BIRLA INSTUTURE OF TECHNOLOGY-MESRA, RANCHI
COURSE STRUCTURE FOR
BACHELOR OF COMPUTER APPLICATION as per NEP-2020
(w.e.f. Academic Session 2023-24)

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods/ week)	T (Periods /week)	P (Periods /week)	C
			THEORY					
First Monsoon	FIRST	Pre-requisite course *	PR001	Elementary Mathematics	3	0	0	0
		DSC-Course	CN 101/ CN 103	Programming and Problem Solving using C/ Programming and Problem Solving using C++	3	0	0	3
		DSC-Course	CN 105	Basics of Operating Systems	2	0	0	2
		DSC-Course	CN 107	Fundamentals of Computer Science	2	0	0	2
		MDC		Principle Of Management	3	0	0	3
		VAC		Human Values and Professional Ethics/ Environmental Science	2	0	0	2
			LABORATORIES					
		AECC	MT132	Communication Skills-I	0	0	3	1.5
		DSC Lab	CN 102/ CN 104	C Lab / C++ Lab	0	0	4	2
		SEC-SB		Office Automation Tools/ Linux administration	2	0	2	3
		VAC		Physical Education/Yoga	1	0	2	2
		TOTAL						20.5

*[will be pass course with no credits]

Semester/ Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery & credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Second Spring	FIRST		THEORY					
		DSC-Course	CN 121	Introduction to Data Structures	3	1	0	4
		DSC-Course	CN 123	Basics of Digital Computer and Logic Design	3	1	0	4
		MDC		Mathematics for Computing I	3	0	0	3
		VAC		Digital Empowerment /Emotional Intelligence	2	0	0	2
			LABORATORIES					
		AECC	MT133	Communication Skills- II	0	0	3	1.5
		DSC Lab	CN 122	Data Structure Lab	0	0	4	2
		SEC-SB		Introduction to Digital Marketing/Latex	2	0	2	3
		Internship/ Dissertation	CN 125	Internship or work based vocational courses**	0	0	0	4
		Total			23.5Including summer internship			

****Vocational course to be offered during Summer term**

EXIT OPTION WITH CERTIFICATION IN COMPUTER APPLICATIONS
Total Credits I Year [DSC Course:19 MDC:6 SEC-SB:6 VAC:6 AECC:3 Internship:4* = 40+4*] =44

Semester/ Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods/ week)	T (Periods/ week)	P (Periods /week)	C
Third Monsoon	SECOND		THEORY					
		DSC-Course	CN 201	Java Programming	3	0	0	3
		DSC-Course	CN 203	DBMS	3	0	0	3
		DSC-Course	CN 205	Concept of Programming Language	2	0	0	2
		MDC		Mathematics for Computing II	3	0	0	3
		AECC		Modern Indian Language I/ Public speaking and creative writing	2	0	0	2
			LABORATORIES					
		DSC lab	CN 202	Java Lab	0	0	4	2
		DSC lab	CN 204	DBMS Lab	0	0	4	2
		SEC-SB		Statistics with R/ Computerized Accounting	2	0	2	3
		TOTAL						**20**

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Fourth Spring	SECOND		THEORY					
		DSC-Course	CN 221	Software Engineering	3	0	0	3
		DSC-Course	CN 223	Python Programming	3	1	0	4
		DSC-Course	CN 225	Computer Networks	3	0	0	3
		DSE-Course	CN 227 / CN 229 / CN 231	Introduction to Data Science/Introduction to Artificial Intelligence /ERP	3	0	0	3
		AECC		Modern Indian Language II/ Personality Development	3	0	0	3
			LABORATORIES					
		DSC Lab	CN 222	Software Engineering Lab	0	0	4	2
		DSC Lab	CN 224	Python Programming Lab	0	0	4	2
		Total						**20**

EXIT OPTION WITH DIPLOMAIN IN COMPUTER APPLICATIONS

Total Credits after II Year [DSC+DSE :48 MDC :9 SEC-SB :9 VAC : 6 AECC :8Internship :4* = 80+4*] =84

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Fifth Monsoon	THIRD		THEORY					
		DSC-Course	CN 301	Fundamentals of Computer Algorithm	3	1	0	4
		DSE-Course	CN 303 /CN 305	Intro to Machine Learning /Computer Graphics	3	0	0	3
		DSC-Course	CN 307	Web Programming	3	0	0	3
		DSC-Course	CN 309	Software Testing	3	1	0	4
			LABORATORIES					
		DSE Lab	CN 304/ CN 306	Machine Learning Lab/Computer Graphics Lab	0	0	4	2
		DSC-Course	CN 308	Web Programming Lab	0	0	4	2
		Minor Internship/ Project	CN 312	Internship/Project	0	0	0	2
		TOTAL						**20**

Semester/ Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Sixth Spring	THIRD		THEORY					
		DSE-Course	CN 331/ CN 333	Advanced Java Programming /Data Analytics	3	1	0	4
		DSC-Course	CN 335	Introduction to Distributed Computing	3	0	0	3
		DSE-Course	CN 337/ CN 339	Introduction to Data Mining/ Introduction to IOT	3	0	0	3
		DSC-Course	CN 341	Computer Oriented Optimization Technique	3	0	0	3
			LABORATORIES					
		DSE Lab	CN 332/ CN 334	Advanced Java Programming Lab/ Data Analytics Lab	0	0	4	2
		DSE Lab	CN 338/ CN 340	Data Mining Lab/IOT Lab	0	0	4	2
			CN 344	Minor Project	0	0	0	3
		TOTAL						20

EXIT OPTION WITH DEGREE (BCA) Total Credits [I Year + II year +III Year = 44+40 +40= 124]

SPECIALIZATION –Artificial Intelligence and Machine Learning / Data Science/ High Performance Computing

Semester/Session of Study (Recommended)	**Course Level**	**Category of Course**	**Course Code**	**Courses**	**Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical**			**Total Credits C-Credits**
					L (Periods /week)	**T (Periods /week)**	**P (Periods /week)**	**C**
			THEORY					
					L	T	P	
Seventh	Fourth	DSE Course		Annexure A/Annexure B/Annexure C	3	1	0	4
		DSE Course		Annexure A/Annexure B/Annexure C	3	1	0	4
		DSE Course		Annexure A/Annexure B/Annexure C	3	1	0	4
		DSE Course		Annexure A/Annexure B/Annexure C	3	1	0	4
		LABORATORIES						
		DSE Lab		Annexure A/Annexure B/Annexure C	0	0	4	2
		DSE Lab		Annexure A/Annexure B/Annexure C	0	0	4	2
		TOTAL						**20**

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
			THEORY					
					L	T	P	
Eight	Fourth	DSE Course		Annexure A/Annexure B/Annexure C	3	0	0	3
		DSE Course -C		Annexure A/Annexure B/Annexure C	3	0	0	3
		LABORATORIES						
		DSE Lab		Annexure A/Annexure B/Annexure C	0	0	4	2
		Research Project/Dissertation		Research project /Internship with Viva-voce and seminar presentation.	0	0	0	12
	TOTAL							**20**

AFTER FOURTH YEAR BACHELOR'S DEGREE : BCA HONOURS in Artificial Intelligence and Machine Learning or BCA HONOURS in Data Science or BCA HONOURS in High Performance Computing

Total Credits 164 for 4 years course

Student will select the specialization in one of the Followings :

- **Annexure A - Artificial Intelligence and Machine Learning**
- **Annexure B - Data Science**
- **Annexure C- High Performance Computing**

ANNEXURE A :Artificial Intelligence and Machine Learning
Courses and Labs to be taken from following table in 7th and 8th semester

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture T-Tutorial P-Practical			Total Credits C
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
		THEORY						
					L	**T**	**P**	
Seventh/ Eighth	Fourth	DSE Course		Deep Learning	3	1	0	4
		DSE Course		Digital Gaming	3	1	0	4
		DSE Course		Soft Computing	3	1	0	4
		DSE Course		Research Methodology	3	1	0	4
		DSE Course		Natural Language Processing	3	1	0	4
		DSE Course		Data Visualization	3	1	0	4
		DSE Course		Introduction to Artificial Intelligence	3	0	0	3
		DSE Course		Advance Data Analytics	3	0	0	3
		DSE Course		Advanced Python Programming	3	0	0	3
		DSE Course		Computer Vision	3	0	0	3
		DSE Course		Image Processing	3	0	0	3
		DSE Course		Introduction to Machine Learning	3	1	0	4
		DSE Course		Introduction to Data Science	3	1	0	4
		DSE Courses		Reinforcement Learning	3	0	0	3
		DSE Course		Feature Engineering	3	0	0	3
			LABORATORIES					
		DSE Lab		Deep Learning Lab	0	0	4	2
		DSE Lab		Digital Gaming Lab	0	0	4	2
		DSE Lab		Soft Computing Lab	0	0	4	2
		DSE Lab		Natural Language Processing Lab	0	0	4	2

		DSE Lab		Advanced Python Programming Lab	0	0	4	2
		DSE Lab		Data Visualization	0	0	4	2
		DSE Lab		Advance Data Analytics Lab	0	0	4	2
		DSE Lab		Machine Learning Lab	0	0	4	2
		DSE Lab		Data Science Lab	0	0	4	2
		DSE Lab		Reinforcement Learning Lab	0	0	4	2
		DSE Lab		Feature Engineering Lab	0	0	4	2

ANNEXURE B : Data Science

Courses and Labs to be taken from following table in 7th and 8th semester

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-LectureT-TutorialP-Practical			Total Credits C
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Seventh And Eighth	Fourth		**THEORY**					
					L	T	P	
		DSE Course		No SQL Data Base	3	1	0	4
		DSE Course		Soft Computing	3	1	0	4
		DSE Course		Data Ethics and Privacy	3	1	0	4
		DSE Course		Research Methodology	3	1	0	4
		DSE Course		Cryptography & Network Security	3	1	0	4
		DSE Course		Cloud Computing	3	1	0	4
		DSE Course		Big Data Analytics	3	0	0	3
		DSE Course		Advance Data Analytics	3	0	0	3
		DSE Course		Advanced Python Programming	3	0	0	3
		DSE Course		Introduction To Machine Learning	3	0	0	3
		DSE Course		Introduction To Data Science	3	0	0	3
		DSE Course		Data Preprocessing and Reporting	3	1	0	4
		DSE Course		Data Security	3	0	0	3
			LABORATORIES					
		DSE Lab		No SQL Lab	0	0	4	2
		DSE Lab		Soft Computing Lab	0	0	4	2

		DSE Lab		Advanced Python Programming Lab	0	0	4	2
		DSE Lab		Advance Data Analytics Lab	0	0	4	2
		DSE Lab		Cloud Computing Lab	0	0	4	2
		DSE Lab		Machine Learning Lab	0	0	4	2
		DSE Lab		Data Science Lab	0	0	4	2
		DSE Lab		Data Preprocessing and reporting Lab	0	0	4	2
		DSE Lab		Data security Lab	0	0	4	2

ANNEXURE C :High Performance Computing
Courses and Labs to be taken from following table in 7th and 8th semester

Semester/Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-LectureT-TutorialP-Practical			Total Credits C
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
			THEORY					
					L	T	P	
Seventh And Eighth	Fourth	DSE Course		Advanced Computer Architecture	3	1	0	4
		DSE Course		Massively Parallel Models of Computation	3	1	0	4
		DSE Course		High Performance Cluster Computing	3	0	0	3
		DSE Course		Cloud Computing	3	0	0	3
		DSE Course		Grid Computing	3	0	0	3
		DSE Course		Introduction to Quantum Computing	3	0	0	3
		DSE Course		Parallel Algorithm and Computation	3	0	0	3
		DSE Course		High-Performance Big Data Computing	3	0	0	3
		LABORATORIES						
		DSE Lab		Massively Parallel Models of Computation Lab	0	0	4	2
		DSE Lab		Cluster Computing Lab	0	0	4	2
		DSE Lab		Cloud Computing Lab	0	0	4	2
		DSE Lab		Grid Computing Lab	0	0	4	2
		DSE Lab		Quantum Computing Lab	0	0	4	2
		DSE Lab		Parallel Algorithm Lab	0	0	4	2
		DSE Lab		Big Data Lab	0	0	4	2