BHARATI VIDYAPEETH

(Deemed to be University), Pune

'A+' Accreditation (Third Cycle) by 'NAAC' in 2017

Category-I Deemed to be University Graded by UGC

'A' Grade University Status by MHRD Govt. of India

Ranked 76th by NIRF – 2022

FACULTY OF MANAGEMENT STUDIES

BACHELOR OF COMPUTER APPLICATION DEGREE

(THREE YEARS) / HONORS (FOUR YEARS)

FRAMED AS PER NATIONAL EDUCATION POLICY (NEP 2020)

SYLLABUS

Applicable with effect from 2022-23

Contents

Bharati Vidyapeeth (Deemed to be University), Pune
Faculty of Management Studies

Bachelor of Computer Application (Honors) FOUR YEARS

Revised Course Structure (To be effective from 2022-2023)

I. Preamble :

The Bachelor of Computer Application (Honors) Programme is a full time four year programme offered by Bharati Vidyapeeth (Deemed to be University), Pune and conducted in Regular mode at its management institutes located in New Delhi, Pune, Navi Mumbai, Kolhapur, Sangli, Karad and Solapur. All the seven institutes have excellent faculty members, computer laboratories, Libraries, and other facilities to provide proper learning environment to the students. The University is accredited by NAAC with 'A+' grade. The expectations and requirements of the Software Industry, immediately and in the near future, are considered while designing the BCA programme. While designing the BCA Programme , the above facts are considered and the requirements for higher studies and immediate employment are visualized. This effort is reflected in the Vision and Mission statements of the BCA programme, the statements also embody the spirit of the vision of Dr. Patangraoji Kadam, the Founder of Bharati Vidyapeeth ― "Social Transformation Through Dynamic Education"

II. Vision:

Preparing the Students to cope with the rigor of Post Graduate Programmes in global and creating high caliber solution architects for software development, who will also be sensitive to societal concerns.

III. Mission:

- We aim to drive transformation, technology and innovation through problem solving approach and research development.
- We aim to provide students with the IT tools to become productive and lifelong learner.

IV. Aims:

- To impart quality computer education to enhance logical computing and programming skills.
- To implement innovative techniques and process in leading-learning and evaluation.
- To further creativity and pursuit of excellence in computer applications.

V. Learning Outcome Based Curriculum Framework -

1. Programme Education Objectives:

The Bachelor of Computer Application (Honors) Four Years degree programme has the following objectives…

I. To prepare the youth to take up positions as system analysts, system engineers, software engineers and programmers.
II. To aim at developing 'systems thinking' 'abstract thinking', 'skills to analyze and synthesize', and 'skills to apply knowledge', through 'extensive problem solving sessions', 'hands on practice under various hardware/software environments' and' projects developed'.
III. To prepare students with 'social interaction skills', 'communication skills', 'life skills', 'entrepreneurial skills', and 'research skills' which are necessary for career growth and for leading quality life are also imparted.

2. Programmme Outcomes (POs) :

On completion of BCA (Honors) Four Year Degree Programme the expected programme outcomes that a student should be able to demonstrate are the following:

PO1. Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2. Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

PO3. Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.

PO4. Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5. Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions

PO6. Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO7. Life-long Learning: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

PO8. Project Management: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO9. Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

PO10. Societal & Environmental Concern: Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO11. Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.

PO12. Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

3. Programmme Specific Outcomes (PSOs) :

After the completion of the course, a student is able to

PSO1: Ability to learn the various programming languages with database concepts along with development environment

PSO2 : Ability to apply theoretical and practical knowledge to solve business problems through data communication technology concepts.

PSO3 : Flourish the innovation and research attitude to develop IT artifact.

PSO4: Foster analytical and critical thinking abilities for efficient programming

PSO5: Demonstrate and apply the programming knowledge to develop effective software solution.

PSO6: Enrich the knowledge in the areas of Advanced technologies and business practices.

PSO7: Maintain the personality with environmental and social concerns

4. Graduate Attributes:

After completing BCA (Honors) Four Year Degree programme the students will be able to acquire following attributes and skills to groom the overall personality.

- **Knowledge of Discipline of Computer Science**: This Graduate will be capable of demonstrating comprehensive and considered knowledge of a discipline. Student enables to evaluate and utilize information and apply their knowledge and professional skills in the field of IT.
- **Creativity**: Graduates will be trained to develop skills needed for creativity to design and implement computer application software. Also able to think and imagine IT solution for real life problems / applications.
- **Intellectual Rigour**: The graduates are expected to have clarity in thinking. Graduates will be involved to develop constructively and methodically, exploring ideas, theories and philosophies. It also relates to the ability to analyse and construct knowledge with depth, insight and intellectual maturity.
- **Problem Solving and Design**: Graduate empower not only within the context of their programmes, but also in their personal and professional lives. Graduate should have ability to identify problems, think creatively to find alternative solutions and evaluate those for selecting effective algorithm to solve the problem efficiently.
- **Ethical Practices**: Graduate should adopt tolerance, responsibility, open-mindedness about cultural diversity, linguistic difference, and the complex nature of our world. Graduate should behave appropriately towards colleagues and the community and being sensitive to local and global social justice issues
- **Communication and Social Skills**: Graduate have the ability to communicate clearly and to work well in a team setting is critical to sustained and successful employment. Good communication and social skills involve the ability to listen to, as well as clearly express information back to others in a variety of ways - oral, written, and visual - using a range of technologies.
- **Life-Long Learning**: Graduate is having open, curious, willing to investigate, and consider new knowledge and ways of thinking. He / She should able to adopt and grasp the new upcoming technologies in IT sector.

- **Self-Management**: Graduates must have capabilities for self-organisation, self-review, personal development and lifelong learning.
- **Critical thinker and problem solver**: Ability to employ critical thinking and efficient problem solving skills for different kinds of problem related to computer science
- **Team player/worker**: Capable of working effectively in diverse teams in both classroom, laboratory, in industry and project-based situations.

VI. Duration of the programme:

The duration of the BCA Bachelor's degree Program having six semesters and BCA (Honors) Degree Program is of four years spread across Eight Semesters with multiple entry and exit options. Student should complete the 4 years degree programme within 7 years.

a) Following EXIT options are available with the students:

Exit Option	**Minimum Credits Requirements**	**NSQF Level**	**Bridge course**
Under graduate Certificate - After successful completion of First Year	40	5	10 credits bridge course(s) lasting two months including at least 06 credits job specific internship that would help the learner to acquire job ready competencies to enter the workforce.
Under graduate Diploma - After successful completion of Second Year	80	6	
Bachelor's Degree - After successful completion of Third Year	120	7	
Bachelor's Degree with Honors- After successful completion of Fourth Year OR **Bachelor's Degree with Honors (Research) -** After successful completion of Fourth Year	160	8	

Note : Student is free to complete some interdisciplinary courses from other institutes provided he/she should earn 50% required credits from home HEI.

Student should complete the core disciplinary courses from home University (HEI) to get exit option for UG certificate/ UG diploma/ Bachelor Degree.

b) Following Entry options are available with the students :

- Student who opt Exit option at the end of 1st / 2nd /3rd year, can reenter the same programme within three years from Exit.
- Student with Bachelors Degree can opt for Bachelor degree with Honors

- Student with Bachelors Degree can opt for Bachelor degree with Honors (Research) if the student secure CGPA >= 9.25

National Skills Qualifications Framework (NSQF) Levels :

Option	NSQF Level	Professional Knowledge	Skill
At the end of first year	**5**	Knowledge of facts, principles, processes, concepts in a field of work or study	The student will have fundamental knowledge of computation, problem solving ability and basic website designing ability.
At the end of Second year	**6**	Factual and theoretical knowledge in the broad context within a field of work or study	Additionally the student will have advanced programming skills along with system development ability
At the end of Third year	**7**	Wide ranging factual and theoretical knowledge in the broad context within a field of work or study	Additionally, student will have skills of Web Application development with Technical Writing and Report Generation.
At the end of Fourth year	**8**	Comprehensive, cognitive theoretical knowledge and practical skills to develop creative solutions to abstract problem	Additionally, student will have skills of solving business application applying advanced technology

VII.Academic Bank Of Credits (ABC) :

As per the National Educational Policy (NEP) 2020, the Academic Bank of Credit offer the flexibility of curriculum framework and interdisciplinary /multidisciplinary academic mobility of students across Higher Educational Institutes (HEIs) with appropriate credit transfer mechanism. In furtherance to these guidelines the Faculty of Management Studies, Bharati Vidyapeeth (Deemed to be University) Pune has designed a four years undergraduate program offered at its constituent units.

As a pre-requisite a student should register in the Bharati Vidyapeeth (Deemed to be University) Academic Bank of Credit. The credits earned by the student/learner will be stored in it. A Student/learner would be required to complete the course as per the ABC (Academic Bank Credit) policy of UGC. The validity of the credits earned for a course is seven years only.

VIII. Eligibility Criteria for admission:

A candidate applying for BCA(Honors) Four years programme should have passed higher secondary (10 + 2) or equivalent examination (10+3) of any recognized Board with satisfying the conditions to pass a common All India Entrance test (BU-MAT) conducted by Bharati Vidyapeeth (Deemed to be University), Pune. The final admission

is based solely on the merit at the BU-MAT test.

IX. Grading System for Programmes under Management Studies:

- **Grade Points** : The Faculty of Management Studies, Bharati Vidyapeeth (Deemed to be University) has suggested 10-point grading system for all programmes designed by its various Board of Studies. A grading system is a 10-point system if the maximum grade point is 10. The system is given in Table Ibelow.

Table I: The 10-point Grading System Adapted for Programmes under FMS

Range of Percent Marks	[80,100]	[70,79]	[60,69]	[55,59]	[50,54]	[40,49]	[00,39]
Grade Point	10.0	9.0	8.0	7.0	6.0	5.0	0.0
Grade	**O**	**A+**	**A**	**B+**	**B**	**C**	**D**

Formula to calculate GP is as under:

Set x = Max/10 where Max is the maximum marks assigned for the examination (i.e. 100)

Formula to calculate the individual evaluation

Range of Marks	Formula for the Grade Point
$8x \leq Marks \leq 10x$	10
$5.5x \leq Marks \leq 8x$	Truncate (M/x) +2
$4x \leq Marks \leq 5.5x$	Truncate (M/x) +1

- **Scheme of Examination**

Courses having Internal Assessment (IA) and University Examinations (UE)shall be evaluated by the respective constituent units and the University at the term end for **40** and **60** Marks respectively. The total marks of IA and UE shall be 100 Marks and it will be converted into grade points and grades.

For Internal Assessment (IA) the subject teacher may use the following assessment tools:

a) Attendance

b) ***Class Tests***

c) ***Presentations***

d) ***Class Assignments***

e) ***Case studies***

f) ***Practical Assignments***

g) ***Mini Projects***

h) ***Oral***

X) MOOCs Policy:-

As per the guidelines provided by UGC each student have to complete **TWO** MOOCs (Massive Open Online Courses) as add on Course which provides wide access to the online learning. The student of regular programme should complete MOOCs prescribed by the institute in semester III, Sem IV, and / or Sem V. Each MOOC will be evaluated for **TWO** credits. The MOOC course fees should be borne by the respective student. On successful completion of MOOCs course, the student should produce the completion certificate to the institute on the basis of which additional Credits will be given to the students.

- Following are the sources from where students can undertake MOOCs

1. iimb.ac.in
2. swayam.gov.in
3. alison.com
4. edx.org
5. Coursera
6. harvardx.harvard.edu
7. udemy.com
8. futurelearn.com
9. Indira Gandhi National Open University (IGNOU)
10. National Council of Educational Research and Training (NCERT)
11. National Institute of Open Schooling (NIOS)
12. National Programme on Technology Enhanced Learning (NPTEL)
13. Any other sources offering online courses suggested by institute

XI. Standard of Passing:

For all courses, both UE and IA constitute separate heads of passing. In order to pass in such courses and to earn the assigned credits, the student/learner must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.

If Student fails in IA, the learner passes in the course provided, he/she obtains a minimum 25% marks inIA and GPA for the course is at least 6.0 (50% in aggregate). The GPA for a course will be calculated only if the learner passes at UE.

A student who fails at UE in a course has to reappear only at UE as backlog candidate and clear the Headof Passing. Similarly, a student who fails in a course at IA he has to reappear only at IA as backlog candidate and clear the Head of Passing to secure the GPA required for passing.

The 10 point Grades and Grade Points according to the following table

Range of Marks (%)	**Grade**	**Grade Point**
80≤Marks≤100	O	10
70≤Marks<80	A+	9
60≤Marks<70	A	8
55≤Marks<60	B+	7
50≤Marks<55	B	6
40≤Marks<50	C	5
Marks < 40	D	0

The performance at UE and IA will be combined to obtain GPA (Grade Point Average) for the course.The weights for performance at UE and IA shall be 60% and 40% respectively.

GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. The total marks out of 100 are converted to grade point, which will be the GPA.

Formula to calculate Grade Points (GP)

Suppose that “Max” is the maximum marks assigned for an examination or evaluation, based on which GP will be computed. In order to determine the GP, Set x = Max/10 (since we have adopted 10 point system). Then GP is calculated by the following formulas

Range of Marks	Formula for the Grade Point
8x ≤ Marks≤10x	10
5.5x ≤ Marks<8x	Truncate (M/x) +2
4x ≤ Marks<5.5x	Truncate (M/x) +1

Two kinds of performance indicators, namely the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA) shall be computed at the end of each term. The SGPA measures the cumulative performance of a learner in all the courses in a particular semester, while the CGPA measures the cumulative performance in all the courses since his/her enrolment. The CGPA of learner when he /she completes the programme is the final result of the learner.

The SGPA is calculated by the formula

$$SGPA = \frac{\sum Ck * GPk}{\sum Ck}$$

where, Ck is the Credit value assigned to a course and GPk is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study during the Semester, including those in which he/she might have failed or those for which he/she remained absent. **The SGPA shall be calculated up to two decimal place accuracy.**

The CGPA is calculated by the following formula

$$CGPA = \frac{\Sigma C_k * GP_k}{\Sigma C_k}$$

where, Ck is the Credit value assigned to a course and GPk is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study from the time of his/her enrolment and also during the semester for which CGPA is calculated.

The CGPA shall be calculated up to two decimal place accuracy.

The formula to compute equivalent percentage marks for specified CGPA:

% marks (CGPA)	10 * CGPA-10	If 5.00 ≤ CGPA < 6.00
	5 * CGPA+20	If 6.00 ≤ CGPA < 8.00
	10 * CGPA-20	If 8.00 ≤ CGPA < 9.00
	20 * CGPA-110	If 9.00 ≤ CGPA < 9.50
	40 * CGPA-300	If 9.50 ≤ CGPA ≤ 10.00

XII. Award of Honours:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honours are given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.5≤CGPA ≤10	O	Outstanding	80≤Marks≤100
9.0≤CGPA ≤9.49	A+	Excellent	70≤Marks<80
8.0≤CGPA ≤8.99	A	Very Good	60≤Marks<70
7.0≤CGPA ≤7.99	B+	Good	55≤Marks<60
6.0≤CGPA ≤6.99	B	Average	50≤Marks<55
5.0≤CGPA ≤5.99	C	Satisfactory	40≤Marks<50
CGPA below 5.0	F	Fail	Marks below 40

XIII. Rules of ATKT:

a) For admission to Semester V of BCA Third year, Students/Learners should pass all the courses under Sem I and II.

ii) For admission to Semester VII of BCA Fourth year, Students/Learners should pass all the courses under Sem I, II ,III and IV.

XIV. INTERNSHIP:

At the end of Semester VI, each student shall undertake Internship in an Industry for 50 (Fifty Days). It is mandatory for the students to seek written approval from the Faculty Guide about the Topic & the Organisation before commencing the Internship.

During the Internship students are expected to take necessary guidance from the faculty guide allotted by the Institute. To do it effectively they should be in touch with their guide through e-mail or telecom. Internship Project should be a Computer Application to Real life business activity.

The learning outcomes and the utility to the organization must be highlighted in Internship Project Report.

General chapterization of the report shall be as under:

1) Introduction
2) Theoretical background
3) Company profile
4) Objectives of the study
5) System Requirements
6) System Analysis & Design
7) Implementation & Testing
8) Conclusion & Suggestions

References:

Annexure:

TECHNICAL DETAILS:

1. The report shall be printed on A-4 size white bond paper.
2. 12 pt. Times New Roman font shall be used with 1.5 line spacing for typing the report.
3. 1" margin shall be left from all the sides.
4. Considering the environmental issues, students are encouraged to print on both sides of the paper.
5. The report shall be hard bound as per the standard format of the cover page given by the Institute and shall be golden embossed.
6. The report should include a Certificate (on company's letter head) from the company duly signed by the competent authority with the stamp.
7. The report shall be signed by the respective guide(s) & the Director of the Institute 10 (Ten) days before the viva-voce examinations.
8. Student should prepare two hard bound copies of the Summer Internship Project Report and submit one copy in the institute. The other copy of the report is to be kept by the student for their record and future references.
9. In addition to this students should prepare two soft copies of their Summer IP reports & submit one each in Training & Placement Department of the Institute & Library

The Internship shall be assessed out of 200 Marks. The breakup of these marks is as under;

Viva- voce examination	=	120	(One Hundred Twenty) Marks
Internship Report	=	+ 80	(Eighty) Marks

		200	(Two Hundred) Marks

The examiners' panel shall be decided as per the guidelines received from the University.

The viva –voce shall evaluate the project based on

i. Actual work done by the student in the organization
ii. Student's knowledge about the company & Business Environment
iii. Learning outcomes for the student
iv. Utility of the study to the organization

XV. Specializations:

BCA three year degree programme and BCA(Hons.) four year degree programme 2022 offers specialization to the students/learners in the third year of both the programmes. The students/learner are required to select any one specialization from the list provided below.

Sr. No.	Specialization Course	Course No	Course Name
01	**Data Analysis**	505-1-A	Data analysis using Excel
		605-1-B	R Programming
02	**Information Security**	505-2-A	Information Security Concepts
		605-2-B	Information Security Administration
03	**Big Data**	505-3-A	Introduction to Big Data
		605-3-B	HADOOP
04	**Information Systems**	505-4-A	E-Commerce
		605-4-B	Knowledge Management

Prerequisite for offering the specialization –

- There must be minimum 10 (Ten) students for a particular specialization.

XVI. Course Structure:

SEMESTER I

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
101	Fundamentals of Information Technology	DSC	3	3	1	-	40	60	100
102	C Programming	DSC	3	3	1	-	40	60	100
103	Organization of IT Business	MDC	3	3	1	-	40	60	100
104	Discrete Mathematics	MDC	3	3	1	-	40	60	100
105	Lab on MS-Office Suite	DSC	2	-	-	4	40	60	100
106	Lab on C Programming	DSC	2	-	-	4	40	60	100
107	Human Universal Values	VBC	2	2	-		50	-	50
108	Language – I	AEC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

SEMESTER II

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
201	Web Development Technology	DSC	3	3	1	-	40	60	100
202	DBMS I	DSC	3	3	1	-	40	60	100
203	Data Structures using C	DSC	3	3	1	-	40	60	100
204	Financial Accounting	MDC	3	3	1	-	40	60	100
205	Lab on Data Structures using C	DSC	2	-	-	4	40	60	100
206	Lab on Web Development Technology	DSC	2			4	40	60	100
207	Environmental Studies	VBC	2	2	-	-	50	-	50
208	Community Work (Swaccha Bharat Abhiyan)	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

SEMESTER III

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
301	Operating Systems	DSC	3	3	1	-	40	60	100
302	Software Engineering	DSC	3	3	1	-	40	60	100
303	Java Programming	DSC	3	3	1	-	40	60	100
304	Statistics	MDC	3	3	1	-	40	60	100
305	Lab on Oracle	DSC	2	-	-	4	40	60	100
306	Lab on Java	DSC	2	-	-	4	40	60	100
307	Start-up Management	AEC	2	2	-	-	50	-	50
308	Yoga & Meditation	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

The student should complete TWO MOOCs (Massive Open Online Courses) as add on Course which provides wide access to the online learning. The student will complete MOOCs prescribed by the institute in semester III, Sem IV, and / or Sem V. Additional Credits will be given to the student as per MOOCs Policy

SEMESTER IV

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
401	Computer Networks	DSC	3	3	1	-	40	60	100
402	Advanced JAVA	DSC	3	3	1	-	40	60	100
403	Advanced HTML with Javascript and CSS	DSC	3	3	1	-	40	60	100
404	Optimization Techniques	MDC	3	3	1	-	40	60	100
405	Lab on JAVA	DSC	2	-	-	4	40	60	100
406	Lab on HTML, Javascript and CSS & Minor Project - I	DSC	2	-	-	4	40	60	100
407	Cyber security	SEC	2	2	-	-	50	-	50
408	Mathematical Aptitude	AEC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

SEMESTER V

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	**T**	**P**			
501	Basic Python Programming	DSC	3	3	1	-	40	60	100
502	Dot Net programming using C#	DSC	3	3	1	-	40	60	100
503	Entrepreneurship Development	MDC	3	3	1	-	40	60	100
504	Elective I	DSE	3	3	1	-	40	60	100
505	Lab on Python	DSC	2	-	-	4	40	60	100
506	Lab on Dot Net and C#	DSC	2	-	-	4	40	60	100
507	IT based Aptitude	AEC	2	2	-	-	50	-	50
508	Human Rights	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

SEMESTER VI

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
601	Data warehousing and Data Mining	DSC	3	3	1	-	40	60	100
602	Web Programming (PHP)	DSC	3	3	1	-	40	60	100
603	Software Project Management	DSC	3	3	1	-	40	60	100
604	Elective II	DSE	3	3	1	-	40	60	100
605	Lab on Web programming with Project	DSC	2	-	-	4	40	60	100
606	Lab on Data Visualization	DSC	2	-	-	4	40	60	100
607	Digital marketing	SEC	2	2	-	-	50	-	50
608	Indian Culture	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

Fourth year of BCA Honors Programme

SEMESTER VII

Course Number	**Course Title**	**Course Type**	**Credits**	**Hours / Week**			**IA**	**UE**	**Total**
				L	**T**	**P**			
701	Cloud Computing	DSC	3	3	1	-	40	60	100
702	Mobile Application Development	DSC	3	3	1	-	40	60	100
703	Internet of Things	DSC	3	3	1	-	40	60	100
704	Object Oriented Analysis and Design	DSC	3	3	1	-	40	60	100
705	Research Methodology	DSC	3	3	1	-	40	60	100
706	Lab on IOT	DSC	2	-	-	4	40	60	100
707	Lab on Mobile Application Development	DSC	2	-	-	4	40	60	100
708	Technical Writing	SEC	1	2	-	-	50	-	50
Total			**20**	**17**	**5**	**8**	**330**	**420**	**750**

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	**T**	**P**			
801	Introduction to AI and ML	DSC	3	3	1	-	40	60	100
802	ERP	DSC	3	3	1		40	60	100
803	Block Chain Technology	DSC	3	3	1	-	40	60	100
804	Internship Project	SEC	6	-	-	8	80	120	200
805	Professional Ethics	MDC	3	3			40	60	100
806	Organisational Behaviour	VBC	1	2			50		50
807	IPR	AEC	1	2			50		50
Total			**20**	13	-	8	**340**	**360**	**700**

Fourth year of BCA Honors Programme with Research

SEMESTER VII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
701	Cloud Computing	DSC	3	3	1	-	40	60	100
702	Mobile Application Development	DSC	3	3	1	-	40	60	100
703	Internet of Things	DSC	3	3	1	-	40	60	100
704	Object Oriented Analysis and Design	DSC	3	3	1	-	40	60	100
705	Research Methodology	DSC	3	3	1	-	40	60	100
706	Lab on IOT	DSC	2	-	-	4	40	60	100
707	Lab on Mobile Application Development	DSC	2	-	-	4	40	60	100
708	Technical Writing	SEC	1	2	-	-	50	-	50
Total			**20**	**17**	**5**	**8**	**330**	**420**	**750**

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	**T**	**P**			
801	Dissertation	DSC	12				100	300	400
802	Seminar on Recent Trends In Computer Science and Information Technology : Literature Review	DSC	3				100		100
803	Professional Ethics	MDC	3	3			40	60	100
804	Organisational Behaviour	VBC	1	2			50	-	50
805	IPR	AEC	1	2			50	-	50
Total			**20**	13	-	8	**340**	**360**	**700**

Abbreviations Expanded

- **DSC** - Discipline Specific Course
- **DSE** - Discipline Specific Elective
- **MDC** – Minor Disciplinary Course
- **SEC** - Skill Enhancement Course
- **VBC** - Value Based Course
- **AEC** - Ability Enhancement Course

XVII. Question Paper Patterns for University Examination:

*The pattern of **question paper** for the courses having University Examinations will be as follows:*

Title of the Course

Day: **Total Marks: 100 ***

Date: **Time: 03 Hours**

Instructions:

a. Section I Question No 1 is Compulsory

b. Attempt any TWO questions from Section II Each question carries 20 Marks.

c. **Attempt any TWO questions from Section III Each question carries 20 Marks**

SECTION – I	
Q 1. includes 10 objective type subquestions covering all units of course, each subquestion carries 2 marks	(20 marks)
SECTION – II	
It should contain 4 questions covering the syllabus & should test the conceptual knowledge of the students	
Question	**Marks**
Q.2 ……	(20 marks)
Q.3 ……	(20 marks)
Q.4 ……	(20 marks)
Q.5 Write **Short Notes** on ANY FOUR a) b) c) d) e) f)	(20 marks)
SECTION – III	
It should contain 03 questions covering the entire syllabus & should be based on application of the Concepts	

Q.6……..	(20 marks)
Q.7……	(20 marks)
Q.8……..	(20 marks)

Note :

1. Answer book for the Section I will be separate and student should return this answerbook within first half an hour.

2. *Marks obtained out of 100 marks will be converted to 60 as per BVDU, Pune Examination Section Scaling down

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
I	**101**	**Fundamental of IT**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE 40 + UA(60)	100

Course Objectives:

To make students to:

- Get familiar with Computer and its components.
- Introduce various devices
- Handle MS-Office package to apply for technical and professional careers.

Course Outcomes:

After completing the course the students shall be able to

- Understand basic concepts and types of Computer, memory devices and software
- Remember types of computer and its peripherals
- Demonstrating MS-office tools for data processing, mathematical operations in worksheets, presentations.
- Analyse the use of various components of computer

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Computer	• Computer-Definition, Characteristics, Concept of Hardware, Software , Evolution of computer and Generations • Types of Computer – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer • Limitations of Computer, Applications of Computer in Various Fields.	Have a basic understanding of personal computers and their operations.	Understand and remembering Computer S/W, H/W and its generation, types of computers.	9
I/O Devices	• Input Device – Keyboard, Mouse, Scanner, MICR, OMR.	Understand basic concepts and terminology of	In detail analyze I/O devices and it's operations.	8

	• Output Devices – VDU, Printers – Dot Matrix, Daisy-wheel, Inkjet, Laser, Line Printers and Plotters.	information technology.		
Computer Memory	• Memory Concept, Memory Cell, Memory Organisation, Semiconductor Memory – RAM, ROM, PROM, EPROM • Secondary Storage Devices – Magnetic Tape, Magnetic Disk (Floppy Disk and Hard Disk.), Compact Disk.	Identify common computer hardware and software elements and understand how they interact with each other	Use of primary and secondary Memory	8
Softwares	• Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. • Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w • Concept of Network and its Type, Basic Elements of a Communication System, Data Transmission Media, Topologies	Software and its needs, Operating System, Utility Programs and Programming Languages	Awareness of basic languages databases, networks with in computer systems.	8
MS-office	• **MS Office:** Introductio n to MS Office, Components and Features. • **MS Word:** Creating Letter, Table,	Demonstrate how to MS-Office software tools for word processing, mathematical processing and presentations.	Developing skill of preparing documents, presentation and storing of simple data in databases.	12

	Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, Auto Text, Inserting Picture, Word Art. • **MS Excel:** Introduction to Excel, Sorting, Queries, Graphs, Scientific Functions. • **PowerPoint:** Introduction to PowerPoint, Creation of Slides, Inserting Pictures, Preparing Slide Show with Animation. • **MS Access:** Creation and Manipulation of Files.			

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	P.K.Sinha	Computer Fundamentals	2015 (6th Edition)	BPB Publication
2	**V.**Rajaraman	Fundamentals of Computers	2001(3rd Edition)	PHI Publication
3	Vishnu Singh	Quick Reference for MS-Office 2007	2008	Asian Publisher

Online Resources:

Online Resources No.	Web site address
1	https://www.udemy.com/course/fundamentals-of-information-technology/
2	https://www.youtube.com/watch?v=DLb8IFee-DI
3	https://www.youtube.com/watch?v=mOYpH24GR6Y
4	https://www.youtube.com/watch?v=j8hVRx2AFP0

MOOCs:

Resources No.	Web site address
1	https://www.classcentral.com/course/swayam-introductory-concepts-of-digital-computing-45159
2	https://www.classcentral.com/course/swayam-sr-secondary-computer-science-330-17803
3	https://www.classcentral.com/course/edx-information-technology-foundations-17970

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year 2022 –2023			
Semester	**Course Code**	**Course Title**	
I	**102**	**C Programming**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	**3**	UE(60)+IE(40)	100

Course Objectives:

Objectives :

- To learn Procedure Oriented Programming Language C.
- Emphasise on process of learning a computer language.
- Focus on semantics and problem solving.

Course Outcomes:

After completing the course the students shall be able to

- Solve a given problem using procedural technique.
- Understand and use control statements and operators.
- Read, understand and design C programs using control structures.
- Effectively use of Arrays and functions implement pointers and its arithmetic
- Apply C programing concepts for solving simple real life problems.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Algorithm	• Concept, of Problem, Procedure and Algorithm • Algorithm Representation through Pseudo -Code and Flow - Charts • Tracing of Algorithms Such as Swapping, Counting, Finding the Sum, Product, maximum, minimum, of a list of numbers.	Argue the correctness of algorithms using inductive proofs and invariants.	Understand and remembering Algorithm. Tracing of Algorithms.	5
Introduction to C Language	• History • Structure of C Programming, Function as building blocks	Defining keywords, identifiers,	Understand the basics of C Programming	5

	• Language Fundamentals, Character set, C Tokens, Keywords, Identifiers, Variables, Constant, • Data Types, Comments	variables, constants in C		
Operators	• Types of operators, Operator Precedence and Associativity • Expression, Statement and types of statements • Built in Operators and functions • Console based I/O and related built in I/O function- printf(), scanf(), getch(), getchar(), putchar(), • Concept of header files, Preprocessor directives - #include, #define	Learn Operator set, statement types, input and output statement	Understanding of input output statements and write simple programs	6
Control Structures	• Basic Control Structures • Decision making structures - if statement, if-else statement, Nested if-else statement, switch statement • Loop Control structures - while loop, do-while loop, for loop, Nested for loop • Other statements - break keyword, continue keyword, goto keyword, exit function	Use of decision making and looping statements for program writing	Program writing using decision making and looping statements	8
Functions and Arrays	• Introduction • Purpose of function, Function declaration/ Function prototype, Functiondefinition,Functioncall,returnstatement • Functionparameters • Typesoffunctions • Callbyvalue • Storageclasses • Recursion,Examples on recursive function • Introduction to one-dimensional Array, Definition, Declaration, Initialization, Accessingand displaying array elements • Arrays and functions • Introduction to two-dimensionalArray, Definition, Declaration, Initialization, Accessing and displaying array elements	Concept of Function, Array and its type	Understanding of use of function and array and implement it to understand the functionalities of same	13

Strings, Structure and Pointers	• Introductions to Strings, Definition, Declaration, Initialization • Input, output statements for strings • Standard String library functions with example • Structure – User defined datatypes, Concept of structure, Union; Member access operator • Introduction to pointer, Definition, Declaring and Initializing pointer variable • Indirection operator and address of operator, Accessing variable through its pointer, Pointer arithmetic • Dynamic memory allocation	String and its manipulation functions User defined data types i.e. Structure and Union	Writing C Program for string handling and use of Structure and Union	8

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Yashwant Kanetkar	Let us C	2018	BPBPublications
2	B.W.Kernighan, D.M.Ritchie	The‘C’programming language	1998	PHI
3	Balaguruswami	Programming inANSIC	2019	TMH

MOOCs:

Resources No.	Website address
1	NPTEL / Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCA CBCS – Revised Syllabus w.e.f. - Year 2022 – 2023			
Semester	**Course Code**	**Course Title**	
I	**103**	**Organization of IT Business**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	UE(60)+IE(40)	100

Course Objectives :

To acquaint students with fundamentals of Business Organization and management systems as abody of knowledge.

Course Outcomes:

- To know about business and its structure and its various forms.
- To Apply and enlighten with nature and scope of IT business organization.
- To make them understand the office function and its significance on office layout
- To understand the complexities associated with management of human resources in the IT organizations and integrate the learning in handling these complexities.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Nature and Evolution of Business	Concept of Business – Meaning, Definition, Nature and Scope, Characteristics ofBusiness. Business as an Economic Activity. Objectives of Business. Structure of Business (Classification of Business Activities. Requisites for Success in ModernBusiness. Beginning and development of Commerce, Evolution of Industry, Industrial Revolution, Beginning and growth of Indian Business, Industrialization in India	Basics of Business	Studying Basics of Business Structure	10
Forms of Business Ownership	Introduction to various forms – Factors affecting choices of an deal form of ownership, features Merits and Demerits of Sole Proprietorship – Joint Hindu FamilyBusiness – Partnership – Joint Stock Company – Co-operative Organization, Public Enterprises.	Different types of business	Study each business type with is merits and demerit	10
Formation of a Company	Stages in formation and incorporation of a company (e Promotion – incorporation and registration – Capital	Documentation for company formation	Study different documents required to operate business	10

	Subscription - Commencement of Business. - Documents of a Company i.e. Memorandum of Association – Articles of Association – Prospectus.			
The Impact of information technology on the Business	Modern Organizations- IT runs the Airlines, Technology Transforms, Securities Industry, Creating New Types of Organization- Examples of Designs using IT Variables, Adding peoples to the design.	Use of IT in Organization	Study the application of IT in Business Process	10
Strategic Issues of Information Technology	IT and Corporate Strategy- Some examples of Technology strategy, value chain, A framework for the strategic use of IT. Creating and sustaining a Competitive edge- Using resource to advantage, protecting an IT innovation. Integrating Technology with the Business Environment.	Corporate Strategy for running Business with IT	Different Corporate Strategy for Business using IT	5

Reference Books:

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	S.A. Sherlekar	Modern Business Organization and Management	latest edition	Himalaya Publishing House)
2	Y.K. Bhushan	Fundamental of Business Organization & Managemen	latest edition	S Chand Publishers
3	C. R. Basu	Business Organization and Management	1998	Tata McGraw Hill
4	Henry C. Lucas,Jr	Information Technology for Management	latest edition	Tata McGraw Hill
5	S.S. Dubey	IT Services Business Management: Concepts, Processes and Practices	latest edition	PHI Publication

MOOCs:

ResourcesNo.	Web site address

1	NPTEL
2	Swayam
3	www.edx.com
4	www.coursera.com

Programme: BCA CBCS – Revised Syllabus w.e.f. - Year 2022 – 2023			
Semester	**Course Code**	**Course Title**	
I	**104**	**Discrete Mathematics**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Minor Disciplinary Course	3	UE(60)+IE(40)	100

Course Objectives :

To make students to :

- Get familiar with discrete structures of mathematics and its application in Business.
- Model the given data in set structure also Set relation among data descriptors.
- Define the function and identify the types of function
- Represent the facts in logic statements and resolve the given problem

Course Outcomes:

After completing the course the students shall be able to :

- Understand the discrete structures and their representations
- Apply the structures to represent the given phenomenon
- Demonstrate the operations of discrete structures
- Analyse the truthiness of the statement

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Set Theory	Definition of a set, Representation of elements of sets, Methods of representing sets,types of sets, operations on sets , cardinality of a set, Principle of Inclusion and Exclusion, Venn Diagram, Proof by using Venn diagram	Defining a set and its elements, finding length of set and performing various operations on sets,	Representing problem information using sets and Venn diagram and find the solution for the problem	8
Functions and Relations	Definition of Function, Types of Functions ,Composite Function, Relation definition, representation of relations	Defining function as a process and define domain and co-domain accordingly	Convert a process to mathematical expression to a function or a relation	8
Logic	Propositions, Logic Operations-Negation, Disjunction, Conjunction, Conditional and Biconditional, Truth Tables of compound propositions,	Different logic connectors, creating truth tables for compound propositions	Expressing a problem as a set of logical statements.	9

	Translating English sentences in to logical statements and vice versa, Logic gates and circuits			
Matrices	Matrix Definition, General Form, Representation of matrix in computers, Types of matrices, Operations on matrices: Addition, Subtraction and Multiplication, transpose , row / column transformations , Inverse of the matrix by Co-factor and Adjoint method, solutions to three variable problems by using matrices, application problems of matrices	Defining and representing data in the form of matrix and processing it as an unit.	Applying matrices for finding solution to multivariate problem.	10
Permutations, Combinations and Probability	Concept- Permutation, Combination, Sum and Product rules, problems on Permutation and combination (with wording atleast, atmost, neither nor, any one etc.) Concept and problem solving, general probability, conditional probability, partitions,Bayes Theorem	Counting possible number of outcomes for given experiment and calculating chance of occurrence of a desired event.	Applying probability concept to solve real life situations.	10

Reference Books:

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Kenneth Rosen	Discrete Mathematics & its Applications, 6th Edition	2007	Tata Mc Graw Hill
2	Semyour Lipschutz & Marc Lipson	Discrete Mathematics, 2nd Edition	Reprint 2010	Tata Mc Graw Hill

MOOCs:

ResourcesNo.	Web site address
1	NPTEL Swayam www.coursera.com www. edx.com

Programme:BCA CBCS – Revised Syllabus w.e.f. - Year 2022 – 2023			
Semester	**Course Code**	**Course Title**	
I	**105**	**Lab on MS-Office Suite**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	UE(60)+IE(40)	100

Course Objectives :

The objective of this course is to help the student gain proficiency in text editing and formatting, spreadsheet and database processing/analysis, and presentation preparation. An additional objective ofthe course is for the student to gain basic knowledge of modern-day computing technology

Course Outcomes:

- Students are able to prepare documentation using MS-Word
- Demonstrate an advanced knowledge of the Word Processing package to design & create effective and structured documents like technical reports, letters, brochures, etc.,.
- Demonstrate the skills in the appropriate use of various features of the spread sheet package MS Excel to create useful spreadsheet applications like tabulated statements, balance sheets, statistical charts, business statements, etc
- Demonstrate the skills in making an effective presentation with audio and video effects using the. MS Power Point

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Information Technology Essentials, Windows and Internet Explorer:	Verify the components of a typical computer system, Explore, maintain files, andcustomize the Windows operating system, Review using the Internet Explorer.	Understanding computer system and customising operating system	Identify various components of computer navigating through various options of operating system and customising it	4
MS Word	Introduction to MS Word, Menus, Shortcuts, Document typesWorking with Documents: a) Opening Files, Formatting page and Setting Margins, Converting files to different formats, Editing	understanding Word software Working with documents and its settings	word document preparation with proper formatting for given theme repairing time tables syllabus	8

	text documents, Using Toolbars, Ruler, Icons and help b) Formatting Documents: Setting Font Styles, Setting Paragraph style, Setting Page Style, Setting Document Styles c) Creating Tables: Table settings, Borders, Alignments, insertion, deletion, Merging, Splitting,Sorting, Formula d) Drawing: Inserting Pictures/Files etc., Drawing Pictures, Formatting &Editing pictures,Grouping and ordering, Rotating e) Tools: Word Completion, Spell Checks, Macros, Mail merge, Templates, UsingWizards, Tracking, Changes, Security	Formatting creating table in tabular data drawing objects pictures use mail merge	Structure using table Preparing Word document with graphical objects sending later reset to recipient using mail merge	
MS Power Point	a) Introduction: Opening new Presentation,Different presentation templates,Setting backgrounds, Selecting presentation layouts b) Creating a presentation: Setting presentation style, Adding Text to the presentation c) Formatting a presentation: Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer,Slide background, Slide layout d) Adding Graphics to the presentation: Inserting pictures, movies, tables, etc into the presentation, Drawing Picturesusing Draw e) Adding effects to the presentation: Setting Animation & transition effect, Adding audio and videoPrinting	Understanding creation of PowerPoint presentation	Prepairing PowerPoint presentation for seminar topic yesterday presentation with animation Presenting a PowerPoint presentation of college department with proper graphics and effects	6

	Handouts and Generating standalone presentation viewer			
MS Excel	a) Introduction: Spreadsheet & its Applications , Opening spreadsheet, Menus & Toolbars &icons, Shortcuts , Using help b) Working with Spreadsheets: Opening a File, Saving Files, Setting Margins, Converting files to differentformats : Importing, Exporting and Sending files to others, Spreadsheet addressing, Entering and Editing Data: c) Computing data : Setting Formula, Finding total in a column or row, Mathematical Operations(Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formula d) Formatting Spreadsheets: Formatting – Cell, row, column Headers, Row Height, Column Width, Visibility – Row, Column, Sheet, worksheet Security e) Formatting – worksheet: Sheet Formatting & style - background, color, Borders & shading, Anchoring objects, Formatting layout for Graphics, Clipart etc., f) Working with sheets : Sorting, Filtering, Validation, Consolidation, Subtotal , Creating Charts, Selecting charts, Formatting charts, label, scaling etc.,	Working with Excel sheet, Spread sheet	Representing Excel sheet preparation for business application Visualisation of Excel data	4

	g) Using Tools: Error Checking, Spell Checks, Macros, Formula Auditing, Creating & using Templates, Tracking changes, customization, printing worksheet			
Working with Excel Functions	Concept of Functions, Commonly used functions: Sum, Max,Min, Average, Count,Today, Now, Datedif, Countif, CountA, CountBlank, Round, RoundUp, RoundDown, ABS, Sign, Ceiling, Floor, Trim, Value, Clean, sqrt, if, sumif **MS Access:** What is an Access Database, Opening a Database File, Create Table, Create andmodify fields of tables, Construct simple queries, Saving and Running Queries	Studying mathematical functions Understanding concept of database Studying how to write and use queries writing queries	applying mathematical functions for given Excel data Creating data bases studying how to write and use queries Writing queries for given database and problem	8

Programme: BCA CBCS – Revised Syllabus w.e.f. - Year 2022 – 2023			
Semester	**Course Code**	**Course Title**	
I	**106**	**Lab on C Programming**	
Course Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	UE(60)+IE(40)	100

Course Objectives :

- To make students practice on the procedure oriented programming using C
- To train the students for programming logic development

Course Outcomes:

- Develop skills to write simple programming concepts using C language
- Implement a real world problem using basic constructs of C language
- Develop an application using Decision making and looping And Make use of proper operators to solve problem
- Make use of Arrays and pointers efficiently and handling strings.
- Comprehend the dynamic memory allocation and pointers in C.
  Able to define new data types using enum, structures and typedef

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Operators	Compilation and Executing programs Arithmetic operations Use of Symbolic constants Demonstrating the following gcc options -o, -c, -D, -l, -I, -g, -E Programs to demonstrate use of operators and Input/ output ***gcc or an equivalent compiler is assumed***. Compilation and Executing programs Arithmetic operations	Understanding of how to write program using input output statement and its execution	program writing using scanf print statements to perform various operations for given problem	5
Selection & Iteration Construct	Program to demonstrate the following - Branching – Nested Branching	use of branching looping statements in programming	writing programs using if if else switch case looks statement based	7

	- Looping Selection.		on the problem requirement	
Function and Storage Classes	Working with functions - Writing function prototype and definition - Using functions to solve problems (Calling a function) - Using recursion Storage classes - Using register, extern and static	Understanding of how to write user defined functions and study where to use it and how to use it	program writing using function with its various variants to solve the given problem	6
4 Arrays and Strings	Arrays and Strings 1D - Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort2 D - Matrix operations Strings: program to do operations on string using library and user defined functions Finding length of string, String concatenation, removing extra spaces, get substring, check whether second string is part of another, converting string to lowercase, uppercase etc..	study array its types various search and sort technique using array study of string and its manipulation	program writing for search technique sorting techniques Matrix manipulation using array writing programs for string manipulation	7
5 **Structures &** **Pointers**	Structures Making use of structures to define new types(user defined types) Arrays of structure, display all elements of array and sorting of them. Pointers, Programs to demonstrate working of pointer; need of pointer, Pointer as parameter to function Comparison of pointer with arrays and using pointer to refer an arrayCreating pointer dynamically by using dynamic memory allocation Array of Pointers, Ragged Arrays, Function pointer.	study user defined data types structure union and concept of pointer	program writing for processing of stored data based on the problem requirement program to implement efficient memory usage for given problems problems	5

Programme:BCA CBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
I	**107**	**Universal Human Values**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Value Addition Course	2	IA (50)	50

Course Objectives:

- To help the student to see the need for developing a holistic perspective of life.
- To sensitize the student about the scope of life – individual, family, society and nature/existence.
- Strengthening self-reflection.
- To develop more confidence and commitment to understand, learn and act accordingly.

Course Outcomes:

- Provide an overview of Prerequisites to Human Values
- Understand the role of a human being in ensuring harmony in self and society
- Analyse ethical dilemma while discharging duties in professional life.
- Evaluate ethical and unethical decisions and take a right stand
- Develop a harmonious environment for holistic development of self and body.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Value Education	1. Value Education, Definition, Concept and Need for Value Education. 2. Self exploration as a means of Value Education.	Introduce the student to value and its need	Observe the change in behavior of the student	3
Harmony in Human Being	1. Human Being is more than just the Body. 2. Harmony of the Self ('I') with the Body - happiness and physical facility 3. Understanding Myself as Co-existence of the Self and the Body. 4. Understanding Needs of the Self and the needs of the Body. 5. Understanding the activities in the Self and the activities in the Body.	Understanding the Students version of Harmony in Human Being	Understanding the past behavior and giving a new perspective and analyzing the change.	7
Harmony in the Family and Society and Harmony in the Nature	1. Family as a basic unit of Human Interaction and Values in Relationships. 2. The Basics for Respect and today's Crisis: Affection, e, Guidance, Reverence, Glory, Gratitude, Prosperity and Love. 3. Comprehensive Human Goal: The Five Dimensions of Human Endeavour. 4. Harmony in Nature: The Four Orders in Nature. 5. The Holistic Perception of Harmony in Existence.	Making the Students understand the terms through various examples and bringing in a holistic perception of Existence	Through case studies interpretation students should be made aware of the importance of these in self and for family and society.	10
Professional Ethics	1. Value based Life and Profession. 2. Professional Ethics and Right Understanding. 3. Competence in Professional Ethics. 4. Issues in Professional Ethics – The Current Scenario.	Understanding the role of ethics.	Through past evidences (historical scriptures) bringing in the role of ethics in right understanding.	10

ReferenceBooks :

Sr.No.	Name of the Author	Title ofthe Book	Year Edition	Publisher Company
1	Bertrand Russell	Human Society in Ethics & Politics	2015	Taylor and Francis
2	I.C. Sharma	Ethical Philosophy of India	1965	Johnsen

Online Resources:

Online Resources No.	Website address
1	https://fdp-si.aicte-india.org/verifiedProgramDetailsList.php
2	https://citizenchoice.in/course/Universal-Human-Values/Unit%201/Happiness-and-Prosperity

MOOCs:

ResourcesNo.	Website address
1	Swayam.gov.in
2	https://epgp.inflibnet.ac.in

Programme:BCA CBCS – Revised Syllabus w.e.f. - Year 2022 – 2023			
Semester	**Course Code**	**Course Title**	
I	**108**	**Language-I**	
Type of Course	**Credits**	**Evaluation**	**Marks**
Ability Enhancement Course	2	IE (50)	100

Course Objectives :

To make students to:

1. Participate actively in discussions & debates
2. Give impromptu speeches and prepared presentations
3. Read, comprehend and summarize articles
4. Learn typical formats for writing and practice writing skills
5. Prepare power-point presentations
6. Receive extensive feedback on their oral and written skills

Course Outcomes:

After completing the course the students shall be able to

- Understand and read English better
- Write accurately and speak fluently.
- Participate actively in discussions and debates
- Give presentations.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Grammar and Translation	• Construction of sentences with there is, there are, it is etc. • Usage of articles, tenses and prepositions etc. • Translation of sentences, & passages from mother tongue to English • General errors in Sentence Constructions • Synonyms, Antonymous, use of appropriate words • Idioms & Phrases	Formation of English sentences with use correct of English Grammar	Understand and apply grammar, Translating sentences, use of idioms and phrases	6
Reading, Listening, and Comprehension skills	• Reading short passages aloud and discussion • Listening of conversations and answering questions • Comprehension of Short Passages	Fluent reading and comprehension of English passages	Pronouncing words, understanding of texts and answering questions thereon	6

	• Comprehensions of texts, judgments and other passages of more general nature			
Speaking skills	• Introducing oneself • Conversations between two student on a given topic/role play • Impromptu speech on a given topics • Debates and Logical reasoning	Use of English in self introduction, debates, logical reasoning and impromptu speech	Introducing oneself, participation in debates, logical reasoning and impromptu speech	6
Writing skills	• Writing correctly (Grammar, Punctuation) • Paragraph Writing • Letters – Structure & Layout (Business & Official letters) • Essay writing • Resume writing	English writing	Paragraph, essay, letter, resume writing	6
Presentation Techniques	• Preparing PowerPoint presentations • Preparing for class-room presentations	Giving English presentations	Making PowerPoint presentations, Giving presentation to class	6

Reference Books:

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	B.M. Sheridan	Speaking and Writing in English	2017	The Readers Paradise
2	Ellen Kaye	Maximize Your Presentation Skills: How to Speak, Look, and Act on Your Way to the Top	2002	Currency
3	Thomson and Martinet	*A practical English Grammar*	1970	The English Language Book Society and Oxford University Press
4	Wren and Martin,	*English Grammar and Composition*	latest edition	S. Chand, Delhi
5	Mike Gould	*Cambridge Grammar and Writing Skills Learner's Book 8*	2019	Cambridge University Press

Online Resources:

Online Resources No.	Web site address
1	https://www.passporttoenglish.com
2	https://www.youtube.com/user/EnglishLessons4U
3	http://www.5minuteenglish.com/grammar.htm
4	https://learnenglish.britishcouncil.org/skills/writing/a1-writing
5	https://www.skillsyouneed.com/presentation-skills.html

MOOCs:

Resources.	Web site address
1	https://www.my-mooc.com/en/mooc/english-grammar-style-uqx-write101x-3/
2	https://www.my-mooc.com/en/mooc/business-english-making-presentations/
3	https://www.my-mooc.com/en/mooc/english-for-effective-business-speaking/
4	https://www.my-mooc.com/en/mooc/english-for-business-and-entrepreneurship/
5	https://www.my-mooc.com/en/mooc/english-doing-business-asia-writing-hkustx-eba102x-1/

BHARATI VIDYAPEETH

(Deemed to be University), Pune

'A+' Accreditation (Third Cycle) by 'NAAC' in 2017

Category-I Deemed to be University Graded by UGC

'A' Grade University Status by MHRD Govt. of India

Ranked 76th by NIRF – 2022

FACULTY OF MANAGEMENT STUDIES

BACHELOR OF COMPUTER APPLICATION DEGREE

(THREE YEARS) / HONORS (FOUR YEARS)

FRAMED AS PER NATIONAL EDUCATION POLICY

(NEP 2020)

Semester II Syllabus

Applicable with effect from 2022-23

SEMESTER II

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	**T**	**P**			
201	Web Development Technology	DSC	3	3	1	-	40	60	100
202	DBMS I	DSC	3	3	1	-	40	60	100
203	Data Structures using C	DSC	3	3	1	-	40	60	100
204	Financial Accounting	MDC	3	3	1	-	40	60	100
205	Lab on Data Structures using C	DSC	2	-	-	4	40	60	100
206	Lab on Web Development Technology	DSC	2			4	40	60	100
207	Environmental Studies	VBC	2	2	-	-	50	-	50
208	Community Work (Swaccha Bharat Abhiyan)	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

Exit option : Student who opt for exit option will be awarded with **Certificate** after successful completion of BCA-Sem-I and BCA-Sem-II and Bridge course internship project.

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**201**	**Web Development Technology**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE(40) + UA(60)	100

Course Objectives:

To make students to:

- To get proficiency in Website designing
- To learn Wordpress as Content Management System
- To get familiar to use all setting and components of Wordpress

Course Outcomes:

After completing the course the students shall be able to

- Understand Wordpress as a Content Management System
- Design Website using Wordpress
- Apply Themes and Templates in Wordpress
- Implement Plugin in Website

Unit	Sub unit	Competency	Competency Indicator	Sessions
Concept of Website	Elements of website - Domain ,Hosting , Content Management System (Wordpress), Domain – Registration , Manage DNS , Nameserver and Domain Forward Hosting – Understand the Difference in Shared Hosting , Cloud Hosting and VPS Hosting WordPress - Installation of WordPress , MySQL Secuirty Certificate – Understand the use of SSL using Free and Paid Service Providers	Understand design and working of simple basic website	Apply the various components required to build website	9
Website Configuration	Header and Footer Configuration General Configuration – Font / Forecolor / Button Type / Backcolor Site Configuration – Logo , Site Icon , Site Name Home page Setting , Website layout Setting	Understand layout and components on website	Create the site configuration and layout	9

Admin Panel Understanding	Change Settings- General Writing Reading, Discussion , media, permalinks and privacy Import and Export website data Add / modify Themes Install – Activate Plugin	Evaluate admin panel	Study and apply different settings using admin panel.	9
WordPress Themes And **Working with Content**	Basics of Themes, Downloading, installing, and activating themes, Installing themes from Dashboard WordPress Plugin: Basics of Plugin, Downloading, installing, and activating free and Paid Plugin WordPress Templates: Basics of Templates, Downloading, installing, and activating Templates, Design Pages using Template Posts Vs Pages, Adding Hyperlinks, Playing with Media content, Previewing and Editing Posts, Previewing and Editing Pages, Page Order, Creating a post, Adding Media files to content –images and videos, Using Categories and Tags, Creating Pages, Page Hierarchy	Apply Plugin and template for designing web page	Implement plugin and template using dashboard	10
Case Study – Online Sales Website	Design Page using Elementor plugin Demonstrate the use of WooCommerce plugin Add WhatsApp Chat button to website for communication Integrate Shipping solution to website using (shiprocket / instashipin) plugin Integrate Payment gateway to website using (payu / razorpay) plugin	Design online sales website	Apply appropriate option to create a online Sales website	8

References Books

Sr. No	**Name of the Author**	**Title of the Book**	**Year**	**Publisher Company**
1	Lisa Sabin - Wilson	Wordpress Web Design for Dummies	2015	For Dummies
2	Lisa Sabin- Wilson	Wordpress All in One for Dummies	2017	John Wiley & Sons
3	Sayyed Majid	Wordpress Web Development:Basic to Advance	2021	Code Academy, Aurangabad

4	Joseph Joyner	Wordpress For Beginners: How to Create and Set Up Your Own Website or Blog Using Wordpress	2015	Mihails Konoplovs
5	Dr. Ritesh Kumar	Learn WordPress in Easy Way	2019	Ganpati Book Centre

Online Resources

Online Resource No.	Website Address
1	https://www.tutorialspoint.com/wordpress
2	https://www.javatpoint.com/wordpress-tutorial
3	https://www.w3schools.in/wordpress

MOOC

Resource No.	**Website Address**
1	NPTEL
2	Swayam
3	edx.com
4	coursera.com

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**202**	**DBMS - I**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE(40) + UA(60)	100

Course Objectives:

To make students to:

- Get familiar with basic concepts of DBMS.
- To impart knowledge of the concepts related to database and operations on databases.
- To manage database in various environments with emphasis on security measures and concurrency.

Course Outcomes:

After completing the course the students shall be able to

- Understand the basic concepts of DBMS.
- Design the database by applying data model like Entity relational model.
- Applying the keys and normalization while designing the database.
- Understand the concept of transaction and its operations.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction of Database Management System	Basic Concepts of DBMS (Data Vs. Information), Data Processing, Definition of DBMS, Characteristic of Database **Database architecture:** Levels of Abstraction, Database schema and instances 3 tier architecture of DBMS Data Independence, Database users, Types of Database System.	Concept of basic terminologies and database architecture	Understand the basic terminologies of DBMS and its architecture	8
Data Modeling	**Logical Data Modeling:** Hierarchical Data Model, Network Data Model, Relational Data Model. **Conceptual Data Modeling:** Entity Relationship Model, Entities, Attributes, Types of Attributes, Relationships, Relationship set, Degree of relationship Set, Mapping	Apply concepts of Data Modeling to design database	Understand the different types of Models and its implementation	8

	Cardinalities, ER Diagram Notations **Roles Participation:** Total and Partial, Strong and Weak Entity Set.			
Normalization	Codd's Rules for RDBMS **Keys:** Primary key, Foreign key, Candidate key, Super key, Unique key. Simple Key, Composite key **Normalization:** Concept of normalization, Decomposition, Lossy and Lossless Decomposition, Functional Dependencies. **Normal Form:** First NF, Second NF, Third NF, Case Studies on Normalization	Standardise the relational database in terms of keys and normalization	Normalize the database schema up to 3rd normal form.	11
Introduction to Database Languages and Basic concepts of SQL	**Database Languages:** Introduction of SQL, features, SQL data types. **DDL commands:** create table, describe table, alter table, and drop table commands. **DML Commands:** insert, delete, update command **DQL commands:** All select commands, and order by clause.	Different statements in database language w.r.t. SQL.	Construct basic queries using SQL	8
Transaction management and Concurrency control	**Transaction management:** Definition of transaction, State of Transaction, ACID properties, Schedules, Serializability of schedules **Concurrency control:** Lock based concurrency control (2PL), Strict 2PL, Time stamping method. **Deadlock and its handling:** Definition, Wait-Die and Wound-Wait methods. **Database Recovery**: Log Based Recovery, Check points, Shadow Paging	Understand concept of transaction and concurrency control.	Learn basics of transaction processing and concurrency control	10

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	Ramez Elmasri, S.Navathe	Fundamentals of Database Systems	6th Edition 2010	Pearson Education
2	A Silberschatz, H Korth, S Sudarshan	Database System and Concepts	6th Edition 2010	McGraw-Hill.
3	C.J.Date	An Introduction to Database Systems	3rd Edition 2006	Addison Wesley

Online Resources:

Online Resources No.	Website address
1	https://www.udemy.com/course/database-management-system/
2	https://www.youtube.com/watch?v=cMUQznvYZ6w
3	https://www.youtube.com/watch?v=3EJlovevfcA
4	https://www.youtube.com/watch?v=T7AxM7Vqvaw

MOOCs:

Resources No.	Website address
1	https://www.classcentral.com/course/swayam-data-base-management-system-9914
2	https://www.classcentral.com/course/youtube-dbms-database-management-system-95181
3	https://www.classcentral.com/course/swayam-introduction-to-database-systems-17660

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year 2022–2023			
Semester	**Course Code**	**Course Title**	
II	**203**	**Data Structures using C**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE(40)&UA(60)	100

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To evaluate significance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.
- To acquire proficiency in file handling in C.

Course Outcomes:

After completing the course the students shall be able to

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem.
- Develop programming skills which require to solve given problem.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to data structure	• Data type • Abstract Data Type (ADT) • Type of data structure • Array as a data structure • Sorting techniques with time complexity: Bubble sort, Selection sort, Insertion sort and Quick sort • Searching techniques with time complexity: Linear search and Binary search	Understanding of data structure concept Apply array as data structure Learning different sorting and searching techniques.	Application of data structure in real life. Implementation of sorting and searching techniques	10
Linked List	• Definition • Memory representation of linked list • Types of Linked List-singly, doubly and circular	Understand concept of Linked list, its types, basic operations and applications	Study the types of linked list and application Implementation of linked list operations	10

	• Basic Operations of linked list • Applications of linked list			
Stack and Queue	**Stack:** • Definition • Stack operations • Array implementation of stack • Linked list implementation of stack • Applications of stack **Queue:** • Definition • Queue operations • Array implementation of queue • Linked list implementation of queue • Applications of queue	Understand concept of stack and queue with its operations and applications	Study the detailed concept of stack and queue Implementation of stack and queue using array and linked list	12
Trees	• Concept of tree • Tree terminologies • Binary Tree • Types of binary tree • Tree traversal-Preorder, Inorder and Postorder	Define tree and various tree terminologies Learn binary tree with its types and traversal methods	Understanding of tree concept Implementation of tree data structure using C Programming	7
File Handling	• Concept of file • Types of File • Operations on file • File modes • file management functions-fopen(), fclose(),fprintf (), fscanf(), getc(), putc (), getw(), putw () • Random access functions-fseek(), ftell() and rewind()	Know concept of file with its types, operations and modes Introduction of file management functions	Apply files processing using C Language	6

Reference Books:

Sr.No.	Name of the Author	Title ofthe Book	Year Edition	Publisher Company
1	Yashavant Kanetkar	Data Structures Through C	2009 Second	BPB Publications
2	Reema Thareja	Programming in C	2011 First	Oxford University Press
3	Aaron Tenanbaum	Data Structures using C and C++	Second Edition	Pearson Education
4	Rajani Jindal	Data Structures using C	2006	Umesh Publication

Online Resources:

Online Resources No.	Website address
1	https://www.mygreatlearning.com/blog/data-structures-using-c/
2	https://www.edureka.co/blog/c-data-structures/
3	https://www.programiz.com/dsa

MOOCs:

Resources No.	Website address
1	NPTEL/Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCA CBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**204**	**Financial Accounting**	
Type	**Credits**	**Evaluation**	**Marks**
Minor Disciplinary Course	3	IE 40 + UA(60)	100
Course Objectives:			
▪ To get familiar with basics of accounting concepts. ▪ To learn journal entries and prepare financial statements ▪ To get acquainted with computerised accounting system			
Course Outcomes:			
After completing the course, the students shall be able to • Remember the basic numerical operations and pass book entries. • Understand the basics of financial accounting and accounting principles • Apply the rules of journal entries for preparing journals, ledgers and trial balance. • Analyse the trial balance and transferring the accounts to respective financial statements. • Evaluate the adjustments and applying its effect on respective accounts. • Generate the logic for implementing accounting procedure in the accounting software.			

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Financial Accounting, Accounting Principles, Concepts and Conventions	Need for Accounting, Meaning and definition of book keeping, System of Book keeping. Financial Accounting- definition, Scope and objectives, Financial Accounting v/s Book Keeping, Limitations of Financial Accounting. End users of financial statements. Accounting principles- Accounting Concepts and Conventions , , Branches of accounting , concept of bad debts , depreciation ,methods of depreciation :Fixed and reducing, Examples on depreciation	Have a basic understanding of need of financial accounting and how accounting works.	Understand and remembering system of book keeping and Financial accounting and ability to apply the concepts and principles	12
Journal and ledger:	Journal-importance and utility, classification of accounts, journalizing of transactions. Ledger- meaning and utility, posting of journal entries to the ledgers ,closing the ledger	Know the types of account and rules of journal entries	Classifying the account and then making appropriate debiting and	10

	accounts, Examples on journal entries of transactions and posting them to ledgers, closing ledger accounts .		crediting respective account	
Subsidiary Books And Trial Balance	Simple Cash book, Cash Book with two columns, Cashbook with three columns, Petty Cash Book , Purchase book, Sales book, Purchase Return book , Sales return book . Trial Balance - meaning and purpose, Preparation of Trial Balance from ledger accounts .	Understand the procedure of preparing appropriate subsidiary books	Preparation of subsidiary books and posting the relevant items	06
Final account of Sole Proprietorship	Meaning of final account, Need to prepare final account , Uses of Final account , Preparation of Final account of Sole Proprietorship : Trading and Profit, Loss Account and Balance Sheet of sole proprietary business with given adjustments.	Understand preparation of trading, profit and loss account and balance sheets	Preparing trading, profit and loss account and balance sheets and tallying the statements	12
Introduction to Accounting Packages	Need of accounting software, features of accounting packages , introduction to Tally package, various books maintained in Tally accounting package, atomized effect of one transaction in various books of accounting through accounting package.	Knowing the use of computers in automation of accounting procedure and updating entire accounting statements with single transaction	Developing logic for accounting packages	05

Reference Books:

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Dr. S. N. Maheshwari	Financial Accounting For Management	2012	Vikas Publishing House
2	Robert Anthony, David Hawkins	Business Accounting	2009	Tata McGraw–Hill
3	M.G.Patkar	Book-Keeping & Accountancy	2006	FYJC Commerce
4	Anil Chowdhary	Fundamentals of Accounting & Financial Analysis	2007	Pearson Education

MOOC's:

Sr.No.	Website address
1	https://in.coursera.org/courses?query=accounting

Programme:BCA CBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**205**	**Lab on Data structures using C**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	IE 40 + UA(60)	100

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To evaluate significance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.
- To acquire proficiency in file handling in C

Course Outcomes:

After completing the course, the students shall be able to

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem..
- Develop programming skills which require to solve given problem.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to data structure	Write C programs for the following operations on Array. (i) Creation (ii) insertion (iii) deletion (iv) traversal Write C programs for implementing the following searching techniques. 1) Linear search 2) Binary search Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order. 1) Bubble sort 2)Insertion sort 3)Selection sort	Learn the concept of array as data structure, searching and sorting techniques with explanation of algorithms to implement it using C code.	Able to design and implement array operations using C code. Able to implement sorting and searching techniques using Array	7
Linked List	Write a C program for the following operations on Singly Linked List. 1) Creation 2) insertion 3) deletion 4) traversal 5) Searching Write a C program to count number of items present in a singly linked list. Write a C program for the following operations on Doubly Linked List.	Discussion of algorithms to implement the concept of linked list and its operations with C code.	Can write programs using C code to demonstrate linked list concept with its operations.	7

	1) Creation 2) insertion 3) deletion 4) traversal 5) Searching			
Stack and Queue	Write a C program to implement stack using array. Write a C program to implement stack using linked list. Write a C program that convert infix expression into postfix form. Write a C program to convert decimal to binary using stack. Write a C program to check whether a string is a Palindrome or not using stack. Write a C program to convert an infix expression into prefix format. Write a C program to implement queue using array. Write a C program to implement queue using linked list.	Designing of algorithms to implement the concept of stack and queue using array and linked with C programming.	Able to write C code to implement stack and queue data structure using array and linked list.	7
Trees	Write C program to demonstrate concept of tree. Write a C program to count number of leaf nodes and total number of nodes in a tree.	Understand the concept of trees as non-linear data structure with explanation of algorithms to implement it using C code.	Can explain tree concept and able to write C code to demonstrate working of trees	4
File Handling	Write C programs to implement working of following file management functions: fprintf (), fscanf(), getc(), putc (), getw(), putw () Write C programs to implement working of following Random access functions: fseek(), ftell() and rewind()	Learn the working of file handling concept and discussion of file management function. Providing knowledge of how to write C	Able to implement file management functions and random access functions using C programming.	5

	Write a C program to display contents of a file in uppercase and lowercase letters. Write a C program to count characters, spaces, tabs and new lines in a file. Write a C program to copy the contents of one file to another file. Write a C program to receive strings from keyboard and write them to a file. Write a program to read strings from a file and display them on screen.	programs to implement file management functions.		

Reference Books:

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Yashavant Kanetkar	Data Structures Through C	2009 Second	BPB Publications
2	Reema Thareja	Programming in C	2011 First	Oxford University Press
3	Aaron Tenanbaum	Data Structures using C and C++	Second Edition	Pearson Education
4	Rajani Jindal	Data Structures using C	2006	Umesh Publication

Online Resources:

Online Resources No.	Website address
1	https://www.mygreatlearning.com/blog/data-structures-using-c/
2	https://www.edureka.co/blog/c-data-structures/
3	https://www.programiz.com/dsa

MOOCs:

Resources No.	Website address
1	NPTEL / Swayam
2	www.edx.com
3	www.coursera.com

Note: The practical examination need to be build on similar questions listed in detail syllabus

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**206**	**Lab on Web Development Technology**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	IE(40) + UA(60)	100

Course Objectives:

To make students to:

- Get aware about the applications of Wordpress as Content Management System
- Get knowledge about all setting and components of Wordpress

Course Outcomes:

After completing the course the students shall be able to

- To operate Wordpress as a Content Management System
- To design Website using Wordpress
- To apply Themes and Templates in Wordpress
- To implement Plugin in Website development

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Concept of Website	Domain Hosting Content Management System (Wordpress), Domain – Registration , Manage DNS , Nameserver WordPress - Installation of WordPress	Apply design and working of simple basic website	Create website with the various components needed to build website	5
Website Configuration	Header and Footer Configuration General Configuration – Site Configuration – Logo , Site Icon , Site Name Home page Setting , Website layout Setting	Understand layout and components on website	Analyze the site configuration and layout	6
Admin Panel Understanding	General Writing Reading ,Discussion , media, permalinks and privacy data Themes Activate Plugin	Understand admin panel with different setting	Apply different setting using admin panel.	6
WordPress Themes And Working with Content	Themes, Downloading, installing, and activating themes, WordPress Plugin:	Understand Plugin and template for designing web page	Apply plugin and template using dashboard	7

	Downloading, installing, and activating Templates Downloading, installing, and activating Templates, Design Pages using Template Adding Hyperlinks, Playing with Media content, Previewing and Editing Pages, Page Order, Creating a post, Adding Media files to content			
Case Study – Online Sales Website	Demonstrate the use of WooCommerce plugin Add WhatsApp Chat button to website for communication Integrate Shipping solution to website Integrate Payment gateway to website	Understand and prepare design online sales website	Apply appropriate option to create a online Sales website	6

References Books

Sr. No	Name of the Author	Title of the Book	Year	Publisher Company
1	Lisa Sabin - Wilson	Wordpress Web Design for Dummies	2015	For Dummies
2	Lisa Sabin- Wilson	Wordpress All in One for Dummies	2017	John Wiley & Sons
3	Sayyed Majid	Wordpress Web Development:Basic to Advance	2021	Code Academy, Aurangabad
4	Joseph Joyner	Wordpress For Beginners: How to Create and Set Up Your Own Website or Blog Using Wordpress	2015	Mihails Konoplovs
5	Dr. Ritesh Kumar	Learn WordPress in Easy Way	2019	Ganpati Book Centre

Online Resources

Online Resource No.	Website Address
1	https://www.tutorialspoint.com/wordpress
2	https://www.javatpoint.com/wordpress-tutorial
3	https://www.w3schools.in/wordpress

MOOC

Resource No.	Website Address
1	NPTEL
2	Swayam
3	edx.com
4	coursera.com

Note: The practical examination need to be build on similar questions listed in detail syllabus

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**207**	**Environmental Studies**	
Type	**Credits**	**Evaluation**	**Marks**
Value Based Course	2	IE(50)	50

Course Objectives:

- To Understand the nature and function of the natural environment affecting society.

Course Outcomes:

- Understand the importance of Environment in the life of living things.
- Apply the awareness knowledge in taking eco-friendly actions in society.
- Judge what is right and wrong for the environment in day to day life.
- Analyse the impact of activities on environment and its effect.
- Understand the need and way of sustainable development and will pass the knowledge to the next generation.

Unit	Sub unit	Competency	Competency Indicator	Sessions
The multidisciplinary nature of environment studies	Definition, scope and importance- need of public awareness. **Natural Resources**: **Renewable and non-renewable resources:** **Forest resources:** Use and over-exploitation, deforestation. Case studies. Timber extraction, mining, dams and their effects on forest and tribal people. **Water resources:** Use and over-utilization of surface and groundwater, floods, droughts, conflicts over water, dams- benefit and Problems. **Mineral resources:** Use and exploitation 'environmental effects of extracting and using mineral resources, case studies. **Food resources:** World food problems, changes caused by agriculture. Fertilizer- pesticide problems, water logging, salinity, case studies. **Energy resources:** Growing energy needs, renewable and non-renewable energy resources, use of alternative energy sources. **Land resources:** Land as resources, land degradation, man induced landslides, desertification.	Understand the multidisciplinary nature of Environment. Understand the various renewable and non-renewable resources in nature.	Observations through field work on resources and understand the Sources, Utility, Problems and solutions for the resources.	10

	Role of individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles			
Ecosystem	Concept of ecosystem, structure and function of an ecosystem, producers, consumers and decomposers .Energy flow in the ecosystem, Ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristics features structure and function of the following ecosystem, forest ecosystem ,grassland ecosystem, Desert ecosystem, Aquatic ecosystems, ponds, stream, lakes, rivers, estuaries	Understand the meaning, types and importance of ecosystem.	Visits to ecosystem and observe the role of producer, consumer and decomposer in the environment.	8
Biodiversity and its conservations	Introduction, Definition: genetic, species and ecosystem diversity, Biogeographically classification of India, value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option vales, India as a mega diversity nation, Hot-Spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, Man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.	Understand the biodiversity in nature, its importance, threats of biodiversity and ways to conserve the biodiversity	Visit to biodiversity spots. Understand the biodiversity and their interrelationship. To adopt and implementation and new ways to conserve biodiversity.	6
Role for Environment Conservation	• Social issues and environment - Unsustainable to sustainable • Role of IT in Environment and human health.- Human population issue. • E-waste – Impact and remedies • Climate Change- Green House gases effect • Project work- Each candidate has to go for field visit and complete a project work on Environmental issues in society	Understand the need and ways of unstainable to sustainable development	Field work, Visit and Project report based on Environmental issues in society	6

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References Books:

Sr. No	Name of the Author	Title of the Book	Publisher Company
1	Bharucha Erach	The Biodiversity of India	Mapin Publishing Pvt. Ltd.
2	Agrawal K.C	Environmental Biology	Nidhi Publishers Ltd(2001)
3	Jadhav H and Bhosale V.M.	Environmental Protection and Laws	Himalaya Publishing House.
4	Miller T.G. Jr.	Environmental Science	Wadsworth Publishing Co.

MOOC

Resource No.	Website Address
1	NPTEL
2	Swayam
3	edx.com
4	coursera.com

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
II	**208**	**Community Work – Swacch Bharat Abhiyan**	
Type	**Credits**	**Evaluation**	**Marks**
Value Based Course	2	IE(50)	50
Course Objectives:			
• This course aims to expose the students to Swacch Bharat Abhiyan initiative of the government			
Course Outcomes:			
• Students will be able to understand the details about the Swacch Bharat Abhiyan and its impact on society.			

Unit	**Sub unit**	**Competency**	**Competency Indicator**	**Sessions**
1.Swacch Bharat Abhiyan	Swacch Bharat Abhiyan : History, meaning, Roots of Swacch Bharat Abhiyan, Goals of Cleanliness initiatives.	Understand the basics of SBM	Change in Students Behaviour towards cleanliness habits	8
2. Cleanliness	Initiators of cleanliness drive in India. Sant Ghadage Baba, Mahatma Gandhi, Efforts taken towards the Swach Bharat Abhiyan, Swachh Bharat Mission, Role of NGO's in Cleanliness	Study different cleanliness drives	Enhancement in Social Awareness	6
3. Impact of Cleanliness	Impact of Cleanliness initiatives and sanitation awareness. Social Awareness, Case Studies- COVID-19, Swachh Toycathon Initiative, Mumbai Municipality Slum Sanitation Program India.	Study and analyse different cases	Strategic development in activities needed for Cleanliness initiatives	6
4. Community Hours	Internship of 15 days (100 hours) to be undertaken Submit a report on a particular type of community involvement undertaken Topics may be related to: Sanitation, Waste Management, Digital Innovations, Green Practices, Involvement in Public Infrastructure Cleanliness, Animations, Videos	Study, Contribute in cleanliness activities and prepare case study report	Students community involvement	10

	creating awareness about Swacch Bharat, Designing innovative Swachh Toycathon toy/game etc.			

References Websites:

1.	www.swachhbharaturban.in/
2.	https://en.wikipedia.org/wiki/Municipal_solid_waste
3.	https://swachhbharatmission.gov.in/sbmcms/index.htm
4.	https://innovateindia.mygov.in/swachh-toycathon/
5.	https://www.susana.org/_resources/documents/default/2-1925-india-draft--en-susana-cs-india-mumbai-slumsanitationprogram-2010doc-anlage.pdf

MOOC

Resource No.	Website Address
1	NPTEL
2	Swayam
3	edx.com
4	coursera.com

Bridge Course :

The student who opt for Exit Option after First Year completion of BCA should complete the 50 days bridge course internship project in the form of Computerised application to the real life problem at industries. It is mandatory for the students to seek written approval from the faculty guide about the selection of topic and organisation before commencing the internship. The selection of the problem should be based on theoretical knowledge he/she gain in BCA-Sem-I and BCA-Sem-II. Student should submit application regarding permission to exit BCA programme at least four months before the completion of First Year of BCA Programme. This bridge course will help the student to absorb job opportunities in the IT field.

General chapterization of the report shall be as under:

1) Introduction
2) Theoretical background
3) Company profile
4) Objectives of the study
5) System Requirements
6) System Analysis & Design
7) Implementation & Testing
8) Conclusion & Suggestions

References:

Annexure: -

TECHNICAL DETAILS:

1. The report shall be printed on A-4 size white bond paper.
2. 12 pt. Times New Roman font shall be used with 1.5 line spacing for typing the report.
3. 1" margin shall be left from all the sides.
4. Considering the environmental issues, students are encouraged to print on both sides of the paper.
5. The report shall be hard bound as per the standard format of the cover page given by the Institute and shall be golden embossed.
6. The report should include a Certificate (on company's letter head) from the company duly signed by the competent authority with the stamp.
7. The report shall be signed by the respective guide(s) & the Director of the Institute 10 (Ten) days before the viva-voce examinations.
8. Student should prepare two hard bound copies of the Summer Internship Project Report and submit one copy in the institute. The other copy of the report is to be kept by the student for their record and future references.
9. At end of bridge course internship the viva –voce shall evaluate the report by University Appointed panel for 4 Credits

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BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY)PUNE, INDIA

FACULTY OF MANAGEMENT STUDIES

Board of Studies in Computer Applications and System Studies

Bachelor of Computer Applications Degree (Three Years)/ Honors (Four Years) Programme
(Under Choice Based Credit System)
Framed as per National Education Policy (NEP 2020)
To be effective from 2022-23

SEM- III

SEMESTERIII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
301	OperatingSystems	DSC	3	3	1	-	40	60	100
302	SoftwareEngineering	DSC	3	3	1	-	40	60	100
303	JavaProgramming	DSC	3	3	1	-	40	60	100
304	Statistics	MDC	3	3	1	-	40	60	100
305	LabonOracle	DSC	2	-	-	4	40	60	100
306	Labon Java	DSC	2	-	-	4	40	60	100
307	Start-up Management	AEC	2	2	-	-	50	-	50
308	Yoga & Meditation	VBC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

The student should complete **TWO** MOOCs (Massive Open Online Courses) as add on Course which provides wide access to the online learning. The student will complete MOOCs prescribed by the institute in semester III, Sem IV, and / or Sem V. Additional Credits will be given to the student as per MOOCs Policy

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**CourseTitle**	
III	**301**	**OperatingSystems**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE(40) + UA(60)	100

Course Objectives:

To make students to:

- Toacquire knowledge regarding structure and working of themajoroperatingsystemcomponents
- To learn and apply different process and memory scheduling algorithms and synchronization techniques to achieve better performance of computer system.
- To understand structure and organisation of file system .

Course Outcomes:

After completing the course the students shall be able to

- Understandfunctioningandworkingof Operating System
- Explaintheconceptsofprocess scheduling, memory and file management
- Understand I/O System

Unit	Sub Unit	Competency	Competency Indicators	Sessions
IntroductiontoOperatingSystem	Definition and concept of OS, History of OS, Importance and function of Operating system.Types of OS-Batch System, timesharing, Multitasking, multiprogramming, multiprocessing,online operating system, real time, distributed operating system. Views-command languageusers view, system call users view, structure of OS-simple, monolithic system and layeredsystem, client server model.User operating-system interface: command line interface, GUI,systemcalls.	Understand the basic conceptof Operating System and its structure	Concept of basic terminologies and structure of Operating System	7
ProcessManagement	Process concept, Process Control Block, process states and its transitions, context switch,	Apply concepts of Process	different types of process Scheduling	10

	OSservices for Process management, scheduling and types of schedulers, scheduling algorithm-First come first served, shortest job first, shortest remaining time next, time slice scheduling,priority-basedscheduling,multilevelqueue,multilevelqueue withfeedback	Management and Scheduling	Algorithms	
StorageManagement	Basicconceptofstoragemanagement, logicalandphysicaladdress space, swapping, contiguousallocation,non-contiguousallocation,fragmentation, segmentation,paging,demandpaging,virtualmemory,pagereplacementalgorithms-FIFO,Optimalpage replacement algorithm, least recently page replacement algorithm, clock page replacement algorithm, design issue of paging, thrashing.	Understanding the concept of Storage Management Strategies	Storage Management Techniques for efficient utilization	10
Inter-process communication and synchronization	Need, Mutual Exclusion, Semaphore, Busy-wait Implementation, characteristics of semaphore, queuing implementation of semaphore, producer consumer problem, critical region and conditional critical area. What is deadlock? Conditions to occur the deadlock, deadlock prevention, deadlock avoidance- banker‘s algorithm. resource request, resource release.	Study the concept of Deadlock with its Prevention	Concept of IPC and Synchronization	8
File Systems and I/O System	**File System** : Files-basic concept, file attributes, operations, file types, file structure, access methods, Directory- structure-single level directory system, two level directory system, hierarchical directory system, directory operations, protection, security, allocation method. **Input/output System:** Principles of I/O hardware, I/O	Understand concept of File with its structure and Principles of Input Output System	Structure of File with its Security and Disk Scheduling Algorithms	10

	devices, device controller, DMA, Principles of I/O software- goals, interrupt handler, device driver. Mass storage structure-disk structure, disk scheduling (FCFS, SSTF, SCAN, LOOK, C- SCAN, C-LOOK)			

ReferenceBooks:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	SilberSchatz, Galvin, Gagne	Operating SystemConcepts	11th Edition	Wiley Publication
2	MilanMilinkovic	OperatingSystemsConceptandDesign	2nd Edition	McGraw Hill Education India
3	AndrewTanenbaumandAlbertWoodhull	Operating SystemsDesign andImplementation	3rd Edition	Pearson

Online Resources:

Online Resources No.	Website address
1	https://www.studytonight.com/operating-system/
2	https://www.tutorialspoint.com/operating_system/index.htm
3	https://www.youtube.com/watch?v=WJ-UaAaumNA
4	https://www.youtube.com/watch?v=zFnrUVqtiOY

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Semester	Course Code	CourseTitle	
III	**302**	**Software engineering**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IA(40) + UE(60)	100

Course Objectives:

To make students to:

- To make students familiar with basic concepts of Software Engineering.
- To introduce the methodologies involved in the development and maintenance of Software over its entire life cycle.

Course Outcomes:

After completing the course, the students shall be able to

- Understand life cycle models**,** Requirement elicitation techniques, understand the concept of Analysis and Design of software.
- Develop SRS as per any of the existing standards.
- Implement software engineering concepts in software development to develop quality software..

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Software Engineering:	Software, Program vs Software, software characteristics, Definition of Software Engineering, importance, principles of software engineering, Difference between software engineering and software programming, Members involved in software development.	Understandin gof basic terminologies of software & software engineering	Concept the basic terminologies of software & software engineering	8
Software process and Feasibility study:	Need of Feasibility study, types of Feasibility study, Cost Benefit Analysis. General software development life cycle with all phases. Overview of software models (Waterfall, Prototyping, and Spiral and Rapid Application Development model).	Apply concepts of feasibility study & s/w development model	the different types of s/w development Models and its implementati on	8

Requirement Engineering Concepts and Methods:	What is Requirement Engineering, Types of requirements, Requirement elicitation techniques- Traditional methods and Modern methods, Verification and validation process. Principles of Requirement Specification, Software Requirement Specification document Outline Characteristics of good SRS: - correct, complete, unambiguous, consistent, modifiable, traceable, Understandable	Derive the concept of software requirements & SRS document.	software requirements from user and design the SRS document	11
Analysis and Structured System Design tools:	**Analysis and Design Tools**: Entity-Relationship Diagrams, Decision Tree and Decision Table, Data Flow Diagrams (DFD), Data Dictionary, Elements of DD Advantage of DD, Pseudo code, Input and Output Design **Structured System Design:** Modules Concepts and Types of Modules Structured Chart , Qualities of Good Design , Coupling, Types of Coupling , Cohesion, Types of Cohesion, CASE STUDIES (Based on Above Topic)	Draw different diagram based on software design	Ability to draw Software design diagrams and operate analysis tools.	8
Software Testing, Quality Control and Software Maintenance	Definition, Test characteristics, Types of testing: Black-Box Testing, White-Box Testing, Unit testing, Integration testing **Quality concept:** Quality, SQA Plan, Software Configuration Management Formal Technical review: Review meeting, review reporting and review guidelines Software Configuration Process. What is software maintenance?	Understand concept of Testing , Quality control and Maintenance	Learn basics of Testing , Quality control and Maintenance	10

	Categories of Software Maintenance: Corrective maintenance, Adaptive maintenance, Perfective maintenance, and preventive maintenance.			

ReferenceBooks:

Sr.No.	NameoftheAuthor	Title ofthe Book	Year	PublisherCompany
1	Roger S. Pressman	SOFTWARE ENGINEERING A PRACTITIONERS APPROACH	seventh edition	McGraw Hill International Edition
2	Sommerville	Software Engineering	seventh edition	Pearson Education
3	K.K. Aggarwal & Yogesh Singh	Software Engineering	-	New Age International

Online Resources:

OnlineResourcesNo.	Websiteaddress
1	https://www.youtube.com/watch?v=Z6f9ckEElsU
2	https://www.youtube.com/watch?v=4b1D1QFEel0

MOOCs:

ResourcesNo.	Websiteaddress
1	https://onlinecourses.nptel.ac.in/noc19_cs69/preview
2	https://www.classcentral.com/course/introduction-to-software-engineering-98973

Semester	Course Code	CourseTitle	
III	**303**	**Java Programming**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IA(40) + UE(60)	100

Course Objectives:

- To develop proficiency in creating console based applications using the Java Programming Language.
- To interpret the concepts of object oriented Programming Language and easily use Java.
- To understand and implement File Handling in Java.
- To develop Application using Database Connectivity in Java.

Course Outcomes:

At the end of this course, student should be able to understand

- Design interfaces, abstract and concrete classes
- Use concurrent programming, Java Collections and utility classes
- Able to achieve object persistence using object serialization.
- Get the main features of Java Programming for Business Applications

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Introduction to Java:	Features of Java, Java compiler, JVM, Garbage collection, Data types, concept of class and object, control structures in java, arrays in java, array of objects.	Understanding What is Java, Structure of Java Program, Understanding Java Data types, Control Statements and the concept of an array	Basic terminologies in Java programming Language and its core concepts	8
Class and Object Concepts:	Concepts of OOP, Defining a class, creating objects from class, adding attributes and methods to the class, using constructors,	Understanding the concept of Class, Object, polymorphism, Encapsulation	Introduction to OOP, Functions and Modifiers	

	Passing values to the functions – pass by value, pass by reference, Function overloading. Modifiers – public, private, protected, default, static, final, Concept of package, Introduction to Exception Handling.	etc Concept of Function Package and Exception Handling		10
Inheritance and Polymorphism:	Concept and importance of inheritance, is-a relationship, types of inheritance, Polymorphism – function overriding, dynamic method dispatch. Using abstract and final keywords with class declaration, Concept of interface and class.	Understanding the properties Inheritance and Polymorphism.	Implementation of Inheritance, Method Overloading, Constructor Overloading and Method Overriding	8
Java Input/Output:	Concept of streams, types of streams – byte streams, character streams. The Console: System.out, System.in, and System.err, InputStream class, OutputStream class, File class, FileInputStreams, File OutputStream, Reader class, Writer class, FileReader, FileWriter.	Understanding the concept of File Handling	File Handling, Concept of stream, Implementation of various Input and Output Streams for handling the data.	8
GUI Programming (AWT, SWING) And Applets	Introduction to GUI controls – Button, Lable, TextField, TextArea, List, Checkbox and RadioButtons, Scrollbar, Menu etc. **Applets:** Applet concept, creating basic applet, applet lifecycle, controlling applet content	Understanding the concept of Graphical User Interface Understanding the Concept of Applet	Applying commonly used controls of AWT and Swing Introduction to Applet, Life Cycle of an Applet.	11

ReferenceBooks:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	Herbert Schildt	The Complete Reference JAVA	7th Edition	McGraw-Hill
2	Cay S. Horstmann and Gary Cornell	Core Java Volume-I	8th Edition	Sun Core Series
3	Bruce Eckel	Thinking In Java	4th Edition	Printice Hall

Online Resources:

Online Resources No.	Website address
1	https://www.w3schools.com/java/
2	https://www.javatpoint.com/java-tutorial
3	https://www.tutorialspoint.com/java/index.htm
4	https://docs.oracle.com/javase/tutorial/

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Programme :BCA CBCS– Revised Syllabus w.e.f.-Year2022 –2023			
Semester	**Course Code**	**Course Title**	
III	**304**	**Statistics**	
Type	**Credits**	**Evaluation**	**Marks**
Minor Specific Course	3	IA(40) + UE(60)	100

Course Objectives:

- Tounderstand the statistical concepts.
- Toprovideknowledge related to various tabulation methods and representation of data.
- To learn and apply Measures of Central Tendencies, Measures o Dispersion, Regression and Correlation Analysis.

Course Outcomes:

After completion of the course the students shall be able to

- Understand types of statistical data, data collection and representation of data.
- ExplaintheconceptsofMeasures of Central Tendencies, Measures o Dispersion, Regression and Correlation Analysis.
- Solve examples applying Measures of Central Tendencies, Measures o Dispersion, Regression and Correlation Analysis.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Unit-I Introduction to Statistics Data Collection and representation	Definition of Statistics, Importance of Statistics, Scope of statistics, Limitations of Statistics, Advantages and Disadvantages of Statistics. **Types of data:** Primary and Secondary data, Sources of Data collection, **Tabular Representation of data:** Ungrouped and grouped frequency distribution, **Graphical representation of data:** Histogram, frequency polygon and Curve, Cumulative frequency curves (ogive curves).	Understand the importance , scope of statics in day to day life Understand the types of data and represent it graphically	Introduction to statistics concepts Tabulation and representation of data	13
Unit-II Measures of central tendency	a) **Mean**: Definition, problems on mean for individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits, Examples. b)**Median**: Definition, problems on median individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits, Examples. c) **Mode**: Definition, problems on mode for individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits, Examples.	Understanding the concept of measures of central tendency.	Measures of central tendency like mean , median and mode	9
Unit-III Measures of Dispersion	**a)Range:** Definition, problems on range for individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits of Range, Examples. **b)Mean Deviation:** Definition, problems on mean deviation about mean for	Understanding the concept of Measures of Dispersion	Concept of Range, Mean Deviation and Standard Deviation	9

	individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits, Examples. **c) Standard Deviation:** Definition, problems on standard deviation for individual observations, ungrouped frequency distribution and grouped frequency distribution, merits and demerits. Coefficient of variation, coefficient of Determination and Standard error, Examples.			
Unit-IV Regression Analysis	Introduction to Regression Analysis, Lines of Regression Equation: A) Regression Equation of Y on X, B) Regression Equation of X on Y , Properties of Regression co-efficients , problems on finding regression equations and estimations	Understand concept of Regression equations	Estimating Regression coefficients using regression equations.	7
Unit-V Correlation Analysis	Introduction, Types of Correlation, Scatter Diagram , Karl Pearson's coefficient of correlation, Properties and Interpretation of Correlation coefficient, Merits and Demerits of Karl Perason'sCoeffecient, Spearman's Rank correlation Coeffecient, Examples	Understand concept of Correlation Analysis	Studying various types of correlation and estimating correlation coefficients	7

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	S.P.Gupta	Statistical Techniques	45th Edition	Sultan Chand & sons, Educational Publishers New Delhi
2	RanjeetChitale	Statistical and Quantative Methods	15th Edition	NiraliPrakashan
3	M.G.Dhayagude	Statistical and Quantative Methods	1st Edition	Everest Publishing House

Online Resources:

Online Resources No.	Website address
1	https://www.tutorialspoint.com/statistics/index.htm
2	https://www.toppr.com/guides/maths/statistics/data/
3	https://ncert.nic.in/textbook/pdf/kest105.pdf
4	https://ncert.nic.in/textbook/pdf/kest106.pdf
5	https://ncert.nic.in/textbook/pdf/kest107.pdf
6	https://www.cimt.org.uk/projects/mepres/alevel/stats_ch12.pdf

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Semester	Course Code	Course Title	
III	**305**	LabonOracle	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	IA(40) + UE(60)	100

Course Objectives:

- To learn the concepts related to SQL (Structured Query Language) and different SQL commands
- Todesigndatabaseschemaandconstruct various SQL queries.
- To develop subprograms for business application.
- Thisisfoundationalcourseforbuildingup databaseand processingthrough different queries.

Course Outcomes:

Attheendofthiscourse,thestudent shouldbeableto:

- Creatingtables, and design queries usingSQL
- ApplyingSQLOperatorsandSQLFunctionsindesigning the SQL queries
- Writingandsolvingcomplex queries basedonjoins, subqueries
- WritingPL/SQLblocks andobjects..

Unit No.	Sub Unit	Competency	Competency Indicators	Sessions
Unit-I	**Introduction to Oracle and SQL:** Introduction to Oracle and SQL Components of **SQL,** Data types, operators, DDL Commands – Defining a database in SQL, Creating table, changing table definition, removing table. Data Constraints: Primary key, Foreign Key, NOT NULL, UNIQUE, CHECK constraint.	Understand the SQL concept Get practice on SQL basic Statements	To know different data types and DDL statements and Practicing DDL statements with constraints	10
Exp – 1	Create following student tables in your user with specified constraints. (1) StudentInformationTable: Student_id varchar2(20) Last_name varchar2(25) First_name varchar2(20) Dob varchar2(20) Address varchar2(300) City varchar2(20)			

	State varchar2(2) ZipCode varchar2(9) Telephone varchar2(10) Fax varchar2(10) Email varchar2(100) (2) DepartmentInformationTable: Department_Id varchar2(20)primarykeyDepartment_Name varchar2(25) (3) Instructor'sInformationTable: Instructor_id varchar2(20)primarykey Department_Id varchar2(20)Foreignkeydepartment(department_id). Last_Name varchar2(25) First_Name varchar2(200) Telephone varchar2(20) Fax varchar2(20) Email varchar2(100) (4) CourseInformationTable: Course_Id varchar2(5) Department_Id varchar2(20)foreignkeydepartment(department_id)Titlechar(60) Description varchar2(200) Additional_fees numberprimarykey(course_id,department_id)
Exp – 2	**DML Commands- Inserting, updating, deleting data.** Describe command. Describethestructureofthefollowingtables. 1. Studentinformationtable 2. Departmentinformationtable 3. Instructor'sInformationTable 4. CourseInformationTable
Exp - 3	AltertheTablewiththefollowingrequirements.(Hint:UseAlterTableCommand) (1) Alterthestudenttabletomakethefollowingchanges: □ AddanewcolumnGenderwhich isof chardatatype. □ AlterthecolumnsizeofFirst_Nameto25. □ AlterthedatatypeofDobtoDate □ AddaprimarykeyconstraintfortheStudentId.

	(2) AltertheCourseTabletomakethefollowingchanges: AddanewcolumnUNITS,whichisofthenumberdatatype.
Exp – 4	InsertRecordsintothefollowingtables.(Hint:insertminimum10recordsineachtable). 1. StudentInformationTable. 2. DepartmentInformationTable. 3. InstructorInformationTable. 4. CourseInformationTable.
Exp - 5	**DQL Commands: Select Statement with all options.** **Renaming table, Distinct Clause, Sorting Data in a Table.** (1) DisplayallinformationfromtheStudenttablewhoselastnameisnull. (2) DisplaytheStudentIdandtheFirstnamefromtheStudenttablewhodoesn'thaveatelephone andanemail. (3) DisplayStudentsFirstnamewhosecityisChennai. (4) DisplayStudentsLastnamewhosestatestartswiththeletter"T". (5) DisplayStudentsId,LastNamewhosestateendswiththeletter'A'. (6) DisplayStudentsFirstname,DobwhoseFirstnamecontains'A'intheFourthposition. (7) DisplayStudentsFirstnameandLastnameConcatenated. DisplayallinformationfromtheStudenttablewheretheStudentsFirstnameisofonlytencharacters.
Exp – 6	(1) Updateallinformation’sfromtheStudenttablewhoselastnameisnulltoalastnameof' Nil'. (2) UpdatetheFirstnamefromtheStudenttablewhodoesn'thaveatelephoneandanema iltoavalueof'Radiant'. (3) UpdateStudentsLastnamewhosecityisChennaito'Madrasi'. UpdateStudentsLastNamewhosestatestartswiththeletter'T'toavalueof'TTT'.
Exp – 7	(1) Deleteallinformation’sfromtheStudenttablewhoselastnameisnull. (2) DeletetheinformationfromStudenttablethatdoesn'thaveatelephoneandanemail. (3) DeleteStudentsinformationwhosecityisChennai.

	(4) DeleteStudentsinformationwhosestatestartswiththeletter'T' (5) DeleteStudentsinformationwhosestateendswiththeletter'A' DeleteStudentsinformationwhoseFirstnamecontains'A'intheFourthposition.			
Unit - II	Introduction to Database objects: views, sequences, index, synonym	Understand and practice the database objects	To know usage of different DML statements with options	**10**
Exp - 8	(1) Createaviewnamedstudentfromstudentinformationanddepartmentinformationtablesthatcontainsonlythefollowingcolumnsstudent_id,firstname,lastnameanddepartment_id. (2) Updatethecolumnofnewlycreatedviewstudent.Observethechangesinthebasetables. (3) Createasynonymforcourseinformationtablewithnamecours. (4) Createasequenceinstseqwiththefollowingspecificationsminimumvalue1,maximumvalue20,incrementby1,startwith0,withcycleandcache10. (5) Alterthesequencesuchthatthemaximumvalueisonly15. (6) Createalocalindexnamedstudonfirstnameofstudentinformationtable.			
Unit: III	**Introduction to PL/SQL programming:** PL/SQL Block, PL/SQL Execution Environment, Data types, Variables, Constants, Displaying User Message on screen, Conditional Control in PL/SQL, Iterative Control Structure: While Loop, For Loop, Goto Statement	Learn to write and practice subprograms	Various programming controls in subprograms	10
Exp – 9	(1) WritePL/SQLblocktoincreasethesalaryby15%forallemployeesinemptable. WritePL/SQLblocktodecreasetheadditional_feesintheCoursetableto5%.			

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	IvanBayross.	SQL,PL/SQLTheProgrammingLanguageofOracle	3rdRevisedEdition	BPBPublications

Programme: BCA			
Semester	**Course Code**	**CourseTitle**	
III	**306**	**Lab on Java**	
Type of Course	Credits	Evaluation	Marks
Discipline Specific Course	2	IA(40) + UE(60)	100
CourseObjectives:			
• To develop logical abilities of students using Java Programming language			
CourseOutcomes:			
Atthe successful completionofthecoursethe learner willbeableto • Provide foundation for programming and Enable the students to analyze and efficiently solve the problems using Java Programming.			

Unit. No.	Contents	Competency	Competency Indicators	Sessions
1	Program to demonstrate the following: 1. Branching Statements 2. Looping Statements 3. Classes and objects 4. Arrays 5. Array of objects.	Evaluate the ability of programming using basic java	Able to write and execute the Java programs using basic structures	5
2	Design Programs on following concepts: 1. Constructor 2. Constructor Overloading 3. Pass by value 4. Method Overloading 5. Package 6. Exception Handling	Implementation of OOP concepts, Functions and Modifiers to solve problems	Able to write and execute the Java programs usingpolymorphism, Encapsulation. Concept of Function Package and Exception Handling	5

3	Working with Inheritance and Interface: 1. Programs to demonstrate working of Inheritance, types of inheritance and Polymorphism – function overriding. 2. Making use of abstract and final keywords with class declaration. 3. Programs to demonstrate working of interface.	Implementation of Inheritance, Method Overloading, Constructor Overloading and Method Overriding	Application of Inheritance and Polymorphism.	6
4	Program to demonstrate Java Input/Output : 1. Concept of streams, byte streams, character streams. 2. The Console: System.out, System.in, and System.err 3. Making use of InputStream class, OutputStream class, File class, FileInputStreams, File OutputStream, Reader class, Writer class, FileReader, FileWriter. Buffered streams – BufferedInputStream, BufferedOutputStream, BufferedReader, BufferedWriter. Object Streams	Writing programs to Handle data in files as stream, Implementation of various Input and Output Streams for handling the data.	Apply the concept of File Handling	6
5	Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t).it takes a name or phone number as input and prints the corresponding other value from the hash table(hint: use hash tables)	Writing programs to Handle data in files as stream, Implementation of various Input and Output Streams and GUI for handling the data.	Apply the concept of File Handling	8
6	Implement the above program with database instead of a text file.			

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company

1	Herbert Schildt	Java: The Complete Reference,;	Seventh Edition, 2007	McGraw-Hill Osborne Media
2	Cay S. Horstmann and Gary Cornell	Core Java-Volume-I	Eighth Edition, 2008	Sun Core Series
3	Bruce Eckel	Thinking In Java	Fourth Edition	Printice Hall

Programme: BCA			
Semester	**CourseCode**	**CourseTitle**	
III	**307**	**Start up Management**	
Type ofCourse	Credits	Evaluation	Marks
Ability Enhancement Course	**2**	**CA – 50 marks**	**50 marks**

CourseObjectives:

- To inspire the student Fraternity with entrepreneurial mind sets andencourage them to brainstorm ideas for a startup.
- To identify various sources of funding and how one can raise capital for a startup.
- To Outline various phases of the new ventures and help one to identify growing markets.
- To acquire skills to overcome challenges one faces in a startup.

CourseOutcomes:

Atthe successful completionofthecoursethe learner willbeableto

- Students will get a better understanding of how to establish a startupand various options available for startup.
- Better Understanding of capital raising and other legal requirements for a new venture.
- Develop in students requisite qualities of an entrepreneur
- Helps a student from the desire of a start up to a complete entrepreneur.

UnitNo.	Subunit	Competencies	Competencyindicators	Sessions
I **Introduction to Startup Management**	• What is a startup • Interception of a startup, idea generation. • Business startup, venture choice • Startup prominence in the Indian Scenario • Role of the Government in promotion of startups • The six forces of change.	Understanding the need of startupconcept and government policy to promotestartup	Parameters for setting up a startup.	7

II Venture capital and Statutory Environment	• Identifying startup capital • Sources of capital and funding • Estimation of fund requirement for a startup • Positioning of a new startup / Venture • Approval of new venture • Tax structure and tax discounts for new ventures • Legal environment for startups and new ventures • Case study	Learning about the legal frame work of a startup and discounts offered in tax structure	various sources of funding and ways to apply for funding	8
III **Financial aspects at the start and during growth phase**	• Feasibility Analysis • Ways and means of raising funding's • Equity Funding • Crowd funding • Alliance and Partnership • Growth strategies and market growth. • Venture life patterns and reasons of failure. • Case Study	Acquaintance with fund raising methods and partnerships	Understanding succession plans and financial realities of a Startup	7
IV **Growth, Failure and Exit**	• Stages of Growth • Venture life partners • Failure and reason of failure • Preparing for change Leadership successor • Dealing with bankruptcy • Exist strategies, sale of startup, being acquired /going public / liquidation	Studying growth, leadership and exit strategies	ways and means for funding strategic alliance and reasons for failure	8

ReferenceBooks:

Sr.No.	NameoftheAuthor	Title oftheBook	Publisher
01	AnjanRaichaudhuri,	Managing New Ventures Concepts and Cases	Prentice Hall International,
02	S.R. Bhowmik and M. Bhowmik,	Entrepreneurship	New Age International,
03	Vijay Sathe	Corporate Entrepreneurship,	Cambridge,
04	Steven Fisher, Ja-nae' Duane, ,	The Startup Equation -A Visual Guidebook for Building Your Startup, Indian Edition	Mc Graw Hill Education India Pvt. Ltd, 2016
05	Peter F. Drucker	Innovation and Entrepreneurship	(Classic Drucker Collection, 2007)

OnlineResources:

OnlineResourceNo.	Website address
1	https://www.cloudways.com/blog/best-startup-tools/ The 30 Best Startup Tools & Resources to Grow Your Business
2	https://otm.illinois.edu/sites/default/files/Start-Up%20Handbook%20for%20web.pdf The Start-up Handbook
3	https://visme.co/blog/wp-content/uploads/24-Essential-Tools-and-Resources-for-Entrepreneurs-by-Visme.pdf 24 Essential Tools and Resources for Startups and Entrepreneurs

MOOCs:

Resource No.	Websiteaddress
1	https://www.mooc-list.com/tags/startup
2	https://www.mooc-list.com/course/entrepreneurial-mindset-coursera
3	https://www.my-mooc.com/en/categorie/entrepreneurship

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year 2022–2023			
Semester	**CourseCode**	**Course Title**	
III	**308**	**Yoga and Meditation**	
Type	**Credits**	**Evaluation**	**Marks**
Value Based Course	2	IA	50

Course Objectives:

- To provide the basic knowledge of the theory and practice of yoga so that the students learn to practice asana
- To build awareness of yoga among student
- To promote positive health and holistic wellness

Course Outcomes:

After completion of the course :

- Students will be acquainted with the Practical knowledge of Yogasana, Kriya, Bandhas, Mudra, Meditation and Pranayama
- Student will be able to practice Yoga exercisefor wellness.

Unit	Subunit	Competency	Competency Indicator	Sessions
Yoga Concepts	What is Yoga? Brief history and development of Yoga. The Fundamentals of Yoga Traditional Schools of Yoga Yogic practices for health and wellness General Guidelines for Yoga Practice Prayer	Understanding basic of yoga	Get to know Fundamentals of yoga	5
Exercises	**Preparatory Exercises** I. Neck Bending II. Trunk Movement III. Knee Movement IV. Other movements Surya Namaskara and Benefits	To learn preparatory exercises needed to warmup	Learn basic movements before starting yoga	5
Yogasana	**Definition, Benefits** **A. Standing Asana** Tadasana ,Vṛikṣasana , ArdhaCḥakrasana Trikoṇasana, Virasana **B. Siting Asana** ArdhaUṣṭrasana, Sanskarsana Vakrasana, Vajrasana **C. Pron Asana** Bhujangasana, Shalabhasana Dharunasan, Makarasan	To learn various Asana in various positions	know different asana with its benefits	10

	D. Supine Asana Setubandhasana, Pavanamuktasana Sarvangasana, Savasana			
Shuddhikriya and **Praṇayama**	**Meditative Postures** :Sukhasan, Swastikasana; Vajrsan; Ardhapadmasan, Padmasan, Siddhasan Preparatory Breathing Practices Sectional Breathing (Abdominal, Thoracic and Clavicular Breathing) Yogic Deep Breathing Concept of Puraka, Rechaka and Kumbhaka **OM Meditation** **Shuddikriya** Definition, Benefits, Kapalbhati Trataka **Praṇayama** Definition, Benefits, NadiSodhana / AnulomaViloma BhramariPraṇayama	To study dyanamtak asana and Shuddikriya and Pranayam	Student will able to practice Meditation , Shuddhikriya and Pranayam	10

Sr.No.	Name of the Author	Title ofthe Book	Year Edition	Publisher Company
1	Goyandka, Harikrishandass	Yoga Darshan	2010	Geeta Press, Gorakhpur
2	DhirendraBrahmachari	Yogic SuksmaVyayma	1986	Dhirendra Yoga Publications, New Delhi,
3	Joshi, K.S.	Yoga in daily life	1985	Orient paper backs Delhi
4	VishwasMandlik	Yoga Parichay		
5	Saraswati, Swami Satyananda	Asana, Pranayama, Mudra, Bandha	2006	Yoga Publications Trust Bihar School of Yoga, Munger,

Sr.No	URL
1	https://yoga.ayush.gov.in/public/assets/front/pdf/CYPEnglishLeaflet.pdf

BHARATI VIDYAPEETH

(DEEMED TO BE UNIVERSITY)PUNE, INDIA

FACULTY OF MANAGEMENT STUDIES

Board of Studies in Computer Applications and System Studies

Bachelor of Computer Applications Degree (Three Years)/ Honors (Four Years) Programme

(Under Choice Based Credit System)

Framed as per National Education Policy (NEP 2020)

To be effective from 2022-23

SEM- IV

SEMESTERIV

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total
				L	T	P			
401	ComputerNetworks	DSC	3	3	1	-	40	60	100
402	Advanced JAVA	DSC	3	3	1	-	40	60	100
403	Advanced HTML with Javascript and CSS	DSC	3	3	1	-	40	60	100
404	Optimization Techniques	MDC	3	3	1	-	40	60	100
405	LabonAdvanced JAVA	DSC	2	-	-	4	40	60	100
406	Lab on HTML, Javascript and CSS &MinorProject - I	DSC	2	-	-	4	40	60	100
407	Cyber security	SEC	2	2	-	-	50	-	50
408	Mathematical Aptitude	AEC	2	2	-	-	50	-	50
Total			**20**	**16**	**4**	**8**	**340**	**360**	**700**

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**CourseTitle**	
IV	**401**	**Computer Networks**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE(40) + UA(60)	100
Course Objectives:			
• Toacquireafoundationalunderstandingofcomputernetworkandcommunication technologies. • Toprovideknowledge regarding various network protocols. • To understand the Advanced NetworkTechnologies andapplicationsof Network.			
Course Outcomes:			

After completing the course

- Students will acquire a good knowledge of thecomputernetwork,itsarchitectureandoperation.
- Studentwillbeabletopursuehisstudyinadvancednetworkingcourses.
- Studentswillbeabletofollowtrendsofcomputernetworks.So,studentswillgetexposure of advanced network technologies likeMANET,WSN,4G and 5G.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
IntroductiontoComputerNetworks	WhatisComputerNetwork?NetworkGoalsandMotivations,ApplicationofNetworks,Network Topologies, Types ofNetworks. **Networksoftware:**Network Protocols, Protocol Hierarchies, ConnectionOrientedandConnectionlessServices. N**etworkModels:**TheOSIReferenceModel,TheTCP/IPReferenceModel, Comparison of OSI and TCP/IP Reference Model, **Examplesofsomenetworks:**Internet, X.25,ISDN, Frame relay,ATM,Ethernet,WirelessLAN-(Wi-Fi).	Understanding the basic concept of Computer Networks and Network Models	Concept of Network Models and Topologies	8
DataTransmissionandPhysicalLayer	**Signals:**AnalogandDigitalSignals,DataRate,TransmissionImpairment,SignalMeasurement: Throughput, Propagation Speed and Time, Wavelength, Frequency, Bandwidth,Spectrum **TransmissionMedia&itsCharacteristics:**GuidedandUnguidedMedia,SynchronousandAsynchronousTransmission,Multiplexing**:**FDM,WDM,TDM,Switching**:**Circuit,MessageandPacketSwitching, **MobileTelephoneSystems**:1G,2G,3G,4G,5G	Understanding the types of signals, transmission media and Mobile Telephone System	Concept of Signals and Transmission Media	9
NetworkLayer: DesignIssues and RoutingAlgorith	Static/ Dynamic, Direct/ Indirect, Shortest Path Routing, Flooding, Distance VectorRouting , Link	Understanding the Routing	Concept of Routing	

ms	State Routing, Hierarchical Routing, Broadcast Routing, MulticastRouting, **Congestion Control Algorithms:** General Principal of Congestion Control,congestion prevention polices, Load shedding, Jitter Control, **IP Addressing:** IP-Protocol, IP-Address Classes (A, B, C, D,E), Broadcast address, Multicast address,NetworkMask,Subnetting, InternetControlProtocol-ICMP, IGMP,Mobile-IP, IPv6	Algorithm and IP Addressing	Algorithms and concept of IP Addressing	10
TransportandApplicationSupport Protocols	Transport service, Service Primitives, Internet, and Transport Protocols: TCP/UDP,Remote Procedure Calls, RTP **Session Layer:** Token Concept **Presentation Layer:**Data Encryption and Data Security, Message Authentication **Application Layer:**DomainNameService, Telnet,FTP, SMTP,SNMP, MIME,POP,IMAP, WWW,HTTP	Study the Concept of Internet and Transport Protocols	Learn the various Network Protocols and its types	8
AdvanceNetworks and Internet	Conceptof5GNetworks,Introductionof802.16,802.20,Bluetooth,Infrared,MANET,SensorNetworks.TechnicalIssuesofAdvancedNetworks. **MobileAd-hocNetworks:**Introductory concepts, Destination-Sequenced Distance Vector protocol, Ad-hoc On-DemandDistanceVectorProtocol**WirelessSensorNetworks:**Sensornetworksoverview:Introduction,applications,designissues,requirements.**InternetBasics:**Concept and Characteristics of Internet, Intranet, Extranet. Structure of Internet,Application of Internet and Concept of Domainname.	Understand concept of Advance Network and Internet Structure	Study of Mobile Ad-hoc Network and Wireless Sensor Network	10

ReferenceBooks:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	A.S.Tanenbaum	ComputerNetworks	6th Edition	Prentice-Hallof India
2	W.BehrouzForouzanandS.C.Fegan	DataCommunicationandNetworking	5thEdition	McGrawHill
3	Uyless D. Black	ComputerNetworks	8thEdition	Prentice Hall

Online Resources:

Online Resources No.	Website address
1	https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm
2	https://www.javatpoint.com/computer-network-tutorial
3	https://www.youtube.com/watch?v=4D55Cmj2t-A
4	https://www.youtube.com/watch?v=ET2W8DyA7zI

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year 2022–2023			
Semester	**Course Code**	**CourseTitle**	
IV	**402**	**Advanced Java**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	3	IE&UA	100

Course Objectives:

- To learn implementation of Thread
- To understand collection classes and interfaces.
- To acquire knowledge about handling databases using Java.
- To study web components for developing web applications

Course Outcomes:

At the end of this course, student should be able to

- Write Java code by making use of thread
- Construct a web application using Servlet and Java Server Pages
- Implement server-side validations with session
- Retrieve data effectively from database using JDBC
- Develop and deploy web-based enterprise applications

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Multithreading	• Concept of thread • Thread lifecycle • Creating threads using Thread class, • Using Runnable interface • Thread synchronization • Inter-thread communication using wait(), notify(), notifyAll() methods	Understand concept of thread and its life cycle Able to choose Thread class and Runnable interface Get acquainted with concept of synchronization and interthread communication	Ability to design and implement threads using Thread class and Runnable interface Write code to use synchronisation	8
Java Collections and Utility Classes	• Introductions to generics: generic types and methods • Collection Basics- A Collection Hierarchy, • Using ArrayList and	Understand use and usage of generics Making use if sequential collections	Writing Simple generic class and methods Using ArrayList, Vector to maintain	8

	Vector, LinkedList • Making use of Iterator to access collection elements. • UsingSet Collections-HasSet, LinkedHashSet and TreeSet • Using Dictionary	Understanding use of Set and Dictionary	collection Ability to use Set and Dictionary types	
Java Database Connectivity	• The role of JDBC, • JDBC configuration, • Types of drivers, • Connectivity with database, • JDBC Statements – Statement, • Using PreparedStatement, • Using stored procedures with CallableStatement, • Working with Scrollable and updatable result sets, • Making use of DatabaseMetadata and ResultSetMetadata	Understand concept JDBC and types of drives Using JDBC to access database	Ability to write code to access data using JDBC	8
Java Servlet	• Installing and configuring Tomcat • Introduction to Servlets • Understanding servlet class Hierarchy • Life cycle of a servlet • Handling get and post request (HTTP), • Handling a data from HTML to a servlet, • Session tracking – Cookies and Http Session • Making use of RequestDispatcher	Understand concept Servlet and its use in web technology Understand need of session tracking and using cookies and HttpSession for implementation of it.	Ability to write simple servlet and describe lifecycle of it. Making use of servlet to read data from user and generate dynamic response to	10

Java Server Pages	• Simple JSP program, • Life cycle of a JSP • Using Directives – Page Directive, include directive, • Scripting elements – Declarations, Expressions, Scriplets, • Comments in JSP • Mixing Scriplets and HTML • JSP Implicit Objects	Understanding basic working of JSP Understanding common JSP implicit objects	Ability to write Simple JSP pages Making use of directives and scriplets Making use of Implicit objects in JSP code	10

Reference Books:

Sr.No.	Nameofthe Author	Title ofthe Book	YearEdition	PublisherCompany
1	Herbert Schildt	Java: The Complete Reference	2017 9th Edition	McGraw-Hill Osborne Media
2	Cay S. Horstmann and Gary Cornell	Core Java Volume I - Fundamentals	Eighth Edition, 2008	Prentice Hall
3	Cay S. Horstmann and Gary Cornell	Core Java Volume II – Fundamentals	Eighth Edition, 2008	Printice Hall,
4	Steven Holzner	Java 2 Programming Black Book	2006 5th Edition	DreamTech Press

Online Resources:

OnlineResourcesNo.	Websiteaddress
1	https://docs.oracle.com/javase/tutorial/
2	https://www.javatpoint.com/java-tutorial
3	https://www.programiz.com/java-programming

MOOCs:

ResourcesNo.	Websiteaddress
1	NPTEL / Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**CourseTitle**	
IV	**403**	**Advanced HTML with JavaScript and CSS**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	IA (40) + UA (100)	100

Course Objectives:

To make students to:

- Students will Have thorough knowledge of HTML and JavaScript. They will be able to design various forms as per requirements.
- They will be able to apply CSS concepts in scripting.
- The students will also apply their creativity to display the output.

Course Outcomes:

After completing the course the students shall be able to

- The students will get information of the basics of internet with the help of examples. It will help them to identify and remember Web supporting concepts.
- Remembering the definitions will help the students to understand basic concepts of HAML, JavaScript, CSSetc. In this subject, students will understand various tags, programming constructs of JavaScript, technical issues, cascading Style Sheets, forms.

Unit	Subunit	Competency	Competency Indicators	Sessions
Unit 1: Basics of Internet:	Differentiate between World Wide Web and Internet, Web Browsers and Web Servers with examples, Basic principles involved in developing a web site, overview of HTML, concept of Tag, types of HTML tags, structure of HTML program, Emphasizing Material in a Web Page, text formatting through HTML, Using Image tag, attributes of Image tag, Lists: Using unordered, ordered, definition lists	Learn the Concept of different tags and structure of HTML Web page	Understanding the concept of structure of HTML Web page	7
Unit 2: Introduction to HTML	Handling Tables: To define header rows & data rows, use of caption tag, changing height & width of table, BGcolor, cell padding, cell spacing, colspan, row span, handling table data, images in table,	Studying the Concept of HTML tags for text formatting, table and more	Understanding the concept of HTML tags for text formatting, table and more	7

	Frames: Introduction To frames, using frames & framesets, named frames, concept of hyperlink, types of hyperlinks, linking to the beginning of document, linking to a particular location in a document, image as hyperlinks.			
Unit 3: Cascading Style Sheets	Introducing CSS,CSS syntax, CSS selectors,Types of style sheets: inline, embedded and external style sheets, working with CSS properties: text properties, color and background properties, border and shading, box and block properties, positioning with CSS, various types of CSS selectors, Using class and span tag, External style sheets	Applying Concept of CSS and Types of CSS	Understanding the concept of CSS	7
Unit 4: Introduction to JavaScript (Client-Side Scripting) **Functions & Arrays**	Introduction to scripting, overview of Java Script, advantages, client-side java Script, capturing user input, writing JavaScript into HTML,Advantages and limitations of JavaScript, **JavaScript Basics:** Data types, literals, variables and operators, Java Script arrays, dense array, operators, expressions, **JavaScript Programming Constructs:** Assignment, data declaration, if, switch, while, for, do while, label, break, continue, function call, return, with, delete, method of invocation **Dialog boxes** -Alert dialog box, prompt dialog box, confirm dialog box, window objects. **JavaScript Functions**- Types of functions in Java Script- Built in functions, User defined functions, function declaration, passing parameters, variable scope, return values, recursive functions, **JavaScript Arrays**- Introduction to arrays, arrays with methods, String functions, math functions, date	Understanding Concept of java script also working of function and arrays	the concept of, JavaScriptfunction and array in java script	12

	functions			
Unit 5: Forms **Objects and Event Handling**	Interactive web pages concepts, difference between static & dynamic web pages, Concept of form, how form works, Different elements - text, password, button, submit, reset, checkbox, Radio, Text Area, select & option, properties of form elements, form object's Method Other built-in Object: String object, math object, date object, Regular Expressions, Form validation What is an Event? Onclick Event Type, onsubmit Event Type, onmouseover and onmouseout, onchange, onload, onkeydown, working with DOM, Concept of Cookies and sessions, when and how to use cookies and sessions Website-Case Study	Design HTMLform and Handle events in JavaScript	Understand concept of form with event handling.	12

ReferenceBooks:

Sr. No.	Name of the Author	Title of the Book	Year	Publisher Company
1	Ivan Bayross	Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI	2006	BPB Publications
2	Thomas Powell	Web Design The complete Reference	2004	Tata McGrawHill
3	Thomas Powell and Fritz Schneider	JavaScript 2.0: The Complete Reference, Second Edition	2004	McGraw-Hill Education; 2nd edition

Online Resources:

Online Resources No.	Website address
1	https://www.w3schools.com › html
2	https://html.com/
3	https://www.geeksforgeeks.org/html/

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year2023 –2024			
Semester	**Course Code**	**CourseTitle**	
IV	**404**	**Optimization Techniques**	
Type	**Credits**	**Evaluation**	**Marks**
Minor Disciplinary Course	3	IE(40) + UA(60)	100

Course Objectives:

To make students to:

- Get familiar with basic concepts of Optimization Techniques
- To impart knowledge of the Linear Programming,Transportation model & Assignment model
- To apply CPM and PERT techniques in Project Management.

Course Outcomes:

After completing the course the students shall be able to

- Understand the basic concepts of Optimization Techniques.
- Design the optimal problem solving techniques using Linear Programming Problem.
- Understand the concept of transportation and Assignment problem.
- Design Solution by using Network Theory .
- Design the Decision Table and Decision Tree for the given problem

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Basics of Optimization Techniques and Linear Programming	Origin of Optimization Techniques,History ,Methodology, different phases, Characteristics, Scope ,Applications of Optimization Techniques, Limitations of Optimization Techniques Introduction and requirement of LP, Assumption and Formulation of LP, General Statement of LP, Solution of LP by using Graphical Method(Maximization & Minimization), Special cases in Graphical Method- i)Alternative solution ii)Unbounded Solution iii)Infeasible solution	Understand the Basics of Optimization Techniques and different types of LP problems solving using Graphical Method	Basic terms and characteristics of Optimization Techniques Apply concepts of formulation to solve LP problems	11
Transportation Model	Linear Programming formulation of Transportation Problem, General Procedure to solve Transportation Problem, Methods for finding Initial Feasible Solution-i)North -West Corner Method ii)Least Cost	Learn Different methods for finding Initial Feasible Solution and calculate Final	Understanding of methods to solve Transportation Model and its	10

	Method iii)Vogel's Aproximation Method, Final Transportation cost using MODI Method. Special Cases :i)Unbalanced problem ii)Mutiple Optimum Solution iii)Prohibited Routes iv)Case of Degeneracy	Transportation cost using MODI Method.	special cases	
Assignment Model	Introduction, Hungerain Method to solve Assignment problem, Special cases-i)Unbalanced Problem ii)Alternate Solution iii)Prohibited Assignment iv)Maximization Problems	Learn the concept of Assignment model	UnderstandAssignment Model and its special cases	8
Network Analysis	Terms used in Network Analysis, Rules for Network construction,Drawing network diagrams, Backward Pass Calculation, Forward Pass Calculation, Crtical Pass Method, Time estimates for critical path, PERT, Types of Float(Therotical point of view only) , Probability of completion of project	Learn concept of CPM & PERT	Understand basics of CPM & PERT and its application	8
Decision Theory & Decision Tree	Elements of Decision making problem, Decision making under risk-i)Expected Monetary value criterion ii)Expected value with perfect information iii)Expected Value of perfect information (E.V.P.I.)iv)Expected Opportunity Loss Decision Making under uncertainty-i)Maximax (gain) or Minimin (loss) criterion ii)Maximin criterion iii)Hurwicz Alpha criterion iv)Laplace criterion v)Minimax Regret criterion Decision Tree -simple Examples	Learn decision making concepts under risk and uncertainty	Understanddifferent methods to solve decision making problems	8

ReferenceBooks:

Sr.No.	NameoftheAuthor	Title ofthe Book	Year	PublisherCompany
1	J.K. Sharma	Operations Research	2016	Laxmi Publications
2	KantiSwaroop, P.K. Gupta, Man Mohan	Operations Research-Introduction to Management Science	2019	Paperback
3	R. Panneerselvam	Operations Research	2006	Prentice Hall of India Pvt Ltd New Delh
4	S. Kalavathy	Operations Research	2006	Vikas Publishing House Company Pvt. Ltd.

Online Resources:

OnlineResourcesNo.	Websiteaddress
1	https://www.youtube.com/watch?v=knZrhVkZ71Q&list=PLU6SqdYcYsfLyEPjMPHT_1ZhTRrnXA55R
2	https://www.youtube.com/watch?v=9vJx6tZgVQs&list=PLU6SqdYcYsfLyEPjMPHT_1ZhTRrnXA55R&index=14
3	https://www.youtube.com/watch?v=ydvnVw80I_8
4	https://www.youtube.com/watch?v=oBPlVV6AiPQ&list=PLEjRWorvdxL6LnWXJxnFB_9DXHhUxJ3dk&index=2

MOOCs:

ResourcesNo.	Websiteaddress
1	https://www.youtube.com/watch?v=BDBhpxRzImI&list=PLWoXNEI-KK1mCv_EL4OdF_-6FXryaZ11N
2	https://www.youtube.com/watch?v=66aKgySf9vo&list=PLLy_2iUCG87Bq8RGMTdeFZiB-87V4i9p1
3	https://www.youtube.com/watch?v=a2QgdDk4Xjw&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year 2022–2023			
Semester	**Course Code**	**Course Title**	
IV	**405**	**Lab on Advanced JAVA**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	IE&UA	100

Course Objectives:

- To learn implementation of Thread
- To understand and implement collection classes and interfaces.
- To acquire knowledge about handling databases using Java.
- To develop web applications using web components.

Course Outcomes:

At the end of this course, student should be able to

- Write Java code by making use of thread
- Construct a web application using Servlet and Java Server Pages
- Implement server-side validations with session

- Retrieve data effectively from database using JDBC
- Develop and deploy web-based enterprise applications

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Multithreading	Write a program to demonstrate Multi-threading using Thread Class. Write java program to implement Runnable interface Write java program for demonstrating concept of Thread synchronization. Write java code for implementing the following Inter-thread communication methods: usingwait(), notify(), notifyAll()	implement concept of thread and its life cycle Able to choose Thread class and Runnable interface Get acquainted with concept of synchronization and interthread communication	Ability to design and implement threads using Thread class and Runnable interface Write code to use synchronisation	8
Java Collections and Utility Classes	Develop java programs to implement Simple generic class and methods Write java programs to demonstrate concept of ArrayList, Vector and LinkedList. Write java code to implement Iterator to access collection elements. Write java programs to demonstrate concept of HasSet, LinkedHashSet and TreeSet.	study use and usage of generics Making use if sequential collections Apply Set and Dictionary	Writing Simple generic class and methods Using Array List, Vector to maintain collection Ability to use Set and Dictionary types	8
Java Database Connectivity	Implement jdbc connectivity to insert records and delete records into a table. Implement jdbc connectivity to	Apply concept JDBC and types of drives Using JDBC to access database	Ability to write code to access data using JDBC	8

	demonstrate PreparedStatement. Write java code to demonstrate stored procedures with Callable Statement. Write java code to implement concept of Scrollable and updatable result sets. Write java code to Making use of Database Metadata and ResultSetMetadata			
Java Servlet	Write a servlet program to create a simple servlet and test it. Write a servlet program to read the client request parameters. Implement a Servlet to generate Multiplication Table for a Number Entered in Html Page.	Implement concept Servlet and its use in web technology Understand need of session tracking and using cookies and Http Session for implementation of it.	Ability to write simple servlet and describe lifecycle of it. Making use of servlet to read data from user and generate dynamic response to	10
Java Server Pages	Develop an application/s to demonstrate all the core tags available in JSP (Declaration, Expression, Directive and Scriptlet Tag) Develop a JSP Application to accept Details from user and store it into the database table. Develop a JSP Application to Authenticate User login as per registration details. If login success the forward user	Demonstrate working of JSP Use implicit objects in JSP	Ability to write Simple JSP pages Making use of directives and scriplets Making use of Implicit objects in JSP code	11

	to Index Page otherwise show login failure Message. Write a web based student registration application where students can register online with their enrolment number. The registered students should be able to log on to the site aftergetting registered. You are required to use JSP, Servlet and JDBC			

ReferenceBooks:

Sr.No.	Nameofthe Author	Title ofthe Book	YearEdition	PublisherCompany
1	Herbert Schildt	Java: The Complete Reference	20179th Edition	McGraw-Hill Osborne Media
2	Cay S. Horstmannand Gary Cornell	Core Java Volume I - Fundamentals	Eighth Edition, 2008	Prentice Hall
3	Cay S. Horstmann and Gary Cornell	Core Java Volume II – Fundamentals	Eighth Edition, 2008	Printice Hall,
4	Steven Holzner	Java 2 Programming Black Book	2006 5th Edition	DreamTech Press

OnlineResources:

OnlineResourcesNo.	Websiteaddress
1	https://docs.oracle.com/javase/tutorial/
2	https://www.javatpoint.com/java-tutorial
3	https://www.programiz.com/java-programming

MOOCs:

ResourcesNo.	Websiteaddress
1	NPTEL / Swayam
2	www.edx.com
3	www.coursera.com

Programme:BCACBCS– RevisedSyllabusw.e.f.-Year2022 –2023			
Semester	**Course Code**	**CourseTitle**	
IV	**406**	**Lab on HTML, JavaScript, and CSS & Project - I**	
Type	**Credits**	**Evaluation**	**Marks**
Discipline Specific Course	2	UA (100)	100

Course Objectives:

To make students to:

- To teach the basic internet concepts and train them to develop internet applications.
- An overview of the HTML5 specification
- Practical knowledge to implement new HTML5 elements and attributes.
- Overview of JavaScript

Course Outcomes:

After completing the course the students shall be able to

- Describe and use client-side technologies of the World Wide Web: HTML5, CSS3, JavaScript.
- To implement different constructs and programming techniques provided by Java Script.
- Student has to complete a Minor prosect work under the guidance of the faculty member in the institute. Students has to develop any software using Java in a group of 2 to 3. Each team has to give 4 minimum PPT presentation to the Project Guide during the semester. Final project viva will be conducted as per University Timetable.

Unit	Subunit	Competency	Competency Indicators	Sessions
Unit 1: Basics of Internet:	1. Design A webpage which has student's biodata with proper formatting and having student name as title. 2. Design a website for PNG jewellers, having images of different types of jewelleries which are linked with the pages giving details about the items.	Design a webpage using HTML	Understanding the concept of HTML Web page designing	6
Unit 2: Introduction	1. Design a website for a class which shows	Implement HTML tags	Understanding the concept of	6

to HTML	student's list linked with their biodata pages. 2. Design a web page to display the following output. • List of subjects o Semester III ▪ C++ ▪ Dot.Net o Semester III ▪ Java ▪ Industrial Projects • Internet Programming o HTML o VBScript o Java Script 3. Design a website for the college which lists all the faculties (ordered lists), courses (definition lists) every course explains details (fees, duration, intake capacity) as unordered list. 4. Create a form having textboxes, radio buttons and check boxes and reset button. On clicking the reset button, the entire form should be reset.	for text formatting, table and more	HTML tags for text formatting, table and more	
Unit 3: Cascading Style Sheets	1. Design a Style sheet to give following effects. The first latter of the paragraph should have 150% font size. The first line of the paragraph should have purple as background color and white as the fore color. 2. Design a website for a college showing features of the university, college and list of different courses running in the institute. Course names have links with the pages having details of the courses having similar design using stylesheets. 3. Design a CSS (inline) that displays the regular text at the center with green as background color and white as fore color and should be bold, using class.	Using CSS and Types of CSS to design pages	Understanding the concept of CSS	6
Unit 4: Introduction to JavaScript (Client-Side Scripting)	1. Design a form using HTML that accepts information about your qualification, extracurricular activities, skill sets, achievements, hobbies, and expectation for a particular job. 2. Write a JavaScript code which contains	Design form using, java script with functions and array	Understanding the concept of form, java script	6

Functions & Arrays	"show" button. When user clicks on show button, first 10 terms of Fibonacci series will be displayed in text box on another HTML page. This page contains button "back". With this button user can come back to original page. 3. Design a website which accepts a number from user and performs the selected operation (even/odd, prime/not prime, positive/negative). 4. Design a webpage which provides calculator facilities. 5. Write JavaScript to display table of numbers 2-10 (use form and form elements)			
Unit 5: Forms And Object Event Handling	1. Design a webpage which accepts users information with validations (name, std code (should not exceed 4 digits), landline number (no. of digits should be between 5 to 7), mobile number (exactly 10 digits), email (should have @ and.)). 2. Develop a HTML form which accepts mathematical expression in one textbox and display its result in another textbox after clicking on a button showing mathematical operations. 3. Create a HTML form that has a number of textboxes. When the form runs in the browser fill the textboxes with data. Write the JavaScript code which verifies that all textboxes have been filled. If the textbox has been left empty, popup an Alert indicating which textbox has been left empty. When alert's OK button is clicked on, set focus to that specific textbox. 4. Design webpage which accepts no of lines and prints it in the form of triangular shaped pyramid. 5. Accept data of a student wants to appear for entrance (name, marks at matriculation, higher secondary and graduation). Ask student to select the course he wants to take admission. If the student scores above 55 at matriculation,	Apply Objects and Event Handling	Understanding the concept of Event Handling	6

	above 60 at higher secondary and graduation then he is eligible for any course. If he has science degree or maths at 11th and 12th, then only he is eligible for MCA. Design the form accordingly. Give the according message. 6. Create a from having textboxes, radio button and check boxes and reset button. On clicking the reset button, the entire form should be reset. 7. Accept login name and password from user and display biodata of the corresponding user. 8. Design a page for a user to create his login by accepting desired login name, password and confirm the password.			

ReferenceBooks:

Sr.No.	Name of the Author	Title of the Book	Year	Publisher Company
1	Ivan Bayross	Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI	2006	BPB Publications
2	Thomas Powell	Web Design The complete Reference	2004	Tata McGrawHill
3	Thomas Powell and Fritz Schneider	JavaScript 2.0: The Complete Reference, Second Edition	2004	McGraw-Hill Education; 2nd edition

Online Resources:

Online Resources No.	Website address
1	https://www.w3schools.com › html
2	https://html.com/
3	https://www.geeksforgeeks.org/html/

Semester	Course Code	Course Title	
IV	**407**	**Cyber Security**	
Type	**Credits**	**Evaluation**	**Marks**
Ability Enhancement Course	2	IA	50

Course Objectives:

- To Understand the cyber security threat landscape.
- To Develop a deeper understanding and familiarity with various types of cyberattacks, cyber crimes, vulnerabilities and remedies thereto.
- To learn and apply existing legal framework and laws on cyber security

Course Outcomes: The students will be in a position

- Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.
- Increase awareness about cyber-attack vectors and safety against cyber-frauds.
- Take measures for self-cyber-protection as well as societal cyber-protection.

Unit	Sub Unit	Competency	Competency Indicators	Sessions
1. Introduction to Cyber security	Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security	Understanding of Cyber Security and various fields associated with cyber security	Knowledge of Cyber Security Across Various Platforms	12
2. Cyber crime	Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks,	Identification of of type of Cyber crime	Crime detection and categorisation	08

	malware and ransomware attacks, zero day and zero click attacks			
3. Cyber law	Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India, Case studies	Cyber Law Enforcement; and Cyber Security Compliance	Ability to apply proper cyber laws applicable	10

Reference Books:

Sr.No.	Name of the Author	Title ofthe Book	Year Edition	Publisher Company
1	R. C Mishra	Cyber Crime Impact in the New Millennium	2010	Auther Press. Edition
2	SumitBelapure and Nina Godbole	Computer Forensics and Legal Perspectives	First Edition, 2011	Wiley India Pvt. Ltd

MOOCs:

Resources No.	Website address
1	NPTEL/ Swayam
2	www.edx.com
3	www.coursera.com

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year 2022–2023			
Semester	**Course Code**	**Course Title**	
IV	**408**	**Mathematical aptitude**	
Type	**Credits**	**Evaluation**	**Marks**
Ability Enhancement Course	2	IA	50

Course Objectives:

- To develop mathematical and logical thinking
- To prepare base for various aptitude tests being conducted by companies
- To develop their ability to draw conclusions

Course Outcomes:

At the end of this course, student should be able to

- Solve problems based on mathematical calculations
- Face aptitude tests as stepping stone for entering companies

Unit	Sub Unit	Competency	Competency Indicators	Sessions
Numerical Reasoning	• Problems on Numbers like divisibility tests, basic arithmetic operations • LCM (Least Common Multiplier), HCF (Highest Common Factor) • Profit and Loss • Partnership • Speed and Distance • Simple and Compound Interest • Problems on ages • Simplification	Knowing basic tricks for solving mathematical problems with big numbers	Will be able to solve problems within optimal time	10
Logical Reasoning	• Series • Directions • Blood Relations • Seating Arrangements • Calendar	Developing skills to find and understand patterns, representation of problem	Will be able to represent problem and understand problem	10
Mathematical	• Permutations and combinations	To calculate chances of	Will be able to represent	10

Aptitude	• Mensuration • Set Theory	happening of an event	problem in sets and calculate chance of happening of an event	

Reference Books:

Sr.No.	Name of the Author	Title ofthe Book	Year Edition	Publisher Company
1	R.S.Agrawal	Quantitative Aptitude	2016	S.Chand