AST AND	BI	BIRLA INSTUTURE OF TECHNOLOGY-MESRA, RANCHI COURSE STRUCTURE FOR											
Real SI	BAC	CHELO	R OF C	OMPUTER AI	PPLICAT	ION as j	per NEl	P-2020					
RANCHI			(w.e	e.f. Academic S	Session 202	23-24)							
Semester/Session	Course	Category	Course	Courses	Mode of Lec	Mode of delivery and credits L- Lecture; T-Tutorial; P-Practical							
(Recommended)	Level	of Course	Code	Courses	L	Т	Р	C					
(itteominenaea)					(Periods/	(Periods	(Periods						
					THEORY	/ WCCK)	/wcck)						
		Pre- requisite course *	PR001	Elementary Mathemati	ics 3	0	0	0					
	EIDST	DSC- Course	CN 101/ CN 103	Programming and Problem Solving using Programming and Problem Solving using C++	3 3 5 C/	0	0	3					
		DSC- Course	CN 105	Basics of Operating Systems	2	0	0	2					
First		DSC- Course	CN 107	Fundamentals of Computer Science	2	0	0	2					
Monsoon		MDC		Principle Of Managem	nent 3	0	0	3					
		VAC		Human Values and Professional Ethics/ Environmental Science	e 2	0	0	2					
]	LABORATORI	ES		•					
		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	2	0	2	3					
		VAC		administration	aga 1	0	2	2					
		VAC	ТОТА	L I Hysical Education/ I C	jga I	0		20.5					

*[will be pass course with no credits]

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Semester/ Session	Course	Category of	Course	Comme	Mode of Lect	Mode of delivery & credits L- Lecture; T-Tutorial; P-Practical				
of Study (Recommended)	Level	Course	Code	Courses	L (Periods /week)	T (Periods /week)	P (Periods /week)	С		
			THEORY							
	FIRST	DSC- Course	CN 121	Introduction to Data Structures	3	1	0	4		
		DSC- Course	CN 123	Basics of Digital Computand Logic Design	ter 3	1	0	4		
Second		MDC		Mathematics for Computing I	3	0	0	3		
Spring		VAC		Digital Empowerment /Emotional Intelligence	2	0	0	2		
				L	ABORATORIE	ES				
		AECC	MT133	Communication Skills- I	I 0	0	3	1.5		
		DSC Lab	CN 122	Data Structure Lab	0	0	4	2		
		SEC-SB		Introduction to Digital	2	0	2	3		
				Marketing/Latex						
		Internship/ Dissertation	CN 125	Internship or work based vocational courses**	0	0	0	4		
			Tota	al	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

					Mode of d	lelivery and	Total	
Semester/Session					Lect	ure; T-Tuto	orial;	Credits
of Study	Course	Category	Course	Courses		P-Practical	1	C-Credits
(Recommended)	Level	of Course	Code	Courses	L	Т	Р	C
(1000)					(Periods/	(Periods/	(Periods	
					week)	week)	/week)	
					THEORY	-	-	-
		DSC-	CN 201	Java Programming	3	0	0	3
		Course						
		DSC-	CN 203	DBMS	3	0	0	3
		Course						
		DSC-	CN 205	Concept of	2	0	0	2
	SECOND	Course		Programming				
				Language				
		MDC		Mathematics for	3	0	0	3
				Computing II				
Third		AFCC		Modern Indian	2	0	0	2
wionsoon		ALCC		Language I/ Public	2	0		2
				speaking and creative				
				writing				
				L	ABORATO	RIES		
		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/	2	0	2	3
				Computerized				
		TOTAL		Accounting				
		TOTAL						20

Semester/Session	Course	Cotogomy	Course		Mode of d Lect	elivery and ure; T-Tuto B. Broatical	very and credits L- e; T-Tutorial; Practical T P Periods (Periods /week) /week) 0 0 1 0 0 0 0 0 0 0 0 0		
of Study (Recommended)	Level	of Course	Code	Courses	L (Periods /week)	L T P (Periods (Periods /week) /week) /week)			
					THEORY				
		DSC- Course	CN 221	Software Engineering	3	0	0	3	
		DSC- Course	CN 223	Python Programming	3	1	0	4	
	SECOND	DSC- Course	CN 225	Computer Networks	3	0	0	3	
Fourth Spring		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	
				LA	BORATOR	IES			
		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/Se ssion of Study (Recommen ded)	Course	Category of	Course	Courses	Mode of Leo	delivery an cture; T-Tu P-Practic	nd credits L- itorial; al	Total Credits C- Credits	
(Recommen ded)	Level	Course	Coue		L (Period s /week)	T (Period s /week)	P (Periods /week)	C	
				T	HEORY				
		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	0	3		
Fifth		DSC-Course	CN 309	Software Testing	vare Testing 3	1	0	4	
Monsoon	THIRD		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	Course	Category	Course	G	Mode of a Lect	lelivery and ture; T-Tuto P-Practical	credits L- prial;	Total Credits C-Credits
Study (Recomm ended)	Level	of Course	Code	Courses	L (Periods /week)	T (Periods /week)	P (Periods /week)	С
					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
Sixth Spring	THIRD	DSC- Course	CN 341	Computer Oriented Optimization Technique	3	0	0	3
				LA	BORATOR	IES		
		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/S ession of					Mode of d Lecture; 7	lelivery and Γ-Tutorial;	credits L-	Total Credits				
Semester/S		Category	Course	Courses	P-Practica	al		C-Credits				
ession of Study	Course	of Course	Code		L	Т	Р	С				
(Recomme nded)	Level				(Periods /week)							
				THEORY								
					L	Т	Р					
	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				
Seventh		DSE Course		Annexure A/Annexure B/Annexure C	3	1	0	4				
				LABORA	TORIES							
	DSE Lab		Annexure A/Annexure B/Annexure C	0	0	4	2					
		DSE Lab		Annexure A/Annexure B/Annexure C	0	0	4	2				
			T	DTAL				20				

				Mode of d	elivery and o	credits L-	Total Credits			
				Lecture; T	-Tutorial;		C Credite			
				P-Practica	1		C-Credits			
	Category	Course	Courses	1 Theorem	1					
Course	of Course	Code		L	Т	Р	С			
Level				(Periods	(Periods	(Periods				
				/week)	/week)	/week)				
			THEORY							
				L	Т	Р				
	DSE		Annexure A/Annexure		0	0	3			
	Course		B/Annexure C							
	DSE		Annexure A/Annexure	3	0	0	3			
	Course -C		B/Annexure C							
Fourth			LABORA	TORIES						
Fourm	DODAL	г г								
	DSE Lab		Annexure A/Annexure	0	0	4	2			
			D/Annexure C							
	Research		Research project /Internship	0	0	0	12			
	Project/Di		with Viva-voce and seminar							
	ssertation		presentation.							
TOTAL	1	<u> </u>					20			
	Course Level Fourth	Course Level Course Cou	Course LevelCategory of Course CodeCourse CodeII </td <td>Course LevelCategory of Course CodeCourse CodeCoursesLevelCourseCourseCoursesDSE CourseAnnexure A/Annexure B/Annexure CNote B/Annexure CDSE Course -CAnnexure A/Annexure B/Annexure CNote B/Annexure CDSE LabAnnexure A/Annexure B/Annexure CNote CourseFourthEEAnnexure A/Annexure B/Annexure CFourthFourse -CResearch Project/Di ssertationResearch project /Internship with Viva-voce and seminar presentation.TOTALTOTALEE</br></br></br></td> <td>Course LevelCategory of Course CodeCoursesMode of d Lecture; TCourse of Course CodeCoursesP-Practical (Periods /week)Image: Course DecourseImage: Course CourseImage: Course Periods (Periods Periods<b< td=""><td>Course LevelCategory of Course of CourseCourse CodeCoursesMode of delivery and of Lecture; T-Tutorial;Course LevelCourse CodeP-PracticalITLT(Periods /week)(Periods /week)(Periods /week)DSE CourseAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C00TOTALResearch Project/Di ssertationResearch project /Internship with Viva-voce and seminar presentation.00</td><td>Course LevelCategory of Course Course CodeCoursesMode of delivery and credits L- Lecture; T-Tutorial; P-PracticalLevelP-PracticalP-PracticalLevel$I$$T$$P$$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$</td></b<></td>	Course LevelCategory of Course CodeCourse CodeCoursesLevelCourseCourseCoursesDSE CourseAnnexure A/Annexure 	Course LevelCategory of Course CodeCoursesMode of d Lecture; TCourse of Course CodeCoursesP-Practical (Periods /week)Image: Course DecourseImage: Course CourseImage: Course Periods (Periods <b< td=""><td>Course LevelCategory of Course of CourseCourse CodeCoursesMode of delivery and of Lecture; T-Tutorial;Course LevelCourse CodeP-PracticalITLT(Periods /week)(Periods /week)(Periods /week)DSE CourseAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C00TOTALResearch Project/Di ssertationResearch project /Internship with Viva-voce and seminar presentation.00</td><td>Course LevelCategory of Course Course CodeCoursesMode of delivery and credits L- Lecture; T-Tutorial; P-PracticalLevelP-PracticalP-PracticalLevel$I$$T$$P$$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$-Practical$P$</td></b<>	Course LevelCategory of Course of CourseCourse CodeCoursesMode of delivery and of Lecture; T-Tutorial;Course LevelCourse CodeP-PracticalITLT(Periods /week)(Periods /week)(Periods /week)DSE CourseAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C30DSE Course -CAnnexure A/Annexure B/Annexure C00TOTALResearch Project/Di ssertationResearch project /Internship with Viva-voce and seminar presentation.00	Course LevelCategory of Course Course CodeCoursesMode of delivery and credits L- Lecture; T-Tutorial; P-PracticalLevel P -Practical P -PracticalLevel I T P P -Practical P			

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	Course	Category	Course	Courses	Mode of d	credits	Total	
of Study (Level	of Course	Code		L-Lecture	Р-	Credits	
Recommended)					Practical		C	
					L	Т	Р	C
					(Periods	(Periods		
					/week)	/week)	(Periods	
					,	,	/week)	
				ТНЕОБ	I RV			
						Т	Р	
	Fourth	DSE Course		Deen Learning	3	1	0	4
	1 0 0 1 11			2 oop 2 omining		-	Ŭ	
		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	3	1	0	4
				Processing				
		DOFIC				1	0	
		DSE Course		Data Visualization	3	1	0	4
		DSE Course		Introduction to Artificial	3	0	0	3
				Intelligence	5		0	5
				Interligence				
		DSE Course		Advance Data Analytics	3	0	0	3
		DSE Course		Advanced Python	3	0	0	3
				Programming				
Seventh/ Eighth		DSE Course		Computer Vision	3	0	0	3
		DEF		L D '	2	0	0	2
		DSE Course		Image Processing	3	0	0	3
		DSE Course		Introduction to Machine	3	1	0	4
				Learning	5	1	0	
				Louining				
		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
					ΩΡΑΤΩΡΙ	FS		
				LAD		1.5		
		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	0	0	Λ	2
				Processing Lab	0	0	-	2
								1

	DSE Lab	Advanced Python	0	0	4	2
		Programming Lab				
	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	Course Level	Category of Course	Course Code	Courses	Mode of d LectureT-	elivery and TutorialP-F	credits L- Practical	Total Credits C
Study (Recommended)					L (Periods /week)	T (Periods /week)	P (Periods /week)	С
	Fourth				THEORY	7		
					L	Т	Р	
		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
Seventh		DSE Course		Big Data Analytics	3	0	0	3
And		DSE Course		Advance Data Analytics	3	0	0	3
Eighth		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
				LA	BORATO	RIES		
		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

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