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Pimpri Chinchwad Education Trust's

Pimpri Chinchwad University

Sate, Maval, Pune - 412106



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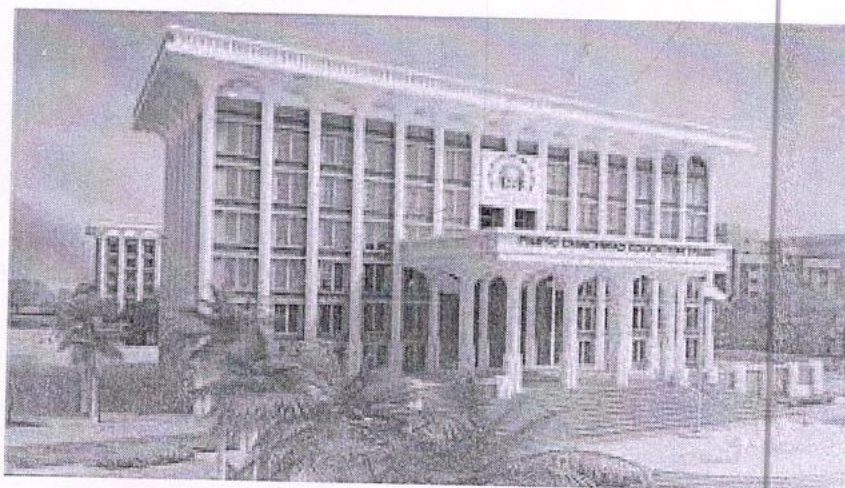
Curriculum Structure

Bachelor of Computer Applications (B.C.A.)

(2026 Pattern)

Choice Based Credit System (CBCS)

School of Computer Applications



Effective from Academic Year 2026-27





BCA Curriculum

Preamble:

At Pimpri Chinchwad University, we present the Bachelor of Computer Application (BCA), an Undergraduate Program designed to equip students with a comprehensive understanding of Computer Science and Application. As aspiring professionals in the field of computing, we acknowledge the weight of responsibility that accompanies our education. Upholding the highest standards of integrity, professionalism, and ethical conduct is fundamental to our academic pursuits and beyond. We embrace the imperative of continuous learning and adaptability in an era marked by rapid technological advancement, pledging to proactively seek new knowledge and master emerging technologies.

The BCA program curriculum is designed to provide students with a strong foundation in computer science, programming languages, software engineering, database management systems, and computer networks. The program also includes courses on business management and soft skills to prepare students for a career in the IT industry.

Overall, an BCA program aims to provide students with a well-rounded education that prepares them for a successful career in the IT industry and for further academic pursuits.

Vision and Mission of Program:

Vision:

Explore the different horizons in the field of Commerce, Management, and Computer Science Applications. Develop students into competent professionals with strong technical, analytical, and problem-solving skills, ready to contribute to the IT industry and society.

Mission:

To drive transformation, technology, and innovation through a problem-solving approach and research & development. To provide students with IT tools, programming skills, and managerial insights to become productive, ethical, and lifelong learners.

Program Educational Objectives:

Here are some possible Program Educational Objectives (PEOs) for a Bachelor of Computer Application (BCA) program:

1. To prepare youth to take up positions as Secure software designers and developers.
2. To aim at the development of knowledge and skills for defending and developing secure software systems.
3. 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 a quality life.





Program Outcome

Here are some possible Program Outcomes (POs) for a Bachelor of Computer Application (BCA) program:

1. **Computational Knowledge:** Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.
2. **Problem Analysis:** Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
3. **Design / Development of Solutions:** Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.
4. **Conduct Investigations of Complex Computing Problems:** Ability to devise and conduct experiments, interpret data and provide well informed conclusions.
5. **Modern Tool Usage:** Ability to select modern computing tools, skills and techniques necessary for innovative software solutions
6. **Professional Ethics:** Ability to apply and commit professional ethics and cyber regulations in a global economic environment.
7. **Life-long Learning:** Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
8. **Project Management:** Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.
9. **Communication Efficacy:** Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
10. **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.
11. **Individual & Team Work:** Ability to work as a member or leader in diverse teams in a multidisciplinary environment.
12. **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.





Program Specific Outcomes

On successful completion of the program, the graduates of Bachelor of Computer Application (BCA) program will be able to:

PSO-1: Investigate technical comprehension in varied areas of Computer Applications and experience a conducive environment in developing abilities for flourishing career and higher studies.

PSO-2: Understand, investigate, and develop computer programs in allied areas like Web, Mobile Apps, Algorithms, Multimedia and Design, and Data Analytics for efficient design of computer-based systems of varying complexity.





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CURRICULUM FRAMEWORK

Sr. No.	Type of course	Abbreviations
1	Major(DSC)	DSC
2	Elective (Minor Stream/Vocational/Program Specific)	DSE
3	Multidisciplinary	MDM
4	Ability Enhancement Courses	AEC
5	Skill Enhancement Courses	SEC
6	Value Added Courses	VAC
7	Summer Internship/ On Job Training	OJT
8	Project	PROJ
9	Field Project	FP
10	Indian Knowledge System	IKS
11	Co-Curricular	CC
12	Community Engagement Program	CEP
13	Massive Open Online Courses	MOOC





CREDIT DISTRIBUTION (2026 PATTERN): SEMESTER WISE

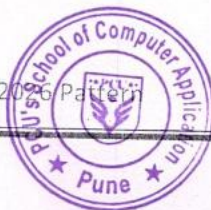
Sr. No.	Type of course	No. of Credits/Semester									Total (Honours)	No. of Credits		Total (Honours with Research)
		1	2	3	4	5	6	Total	7	8		7	8	
1	Major(DSC)	MAX:13-MIN:10	MAX:11-MIN:8	MAX:11-MIN:8	MAX:12-MIN:9	MAX:10-MIN:10	MAX:10-MIN:10	61	MAX:14-MIN:14	MAX:18-MIN:18	93	MAX:10-MIN:10	MAX:14-MIN:14	85
2	Major Elective (Interdisciplinary)	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:3		9	MAX:4-MIN:4		13	MAX:4-MIN:4		13
3	Multidisciplinary	-	-	MAX:3-MIN:3	MAX:3-MIN:3	MAX:3-MIN:3		9			9			9
4	Ability Enhancement Courses/Sports/Yoga	MAX:3-MIN:1	MAX:3-MIN:1	MAX:3-MIN:1	MAX:3-MIN:1			6			6			6
5	Skill Enhancement Courses/ Internship/Dissertation	MAX:2-MIN:0	MAX:2-MIN:0	MAX:3-MIN:1	MAX:2-MIN:0	MAX:6-MIN:6	MAX:12-MIN:12	22	MAX:4-MIN:4		26	MAX:4-MIN:4		26
6	VAC(IKSRM/Open Elective/Research Project)	MAX:3-MIN:3	MAX:4-MIN:4	MAX:2-MIN:2	MAX:2-MIN:2			11		MAX:4-MIN:4	15	MAX:4-MIN:4	MAX:8-MIN:8	23
7	MOOC (Swayam/Coursera)	MAX:3-MIN:3	MAX:4-MIN:4	MAX:2-MIN:2	MAX:2-MIN:2	-		14			14			14
Total		22	22	22	22	22	22	132	22	22	176	22	22	176





Course Code Nomenclature

COURSE CODE	COURSE NAME	COURSE TYPE
SEMESTER-I		
U26BCCA101	Programming Fundamentals using C	DSC
U26BCCA111	Programming Fundamentals using C Lab	DSC
U26BCCA102	Web Technology	DSC
U26BCCA112	Web Technology Lab	DSC
U26BCCA103	Discrete Mathematics	DSC (CBCS-1)
U26BCCA104	Domain Specific Elective-I: Computer Architecture	DSCE (CBCS-1)
U26BCCA105	Domain Specific Elective-I: Fundamental of Information Technology	
U26BCCA106	Software Engineering	SEC (CBCS-2)
U26BCCA107	Applied Communication	AEC (CBCS-2)
	Foreign Language-I	AEC
U26BCCA108	Indian Knowledge System	VAC
	UHV-I	VAC
U26BCCA109	Cyber Security in IoT	MOOC
SEMESTER-II		
U26BCCA201	Advanced C Programming	DSC
U26BCCA211	Advanced C Programming Lab	DSC
U26BCCA202	Database Management System	DSC
U26BCCA212	Database Management System Lab	DSC
U26BCCA103	Discrete Mathematics	DSC (CBCS-1)
U26BCCA104	Domain Specific Elective-I:: Computer Architecture	DSCE (CBCS-1)
U26BCCA105	Domain Specific Elective-I:: Introduction to OOPs	
U26BCCA106	Software Engineering	SEC(CBCS-2)
U26BCCA107	Applied Communication	AEC (CBCS-2)
	Foreign Language-II	AEC
U26BCCA203	AI for Everyone	VAC
U26BCCA204	Basics of Computer Network	VAC
U26BCCA205	Data Science & Data Analytics using R	MOOC



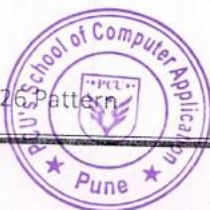


**Bachelor Computer Applications (BCA)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)**

SEMESTER-I

COURS E CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME				
			TH	P R	TU T	CRE DIT	HRS		CIA	ESA	PR/ OR	TOTA L
U26BCCA101	DSC	Programming Fundamentals using C	3	-	-	3	3		40	60		100
U26BCCA111	DSC	Programming Fundamentals using C lab	-	2	-	2	4		50		50	100
U26BCCA102	DSC	Web Technology	3	-	-	3	3		40	60		100
U26BCCA112	DSC	Web Technology Lab	-	2	-	2	4		50		50	100
U26BCCA103	DSC (CBCS-1)	*Discrete Mathematics	3	-	-	0-3	3		40	60		100
U26BCCA104/ U26BCCA105	DSCE (CBCS-1)	*Domain Specific Elective-I	3	-	-	0-3	3		40	60		100
U26BCCA106	SEC (CBCS-2)	*Software Engineering	2	-	-	0-2	2		20	30		50
U26BCCA107	AEC (CBCS-2)	*Applied Communication	2	-	-	0-2	2		50	-		50
	AEC	Foreign Language-I	2	-	-	1	2		50	-	-	50
U26BCCA108	IKS	Indian Knowledge System	2	-	-	1	2		50			50
	VAC	UHV-I	2	-	-	2	2		50	-	-	50
U26BCCA109	MOOC	Cyber Security in IoT	3	-	-	3	3		40	60		100
TOTAL			20	4	0	22	28				100	800
Domain Specific Elective-I												
U26BCCA104	DSCE (CBCS-1)	Computer Architecture	3	-	-	3	3		40	60	-	100
U26BCCA105		Fundamental of Information Technology	3	-	-	3	3		40	60	-	100
Foreign Language – I												
UFL101A	AEC	Foreign Language – I: German	2	-	-	-	2		50	-	-	50
UFL101B	AEC	Foreign Language – I: Japanese	2	-	-	-	2		50	-	-	50
UFL101C	AEC	Foreign Language – I: Korean	2	-	-	-	2		50	-	-	50

Note: * Student can opt the course wither in Sem-I/Sem-II, under choice based credit system





**Bachelor Computer Applications (BCA)
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SEMESTER-II

SEMESTER-II												
COURSE CODE	COURS E TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			T H	PR	TU T	CREDI T	HR S		CIA	ESA	PR/ OR	TOTA L
U26BCCA201	DSC	Advanced C Programming	3	-	-	3	3		40	60		100
U26BCCA211	DSC	Advanced C Programming Lab	-	1	-	1	2		50		50	100
U26BCCA202	DSC	Database Management System	3	-	-	3	3		40	60		100
U26BCCA212	DSC	Database Management System Lab	-	1	-	1	2		50		50	100
U26BCCA103	DSC (CBCS-1)	*Discrete Mathematics	3	-	-	0-3	3		40	60		100
U26BCCA104/ U26BCCA105	DSCE (CBCS-1)	*Domain Specific Elective-I	3	-	-	0-3	3		40	60		100
U26BCCA106	SEC (CBCS-2)	*Software Engineering	2	-	-	0-2	2		20	30		50
U26BCCA107	AEC (CBCS-2)	*Applied Communication	2	-	-	0-2	2		50	-		50
	AEC	Foreign Language-II	2	-	-	1	2		50	-	-	50
U26BCCA203	VAC	AI for Everyone	2	-	-	2	2		20	30		50
U26BCCA204	VAC	Basics of Computer Network	2	-	-	2	2		50	-		50
U26BCCA205	MOOC	Data Science & Data Analytics using R	3	-	1	4	5		40	60		100
TOTAL			20	02	01	22	26				100	800
Domain Specific Elective-I												
U26BCCA104	DSE (CBCS-1)	Computer Architecture	3	-	-	3	3		40	60	-	100
U26BCCA105		Fundamental of Information Technology	3	-	-	3	3		40	60	-	100
Foreign Language – II												
	AEC	Foreign Language – II: German	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – II: Japanese	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – II: Korean	2	-	-	-	2		50	-	-	50

Note: * Student can opt the course wither in Sem-I/Sem-II, under choice based credit system





Exit Policy: UG Certificate in BCA: A Students who opt to exit after completion of the first year and have scored the required credits offered by the school in the program structure will be awarded a UG certificate in BCA, provided they must earn additional credits during the summer vacation of the first year

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	PR	TUT	CRED IT	Hrs	CIA	ESA	PR/OR	TOTAL
UCXBC101	VSC	Php & MySQL/MOOC	2	-	-	2	2	50	-	-	50
UCXBC102	VSC	Project	-	2	-	4	8	50	-	50	100





**Bachelor Computer Applications (BCA)
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SEMESTER-III

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	P R	TU T	CRED IT	HRS	CI A	ES A	PR/OR	TOTAL
U26BCCA301	DSC	Data Structure using C	3	-	-	3	3	40	60		100
U26BCCA311	DSC	Data Structure using C Lab.	-	1	-	1	2	50		50	100
U26BCCA302	DSC	Data Communication & Networking	3	-	-	3	3	40	60	-	100
U26BCCA312	DSC	Data Communication & Networking Lab	-	1	-	1	2	50		50	100
U26BCCA303	DSC (CBCS-1)	*Numerical Methods	3	-	-	0-3	3	40	60		100
U26BCCA304 U26BCCA305	DSCE (CBCS-1)	*Domain Specific Elective-II	3	-	-	0-3	3	40	60		100
U26BCCA306	SEC (CBCS-2)	*Search Engine Optimization	2	-	-	0-2	2	20	30		50
U26BCCA307	AEC (CBCS)	*Professional Writing	2	-	-	0-2	2	50	-		50
	AEC	Foreign Language-III	2	-	-	1	2	50	-	-	50
U26BCCA308	VAC	Sports/Yoga/Cultural Activities/Club Activities	2	-	-	1	2	50	-		50
U26BCCA309	VAC	Rural Immersion/Community Engagement Project	2	-	-	1	2	50	-		50
U26BCCA310	MOOC	Software Engineering using UML	2	-	-	2	2	20	30		50
U26BCCA313	SEC	Capstone: ALR	-	2	-	1	2	50	-	-	50
	MDM	MINOR-I	3	-	1	3	4	40	60		100
TOTAL			22	02	01	22	29			100	900
Foreign Language – III											
	AEC	Foreign Language – III: German	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – III: Japanese	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – III: Korean	2	-	-	-	2	50	-	-	50

Domain Specific Elective-II

U26BCCA304	DSCE	Statistical Techniques & Tools	3	-	-	3	3	40	60	-	100
U26BCCA305	DSCE	Data Mining & Data' Warehousing	3	-	-	3	3	40	60	-	100

Note: * Student can opt the course wither in Sem-III/Sem-IV, under choice based credit system





**Bachelor Computer Applications (BCA)
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SEMESTER-IV

COURS E CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			T H	PR	TUT	CRED IT	HRS	CIA	ESA	PR/ OR	TOTAL
U26BCCA401	DSC	Operating Systems Using Linux	3	-	-	3	3	40	60	-	100
U26BCCA411	DSC	Operating Systems Using Linux Lab	-	2	-	2	4	50		50	100
U26BCCA402	DSC	Python Programming	3	-	-	3	3	40	60		100
U26BCCA412	DSC	Python Programming Lab.	-	2	-	2	4	50		50	100
U26BCCA303	DSC (CBCS-1)	*Numerical Methods	3	-	-	0-3	3	40	60		100
U26BCCA304/ U26BCCA305	DSCE (CBCS-1)	*Domain Specific Elective-II	3	-	-	0-3	3	40	60		100
U26BCCA306	SEC (CBCS-2)	*Search Engine Optimization	2	-	-	0-2	2	20	30		50
U26BCCA307	AEC (CBCS-2)	*Professional Writing	2	-	-	0-2	2	50	-		50
U26BCCA403	AEC	Foreign Language-IV	2	-	-	1	2	50	-	-	50
U26BCCA404	VAC	Sports/Yoga/Cultural Activities/Club Activities	2	-	-	1	2	50	-		50
U26BCCA405	VAC	Rural Immersion/Community Engagement Project	2	-	-	1	2	50	-		50
U26BCCA406	MOOC	Artificial Intelligence	2	-	-	2	2	20	30		50
	MDM	MINOR-II	3	-	-	3	4	40	60		100
TOTAL			22	4	0	22	31			100	850
Foreign Language – IV											
	AEC	Foreign Language – IV: Japanese	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – IV German	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – IV: Korean	2	-	-	-	2	50	-	-	50

Domain Specific Elective-II

U26BCCA304	DSCE	Statistical Techniques & Tools	3	-	-	3	3	40	60	-	100
U26BCCA305	DSCE	Data Mining & Data Warehousing	3	-	-	3	3	40	60	-	100

Note: * Student can opt the course wither in Sem-III/Sem-IV, under choice based credit system





Exit Policy: UG Diploma in BCA: A Students who opt to exit after completion of the second year and have scored the required credits offered by the school in the program structure will be awarded a UG certificate in BCA, provided they must earn additional credits during the summer vacation of the second year.

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	PR	TUT	CREDIT	Hrs.	CIA	ESA	PR/ OR	TOTAL
UDIEXBC201	VSC	Advance C++/MOOC	2	-	-	2	2	-	-	50	50
UDIEXBC202	VSC	Project	-	4	-	4	8	50	-	50	100





**Bachelor Computer Applications (BCA)
CURRICULUM STRUCTURE
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SEMESTER V

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			T H	PR	TU T	CRE DIT	HR S	CIA	ESA	PR /O R	TOT AL
U26BCCA501	DSC	Core Java Programming	3	-	-	3	3	40	60	-	100
U26BCCA511	DSC	Core Java Programming Lab	-	2	-	2	4	50	-	50	100
U26BCCA502	DSC	Advanced Internet Technologies	3	-	-	3	3	40	60	-	100
U26BCCA512	DSC	Advanced Internet Technologies Lab	-	2	-	2	4	50	-	50	100
U26BCCA503/ U26BCCA504	DSCE	Domain Specific Elective-III	3	-	-	3	3	40	60	-	100
U26BCCA505	SEC	Capstone Program-ALR + Soft Skill (Summer Break)	-	3	-	3	-	50	-	50	100
U26BCCA506	PROJ	Internship	3	-	-	3	3	50	-	50	100
	MDM	Minor – III	3	-	-	3	3	40	60	-	100
TOTAL			15	7	0	22	23	360	240	200	800
Domain Specific Elective-III											
U26BCCA503	DSCE	Software Project Management	3	-	-	3	3	40	60	-	100
U26BCCA504	DSCE	Data Science	3	-	-	3	3	40	60	-	100





**Bachelor Computer Applications (BCA)
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SEMESTER VI SCHEME A

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	PR	TU T	CREDIT	HRS	CIA	ESA	PR/OR	TOTAL
U26BCCA601	DSC	Advanced Java	3	-	-	3	3	40	60		100
U26BCCA611	DSC	Advanced Java Lab	-	2	-	2	4	50	-	50	100
U26BCCA602	DSC	Machine Learning with Python	3	-	-	3	3	40	60		100
U26BCCA612	DSC	Machine Learning with Python Lab	-	2	-	2	4	50	-	50	100
U26BCCA603	PROJ	Internship/Project	-	4	-	12	12	250		250	500
TOTAL			6	8	0	22	26	430	120	350	900

SEMESTER VI SCHEME B

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	PR	TU T	CREDIT	HRS	CIA	ESA	PR/OR	TOTAL
U26BCCA601	MOOC	Advanced Java	3	-	-	3	3	40	60		100
U26BCCA611	MOOC	Advanced Java Lab	-	2	-	2	4	50	-	50	100
U26BCCA602	MOOC	Machine Learning with Python	3	-	-	3	3	40	60		100
U26BCCA612	MOOC	Machine Learning with Python Lab	-	2	-	2	4	50	-	50	100
U26BCCA603	PROJ	Internship/Project	-	4	-	12	12	250		250	500
TOTAL			6	8	0	22	26	430	120	350	900





**Bachelor Computer Applications (BCA)
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SEMESTER VII(Honours)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME				
			TH	P R	TU T	Credit	Hrs	CI A	ES A	PR/OR	TO TAL	
U26BCCA701	DSC	Prompt & Generative AI	3	-	-	3	3	40	60	-	100	
U26BCCA711	DSC	Prompt & Generative AI Lab	-	2	-	2	4	50	-	50	100	
U26BCCA702	DSC	Mobile Computing	3	-	-	3	3	40	60	-	100	
U26BCCA712	DSC	Mobile Computing Lab	-	2	-	2	4	50	-	50	100	
U26BCCA703	DSC	Agile Methodologies & Scrum Practices	4	-	-	4	4	40	60	-	100	
U26BCCA704 / U26BCCA705	DSCE	Domain Specific Elective – IV	4	-	-	4	4	40	60	-	100	
U26BCCA706	SEC	Blockchain Technologies	4	-	-	4	4	40	60	-	100	
		TOTAL	18	4	0	22	26	300	300	100	700	
Domain Specific Elective – IV												
U26BCCA704	DSCE	Artificial Intelligence for Real-World Applications	4	-	-	4	4	40	60	-	100	
U26BCCA705	DSCE	Advanced Database Management System	4	-	-	4	4	40	60	-	100	





**Bachelor Computer Applications (BCA)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)**

SEMESTER-VIII(Honours)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			T H	PR	TU T	CREDI T	HRS		CIA	ESA	PR / OR	TOTAL
U26BCCA801	DSC	Full Stack Developer	3	-	-	3	3		40	60		100
U26BCCA811	DSC	Full Stack Developer Lab	-	2	-	2	4		50	-	50	100
U26BCCA802	DSC	Design & Analysis of Algorithm	3	-	-	3	3		40	60		100
U26BCCA812	DSC	Design & Analysis of Algorithm Lab	-	2	-	2	4		50	-	50	100
U26BCCA803	DSC	Management Information System	4	-	-	4	4		40	60		100
U26BCCA804	DSC	Applied Cryptography	4	-	-	4	4		40	60		100
U26BCCA805	PROJ	Research Project				4	8		50	-	50	100
TOTAL			14	4	0	22	30		310	240	150	700





**Bachelor Computer Applications (BCA)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)**

SEMESTER VII(Honours with Research Degree)

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	P R	TU T	Credit	Hrs	CI A	ES A	PR/ OR	TO TAL
U26BCCA701	DSC	Prompt & Generative AI	3	-	-	3	3	40	60		100
U26BCCA711	DSC	Prompt & Generative AI Lab	-	2	-	2	4	50	-	50	100
U26BCCA702	DSC	Mobile Computing	3	-	-	3	3	40	60		100
U26BCCA712	DSC	Mobile Computing Lab	-	2	-	2	4	50	-	50	100
U26BCCA704/ U26BCCA705	DSCE	Domain Specific Elective –IV	4	-	-	4	4	40	60	-	100
U26BCCA706	RM	Research Methodologies and Techniques	4	-	-	4	4	40	60	-	100
U26BCCA707	RP	Research Project-I	-	4	-	4	4	50	-	50	100
		TOTAL	14	8	0	22	28	310	240	150	700
Domain Specific Elective – IV											
U26BCCA704	DSCE	Artificial Intelligence for Real-World Applications	4	-	-	4	4	40	60	-	100
U26BCCA705	DSCE	Advanced Database Management System	4	-	-	4	4	40	60	-	100





**Bachelor Computer Applications (BCA)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)**

SEMESTER-VIII(Honours with Research Degree)

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			T H	PR	TUT	CREDIT	HRS	CIA	ESA	PR/ OR	TOTAL
U26BCCA801	DSC	Full Stack Developer	3	-	-	3	3	40	60		100
U26BCCA811	DSC	Full Stack Developer Lab	-	2	-	2	4	50	-	50	100
U26BCCA802	DSC	Design & Analysis of Algorithm	3	-	-	3	3	40	60		100
U26BCCA812	DSC	Design & Analysis of Algorithm Lab	-	2	-	2	4	50	-	50	100
U26BCCA806	DSC	Blockchain Technologies	4	-	-	4	4	40	60		100
U26BCCA807	RP	Research Project-II	-	8	-	8	8	100	-	100	200
TOTAL			10	12	0	22	26	320	180	200	700





BCA 2026 PATTERN
COURSE DETAILS
Semester - I





COURSE CURRICULUM

Name of the Program:	BCA	Semester: I	Level: UG
Course Name	Programming Fundamentals using C	Course Code and Course Type	U26BCCA101/DSC
Course Pattern	2026	Version	1.0
Teaching Scheme		Assessment Scheme	
Theory	Practical	Tutorial	Total Credits
3	-	-	3
Hou rs	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	40	60	-

Prerequisite:

Course Objectives (CO):

The objectives of:

1. Introduce students to the fundamentals of problem solving and algorithmic thinking.
2. Develop basic programming skills using the C language.
3. Familiarize students with variables, operators, control structures, and functions.
4. Build logical reasoning for structured programming.
5. Prepare students for an advanced C programming course in the next semester.

Course Learning Outcomes (CLO):

Students will be able to:

1. Understand the structure and syntax of C programs.
2. Develop simple programs using operators and expressions.
3. Apply decision-making and looping constructs.
4. Use arrays, strings, and functions for modular programming.
5. Solve basic computational problems using C programming concepts.

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Introduction to Programming and C Basics: Introduction to programming, Problem solving concepts - algorithm, flowchart, Features of C language, Structure of C program - documentation, declaration, executable section, Character set and tokens, Keywords and identifiers, Variables and constants - declaration, initialization, Data types - basic data types, Input and output statements - printf(), scanf(), Program compilation process - edit, compile, execute, Simple C programs	CLO 1	9
UNIT II:		
Operators and Expressions: Arithmetic operators - addition, subtraction, multiplication, division, modulus, Relational operators - comparison operations, Logical operators - AND, OR, NOT, Assignment operators - shorthand assignment, Increment and decrement operators - prefix, postfix, Conditional operator - ternary expression, Operator precedence and associativity, Type conversion - implicit and explicit conversion, Expression evaluation - numerical problem solving	CLO 2	9
UNIT III:		
Decision Making and Looping Statements: Decision making concepts, if statement - simple conditional execution, if-else statement - branching, Nested if statement, switch statement - menu-	CLO 3	9





driven logic, Looping concepts, while loop - entry-controlled loop, do-while loop - exit-controlled loop, for loop - counter-based iteration, Nested loops - multiple iterations, break and continue statements, Programs using conditional and looping statements

UNIT IV:

Arrays and Strings: Introduction to arrays, One-dimensional arrays - declaration, initialization, Two-dimensional arrays - matrix representation, Array operations - traversal, searching, Character arrays, Introduction to strings, String input and output, String handling functions - strlen(), strcpy(), strcmp(), strcat(), String manipulation programs, Programs using arrays and strings

CLO4

9

UNIT V:

Functions and Modular Programming: Introduction to functions, Need for modular programming, Function declaration - prototype, Function definition and calling, Function arguments - actual and formal parameters, Return values, Types of functions - with/without arguments and return type, Scope and lifetime of variables - local and global variables, Recursive functions - basics, Header files and library functions, Programs using functions

CLO5

9

Total Hours

45

Reference Books:

1. *Programming in ANSI C* – E. Balagurusamy
2. *Let Us C* – Yashavant Kanetkar
3. *The C Programming Language* – Brian Kernighan and Dennis Ritchie
4. *Programming with C* – Byron Gottfried
5. *Problem Solving and Programming in C* – R.S. Salaria

Online Resources:

1. W3Schools – Step-by-step C tutorial with syntax, examples, and exercises.
2. Programiz – Structured C programming tutorials with examples and coding practice.
3. GeeksforGeeks – Detailed explanations, coding examples, and interview-oriented C concepts.





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Programming Fundamentals using C Lab		Course Code and Course Type		U26BCCA111/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theo ry	Practical	Tutorial	Total Credits	Hours	CIA(Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
-	2	-	2	4	50	-	50

Prerequisite:

Course Objectives (CO):

The objectives are:

1. Introduce students to programming practice using C language in a Linux environment.
2. Develop problem-solving skills through hands-on coding.
3. Familiarize students with Linux terminal commands for compiling and executing C programs.
4. Build programming logic using control structures, arrays, strings, and functions.
5. Prepare students for advanced C programming laboratory work.

Course Learning Outcomes (CLO):

Students will be able to:

1. Write, compile, and execute C programs using GCC compiler in a Linux-based environment.
2. Develop structured C programs using variables, operators, and expressions.
3. Apply conditional and looping statements for problem-solving in C programming.
4. Develop programs using arrays, strings, and user-defined functions.
5. Debug, test, and improve program logic using standard C programming practices..

Course Contents/ Syllabus: Practical Plan

Activity Number	Assignment/ Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Write a C program to perform basic input and output operations	Week 1/ Turn1and2	a. Print "Hello World". b. Display personal information. c. Read integer, float, and character from user. d. Display entered values using formatted output. e. Demonstrate escape sequences (\n, \t).	CLO1	4
2	Write a C program to perform arithmetic	Week 2/ Turn1and2	a. Addition, subtraction, multiplication, division. b. Calculate area of rectangle and circle.	CLO1	4





	operations		c. Swap two numbers. d. Convert Celsius to Fahrenheit. e. Calculate simple interest.		
3	Write a C program using conditional statements	Week 3/ Turn 1 and 2	a. Find largest among two numbers. b. Find largest among three numbers. c. Check even or odd number. d. Check positive, negative, or zero. e. Determine voting eligibility.	CLO1	4
4	Write a C program using nested conditions	Week 4/ Turn 1 and 2	a. Check leap year. b. Find smallest among three numbers. c. Grade calculation using percentage. d. Income tax calculation logic. e. Menu-based conditional program.	CLO1	4
5	Write a C program using switch case	Week 5/ Turn 1 and 2	a. Calculator using switch case. b. Display weekday from number. c. Menu-driven arithmetic operations. d. Unit conversion menu. e. Simple banking menu operations.	CLO2	4
6	Write a C program using looping statements	Week 6/ Turn 1 and 2	a. Print numbers 1-100. b. Display multiplication table. c. Sum of natural numbers. d. Reverse counting. e. Print even and odd numbers.	CLO2	4
7	Write a C program using iterative logic	Week 7/ Turn 1 and 2	a. Check prime number. b. Check palindrome number. c. Armstrong number. d. Perfect number. e. Strong number.	CLO3	4
8	Write a C program for number-based logic	Week 8/ Turn 1 and 2	a. Check prime number. b. Check palindrome number. c. Armstrong number. d. Perfect number. e. Strong number.	CLO3	4
9	Write a C program using nested loops	Week 9/ Turn 1 and 2	a. Star pattern printing. b. Pyramid pattern. c. Floyd's triangle. d. Multiplication table matrix. e. Number triangle patterns.	CLO3	4
10	Write a C program using one-dimensional arrays	Week 10/ Turn 1 and 2	a. Read array elements. b. Find largest and smallest element. c. Calculate sum and average. d. Search an element. e. Reverse array elements.	CLO4	4
11	Write a C program using two-dimensional arrays	Week 11/ Turn 1 and 2	a. Matrix addition. b. Matrix subtraction. c. Matrix transpose. d. Matrix Multiplication. e. Diagonal element display.	CLO4	4
12	Write a C program using strings	Week 12/ Turn 1 and 2	a. String length calculation. b. String copy. c. String comparison. d. String concatenation. e. Reverse a string.	CLO5	4





13	Write a C program using functions	Week 13/ Turn 1 and 2	a. Function for addition. b. Function for factorial. c. Function for prime number check. d. Function for largest number. e. Function for palindrome check.	CLO5	4
14	Write a C program using recursion	Week 14/ Turn 1 and 2	a. Recursive factorial. b. Recursive Fibonacci. c. Sum of natural numbers using recursion.	CLO5	4
15	Write a C program using combined concepts	Week 15/ Turn 1 and 2	a. Menu-driven program using functions. b. Student marks calculation using arrays and conditions. c. Employee salary calculation using functions and loops. d. String palindrome check using functions. e. Number-based menu program combining loops and conditions.	CLO5	4

Learning resources

Textbooks

1. Programming in ANSI C – Beginner-friendly textbook covering C fundamentals, operators, arrays, and functions.
2. Let Us C – Widely used academic book with simple examples and practice programs.
3. Programming with C – Good for structured learning and laboratory-oriented exercises.
4. Programming in C – Practical introduction to C programming with examples.
5. C Programming: A Modern Approach – Strong conceptual coverage for foundational C learning.

Reference Books

1. The C Programming Language – Classic reference book written by the creators of C.
2. C in a Nutshell – Concise reference for syntax and standard libraries.
3. Practical C Programming – Useful for lab practice and coding techniques.
4. Head First C – Visual and activity-based learning for beginners.
5. C: How to Program – Detailed programming exercises and examples.

Online Resources

1. W3Schools – Beginner-friendly C programming tutorials and examples.
2. Programiz – Step-by-step tutorials with syntax explanations and exercises.
3. GeeksforGeeks – C programming concepts, coding problems, and practice programs.
4. Learn-C.org – Interactive browser-based C coding exercises.
5. TutorialsPoint – Practical examples and compiler-based C practice environment.





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Web Technology		Course Code/ Course Type		U26BCCA102/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-
Prerequisite: Basic knowledge of computers.							
Course Objectives (CO):				The objectives of Web Technology are: 1. To understand the basic concepts and components of the World Wide Web. 2. To recognize and use HTML5 elements for structuring web pages. 3. To apply CSS for designing and creating responsive web layouts. 4. To develop interactive web pages using JavaScript and DOM manipulation. 5. To design and develop basic web applications using client-side technologies.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Identify and explain fundamental web development concepts and technologies. 2. Develop static web pages using HTML5 elements and attributes. 3. Design responsive and visually appealing web pages using CSS. 4. Apply JavaScript for event handling and DOM-based dynamic content. 5. Create simple interactive web applications using client-side scripting.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Basics of Internet and Web: Introduction to Internet and Web, Web Browsers and Web Servers, Static and Dynamic Web Pages, Client-side and Server-side Scripting, Web Protocols (HTTP, HTTPS), Web Hosting concepts, Domain Name System (DNS), URL structure	CLO 1	9
UNIT II		
HTML5 Fundamentals: Introduction to HTML5, Document structure, Metadata, Headings, Paragraphs, Text formatting, Lists, Links, Images, Tables, Forms and input types, Multimedia elements (audio, video), Semantic elements.	CLO 2	9
UNIT III		
CSS for Web Design: Introduction to CSS and CSS3, Types of CSS (inline, internal, external), Selectors and properties, Text and font styling, Colors and backgrounds, Box model (margin, padding, border), Layout techniques (Flexbox basics), Positioning and display, Introduction to responsive design and media queries.	CLO3	9
UNIT IV		
JavaScript and DOM Manipulation: Introduction to JavaScript, Variables and data types, Operators and control statements, Functions, Arrays, Events and event handling, Document Object Model (DOM), DOM manipulation (changing content and styles), Form validation using JavaScript.	CLO4	9
UNIT V		
Dynamic Web Page Development: JavaScript objects and methods, Built-in functions, working with forms and validations, Dynamic content generation, Introduction to browser developer tools, Debugging basics, best practices in web development..	CLO5	9
Total		45





Learning resources

Textbooks:

1. Learn HTML for Beginners: The Illustrated Guide to Coding Paperback, Jo Foster
2. HTML: A Beginner's Guide, Fifth Edition: A Beginner's Guide, Fifth Edition: CourseLoad e-book for HTML A BEGINNERS GD 5E, Wendy Willard.

Reference Books:

1. JavaScript for Absolute Beginners (Expert's Voice in Web Development) Paperback, by Terry McNavage (Author)
2. Learn JavaScript Quickly: A Complete Beginner's Guide to Learning JavaScript, Even If You're New to Programming by Code Quickly.

Online Resources/E-Learning Resources

1. <https://www.w3schools.com/html/>
2. <https://www.tutorialspoint.com/html5/index.htm>
3. <https://javascript.info/>

COURSE CURRICULUM

Name of the Program:		BCA	Semester: I			Level: UG	
Course Name		Web Technology Lab	Course Code/ Course Type			U26BCCA112/DSC	
Course Pattern		2026	Version			1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	2	-	2	2	50	-	50

Prerequisite: Basic Knowledge of Computers are required.

Course Objectives (CO):

The objectives of Web Programming are:

1. To recall different components and technologies of the World Wide Web as a platform.
2. To recognize HTML5 elements and components
3. To apply knowledge of HTML5 and CSS
4. Develop responsive web designs that adapt to various devices, and use JavaScript to enhance user interactivity and create dynamic web applications.
5. To Design and develop websites using fundamental web languages, technologies, and tools.





Course Learning Outcomes (CLO):

Students would be able to:

1. Identify basic web development methodologies.
2. Comprehend static web-based application using suitable client-side web technologies
3. Apply knowledge of foundational understanding of web development concepts for further study.
4. Analyze and create responsive layouts that adapt to various devices and screen sizes.
5. Evaluate the JavaScript, enabling dynamic content generation, effective event handling, and efficient DOM traversal techniques.

Course Contents/Syllabus: Practical Plan

Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Write a HTML program for the demonstration of Lists.	Week 1/ Turn 1 and 2	a. Unordered List b. Ordered List c. Definition List d. Nested List	CLO1	4
2	Write a HTML program for demonstrating Hyperlinks.	Week 2/ Turn 1 and 2	a. Navigation from one page to another. b. Navigation within the page.	CLO1	4
3	Assignment on HTML5 Table Element	Week 3/ Turn 1 and 2	Write a HTML program for time-table using tables.	CLO1	4
4	Create Home Page using HTML5	Week 4/ Turn 1 and 2	Write a HTML program to develop a static Home Page using frames.	CLO1	4
5	Create Registration Page using HTML5	Week 5/ Turn 1 and 2	Write a HTML program to develop a static Registration Form.	CLO2	4
6	Create Login Page using HTML5	Week 6/ Turn 1 and 2	Write a HTML program to develop a static Login Page.	CLO2	4
7	Create Product catalog.	Week 7/ Turn 1 and 2	Write a HTML program to develop a static Web Page for Catalog.	CLO3	4
8	Create CSS	Week 8/ Turn 1 and 2	Write HTML for demonstration of cascading style sheets. a. Embedded stylesheets. b. External stylesheets. c. Inline styles.	CLO3	4
9	Create Login page using Javascript Validation	Week 9/ Turn 1 and 2	Write a javascript program to validate the USER LOGIN page.	CLO3	4
10	Create Registration page using Javascript Validation	Week 10/ Turn 1 and 2	Write a javascript program for validating REGISTRATION FORM	CLO4	4





11	Event Handling	Week 11/ Turn 1 and 2	Background Color Change	CLO4	4
12	Event Handling	Week 12/ Turn 1 and 2	calendar for the month and year by combo box [APL]	CLO5	4
13	Event Handling	Week 13/ Turn 1 and 2	OnMouseover event	CLO5	4
14	Event Handling	Week 14/ Turn 1 and 2	OnMouseover using objects	CLO5	4
15	Application	Week 15/ Turn 1 and 2	Online Exam [APL]	CLO5	4

Learning resources

Textbooks:

1. Learn HTML for Beginners: The Illustrated Guide to Coding Paperback, Jo Foster
2. HTML: A Beginner's Guide, Fifth Edition: A Beginner's Guide, Fifth Edition: CourseLoad ebook for HTML A BEGINNERS GD 5E, Wendy Willard.

Reference Books:

1. JavaScript for Absolute Beginners (Expert's Voice in Web Development) Paperback, by Terry McNavage (Author)
2. Learn JavaScript Quickly: A Complete Beginner's Guide to Learning JavaScript, Even If You're New to Programming by Code Quickly.

Online Resources/E-Learning Resources

1. <https://www.w3schools.com/html/>
2. <https://www.tutorialspoint.com/html5/index.htm>
3. <https://javascript.info/>





COURSE CURRICULUM

Name of the Program:	BCA	Semester: I	Level: UG
Course Name	Discrete Mathematics	Course Code/ Course Type	U26BCCA103
Course Pattern	2026	Version	1.0
Teaching Scheme			
Theory	Practical	Tutorial	Total Credits
3	-	-	3
Assessment Scheme			
CIA (Continuous Internal Assessment)		ESA (End Semester Assessment)	Practical/Oral
40		60	-

Prerequisite: Basics of Mathematics

Course Objectives (CO):

The objectives of Discrete Mathematics are:

1. To introduce fundamental concepts of mathematical logic, sets, relations, and functions relevant to computer science.
2. To develop analytical and logical reasoning skills for solving computational problems.
3. To provide knowledge of sequences, summations, and discrete structures used in algorithm design.
4. To familiarize students with algebraic systems and group theory concepts for abstract problem solving.
5. To introduce graph theory and trees for modeling and solving real-world computing problems.

Course Learning Outcomes (CLO):

Students would be able to:

1. Apply logical reasoning to analyze propositions, construct truth tables, and solve problems using logical equivalences and normal forms.
2. Analyze binary relations, determine their properties, and apply concepts such as equivalence relations, partial orders, and lattices in problem-solving.
3. Apply set theory, functions, and sequences to solve mathematical and computational problems, including inclusion-exclusion and function composition.
4. Apply algebraic structures such as semigroups, monoids, and groups, including subgroups and cosets.
5. Apply graph theory concepts to solve problems.

Course Contents/Syllabus:

Descriptors/Topics

	CLO	Hours
UNIT I		
Mathematical Logic: Propositions (Statements) Logical connectives, NOT $\neg$, AND $\wedge$, OR $\vee$, $\rightarrow$, $\leftrightarrow$ Compound statements form, truth tables, tautology, implications and equivalence of statements forms logical identities Normal forms : disjunctive normal form and simplification. Conjunctive normal form, PDNF, PCNF, logical implications	CLO 1	9
UNIT II		
Relation: Relation defined as ordered n-tuple Unary, binary, ternary, n-ary Restrict to binary relations Complement of a relation, converse relation, compositions, matrix representation and its properties Graphical representation of relation – Digraphs Properties of binary relation – reflexive, irreflexive, symmetric, asymmetric, transitive equivalence, equivalence classes, partitions covering, compatible relation maximal compatibility block, transitive closure – Warshall's algorithm. Partial ordering relation – Hasse diagram, Chains and antichains. Lattice, maximal and minimal elements, upper bound, lower bound.	CLO 2	9
UNIT III		





Sets, Functions, Sequences and Summations:

Sets: Set Operations, Computer Representation of Sets, Countable and Uncountable Set, Principle of Inclusion and Exclusion, Multisets; Functions: One-to-one and Onto Functions, Inverse Functions and Compositions of Functions, Graphs of Functions, Sequences and Summations: Sequences, Special Integer Sequences, Summations

CLO3

9

UNIT IV

Algebraic Systems: Unary , binary , ternary definitions of algebraic systems (restrict to binary operations) Properties – closure, idempotent , associative, commutative, identity , inverse, Semigroup , subsemigroup Monoid , submonoid group , abelian group , permutation group, multiplicative abelian group, cyclic group Subgroups : Cosets , right cosets , left cosets , normal subgroups , quotient groups.

CLO4

9

UNIT V

Graph theory : trees Basic terminology , simple and weighted graph , adjacency and incidence , handshaking lemma , underlying graph of a digraph , complete graph , regular graph , bipartite graph , complete bipartite Isomorphism, complement of graph , connected graphs , paths-simple , elementary , circuit – simple , elementary Edge connectivity , vertex connectivity Eulersian path and eulersian circuit , planner graph – regions Euler's formula

CLO5

9

Total Hours

45

Learning resources

Textbooks:

1. Discrete Mathematical Structures for Computer Science by Kolman B and Bushy
2. Discrete Mathematical Structures with applications to Computer Science by Tremblay and Manohar

Reference Books:

1. Discrete Mathematics by C L Liu
2. Discrete Mathematics by Rosen

Online Resources and E-Learning Resources

1. <https://jeenotes.in/mathematics/sets-relations-functions/>
2. <https://www.coursera.org/specializations/discrete-mathematics>
3. <https://www.geeksforgeeks.org/engineering-mathematics/discrete-mathematics-tutorial/>





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Computer Architecture		Course Code/ Course Type		U26BCCA104/DSCE	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	
Prerequisite: Basic Knowledge of Computers.							
Course Objectives (CO):				The objectives of Computer Architecture are: 1. To understand the fundamentals of computer systems and architecture. 2. To learn data representation, logic gates, memory, and processor organization. 3. To develop understanding of instruction execution and memory management. 4. To Explore modern trends and emerging technologies in computer architecture. .			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain the fundamentals, components, and organization of computer systems. 2. Apply number systems and Boolean logic concepts to solve computing problems. . 3. Describe memory organization and storage mechanisms in computer systems. 4. Explain processor organization and instruction execution processes. 5. Identify I/O mechanisms and emerging trends in computer architecture.			
Course Contents/Syllabus							

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Fundamentals of Computer Systems: Introduction to Computer Systems, Characteristics and Applications of Computers ,Types of Computers ,Generations of Computers , Functional Units of a Computer , Hardware and Software Concepts, Computer Organization vs Computer Architecture, Basic Block Diagram of Computer System, Overview of System Bus and Data Flow	CLO1	9
UNIT II		
Data Representation and Boolean Logic: Data Representation and Information Coding, Number Systems: Binary, Decimal, Octal, Hexadecimal, Number System Conversion, Binary Arithmetic Operations ,1's and 2's Complement, Character Encoding: ASCII and Unicode, Introduction to Logic Gates, Boolean Algebra Basics, De Morgan's Theorem and Simplification	CLO2	9
UNIT III		
Memory Organization and Storage Devices: Memory Hierarchy, Primary Memory: RAM, ROM, Cache Memory Secondary Storage Devices, Registers and Register Organization, Bus Structure and Data Transfer ,Cache Memory Concepts, Virtual Memory Basics, Memory Units and Access	CLO3	9





Methods, Storage Performance Parameters

UNIT IV

Processor Organization and Instruction Execution: CPU Structure and Functions, Arithmetic Logic Unit (ALU), Control Unit Basics, Machine Language and Assembly Language, Instruction Cycle, Types of Instructions, Basic Addressing Modes, Interrupts and Their Types, Introduction to Microprocessors

CLO4

9

UNIT V

Input/Output Organization and Emerging Trends: Input and Output Devices, I/O Interface Concepts, Modes of Data Transfer, Interrupt Driven I/O, Direct Memory Access (DMA) Basics, Introduction to Parallel Processing, Multicore Processors, Cloud Computing Basics, Recent Trends in Computer Architecture

CLO5

9

Total

45

Learning resources

Textbooks:

1. Computer Organization and Architecture, William Stallings, Pearson Education
2. Computer System Architecture, M. Morris Mano, Pearson Education
3. Structured Computer Organization, Andrew S. Tanenbaum. Pearson Education

Reference Books:

1. Computer Fundamentals and Architecture, P. K. Sinha, BPB Publications
2. Digital Logic and Computer Design, M. Morris Mano, Pearson Education
3. Fundamentals of Computer, V. Rajaraman, PHI Learning Pvt. Ltd.

Online Resources/E-Learning Resources:

1. <https://www.coursera.org/courses?query=computer%20architecture>
2. <https://nptel.ac.in/courses/106102157>
3. <https://nptel.ac.in/courses/106105163>



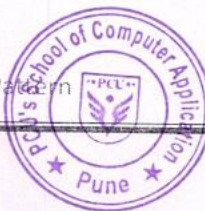


COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Fundamental of Information Technology		Course Code/ Course Type		U26BCCA105/ DSCE	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	
Prerequisite: Basic Knowledge of Computers.							
Course Objectives (CO):				The objectives of Fundamental of Information Technology are: • To understand basic concepts of Information Technology and computer systems • To familiarize students with hardware, software, and operating systems • To introduce networking, internet, and digital communication concepts • To develop awareness about cybersecurity and digital ethics • To provide hands-on knowledge of office automation tools			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain basic IT concepts, computer organization, and components 2. Identify types of software and operating system functionalities 3. Describe networking concepts, internet services, and communication tools 4. Apply office automation tools for documentation, spreadsheets, and presentations 5. Demonstrate awareness of cybersecurity, ethics, and digital safety			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Information Technology: Definition of Information Technology, Importance of IT, Evolution of computers, Types of computers (Analog, Digital, Hybrid), Components of computer system (Input unit, Output unit, CPU, Memory), Data and Information, Applications of IT in business, education and healthcare	CLO1	9
UNIT II		
Computer Hardware and Software: Computer hardware components (CPU, RAM, ROM, Storage devices), Input devices (Keyboard, Mouse, Scanner), Output devices (Monitor, Printer), Types of software (System software, Application software, Utility software), Operating system concepts, Functions of operating system, Types of operating systems, Introduction to Windows and Linux	CLO2	9
UNIT III		
Networking and Internet: Basics of computer networks, Types of networks (LAN, WAN, MAN), Network devices (Router, Switch, Modem), Internet concepts, World Wide Web, Web	CLO3	9





browsers, Search engines, Email concepts, Cloud computing basics, Introduction to Internet of Things (IoT)		
UNIT IV		
Office Automation Tools: Word processing concepts (Creating, editing, formatting documents), Spreadsheet concepts (Data entry, formulas, functions, charts), Presentation tools (Slides creation, themes, animations), File management, Data organization, Basic formatting techniques	CLO4	9
UNIT V		
Cybersecurity and Digital Ethics: Introduction to cybersecurity, Types of cyber threats (Malware, Phishing, Hacking), Data privacy and protection, Safe internet practices, Digital signatures, Overview of cyber laws, Ethical use of information technology, Social media ethics	CLO5	9
Total		45

Learning resources

Textbooks:

1. Fundamentals of Information Technology, Alexis Leon, Vikas Publishing House
2. Introduction to Computers, Peter Norton, McGraw-Hill Education

Reference Books:

1. Computer Fundamentals, P.K. Sinha, BPB Publications
2. Fundamentals of Computers, V. Rajaraman, Prentice Hall India
3. Principles of Information Security, Michael E. Whitman & Herbert J. Mattord, Cengage Learning

Online Resources/E-Learning Resources:

1. NPTEL

<https://nptel.ac.in>

- Free IIT-based courses on IT, networking, and computing

2. SWAYAM

<https://swayam.gov.in>

- NEP-aligned online courses for UG students

3. Microsoft Learn

<https://learn.microsoft.com>

- Tutorials on IT tools, Office, cloud, and security

4. Cisco Networking Academy

<https://www.netacad.com>

- Networking fundamentals, cybersecurity basics

5. GeeksforGeeks

<https://www.geeksforgeeks.org>

- Easy explanations of IT concepts, networking, and basics



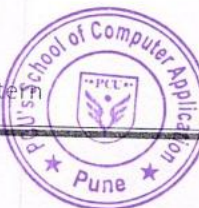


COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		UG	
Course Name		Software Engineering		Course Code/Course Type		U26BCCA106/SEC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	20	30	-
Prerequisite: ER Modeling							
Course Objectives (CO):				The objectives of Operating Systems Fundamentals are: 1. To learn and understand the principles of System Engineering. 2. To learn and understand the principles of Software Engineering. 3. To gain the knowledge of Software Development Life Cycle and methodology. 4. To impart various software requirement techniques. 5. To demonstrate the different system analysis and design engineering.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Compare and contrast various Software Engineering models. 2. Decide on an appropriate process model for developing a software project. 3. Classify software applications and Identify unique features of various domains. 4. Prepare System Requirement Specification (SRS) for the given problem. 5. Design and analyze Data Flow diagrams.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to System Engineering: Definition, Basic Components, Elements of the system, System Components, Types of System.	CLO 1	6
UNIT II		
Introduction to Software Engineering: Definition of Software, Characteristics of Software, Software Application Domain, Definition of Software Engineering, Need for software Engineering, Mc Call's Quality factors, The Software Process, Software Engineering Practice.	CLO 2	6
UNIT III		
Software Development Life Cycle (SDLC) and Methodologies: Introduction, Activities of SDLC, A Generic Process Model, Prescriptive Process models- Waterfall Model, Incremental Process Models, Evolutionary process Models (Prototyping and Spiral Model), Concurrent Models, Types	CLO3	6
UNIT IV		
Requirement Engineering: Introduction, Requirement Engineering Tasks, Establishing Groundwork for understanding of Software Requirement, Requirement Gathering, Feasibility study, Fact Finding Techniques.	CLO4	6
UNIT V		





Analysis and Design Engineering: Decision Tree and Decision Table, Data Flow Diagrams (DFD), Data Dictionary, Elements of DD, Advantages of DD, Input and Output Design, Entity Relationship Diagram (ERD), Case Studies on above topics.

CLO5

6

Total Hours

30

Learning resources

Textbooks:

1. Rajib Mall, "Fundamentals of Software Engineering", PHI 2018, 5th Edition.

Reference Books:

1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", McGraw Hill 2010, 7th Edition.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishing House 2011, 3rd Edition.

Online Resources/E-Learning Resources

1. <https://www.javatpoint.com/software-engineering>
2. <https://www.scaler.com/topics/software-engineering/>





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Applied Communication		Course Code/ Course Type		U26BCCA107/AEC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	-	2	50	-	-
Prerequisite: Anyone can take this course with basic knowledge of English communication.							
Course Objectives (CO):				The objectives of Applied Communication are: 1. To comprehend the basic English communication components. 2. To Identify the Factors influencing interpersonal communication. 3. To Apply the knowledge of written communication. 4. To Demonstrate English communication in public speaking and presentation. 5. To develop students' understanding of digital communication tools, media literacy skills, and ethical considerations in online communication.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Define communication and explain its significance in personal, professional, and societal contexts. 2. Apply interpersonal communication skills in various contexts, such as social interactions, group discussions, teamwork, leadership, and professional settings. 3. Understand the fundamental principles of effective writing, including clarity, coherence, conciseness, and correctness. 4. Reflect on their presentation experiences, seek feedback from peers. 5. Use digital tools for collaboration, communication, and productivity, including project management platforms.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Communication: Definition and models of communication, Importance of effective communication in personal and professional contexts, Basic elements of communication: sender, receiver, message, channel, feedback, Communication barriers and strategies for overcoming them, Verbal and nonverbal communication skills.	CLO 1	6
UNIT II		
Interpersonal Communication: Understanding interpersonal relationships, Factors influencing interpersonal communication: culture, gender, perception, and self-concept, Effective listening skills and techniques, Assertiveness and conflict resolution strategies, Building and maintaining healthy, relationships	CLO 2	6
UNIT III		
Written Communication: Principles of effective writing, clarity, coherence, conciseness and correctness, Types of written communication, emails, memos, letters, reports and resumes, Planning and organizing written documents, Grammar, punctuation and style conventions, Proofreading and editing techniques		





	CLO3	6
UNIT IV		
Public Speaking and Presentation Skills: Understanding the importance of public speaking, Preparing and organizing a presentation, topic selection, audience analysis and speech outline, Delivery techniques, voice modulation, body language, and eye contact, Overcoming stage fright and anxiety, Handling questions and feedback from the audience	CLO4	6
UNIT V		
Digital Communication and Media Literacy: Overview of digital communication tools, email, social media, instant messaging and video conferencing, Netiquette and online professionalism, Understanding media messages and sources	CLO5	6
Total Hours		30

Learning resources

Textbooks:

1. "Communication in Everyday Life: A Social Interpretation" by Steve Duck and David T. McMahan
2. "Applied Communication in the 21st Century" by Carole L. Huston and Ronald B. Adler

Reference Books:

1. "The SAGE Handbook of Communication and Instruction" edited by Deanna L. Fassett and John T. Warren
2. "Communication: Principles for a Lifetime" by Steven A. Beebe, Susan J. Beebe, and Diana K. Ivy

Online Resources/E-Learning Resources

1. <https://www.udemy.com/topic/communication-skills/free/>
2. <https://www.uou.ac.in/sites/default/files/slm/BHMAECC-II.pdf>





COURSE CURRICULUM

Name of the Program:	Foreign Language	Semester : III	Level: UG/PG
Course Name	Basic German Language skill	Course Code/ Course Type	
Course Pattern	2026	Version	1.0
Teaching Scheme			
Assessment Scheme			
Theory	Practical	Tutorial	Total Credits
			Hours
			CIA (Continuous Internal Assessment)
			ESA (End Semester Assessment)
			Practical/Oral
2	-	-	1
			2
			50
			-
			-

Pre-Requisite: Desire to get acquainted with the German Language.

Course Objectives (CO):

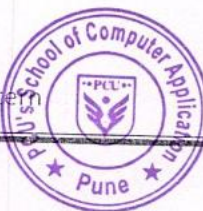
The objectives of Basic German language skill are:

1. Identify and correctly pronounce German alphabets, numbers, and basic expressions used in everyday communication.
2. Use common greetings, introductions, and simple conversational phrases in formal and informal contexts.
3. Construct basic sentences using personal pronouns and regular verb conjugations in the present tense.
4. Apply fundamental grammar concepts such as articles (definite/indefinite), singular-plural forms, and basic sentence structure.
5. Demonstrate the ability to ask and answer yes/no and WH-questions in simple conversations.

Course Learning Outcomes (CLO):

After learning the course, the students will be able to:

1. Correct pronunciation of German alphabets, numbers, and basic greetings in simple interactions.
2. Introduce oneself and others using basic sentence structures and personal pronouns.
3. Describe hobbies, professions, days, months, and seasons using relevant vocabulary and simple sentences.
4. Form and respond to yes/no and WH-questions using correct articles and sentence structures.
5. Ask for and give directions, describe places, and use transport-related vocabulary effectively.





Course Contents/Syllabus:

Topic / Description	CLO	Hours
Unit I		
Lektion 1: Guten Tag 1. Alphabets, pronunciation keys 2. Numbers 0-20 3. Numbers 20-100 4. Greetings, Bidding bye 5. How are you doing? Formal and informal	1	6
Unit II		
Lektion 1: Guten Tag 1. Countries and languages 2. Verb structure 3. Personal pronouns 4. Verb Conjugation for regular verbs 5. Basic sentence formation 6. Self-introduction	2	6
Unit III		
Lektion 2 Freunde, kollegen und ich 1. Hobbies 2. Weekdays, Months 3. Season 4. Professions 5. Regular and irregular verbs	3	6
Unit IV		
Lektion 2 Freunde, kollegen und ich 1. Definite Articles- der, die, das 2. Singular and plural forms 3. Yes/ no questions 4. Wh questions	4	6
Unit V		
Lektion 3: In Hamburg 1. To know and learn names of different buildings and places 2. Learn to ask and guide the directions 3. Mode of transport 4. Imperativ form in 'Sie' 5. Negative Articles- kein, keine 6. Indefinite Articles- ein, eine	5	6
Total Hours		30





Learning Resources:

Textbook:

- 1) Netzwerk neu A1 – Published by Goyal Publishers and Distributors (updated text book)

Reference Books:

- 1) Brücke 1- Maharashtra state board Bureau of Textbook production
- 2) Hilfe Vol. 1 and 2 (Publisher – Nirali Publications)
- 3) Collins Grammar book (Publisher – Goyal Publisher and Distributors)
- 4) Grammatik Aktiv A1 – B1 (Publisher – Goyal Publisher and Distributors)

Online Resources:

- 1) You tube Channel
 - a. Easy German – <https://www.youtube.com/channel/Ucbxb2f9e9oNggIAoYqsYotQ>
 - b. Learn German with Anja – <https://www.youtube.com/channel/UCZwegPHTG4gvmR0Wlzaq5OQ>
 - c. German Speakers Club – <https://www.youtube.com/@germanspeakersclub29>
- 2) App
 - a. Duolingo
 - b. Deutsche Welle
 - c. Dict.cc
 - d. Linguee

Name of the Program:		BCA		Semester: I		Level: UG/PG	
Course Name		Basic Japanese Language skill		Course Code/Course			
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	1	2	50	-	-

Pre-Requisite: Desire to get acquainted with the Japanese language.

Course Objectives (CO):

- The objectives of Basic Japanese language skill are:
1. To meet the needs of ever-growing industry, with respect to language support.
 2. To get introduced to Japanese society and culture through language.
 3. To acquire competitive edge in career choices.
 4. To participate effectively & responsibly in a multicultural world.
 5. To enable learners to communicate effectively in Japanese language.





Course Learning Outcomes (CLO):

After learning the course, the students will be able to:

1. Read and Write Hiragana script.
2. Write and speak basic sentences.
3. Comprehend and speak about time, hobbies, likes and dislikes.
4. Write basic kanji.
5. Use the Hiragana script in discussion.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Japanese Language 1. Introduction of Japanese culture, History, History of script 2. Speaking Self-introduction 3. Daily Greetings & Expressions 4. Numbers-1-20 5. Classroom Instructions	CLO 1	6
UNIT II		
Introduction of Hiragana Script 1. Days of the week 2. Months, Days of the month 3. Colors, Age 4. Short video skit on self-introduction 5. Start with Hiragana script Series 1-3	CLO 2	6
UNIT III		
Introduction of Hiragana Script 1.2 1. Hiragana script Series 4-6 2. Hiragana script Series 7-10 3. Writing Practice – Basic words 4. Hiragana Modified sounds 5. Hiragana Contracted sounds	CLO 3	6
UNIT IV		
Time and verbs 1. Speaking: Talking about routine 2. Reading: A clock 3. Writing: routine using verbs and time 4. Writing words using Hiragana Series, self-introduction in Hiragana script.	CLO 4	6
UNIT V		
Introduction of Katakana and basic kanji 1. Reading: English words, country names	CLO 5	6





2. Starting with Katakana series		
3. Writing: Basic number Kanji		
4. short video skit on self-introduction		
Total		30

Learning Resources:

➤ Textbooks:

1. Minna no Nihongo, "Japanese for everyone", Elementary Main Textbook, Goyal Publishers & Distributors Pvt. Ltd.

➤ Reference books:

1. Shyoho Volume I
2. Genki Japan
3. Ham vol. 1 & 2

➤ Online Resources/E-Learning Resources:

You Tube links:

<https://youtu.be/1JephUxTHxg?si=ouCwTXZc tYgY9Kh> 2. <https://youtu.be/9EtbkBkF2ag?si=rLNzc55 REacMoGu> 3. <https://youtu.be/DpEolYasgv?si=dva9ue-YMSH03VOG>





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG		
Course Name		Indian Knowledge System		Course Code and Course Type		U26BCCA108/IKS		
Course Pattern		2026		Version		1.0		
Teaching Scheme					Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA Semester Assessment	(End	Practical and Oral
2	-	-	2	2	50			-
Prerequisite: None								
Course Objectives (CO):				The objectives of Concepts and Application in Science are: 1. To remember Indian Knowledge Systems: Origin, Evolution and Ontological Approach 2. To understand Indian Knowledge Approaches. 3. To apply Sciences of Life and Mind. 4. To examine Indian Knowledge System Torchbearers - Ancient and Modern 5. To analyze Self-Knowledge for Personal Effectiveness.				
Course Learning Outcomes (CLO):				Students will be able to: 1. Identify and appreciate the rich heritage that resides in our traditions. 2. Explain the mind/voice dynamic in Indian knowledge systems. 3. Explain the practices that will prepare one for the inner- journey to discover the Self. 4. Analyze the need and importance of Sanskrit in getting to the roots of the philosophical concepts. 5. Analyze the various functions in Indian knowledge systems.				

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Indian Knowledge System and Vedic Corpus: Introduction to IKS, Need for IKS, Historicity of IKS, Salient aspects of IKS, IKS in ancient India and in modern India. Introduction to Vedas, Four Vedas, Sub-classification of Vedas, Messages in Vedas, Basics of Nirukta and Chandas.	CLO 1	6



UNIT II		
Wisdom through the Ages: Puranas, Ithihasas, Nitishastras, Subhasitas, Linguistics, Components of a language, Panini's work on Sanskrit grammar. Phonetics in Sanskrit. Role of Sanskrit in natural language processing, Framework for establishing valid knowledge.	CLO 2	6
UNIT III		
Number Systems and Units of Measurement: Salient features of the Indian numeral system, Importance of decimal representation, The discovery of zero and its importance, Unique approaches to represent numbers, Unique aspects of Indian Mathematics, Great mathematicians and their significant contributions in the area of arithmetic, algebra, geometry, trigonometry, combinatorial problems in Chandah-sastra of Pingala	CLO3	6
UNIT IV		
Knowledge Framework and classifications: Indian scheme of knowledge, The knowledge triangle Prameya. A vaishesikan approach to physical reality, Dravyas, The constituents of the physical reality.	CLO4	6
UNIT V		
Science and Technology in the Vedic Age and Post-Vedic Records. Knowledge Framework and Classification, Astronomy Encryption Method used in ancient India, Introduction to Yantra Shastra, Vaimanik Shashtra, Agriculture Technologies	CLO5	6
Total Hours		30

Learning resources

Activity 1: Comparative Analysis of Traditional and Modern Scientific Methods

Activity 2: Presentation on Indian scientific texts such as the Phonetics in Sanskrit, Astronomy Encryption Method used in ancient India Learning resources

Textbooks:

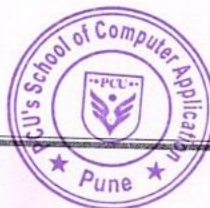
1. Introduction to Indian Knowledge Systems: Concepts and Applications by B. Mahadevan, Vinayak Rajat Bhat & Nagendra Pavana

Reference Books:

1. Introduction to Indian Knowledge System: Concepts and Applications by Pallavi Ghosh

Online Resources/E-Learning Resources

1. https://onlinecourses.swayam2.ac.in/imb23_mg53/preview?utm_source=chatgpt.com
2. https://onlinecourses.swayam2.ac.in/imb25_mg110/preview?utm_source=chatgpt.com





COUSE CURRICULUM

Name of the Program:		BCA			Semester: I		Level: UG	
Course Name		UHV-I: Professional Ethics			Course Code/ Course Type			
Course Pattern		2026			Version		1.0	
Teaching Scheme					Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA(Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral	
2	0	0	2	2	50	-	-	

Pre-Requisite: UHV-I

Course Objectives (CO):

The objectives of Universal Human Value- Professional Ethics are:

1. To make the students understand the importance of ethical behaviour.
2. To expose the students to the ethical practices to be followed in profession.
3. To sensitize the students to become responsible persons who will uphold ethics in profession when they pursue their career.
4. To make students understand Psychological and Philosophical approaches.
5. To make students understand social responsibility and corporate Sustainability.

Course Learning Outcomes (CLO):

Students would be able to:

1. Equip themselves with an understanding of moral, professional and personal values.
2. Understand the need of ethics in shaping their profession. The learners will hone their decision-making skills.
3. Refine their business ethics based on psychological and philosophical perspective.
4. Assess the need for a balance between ecology, and economy.
5. Equip themselves with a better understanding of themselves and the society they live in and the responsibilities they shoulder in creating a sustainable world.



Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Individual and Professional Ethics: Introduction to Professional Ethics, Morals, Values and Ethics – Personal and Professional- Sense of Professional Ethics – Code of Ethics by NSPE-Making decisions with ethical dimensions–definition–roadmap to ethical decision making–common standards– internal obstacles – bias – empathy.	CLO 1	5
UNIT II		
Business Ethics: Philosophical approaches to Business Ethics – ethical reasoning – ethical issues in business - Social Responsibility of Business- conflict of interest–cultural relativism-Ethical Leadership- Resisting un-ethical authority and domination-Global Business Ethics	CLO 2	5
UNIT III		
Psychological Approaches: Ethical Theories-Psychological and Philosophical Approaches-Myths about Morality-conflict of interest in psychological perspective - Courage-Integrity – ethical dilemma – Emotional Intelligence (Mahabharata- Iskcon Publications)	CLO 3	5
UNIT IV		
Workplace Ethics: Ethics in changing domains of Research–academic integrity–intellectual honesty- Role of Engineers and Managers-Ethical issues in Diverse workplace – competition – free will- Confidentiality – employee rights – Intellectual property rights – discrimination	CLO 4	5
UNIT V		
Safety, Responsibilities and Rights: Ecology, and Economy-Risk benefit analysis and reducing risk SDGs–Corporate social responsibility and Corporate Sustainability - CSR in India - Sustainability Case Studies.	CLO 5	5
Total Hours		30

Learning resources

Textbooks:

1. Subramanian. R. Professional Ethics, Oxford Publication, 2013.
2. Nagarasan. R. S. Professional Ethics and Human Values. New Age International Publications, 2006.

Reference Book:

1. Mike W Martin and Roland Schinzinger, Ethics in Engineering, 4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi, 2014

Online Resources/E-Learning Resources

1. <https://www.nspe.org/resources/ethics/code-ethics>
2. <https://www.toolshero.com/tag/ethical-decision-making/>
3. <https://pagecentertraining.psu.edu/public-relations-ethics/introduction-to-public-relations-ethics/lesson-1/ethical-theories>
4. <https://peer.asee.org/case-studies-in-engineering-ethics.pdf>



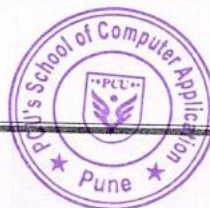


COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Cyber Security in IOT		Course Code/ Course Type		U26BCCA109/MOOC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	
Prerequisite: Basic Knowledge of Computers & Electronics							
Course Objectives (CO):				The objectives of Cyber Security in IOT are: 1. Understand the fundamentals and architecture of IoT systems. 2. Identify IoT components, smart devices, and communication technologies used in IoT ecosystems. 3. Explain IoT networking concepts, communication models, and protocols. 4. Recognize security threats, vulnerabilities, and risks in IoT environments. 5. Understand security mechanisms, best practices, and mitigation techniques for protecting IoT systems.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain IoT concepts, architecture, and applications. 2. Identify IoT communication models and networking protocols. 3. Understand IoT ecosystem components including sensors, gateways, and cloud platforms. 4. Recognize cyber threats, vulnerabilities, and attacks targeting IoT devices. 5. Apply basic IoT security practices and recommend protection techniques.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Internet of Things (IoT): Introduction to Internet of Things, Evolution and History of IoT, Characteristics of IoT, Difference between Internet and IoT, IoT Ecosystem Overview, Smart Devices and Connected Systems, Sensors and Actuators (Conceptual Overview), IoT Architecture Basics, Machine-to-Machine (M2M) Communication, IoT Applications, Smart Homes, Healthcare, Smart Cities, Agriculture, Industrial Automation.	CLO1	9
UNIT II		
IoT Communication and Networking Basics: IoT Communication Concepts, Embedded Systems Overview, Wireless Communication Technologies, Wi-Fi, Bluetooth, Zigbee, RFID, NFC, IoT Networking Basics, IPv6 Concept in IoT, Gateways and Cloud Connectivity, IoT Communication Models, Data Flow in IoT Systems, Device-to-Device Communication, Device-to-Cloud Communication, Introduction to IoT Protocols, MQTT, CoAP, HTTP/HTTPS, Learning Focus: Students understand networking and communication technologies without requiring hardware implementation.	CLO2	9
UNIT III		
Introduction to Cyber Security in IoT: Introduction to Cyber Security, Need for Security in IoT, Security Challenges in IoT, CIA Triad in IoT, Confidentiality, Integrity, Availability, IoT Attack Surface, Risks in Connected Devices, Data Privacy Issues in IoT, Security Requirements of IoT Systems, Importance of Secure IoT Design	CLO3	9





CIA Guidelines

Online Quiz (Based on MCQ) 20 marks

Activity (with short Report Submission) - 20 Marks

Academic Sincerity - 10 marks

Few of the suggested activities are Assignments, Debates, Poster presentations, Model making, Group

Presentation, Field visits and Group Discussions.

Few of suggested topics related to UHV1- Professional Ethics are:

Debate Topics

1. Ethical Approach versus Realistic Approach
2. Individual and Social Approach
3. Dilemma between heart and Mind

Activity

1. Analyze the wastage (Electricity or any other) at work place? How you managed.

Assignment

1. Analyze the code of ethics at work place.
2. If you fulfil the duties, rights will automatically fall in place. Justify the statement

References:

1. <https://uhv.org.in/>
2. <https://vvce.ac.in/wp-content/uploads/2021/04/Realising-Aspirations-of-NEP2020-UHV.pdf>





UNIT IV		
Threats, Vulnerabilities and Attacks in IoT: IoT Vulnerabilities - Weak Authentication, Default Passwords and Insecure Configurations, Firmware Vulnerabilities, Network-Level Vulnerabilities, Common IoT Attacks - Malware Attacks, Botnets, DoS and DDoS Attacks, Spoofing Attacks, Man-in-the-Middle Attack, Eavesdropping, Replay Attack, Mirai Botnet Case Study, IoT Privacy Threats, Real-World IoT Security Incidents	CLO4	9
UNIT V		
Security Mechanisms and Best Practices in IoT: Authentication and Authorization, Access Control Concepts, Encryption Basics, Secure Communication in IoT, Device Identity Management, Firmware Updates and Patch Management, Secure Boot Concept, Network Security Fundamentals, Firewalls and Intrusion Detection Basics, IoT Security Standards Overview, Best Practices for Secure IoT Deployment, Future Trends in IoT Security - AI in IoT Security, Blockchain in IoT Security	CLO5	9
Total hours		45

Learning resources

Textbooks:

1. Arshdeep Bahga and Vijay Madisetti — Internet of Things: A Hands-On Approach
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete — IoT Fundamentals
3. Jean-Philippe Aumasson — *Serious Cryptography*
4. Dieter Uckelmann — Architecting the Internet of Things
5. Brian Russell and Drew Van Duren — Practical Internet of Things Security

Reference Books:

1. Adrian McEwen and Hakim Cassimally — Designing the Internet of Things
2. Fei Hu — Security and Privacy in Internet of Things (IoTs)
3. Perry Lea — Internet of Things for Architects
4. Shancang Li and Li Da Xu — Securing the Internet of Things
5. Jan Holler — From Machine-to-Machine to the Internet of Things

Online Resources and E-Learning Resources

1. NPTEL – IoT and Cyber Security courses from IIT faculty
2. Cisco Networking Academy – IoT Fundamentals and Networking Basics
3. OWASP Foundation – IoT Security Guidelines and Threat Models
4. CISA – IoT Security Best Practices and Awareness Resources
5. MIT OpenCourseWare – Networking and Cyber Security learning resources





BCA 2026 PATTERN
COURSE DETAILS
Semester - II





COURSE CURRICULUM

Name of the Program:		BCA		Semester: II		Level: UG	
Course Name		Advanced C Programming		Course Code and Course Type		U26BCCA201/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3	3	40	60	-

Prerequisite: Basic Programming Fundamentals, Pointer concepts (pointer to pointer, arrays & pointers)

Course Objectives (CO):

The objectives of Advanced C Programming are:

1. Apply advanced function concepts, storage classes, and modular programming techniques to develop structured C programs.
2. Use pointers, dynamic memory allocation, and memory management concepts for efficient problem solving in C.
3. Develop programs using structures, unions, enumerations, and user-defined data organization techniques.
4. Implement file handling operations and command-line arguments for data processing applications in C programming.
5. Apply advanced string handling, preprocessor directives, debugging, and optimization techniques using GCC compiler in a Linux-based programming environment.

Course Learning Outcomes (CLO):

Students will be able to:

1. Develop modular C programs using advanced functions, recursion, storage classes, and reusable code structures.
2. Apply pointers, pointer arithmetic, and dynamic memory allocation techniques for efficient program execution.
3. Design programs using structures, unions, enumerations, and user-defined data types for complex data handling.
4. Implement file processing and command-line argument techniques for persistent data storage and program execution.
5. Develop optimized C programs using string manipulation, macros, preprocessing directives, and debugging practices in Linux-based GCC environment.

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Advanced Functions and Storage Classes: Function review and modular programming, Call by value and call by reference - parameter passing techniques, Recursive functions - nested recursion, Scope and lifetime of variables, Storage classes - auto, static, register, extern, Header files - user-defined header creation, Function prototypes and reusable code, Modular programming concepts - multiple file handling, Program organization techniques	CLO I	9
UNIT II:		





Pointers and Dynamic Memory Allocation: Introduction to pointers, Pointer declaration and initialization, Pointer arithmetic - increment, decrement, Pointer with arrays - array traversal, Pointer with functions - parameter passing, Double pointers - pointer to pointer, Dynamic memory allocation - malloc(), calloc(), realloc(), free(), Memory allocation errors - dangling pointers, NULL pointers, Dynamic memory-based programs	CLO 2	9
UNIT III:		
Structures, Unions, and Enumerations: Structure declaration and initialization, Accessing structure members - dot operator, Arrays of structures, Nested structures, Structures with functions - passing structure to function, Self-referential structures, Union declaration and memory sharing, Difference between structure and union, Enumeration data types - symbolic constants, Applications of structures and unions	CLO3	9
UNIT IV:		
File Handling and Command Line Arguments: File handling concepts, File operations - open, close, read, write, append, File modes - text and binary modes, File pointers and EOF handling, Reading and writing records, Sequential file processing, Command line arguments - argument passing, Error handling in file operations, Record management applications using files	CLO4	9
UNIT V:		
Advanced String Handling and Preprocessor Directive: Advanced string operations, String manipulation using pointers, String tokenization - parsing strings, Command-based string processing, Preprocessor directives - #define, #include, #ifdef, Macro functions - parameterized macros, Conditional compilation, Bitwise operators - AND, OR, XOR, shift operations, Program debugging and optimization techniques	CLO5	9
Total Hours		45

Learning resources

Textbooks

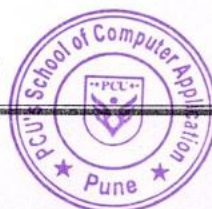
1. *Programming in ANSI C* – Programming in ANSI C
2. *Let Us C* – Let Us C
3. *Programming with C* – Programming with C
4. *C Programming: A Modern Approach* – C Programming: A Modern Approach
5. *The C Programming Language* – The C Programming Language

Reference Books

1. *Expert C Programming: Deep C Secrets* – Expert C Programming: Deep C Secrets
2. *Head First C* – Head First C
3. *Practical C Programming* – Practical C Programming
4. *C: How to Program* – C: How to Program
5. *C in a Nutshell* – C in a Nutshell

Online Resources

1. W3Schools – Advanced C programming tutorials and syntax references.
2. Programiz – Structured tutorials for pointers, structures, and file handling.
3. GeeksforGeeks – Advanced C concepts, examples, and coding problems.
4. TutorialsPoint – C programming reference with compiler examples.
5. Learn-C.org – Interactive coding exercises for advanced C practice.





Name of the Program:	BCA	Semester: I	Level: UG
Course Name	Advanced C Programming Lab	Course Code and Course Type	U26BCCA211/DSC
Course Pattern	2026	Version	1.0
Teaching Scheme			
Assessment Scheme			
Theory	Practical	Tutorial	Total Credits
			Hours
			CIA (Continuous Internal Assessment)
			ESA (End Semester Assessment)
			Practical and Oral
-	2	-	2
			4
			50
			-
			50

Prerequisite: Basic Programming Fundamentals, Pointer concepts (pointer to pointer, arrays & pointers)

Course Objectives (CO):

The objectives of Advanced C Programming Lab are:

1. Introduce students to programming practice using C language in a Linux environment.
2. Develop problem-solving skills through hands-on coding.
3. Familiarize students with Linux terminal commands for compiling and executing C programs.
4. Build programming logic using control structures, arrays, strings, and functions.
5. Prepare students for advanced C programming laboratory work.

Course Learning Outcomes (CLO):

Students will be able to:

1. Write, compile, and execute C programs using GCC compiler in a Linux-based environment.
2. Develop structured C programs using variables, operators, and expressions.
3. Apply conditional and looping statements for problem-solving in C programming.
4. Develop programs using arrays, strings, and user-defined functions.
5. Debug, test, and improve program logic using standard C programming practices.

Course Contents/ Syllabus: Practical Plan

Activity Number	Assignment/ Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Advanced Functions and Recursion	Week 1/ Turn1 and 2	a. Write a recursive program for factorial. b. Generate Fibonacci series using recursion. c. Find GCD of two numbers using recursive function. d. Reverse a number using recursion.	CLO1	4
2	Call by Value and Call by Reference	Week 2/ Turn1and2	a. Swap two numbers using call by value. b. Swap two numbers using call by reference. c. Compare outputs of both techniques. d. Pass array to function and display elements.	CLO1	4





3	Storage Classes in C	Week 3/ Turn 1 and 2	a. Demonstrate auto storage class. b. Demonstrate static variable behavior. c. Use register variable in loop. d. Create example using extern variable.	CLO1	4
4	Pointer Basics and Arithmetic	Week 4/ Turn 1 and 2	a. Declare and initialize pointers. b. Perform pointer arithmetic. c. Access array elements using pointers. d. Display memory addresses of variables.	CLO1	4
5	Pointers with Arrays and Strings	Week 5/ Turn 1 and 2	a. Traverse array using pointers. b. Reverse array using pointers. c. Find string length using pointers. d. Copy one string to another using pointers.	CLO2	4
6	Dynamic Memory Allocation	Week 6/ Turn 1 and 2	a. Allocate memory using malloc(). b. Allocate memory using calloc(). c. Resize memory using realloc(). d. Release memory using free().	CLO2	4
7	Pointer to Functions and Double Pointer	Week 7/ Turn 1 and 2	a. Implement pointer to function. b. Call function using function pointer. c. Demonstrate pointer to pointer. d. Modify value using double pointer.	CLO3	4
8	Structures in C	Week 8/ Turn 1 and 2	a. Create student structure. b. Read and display structure data. c. Array of structures for multiple records. d. Pass structure to function.	CLO3	4
9	Nested Structures and Self-Referential Structures	Week 9/ Turn 1 and 2	a. Create nested structure for employee details. b. Display nested structure values. c. Create self-referential structure example. d. Use structure pointers.	CLO3	4
10	Union and Enumeration	Week 10/ Turn 1 and 2	a. Create union for mixed data storage. b. Compare memory usage of structure and union. c. Use enumeration for weekdays. d. Display enum constants.	CLO4	4
11	File Handling Basics	Week 11/ Turn 1 and 2	a. Create file and write data. b. Read data from file. c. Append data to file. d. Count characters in file..	CLO4	4
12	File Handling with Records	Week 12/ Turn 1 and 2	a. Store student records in file. b. Read records from file. c. Search record using roll number. d. Update file record.	CLO5	4
13	Command Line Arguments	Week 13/ Turn 1 and 2	a. Accept values through command line. b. Perform arithmetic operations using arguments. c. Count number of arguments passed. d. Display argument list.	CLO5	4
14	Preprocessor Directives and Macros	Week 14/ Turn 1 and 2	a. Create macros using #define. b. Implement parameterized macro. c. Use conditional compilation. d. Create user-defined header file.	CLO5	4





15	Advanced String Handling and Bitwise Operations	Week 15/ Turn 1 and 2	a. Tokenize string using delimiters. b. Reverse string using pointers. c. Perform bitwise AND, OR, XOR. d. Demonstrate left shift and right shift operations.	CLO5	4
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COURSE CURRICULUM

Name of the Program:		BCA		Semester :II		Level: UG	
Course Name		Database Management System		Course Code/ Course Type		U26BCCA202/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total* Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-
Prerequisite: Basic Knowledge of Statistics.							
Course Objectives (CO):				The objectives of Database Management System: - 1. Understand fundamental concepts, architecture, and components of database management systems. 2. Design databases using entity-relationship and relational models. 3. Apply relational algebra and SQL for data definition and manipulation. 4. Analyze database design using functional dependencies and normalization techniques. 5. Understand and evaluate transaction management, concurrency control, and basic database security concepts.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain DBMS architecture, data models, and roles of database users. 2. Design ER models and convert them into relational schemas. 3. Apply SQL queries for data retrieval and manipulation. 4. Analyze functional dependencies and perform normalization up to 3NF. 5. Evaluate transaction processing, concurrency control, and basic database security issues.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
INTRODUCTION TO DATABASE MANAGEMENT SYSTEM: Introduction to Database Systems, Characteristics and Advantages of DBMS, Database Users and Database Administrator, DBMS Architecture and Data Independence, Data Models: Hierarchical, Network and Relational (Overview), Schema and Instances, Database Languages and Interfaces, Conceptual Database Design, Entity-Relationship Model, Entities, Attributes and Relationships, Strong and Weak Entity Sets, Generalization, Specialization and Aggregation, Introduction to Data Security Concepts in Databases.	CLO 1	9
UNIT II		
INTRODUCTION TO RELATIONAL MODEL: Relational Model Concepts, Relational Model Constraints, Mapping ER Model to Relational Model, Relational Algebra Operations, Introduction to SQL, Data Definition Language, Data Manipulation Language, Basic SQL Queries, Selection and Projection,	CLO	9





Joins, Aggregate Functions, Group By And Having Clause, Views, Constraints and Indexes , Introduction To SQL Injection (Concept).	2	
UNIT III		
DATABASE DESIGN AND NORMALIZATION: Relational Database Design Concept, Functional Dependencies, Normal Forms (1NF, 2NF, 3NF), Lossless Join and Dependency Preserving Decomposition, Introduction to Multivalued Dependency, Role of Normalization in Data Integrity and Security	CLO3	9
UNIT IV		
TRANSACTION MANAGEMENT: Transaction Concept and Transaction States, ACID Properties, Serializability, Schedules, Recoverability, Isolation Levels , Overview of Recovery Concepts, Role of Transactions in Maintaining Data Consistency and Preventing Data Anomalies.	CLO4	9
UNIT V		
CONCURRENCY CONTROL: Concurrency Control Concepts, Problems in Concurrent Transactions, Lock-Based Protocols, Two-Phase Locking (2PL), Basic Deadlock Concepts, Introduction to Database Security: Access Control Concepts,*User Roles and Privileges, Overview of Data Protection Mechanisms in Databases.	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw Hill Education.
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth and S. Sudarshan, 6th Edition, McGraw Hill Education.

Reference Books:

1. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, Pearson Education.
2. Database Systems, Ramez Elmasri and Shamkant B. Navathe, 6th Edition, Pearson Education.
3. Database Systems: Design, Implementation, and Management, Peter Rob and Carlos Coronel, 7th Edition, Cengage Learning.

Online Resources

1. Scaler – DBMS tutorials and structured learning-<https://www.scaler.com/topics/course/dbms/>
2. GeeksforGeeks – DBMS concepts, examples, and practice- <https://www.geeksforgeeks.org/dbms/>

E-Learning Resources

1. Udemy – Courses on database management systems- <https://www.udemy.com/topic/database-management/>
2. GitHub – DBMS learning repositories and examples- https://github.com/vinabi/e_learning-db





COURSE CURRICULUM

Name of the Program:		BCA		Semester :II		Level: UG	
Course Name		Database Management System Lab		Course Code/ Course Type		U26BCCA212/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	2	-	1	2	25	-	25

Prerequisite: Basic Knowledge of Statistics.

Course Objectives (CO):

The objectives of Database Management System: -

1. Understand fundamental SQL commands for database definition and manipulation.
2. Construct SQL queries using selection, projection, and expressions.
3. Apply filtering and conditional operations to retrieve relevant data.
4. Use advanced SQL features such as functions, joins, and subqueries.
5. Understand basic database management operations including views and indexing.

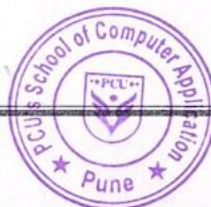
Course Learning Outcomes (CLO):

Students would be able to:

1. Create and modify database tables using DDL commands.
2. Perform data manipulation operations using DML commands (insert, update, delete).
3. Write SQL queries using SELECT statements with expressions and operators.
4. Apply filtering techniques using WHERE clause and logical operators.
5. Implement joins, subqueries, views, and basic indexing operations.

Course Contents/Syllabus: Practical Plan

Activity Number	Assignment/ Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Introduction to SQL and DDL Commands	Week 1 Turn 1 and 2	Components of SQL with Examples and Syntax. DDL Commands	CLO1	2
2	Data Manipulation Language (DML)	Week 2/ Turn 1 and 2	insert, update, delete operations	CLO1	2
3	Data Control Language (DCL) and Access Control	Week 3/ Turn 1 and 2	Grant and Revoke Commands, Role of Access Control in Database Security	CLO1, CLO2	2
4	Basic SELECT Queries	Week 4/ Turn 1 and 2	Basic Select Statements, Arithmetic Expressions, Simple Queries	CLO1, CLO2	2
5	Operators and Expressions	Week 5/ Turn 1 and 2	Operator, Precedence, Concatenation Operator, Literal Character Strings	CLO2	2
6	Filtering Data using WHERE Clause	Week 6/ Turn 1 and 2	Using the WHERE Clause Comparison Operators, Character and Date Conditions, Introduction to Unsafe Query Handling	CLO2, CLO3	2
7	Pattern Matching and NULL Handling	Week 7/	Using the LIKE Condition, Wildcard Characters, Using the NULL Conditions	CLO3	2
8	Logical Conditions	Week 8/	AND, OR, NOT operators	CLO3	2





		Turn 1 and 2			
9	SQL Functions	Week 9/ Turn 1 and 2	Basic Functions and Precedence Examples	CLO3	2
10	Single Row and Aggregate Functions	Week 10/ Turn 1 and 2	Single Row Functions, Aggregate Functions		2
11	Advanced Functions	Week 11/ Turn 1 and 2	Date Functions Conversion Functions	CLO4, CLO5	2
12	Joins and Multi-table Queries	Week 12/ Turn 1 and 2	Joins and their types	CLO5	2
13	Advanced Joins	Week 13/ Turn 1 and 2	Natural joins, SQL joins syntax	CLO5	2
14	Grouping and Subqueries	Week 14/ Turn 1 and 2	Group by, Having, Subqueries (single-row)	CLO5	2
15	Index And View	Week 15/ Turn 1 and 2	Create Views, Simple Index Creation and Deletion	CLO5	2
Total					30

Learning resources

Textbooks:

1. SQL QuickStart Guide, Walter Shields, ClydeBank Media.
2. SQL All-in-One For Dummies, Allen G. Taylor, Wiley

Reference Books:

1. Practical SQL: A Beginner's Guide to Storytelling with Data, Anthony DeBarros, No Starch Press.
2. Learning SQL, Alan Beaulieu, O'Reilly Media.

Online Resources

1. Scaler – DBMS tutorials and structured learning-<https://www.scaler.com/topics/course/dbms/>
2. GeeksforGeeks – DBMS concepts, examples, and practice- <https://www.geeksforgeeks.org/dbms/>

E-Learning Resources

1. W3Schools – SQL tutorials with examples- <https://www.w3schools.com/sql/>
2. LearnSQL.com – Structured SQL courses and exercises- <https://learnsql.com/>
3. SQLZoo – Practice-based SQL learning- <https://sqlzoo.net/>





COURSE CURRICULUM

Name of the Program:		BCA		Semester: II		Level: UG	
Course Name		AI for Everyone		Course Code and Course Type		U26BCCA203/VAC	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
2	-	-	2	2	20	30	-

Prerequisite: Basic computer literacy, familiarity with internet usage, and general awareness of digital applications; no prior knowledge of Artificial Intelligence or programming required.

Course Objectives (CO):

The objectives of AI for Everyone are:

1. To define and recall basic concepts, terminology, and applications of Artificial Intelligence.
2. To explain fundamental AI technologies and how they are used in everyday applications.
3. To use AI tools to perform simple tasks such as content generation, communication, and problem-solving.
4. To analyse real-world AI applications across domains and identify their benefits and limitations.
5. To evaluate ethical, social, and future implications of AI and justify responsible usage.

Course Learning Outcomes (CLO):

Students will be able to:

1. Identify AI-based systems in daily life and list basic AI-related terms.
2. Describe how AI systems such as recommendation engines and chatbots function at a conceptual level.
3. Demonstrate the use of AI tools by generating text, images, or simple chatbot responses.
4. Differentiate between various AI applications by analysing real-life case studies.
5. Assess ethical concerns such as bias, privacy, and misuse of AI and propose responsible practices.



Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I: Introduction to Artificial Intelligence		
What is Artificial Intelligence? History and evolution of AI; AI vs Machine Learning vs Deep Learning; Types of AI (Narrow AI, General AI, Super AI); Basic AI terminology (data, algorithm, model, training); Applications of AI in daily life (search engines, recommendation systems, virtual assistants)	CLO 1	6
UNIT II: How AI Works		
What is Machine Learning? (learning from data); Types of learning (only concept with examples); How recommendation systems work (YouTube/Netflix); Natural Language Processing (NLP) basics; Basic of Language AI (chatbots, translators), image AI (face detection)	CLO 2	6
UNIT III: Hands-on AI Tools		
Introduction to AI tools (no coding); Basic prompt writing (how to ask AI properly); Basic prompt writing; Using AI for Writing (emails, summaries); Image generation; Simple chatbot interaction.	CLO3	6
UNIT IV: AI in Real Life		
AI in: Education (smart learning apps), Healthcare (diagnosis tools), Banking (fraud detection), E-commerce (product suggestions); Case studies (e.g., recommendation systems, fraud detection); Benefits and limitations of AI; Impact of AI on jobs and society	CLO4	6
UNIT V: Ethics & Future of AI		
Ethical issues in AI: Bias and fairness, Privacy concerns, Data security; Responsible AI and governance; AI regulations (basic awareness); Future trends: Generative AI, Autonomous systems; Human-AI collaboration	CLO5	6
Total Hours		30

Learning resources

Textbooks:

1. Artificial Intelligence Basics
2. AI for Everyone

Reference Books:

1. Artificial Intelligence: A Modern Approach
2. Prediction Machines

Online Resources and E-Learning Resources

1. Coursera – AI for Everyone (Andrew Ng)
2. Google AI – Beginner-friendly AI concepts
3. Microsoft Learn – AI fundamentals modules





COURSE CURRICULUM

Name of the Program:		BCA		Semester: I		Level: UG	
Course Name		Basic of Computer Network		Course Code/ Course Type		U26BCCA204/VAC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	20	30	-
Prerequisite: Basic Knowledge of Computer Network							
Course Objectives (CO):				The objectives of Basic of Computer Network are: 1. To understand various computer networks and technologies behind networks. 2. To study TCP/IP protocol suite, IP addressing schemes and link layer communication 3. To study routing concept along with Routing protocols. 4. To study application layer protocols 5. To understand basics of cryptography and socket programming.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Understand the basic concepts of Computer Network, and principle of layering. 2. Apply the error detection and correction techniques used in data transmission. 3. Apply IP addressing schemes and sub netting. 4. Understand the concept of routing protocols, Application layer protocols and Network Security. 5. Apply the socket programming basics to create a simple chat application.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Data Communication and Computer Networks Internet basics and network components. [Transmission Media-Guided, Unguided, Network Devices] Various types of Networks (only overview) Connection Oriented N/Ws Vs Connectionless N/Ws, Ethernet- Ethernet standards ZigBee, WiFi, Access Technique -CSMA-CD, Negotiation technique Overview, Wireless Network, Unified Communication	CLO1	6
UNIT II		
Principle of Layering concept: Need for layering, ISO-OSI 7 Layer Model, TCP/IP model, OSI Model vs TCP/IP mode, Data Encapsulation	CLO2	6
UNIT III		
Link Layer Communication: Error detection and correction techniques, Framing and its types, Flow and error control, HDLC protocol, P2P Protocol	CLO3	6
UNIT IV		
IP Addressing: Internet Protocol and IPv4 Packet format, Addressing, Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses, IP Address- Network Part and Host Part, Network Masks, Network Addresses and, Broadcast Addresses, Loop Back Address, TCP and UDP Connections, TCP Performance in wireless network	CLO4	6





UNIT V			
Application Layer Protocols: DHCP – DHCP Client, DHCP server, DHCP scope, DNS – Resolution process, Resource Records, DNS protocol structure, HTTP – WWW architecture, HTTP: Request and Response Message, Email protocols – SMTP, POP3, IMAP4 & MIME, FTP, Telnet		CLO5	6
Total			30 hrs.

Learning resources

Textbooks:

1. Data and Computer Communication 8th Edition – William Stallings
2. Internetworking Technology Handbook CISCO System

Reference Books:

1. Data Communication and Networking Behroz A. Forouzan, TMH, 4th Edition
2. Computer Networks and Internets with Internet Applications Douglas Comer

Online Resources/E-Learning Resources

1. <https://docs.oracle.com/javase/tutorial/networking/index.html>
2. <https://docs.oracle.com/javase/tutorial/networking/overview/networking.html>





COURSE CURRICULUM

Name of the Program:	BCA	Semester: II	Level: UG
Course Name	Data Science & Data Analytics using R	Course Code and Course Type	U26BCCA205/MOOC
Course Pattern	2026	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	1	4	4	40	60	-

Prerequisite: Basic computer knowledge, familiarity with spreadsheets, and elementary understanding of programming concepts; no prior experience in R or data science required.

Course Objectives (CO):	The objectives of Data Science & Data Analytics using R: 1. To recall fundamental concepts of data science, data types, and basic syntax of R. 2. To explain data structures, data handling techniques, and visualization concepts in R. 3. To apply R programming to perform data manipulation and create basic visualizations. 4. To analyse datasets using descriptive statistics and visualization techniques to identify patterns. 5. To evaluate data insights to support decision-making while considering ethical aspects of data usage.
Course Learning Outcomes (CLO):	Students will be able to: 1. Identify different types of data and list basic R commands and data structures. 2. Describe how data is imported, cleaned, and organized using R data structures. 3. Demonstrate the use of R to create charts (bar, pie, histogram) and perform basic data operations. 4. Analyze datasets using R-based statistical summaries and visualizations to identify patterns. 5. Evaluate data insights to support decision-making and justify conclusions considering ethical issues.

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Introduction to Data Science & R: What is Data Science and Data Analytics? Importance of data in decision making; Data types: structured vs unstructured; Introduction to R and RStudio;	CLO 1	9





Basic R syntax: Variables, data types, Operators, Simple input/output

UNIT II:

Data Handling in R : Data structures in R: Vectors, Lists, Matrices, Data Frames; Importing data (CSV, Excel); Data cleaning basics: Missing values, Filtering and sorting; Introduction to packages (e.g., dplyr – concept level)

CLO 2

9

UNIT III:

Data Visualization using R: Importance of data visualization; Basic plots in R: Bar chart, Pie chart, Histogram; Introduction to visualization libraries: ggplot2 (basic usage); Customizing graphs (labels, colors, titles)

CLO3

9

UNIT IV:

Basic Data Analysis: Descriptive statistics: Mean, Median, Mode, Variance, Standard deviation; Data summarization using R; Correlation (basic idea); Identifying trends and patterns; Introduction to simple predictive idea; Case-Based Learning: Sales data analysis, Student performance analysis

CLO4

9

UNIT V:

Data-Driven Decision Making & Applications: Interpreting results and drawing conclusions; Data storytelling (presenting insights); Applications of data science: Business, Healthcare, social media; Limitations of data analysis; Ethics in data (privacy, bias)

CLO5

9

Total Hours

45

Learning Resources

Textbooks

1. R for Data Science (selected beginner-friendly chapters)
2. Data Science for Business (conceptual understanding)

Reference Books

1. Hands-On Programming with R (for basic R programming practice)
2. Practical Data Science with R
3. An Introduction to Statistical Learning (selected simple topics only)

Online Resources & E-Learning

1. NPTEL – Data Analytics / R programming courses
2. SWAYAM – AI & Data Science beginner courses
3. Coursera – R Programming & Data Science courses

