	100	3 Hours

**Instructions:** For External Examiner: 60% marks (60 marks) will be awarded based on practical implementation and Internship Report in final practical examination and remaining 40% marks (40 marks) will be awarded based on viva-voce and written script.

BCA-6410 MOOC/NPTEL/Swayam Certification/Online Certification							
Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P		Sessional	End Semester Exam	Total	
0	0	2 Months	4	40	60	100	3 Hours

**Instructions:** For External Examiner: 60% marks (60 marks) will be awarded based on practical implementation and Internship Report in final practical examination and remaining 40% marks (40 marks) will be awarded based on viva-voce and written script.

  
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BCA-6411(A) Data Analytics with Python							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
4	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The Learning Objectives of this course is to introduce machine learning techniques to students using Python programming. It enable students to use various tools and packages for advanced data analysis

<b>Unit I</b>	<b>15 Lectures</b>
<b>Python overview:</b> Python vs. Excel, Anaconda and Jupyter notebook: Interface overview, Data types in Python, Python basic syntax: Assignment statements, creating variables, indentation, conditionals, and loops, writing user defined functions.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Working with libraries:</b> Pandas, NumPy, Matplotlib, and Seaborn, Data analysis with these libraries. Python SQL Database Access: Introduction, Installation, DB Connection, Creating DB Table.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>Pandas:</b> Working with Data Frame, Importing from Excel or .csv files, Powerful filters and indexes. Numpy: Selecting data with loc and iloc, Using NumPy for speed, Trade-offs between arrays and lists, Array functions. Data cleansing and normalization: Libraries for data visualization, Types of charts/graphs and how to build them.	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Machine learning:</b> Introduction, Definitions, Supervised, unsupervised, python libraries for machine learning: Sci-kit learn, Regression: Linear regression, logistic regression, over-fitting and regularization.	

#### Course Learning Outcomes (CLOs)

- Students will be able to learn about Python's main features and how they make Python a great tool for financial analysts and to learn basics of Machine learning techniques and apply these techniques on data.

#### Suggested Readings

- Liu, Y.(2019). Python machine learning byexample:Implement machine learning algorithms and techniques to build intelligent systems (Second edition.). Packt Publishing.
- Boschetti, A. (2016).Regression Analysis with Python (1st ed.).

#### Further References

- Mitchell,T.M.(1997).Machine Learning New York: McGraw-Hill.
- Sivanandam,S.N.,&Deepa,S.N. (2011).Principles of soft computing.

BCA-6411(B) Front End Web Development							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P	C	Internal Assessment	End Semester Examination	Total	
4	0	0	4	Maximum Marks: 40 Minimum Marks: 16	Maximum Marks: 60 Minimum Marks: 24	100 40	3 Hours

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The Learning Objectives of this course is followed by core features, participants will learn to integrate React with backend services (ex: Firebase) and consuming HTTP services in forms of REST APIs. The course exposes participants with advanced features like Routing, Authentication and authorization followed by deploying into popular servers (ex: GitHub)

<b>Unit I</b>	<b>15 Lectures</b>
<b>Bootstrap:</b> Introduction to Bootstrap , Bootstrap Basics, Bootstrap Grids, Bootstrap Themes, Bootstrap CSS, Bootstrap JS.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Introduction to React:</b> History of React, Key Benefits of React, React development environment, Creating your first React Application, React Source code structure JSX <b>Introduction to JSX :</b> Coding in JSX, Expressions in JSX, Working with HTML, Conditional Constructs Components, <b>Introduction to components:</b> Why Components? ,Writing JSX code in components , Adding CSS	
<b>Unit III</b>	<b>15 Lectures</b>
<b>State and Event Binding:</b> Introduction to Events, Event Handlers, Working with state, Data Binding, Controlled and Uncontrolled Components HTTP: Introduction to HTTP, Methods in HTTP, Response code in HTTP, <b>Introduction to REST interfaces:</b> ,Characteristics of REST, Introduction to JSON, JSON data representation, GET request, Using async and await, Handling Http errors , useEffects(), POST request	
<b>Unit IV</b>	<b>15 Lectures</b>
Forms : Introduction to Forms, Working with user input and submission, Adding validation, Working with custom hooks, <b>Authentication:</b> Authentication tokens , Setting up, Adding signup, Showing feedback to the user, Adding User login, Managing authstate with context, Using tokens, Redirecting the user, Adding logout ,Protecting frontend pages, Persisting User authentication status ,Adding auto logout	

#### Course Learning Outcomes (CLOs)

Students will be able to create Single Page Applications (SPA) using React and learn core React features and use-cases

- Integrate React Applications into Firebase backend
- Deploy React applications into popular servers

#### Suggested Readings

- Liu, Y.(2019). Python machine learning byexample:Implement machine learning algorithms and techniques to build intelligent systems (Second edition.). Packt Publishing.
- Boschetti, A. (2016).Regression Analysis with Python (1st ed.).

#### Further References

- Mitchell,T.M.(1997).Machine Learning New York: McGraw-Hill.
- Sivanandam,S.N.,&Deepa,S.N. (2011).Principles of soft computing.

  
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BCA-6411(C) Server Side Programming using JSP							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		C	Internal Assessment	End Semester Examination	
0	0	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

**Guidelines for setting Question Paper:** Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D, E. Sections A,B,C and D will have 2 questions of 10 marks each and Section E has short answer type questions consisting of ten parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A,B,C,D and the compulsory question from section E. In the question paper, the questions available in sections A,B,C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

#### Course Objectives (COs)

The main objective of this course is to provide conceptual as well as practical knowledge of server side programming and JSP tools for Server Side Programming.

<b>Unit I</b>	<b>15 Lectures</b>
<b>An Overview of Servlet and JSP Technology:</b> Servlet, Dynamic web Pages with Servlet, Advantages of servlets over "Traditional CGI", Role of JSP. Server Setup And Configuration: Configure Server, Apache Tomcat, Macromedia, JRun, Caucho Resin. <b>Servlet Basic:</b> Basic Servlet Structure, Servlet Packaging, Servlet Life cycle, Servlet Debugging.	
<b>Unit II</b>	<b>15 Lectures</b>
<b>Handling The Client Request and Generating Server Response:</b> Form Data, Reading Form Data from Servlet, HTTP Request Headers, Reading Request Header, Accessing the standard CGI variables, HTTP Status Codes, HTTP Response Header. <b>Handling Cookies:</b> Cookies, It's Benefits and Problems, Sending Receiving and Deleting Cookies, Modifying Cooking Values. <b>Session Tracking:</b> Need for Session Tracking, Session Tracking Basics, Session Tracking API, Browser Sessions and Server Sessions, Shopping cart Session Tracking for On-Line Store.	
<b>Unit III</b>	<b>15 Lectures</b>
<b>JSP Technology:</b> Need for JSP, Benefits of JSP over competing Technologies, Misconceptions about JSP, Installation of JSP Pages, Basic Syntax of JSP, Invoking Java Code with JSP Scripting Elements, Invoking Java code with JSP scripting Elements, Controlling the structure of Generated Servlets using JSP Page Directive, Including Files and Applets in JSP Pages	
<b>Unit IV</b>	<b>15 Lectures</b>
<b>Accessing Databases with JDBC:</b> Introduction to JDBC, Establishing and closing JDBC connection, JDBC Utilities, Creating Callable statements, Using Database Transactions, ORM Frameworks. <b>Configuring, MySQL and Oracle:</b> Configuring Microsoft Access for Use with JDBC, Installing and Configuring MySQL, Installing and Configuring Oracle Database, Testing Your Database through a JDBC Connection.	

#### Course Learning Outcomes (CLOs)

- Student should be competent in Servlets and JSP tools and able to use these tools and methodologies to solve real life problems.

#### Suggested Readings

- Hall Brown, Core Servlets and JavaServer Pages Volume1: Core Technologies Second Edition, Pearson.
- Deital&Deital, Java How to Program Ninth Edition, PHI Publication

#### Further References

- Hall Brown, Core Servlets and JavaServer Pages Volume1: Core Technologies Second Edition, Pearson.
- Deital&Deital, Java How to Program Ninth Edition, PHI Publication

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