## MANIPAL UNIVERSITY JAIPUR

## **B.** Tech in Computer and Communication Engineering (2019-2023)

EO2001         Economics         3         0         0         3         BB0025         Value, Ethics and Governance         2         0         0           MA2101         Engineering Mathematics III         2         1         0         3         MA2201         Engineering Mathematics IV         2         1         0           CC2102         Data Communications         3         1         0         4         CC2202         Relational Database Management Systems         3         1         0           CC2103         Data Structures and Algorithms         3         1         0         4         CC2202         Relational Database Management Systems         3         1         0         2         CC2103         Data Structures and Algorithms         3         1         0         4         CC2203         Operating Systems         3         0         0         2         1         CC2130         Data Communications Lab         0         0         2         1         CC2230         Operating Systems Lab         0         0         2         1         CC2131         Data Structures and Algorithms Lab         0         0         2         1         CC2330         Operating Systems Lab         0         0         2         1	L		THIRD SEMESTER	FOURTH SEMESTER										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Year	Course Code	Course Name	L	Т	Р	С	Course Code	Course Name	L	Т	Р	С	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		EO2001	Economics	3	0	0	3	BB0025	Value, Ethics and Governance	2	0	0	2	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		MA2101	Engineering Mathematics III	2	1	0	3	MA2201	Engineering Mathematics IV	2	1	0	3	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		CC2101	Digital Design and Computer Architecture	3	1	0	4	CC2201	Computer Networks	3	1	0	4	
II       CC2104       Object Oriented Programming       3       1       0       4       ******       Open Elective -I       3       0       0         CC2130       Data Communications Lab       0       0       2       1       CC2230       Computer Networks Lab       0       0       2         CC2132       Object Oriented Programming Lab       0       0       2       1       CC2232       Operating Systems Lab       0       0       2         CC2132       Object Oriented Programming Lab       0       0       2       1       CC2232       Operating Systems Lab       0       0       2         II       5       6       25        16       4       6         Cotal Contact Hours (L + T + P)       17+5+6=28       Total Contact Hours (L + T + P)       16+4+6         CC3101       Software Engineering       3       1       0       4       B80026       Organization and Management       3       0       0         CC3102       Design and Analysis of Algorithms       3       1       0       4       CC3202       Wireless Communications       3       1       0       0       2       CC3102       Corgraphy and Security       3       1		CC2102	Data Communications	3	1	0	4	CC2202	Relational Database Management Systems	3	1	0	4	
CC2104         Object Oriented Programming         3         1         0         4         ######         Open Elective - 1         3         0         0         0         2         1         CC22130         Data Communications Lab         0         0         2         1         CC2230         Computer Networks Lab         0 <th< td=""><td>п</td><td>CC2103</td><td>Data Structures and Algorithms</td><td>3</td><td>1</td><td>0</td><td>4</td><td>CC2203</td><td>Operating Systems</td><td>3</td><td>1</td><td>0</td><td>4</td></th<>	п	CC2103	Data Structures and Algorithms	3	1	0	4	CC2203	Operating Systems	3	1	0	4	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	п	CC2104	Object Oriented Programming	3	1	0	4	****	Open Elective – I	3	0	0	3	
CC2132         Object Oriented Programming Lab         0         0         2         1         CC2232         Operating Systems Lab         0         16         4         6         0         0         16         4         6         4         6         16         4         6         4         16         4         6         16         4         6         16         4         6         16         4         6         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10 </td <td></td> <td>CC2130</td> <td>Data Communications Lab</td> <td>0</td> <td>0</td> <td>2</td> <td>1</td> <td>CC2230</td> <td>Computer Networks Lab</td> <td>0</td> <td>0</td> <td>2</td> <td>1</td>		CC2130	Data Communications Lab	0	0	2	1	CC2230	Computer Networks Lab	0	0	2	1	
Image: Constraint of the second sec		CC2131	Data Structures and Algorithms Lab	0	0	2	1	CC2231	Relational Database Management Systems Lab	0	0		1	
Total Contact Hours (L + T + P)         17+5+6=28         Total Contact Hours (L + T + P)         16 +4+6           FIFTH SEMESTER         SIXTH SEMESTER         SIXTH SEMESTER         SIXTH SEMESTER         3         0         0           CC3101         Software Engineering         3         1         0         4         BB0026         Organization and Management         3         0         0           CC3102         Design and Analysis of Algorithms         3         1         0         4         CC3201         Artificial Intelligence and Machine Learning         3         1         0           CC3103         Foundations of Data Science         3         1         0         4         CC3202         Wireless Communications         3         1         0		CC2132	Object Oriented Programming Lab	0	0	2	1	CC2232	Operating Systems Lab	0	0	2	1	
SIXTH SEMESTER           CC3101         Software Engineering         3         1         0         4         BB0026         Organization and Management         3         0         0           CC3102         Design and Analysis of Algorithms         3         1         0         4         CC3201         Artificial Intelligence and Machine Learning         3         1         0         0         2         1         0         4         CC3202         Wireless Communications         3         1         0				17	5	6	25			16	4	6	23	
CC3101         Software Engineering         3         1         0         4         BB0026         Organization and Management         3         0         0           CC3102         Design and Analysis of Algorithms         3         1         0         4         CC3201         Artificial Intelligence and Machine Learning         3         1         0<		Total Contact Hours (L + T + P)17+5+6=28Tota							Fotal Contact Hours (L + T + P)16			6 + 4 + 6 = 26		
CC3102         Design and Analysis of Algorithms         3         1         0         4         CC3201         Artificial Intelligence and Machine Learning         3         1         0           CC3103         Foundations of Data Science         3         1         0         4         CC3202         Wireless Communications         3         1         0         2         1         CC3203         Automata Theory and Compiler Design         3         0         0         0         2         1         CC3130         Software Engineering Lab         0         0         2         1         CC3230         Artificial Intelligence and Machine Learning Lab         0         0		FIFTH SEMESTER						SIXTH SEMESTER						
CC3103         Foundations of Data Science         3         1         0         4         CC3202         Wireless Communications         3         1         0		CC3101	Software Engineering	3	1	0	4	BB0026	Organization and Management	3	0	0	3	
III         CC3104         Cryptography and Security         3         1         0         4         CC3203         Automata Theory and Compiler Design         3         0         0         0         0         0         3         CC32XX         Program Elective – II         3         0         0         3         CC32XX         Program Elective – II         3         0         0         3         ******         Open Elective – II         3         0         0         2         1         CC3230         Artificial Intelligence and Machine Learning Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2         10           CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC327		CC3102	Design and Analysis of Algorithms	3	1	0	4	CC3201	Artificial Intelligence and Machine Learning	3	1	0	4	
III       CC31XX       Program Elective - I       3       0       0       3       CC32XX       Program Elective - II       3       0       0         ******       Open Elective - II       3       0       0       3       ******       Open Elective - III       3       0       0       2       1       CC3130       Software Engineering Lab       0       0       2       1       CC3230       Artificial Intelligence and Machine Learning Lab       0       0       2         CC3131       Design and Analysis of Algorithms Lab       0       0       2       1       CC3270       Minor Project       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       2       0       0       0       0       2       0       0       0       2       0       0       0       0       0       0       0       0       0       0       0		CC3103	Foundations of Data Science	3	1	0	4	CC3202	Wireless Communications	3	1	0	4	
******         Open Elective - II         3         0         0         3         ******         Open Elective - III         3         0         0         2         1         CC3130         Software Engineering Lab         0         0         2         1         CC3230         Artificial Intelligence and Machine Learning Lab         0         0         2           CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2           CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         0         0         0         2           Image: CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0 </td <td></td> <td>CC3104</td> <td>Cryptography and Security</td> <td>3</td> <td>1</td> <td>0</td> <td>4</td> <td>CC3203</td> <td>Automata Theory and Compiler Design</td> <td>3</td> <td>0</td> <td>0</td> <td>3</td>		CC3104	Cryptography and Security	3	1	0	4	CC3203	Automata Theory and Compiler Design	3	0	0	3	
Image: Construction of the intervention of the interventinter of the intervention of the intervention of the intervention o	III	CC31XX		3	0	0	3		Program Elective – II	3	0	0	3	
CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0         0         2           CC3131         Design and Analysis of Algorithms Lab         0         0         2         1         CC3231         LINUX Shell Programming Lab         0 <t< td=""><td></td><td></td><td>A</td><td>3</td><td>0</td><td>0</td><td></td><td></td><td>· · · · ·</td><td>3</td><td>0</td><td>0</td><td>3</td></t<>			A	3	0	0			· · · · ·	3	0	0	3	
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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$								CC3270	Minor Project	0	0	6	3	
EIGHTH SEMESTER           CC41XX         Program Elective – III         3         0         0         3         CC4270         Major Project         Image: Colspan="5">Image: CC41XX           IV         CC41XX         Program Elective – IV         3         0         0         3         Image: CC41XX         Program Elective – V         3         0         0         3         Image: CC41XX         Program Elective – V         3         0         0         3         Image: CC41XX         Program Elective – V         3         0         0         3         Image: CC41XX         Program Elective – V         3         0         0         3         Image: CC41XX         Program Elective – VI         3         0         0         3         Image: CC41XX         Program Elective – VI         3         0         0         3         Image: CC41XX         Program Elective – VI         3         0         0         3         Image: CC41XX         Program Elective – VII         3         0         0         3         Image: CC41XX         Program Elective – VII         3         0         0         3         Image: CC41XX         Image:				18	4	4	24			18	2	10	25	
IV         Program Elective – III         3         0         0         3         CC41XX         Major Project         1           IV         CC41XX         Program Elective – IV         3         0         0         3         1         1           IV         CC41XX         Program Elective – IV         3         0         0         3         1         1           CC41XX         Program Elective – V         3         0         0         3         1         1           CC41XX         Program Elective – VI         3         0         0         3         1         1           CC41XX         Program Elective – VI         3         0         0         3         1         1           CC41XX         Program Elective – VII         3         0         0         3         1         1		Total Contact Hours $(L + T + P)$ $18 + 4 + 4 = 26$					Total Contact Hours (L + T + P)18+2					+10 = 30		
IV         CC41XX         Program Elective – IV         3         0         0         3           IV         CC41XX         Program Elective – V         3         0         0         3              CC41XX         Program Elective – V         3         0         0         3		SEVENTH SEMESTER						EIGHTH SEMESTER						
IV         CC41XX         Program Elective - V         3         0         0         3           CC41XX         Program Elective - VI         3         0         0         3         0         0         3           CC41XX         Program Elective - VI         3         0         0         3         0         0         3           CC41XX         Program Elective - VII         3         0         0         3         0         0         3		CC41XX	Program Elective – III	3	0	0	3	CC4270	Major Project				12	
IV         CC41XX         Program Elective – VI         3         0         0         3           CC41XX         Program Elective – VII         3         0         0         3         0         0         3		CC41XX	Program Elective – IV	3	0	0	3							
IV     CC41XX     Program Elective – VI     3     0     0     3       CC41XX     Program Elective – VII     3     0     0     3		CC41XX	Program Elective – V	3	0	0	3							
CC41XX Program Elective – VII 3 0 0 3				3	0	0	3							
					0	0								
CC4170 Industrial Training 0 0 2 1							1							
				~	-		16				┨───┤		12	

## Total Contact Hours (L + T + P)

15+0+2=17

2

Program Electives (Minor Specializations)	Other Programme Electi	ves	Open Electives (OE-I,
(PE-I, PE-II, PE-III, PE-IV)	(PE V, PE VI, VII)		OE-II, OE-III)
<ul> <li>Web Technologies <ol> <li>CC3140: Web Programming</li> <li>CC3240: Advanced Internet Technologies</li> <li>CC4140: Principles of Web Services</li> <li>CC4141: DevOps Fundamentals</li> </ol> </li> <li>Computational Intelligence <ol> <li>CC3141: Soft Computing</li> <li>CC3241: Computer Vision</li> <li>CC4142: Natural Language Processing</li> <li>CC4143: Deep Learning</li> </ol> </li> <li>Sensors Networks and IoT <ol> <li>CC3242: Next Generation Telecom Networks</li> <li>CC4144: Internet of Things (IoT)</li> <li>CC4145: Software Defined Networks</li> </ol> </li> </ul>	$\begin{array}{c} CC4146\\ CC4147\\ CC4148\\ CC4149\\ CC4150\\ CC4150\\ CC4151\\ CC4152\\ CC4152\\ CC4153\\ CC4154\\ CC4155\\ CC4156\\ CC4157\\ CC4158\\ CC4159\\ CC4160\\ CC4161\\ CC4162\\ CC4163\\ CC4163\\ CC4164\\ \end{array}$	Embedded Systems Networks on Chip Wireless Sensors & Adhoc Networks Human Computer Interaction Mobile Computing Information Retrieval Computer Graphics & Multimedia User Interface Design Digital Image Processing Big Data Analytics Data Mining and Data Warehousing Social Network Analysis Software Testing Cloud Computing Information Theory and Coding Network Security Spatial Data Analytics Foundation of Digital Forensics Information System Auditing, Control, and Assurance Network Vulnerabilities Cloud Security Foundations of Blockchain Technology Advanced Java	<ol> <li>CC2080: Introduction to Data Structures and Algorithms</li> <li>CC3080: Introduction to Object Oriented Programming</li> <li>CC3081: Introduction to Web Technology</li> <li>CC3082: Introduction to IoT</li> <li>CC3083: Introduction to Linux</li> </ol>