



Symbiosis Institute of Technology, Pune
Bachelor of Technology (Computer Science and Engineering)
Programme Structure 2019-23

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|--------------------------------|---|--|------------------------------|--|
| 1. OBJECTIVE | <p>B.Tech is a full-time four year graduation programme, which aims at transforming a student into a technically sound professional. The syllabus contains courses on basic sciences, technical arts, humanities & liberal arts and professional courses. The mix of these courses has been evolved with an aim to produce professionals who have knowledge not only of Engineering but who are good managers to contribute in a cross-functional team and have human values. Being a professional programme it ensures a healthy balance between theoretical foundation and practical exposure to the present day world. The emphasis is to develop all round personality that would enable the students to take up the challenges of the corporate world and also become responsible citizens of the society.</p> | | | |
| 2. DURATION (IN MONTHS) | 48 (Full Time) | | | |
| 3. INTAKE | 180 | | | |
| 4. RESERVATION | I. Within the sanctioned intake | a) SC (In Percentage) | b) ST (In Percentage) | c) Differently abled (In Percentage) |
| | | 15 | 7.5 | 3 |
| | II. Over and above the sanctioned intake | a) Kashmiri Migrants (In Seats) | | b) International Students (In Percentage) |
| | | 2 | | 15 |
| 5. ELIGIBILITY | <p>Passed 10+2 examination with Physics and Mathematics as compulsory subjects along with one of Chemistry/ Biotechnology/ Biology/ Technical Vocational subjects. Obtained at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) in the above subjects taken together.</p> <p>B. Tech (Lateral entry to second year) :</p> <p>a) Passed Diploma examination from an AICTE approved Institution; with at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) in appropriate branch of Engineering / Technology.</p> <p>b) Passed B.Sc. Degree from a recognized University as defined by UGC, with at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) and passed XII standard with mathematics as a subject.</p> <p>c) Provided that in case of students belonging to B. Sc. Stream, shall clear the subjects of Engineering Graphics / Engineering Drawing and Engineering Mechanics of the first year Engineering program along with the second year subjects.</p> <p>d) Provided further that, the students belonging to B. Sc. Stream shall be considered only after filling the supernumerary seats in this category with students belonging to the Diploma stream.</p> <p>e) Provided further that students, who have passed Diploma in Engineering and Technology from an AICTE approved Institution or B. Sc. Degree from a recognized University as defined by UGC, shall also be eligible for admission to</p> | | | |



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|-----|--|--|-------------------------|--------------------------|--------------|
| | | the first year Engineering Degree courses subject to vacancies in the first year class in case the vacancies at lateral entry are exhausted. However the admissions shall be based strictly on the eligibility criteria as mentioned in a, b, c, and d above. | | | |
| 6. | SELECTION PROCEDURE | Merit list by valid score of Symbiosis Entrance Test (SET) or Joint Entrance Examination (JEE - Main) or Maharashtra Common Entrance Test (MHT-CET) | | | |
| 7. | MEDIUM OF INSTRUCTION | English | | | |
| 8. | PROGRAMME PATTERN | Semester | | | |
| 9. | COURSE & SPECIALIZATION | <p>Annexure A: Bachelor of Technology (Computer Science and Engineering) Students may pursue optional 'Honours' OR 'Minor' specialization in one of the specialization areas by completing additional 20 credits in Semester: 5, 6 and 7 as specified in Annexure B for Honours and Annexure C for Minor in the respective specialization area.</p> <p>Annexure B: Optional 'Honours' specialization area</p> <ol style="list-style-type: none"> 1. Artificial Intelligence and Machine Learning 2. Computing 3. Data Science 4. Game Design & Development 5. Security and Privacy 6. Internet of Things <p>Annexure C: Optional 'Minor' specialization area</p> <ol style="list-style-type: none"> 1. Automobile Engineering with Hybrid and Autonomous Technology (ME) 2. Embedded Systems (E&TC) 3. Smart Cities and Urban Analytics (CE) | | | |
| 10. | FEE | | Academic Fee p.a | Institute Deposit | Total |
| | | Indian Students | 260000 | 20000 | 280000 |
| | | International Students (USD equivalent to INR) | 390000 | 20000 | 410000 |
| 11. | ASSESSMENT | All internal courses will have 100% component as internal evaluation at the institute level. All external courses will have 40% internal component and 60% component as external [University] examination. The internal and external will be separate heads of passing. | | | |
| 12. | STANDARD OF PASSING | The assessment of the student for each examination is done, based on relative performance. Maximum Grade Point (GP) is 10 corresponding to O (Outstanding). For all courses, a student is required to pass both internal and external examination separately with a minimum Grade Point of 4 corresponding to Grade P. Students securing less than 40% absolute marks in each head of passing will be declared FAIL. The University awards a degree to the student who has achieved a minimum CGPA of 4 out of maximum of 10 CGPA for the programme. | | | |
| 13. | AWARD OF DEGREE/ DIPLOMA/ CERTIFICATE | Bachelor of Technology (Computer Science and Engineering) OR Bachelor of Technology (Computer Science and Engineering) with Honours in | | | |

| | |
|--|--|
| | Artificial Intelligence and Machine Learning / Data Science / Computing / Game Design & Development / Security and Privacy / Internet of Things OR Bachelor of Technology (Computer Science and Engineering) with Minor in Automobile Engineering with Hybrid and Autonomous Technology / Embedded Systems and Smart Cities and Urban Analytics will be awarded at the end of semester VIII examination by taking into consideration the performance of all semester examinations after obtaining minimum 4.00 CGPA out of 10 CGPA. |
|--|--|

14. CLASSIFICATION OF CREDITS

| Semester | Generic Core | Generic Elective | Specialization Core | Specialization Elective | Open Elective | Audit | Total |
|--|--------------|------------------|---------------------|-------------------------|---------------|----------|------------|
| Group A | | | | | | | |
| 1 | 20 | 0 | 0 | 0 | 0 | 0 | 20 |
| 2 | 19 | 0 | 0 | 0 | 0 | 0 | 19 |
| 3 | 23 | 1 | 0 | 0 | 0 | 0 | 24 |
| 4 | 17 | 2 | 0 | 0 | 0 | 1* | 19 |
| 5 | 22 | 3 | 0 | 0 | 0 | 1* | 25 |
| 6 | 14 | 8 | 0 | 0 | 3 | 0 | 25 |
| 7 | 11 | 13 | 0 | 0 | 0 | 0 | 24 |
| 8 | 14 | 0 | 0 | 0 | 0 | 0 | 14 |
| Total | 140 | 27 | 0 | 0 | 3 | 0 | 170 |
| Group B | | | | | | | |
| 1 | 19 | 0 | 0 | 0 | 0 | 0 | 19 |
| 2 | 20 | 0 | 0 | 0 | 0 | 0 | 20 |
| 3 | 23 | 1 | 0 | 0 | 0 | 0 | 24 |
| 4 | 17 | 2 | 0 | 0 | 0 | 1* | 19 |
| 5 | 22 | 3 | 0 | 0 | 0 | 1* | 25 |
| 6 | 14 | 8 | 0 | 0 | 3 | 0 | 25 |
| 7 | 11 | 13 | 0 | 0 | 0 | 0 | 24 |
| 8 | 14 | 0 | 0 | 0 | 0 | 0 | 14 |
| Total | 140 | 27 | 0 | 0 | 3 | 0 | 170 |
| Optional Additional Courses (Honours) | | | | | | | |
| Total | 0 | 0 | | | 0 | 0 | 20 |
| Optional Additional Courses (Minor) | | | | | | | |
| Total | 0 | 0 | | | 0 | 0 | 20 |
| Grand Total | | | | | | | 190 |

* Satisfactory completion of the non letter grade course 'Integrated Disaster Management' Certificate in COVID-19 Care for the Community' is mandatory for award of degree.

Note: For additional specializations (optional) as applicable, fees of Rs.25000/- will be charged, additionally in the third year

The revised programme structure supersedes the previously approved programme structure dated 14/03/2022 for the programme.

This Programme Structure is aligned with the norms laid down by the University and is approved by the Academic Council.
Hereafter changes (if any) which conform to the policy on "Curriculum Development and Review" would be permissible, subject to revision of the Programme Structure, following the specified processes.

Head - Academics

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Annexure A

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|--|----------------|-----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Semester : 1 | | | | | | | | | |
| Group - A - Generic Core Courses | | | | | | | | | |
| Group - A | | | | | | | | | |
| TE7168 | 070122101 | Engineering Mathematics -I | | 4 | 40 | 60 | 0 | 0 | 100 |
| T7391 | 070122102 | Physics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7288 | 070122103 | Programming in C | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7188 | 070122104 | Environmental Science | | 2 | 20 | 30 | 0 | 0 | 50 |
| TE7300 | 070122105 | Tinker Lab | | 2 | 0 | 0 | 50 | 0 | 50 |
| T7383 | 070122106 | Communication Skills | | 2 | 20 | 30 | 0 | 0 | 50 |
| T7384 | 070122107 | Communication skills lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T6773 | 070122108 | Creative Thinking | | 1 | 25 | 0 | 0 | 0 | 25 |
| T7392 | 070122109 | Physics lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7289 | 070122110 | Programming in C Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 20 | 165 | 210 | 80 | 45 | 500 |
| Group - B - Generic Core Courses | | | | | | | | | |
| Group - B | | | | | | | | | |
| TE7168 | 070122101 | Engineering Mathematics -I | | 4 | 40 | 60 | 0 | 0 | 100 |
| T7381 | 070122111 | Chemistry | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7540 | 070122112 | Basic Electrical and Electronics Engineering | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7286 | 070122113 | Programming and Problem Solving | | 2 | 20 | 30 | 0 | 0 | 50 |
| T7924 | 070122114 | Engineering Graphics | | 2 | 0 | 0 | 20 | 30 | 50 |
| TE7396 | 070122115 | Software Tools | | 1 | 25 | 0 | 0 | 0 | 25 |
| TE7287 | 070122116 | Programming and Problem Solving Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T6732 | 070122117 | Critical Thinking | | 1 | 25 | 0 | 0 | 0 | 25 |
| T7593 | 070122118 | Basic Electrical and Electronics Engineering Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7382 | 070122119 | Chemistry Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 19 | 170 | 180 | 50 | 75 | 475 |
| Semester : 2 | | | | | | | | | |
| Group - A - Generic Core Courses | | | | | | | | | |
| TE7169 | 070122201 | Engineering Mathematics -II | | 4 | 40 | 60 | 0 | 0 | 100 |
| T7381 | 070122202 | Chemistry | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7540 | 070122203 | Basic Electrical and Electronics Engineering | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7924 | 070122204 | Engineering Graphics | | 2 | 0 | 0 | 20 | 30 | 50 |
| TE7286 | 070122205 | Programming and Problem Solving | | 2 | 20 | 30 | 0 | 0 | 50 |
| TE7287 | 070122206 | Programming and Problem Solving Lab | | 1 | 0 | 0 | 10 | 15 | 25 |



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|---|-------------|--|----------------|-----------|----------------|---------------|--------------------------|--------------------------|-------------|
| T6732 | 070122207 | Critical Thinking | | 1 | 25 | 0 | 0 | 0 | 25 |
| TE7396 | 070122208 | Software Tools | | 1 | 25 | 0 | 0 | 0 | 25 |
| T7593 | 070122209 | Basic Electrical and Electronics Engineering Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7382 | 070122210 | Chemistry Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 19 | 170 | 180 | 50 | 75 | 475 |
| Group - B - Generic Core Courses | | | | | | | | | |
| TE7169 | 070122201 | Engineering Mathematics -II | | 4 | 40 | 60 | 0 | 0 | 100 |
| T7391 | 070122211 | Physics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7288 | 070122212 | Programming in C | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7300 | 070122213 | Tinker Lab | | 2 | 0 | 0 | 50 | 0 | 50 |
| T7383 | 070122214 | Communication Skills | | 2 | 20 | 30 | 0 | 0 | 50 |
| TE7188 | 070122215 | Environmental Science | | 2 | 20 | 30 | 0 | 0 | 50 |
| T6773 | 070122216 | Creative Thinking | | 1 | 25 | 0 | 0 | 0 | 25 |
| T7384 | 070122217 | Communication skills lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7289 | 070122218 | Programming in C Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7392 | 070122219 | Physics lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 20 | 165 | 210 | 80 | 45 | 500 |
| Semester : 3 | | | | | | | | | |
| Generic Core Courses | | | | | | | | | |
| T7995 | 070122301 | Discrete Mathematics and Probability Theory | | 4 | 40 | 60 | 0 | 0 | 100 |
| T7906 | 070122302 | Fundamentals of Data Structures | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7512 | 070122303 | Programming Paradigms | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7996 | 070122304 | Computer Organization | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7997 | 070122305 | Digital Electronics and Logic Design | | 3 | 30 | 45 | 0 | 0 | 75 |
| F7010 | 070122306 | Agile Software Development | | 3 | 75 | 0 | 0 | 0 | 75 |
| T7555 | 070122307 | Digital Electronics and Logic Design Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T2646 | 070122308 | Entrepreneurship Venture | | 1 | 25 | 0 | 0 | 0 | 25 |
| T7513 | 070122309 | Programming Paradigms Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7257 | 070122310 | Fundamentals of Data Structures Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total | | | | 23 | 260 | 240 | 30 | 45 | 575 |
| Generic Elective Courses Group | | | | | | | | | |
| T6760 | 070122311 | Introduction to Indian Philosophy | | 1 | 25 | 0 | 0 | 0 | 25 |



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|---------------------------------------|-------------|--|----------------|-----------|----------------|---------------|--------------------------|--------------------------|------------------|
| T6761 | 070122312 | Foundation of Ethics | | 1 | 25 | 0 | 0 | 0 | 25 |
| Total Required Credits | | | | 1 | 25 | 0 | 0 | 0 | 25 |
| Semester : 4 | | | | | | | | | |
| Generic Core Courses | | | | | | | | | |
| F7021 | 070122401 | Advanced Java | | 4 | 100 | 0 | 0 | 0 | 100 |
| T7488 | 070122402 | Data Structures | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7510 | 070122403 | Operating Systems | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7170 | 070122404 | Engineering Mathematics-III | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7290 | 070122405 | Project Based Learning -I | | 2 | 0 | 0 | 20 | 30 | 50 |
| T7489 | 070122406 | Data Structures Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7511 | 070122407 | Operating Systems Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T4005 | 070122408 | Integrated Disaster Management * | | 0 | 0 | 0 | 0 | 0 | Non Letter Grade |
| Total | | | | 17 | 190 | 135 | 40 | 60 | 425 |
| Generic Elective Courses Group | | | | | | | | | |
| T6012 | 070122409 | Basic German I | | 2 | 50 | 0 | 0 | 0 | 50 |
| T6014 | 070122410 | Basic French I | | 2 | 50 | 0 | 0 | 0 | 50 |
| T6016 | 070122411 | Basic Spanish I | | 2 | 50 | 0 | 0 | 0 | 50 |
| Total Required Credits | | | | 2 | 50 | 0 | 0 | 0 | 50 |
| Semester : 5 | | | | | | | | | |
| Generic Core Courses | | | | | | | | | |
| T8000 | 070122501 | Service Learning | | 4 | 100 | 0 | 0 | 0 | 100 |
| TE7136 | 070122502 | Deep Learning | | 4 | 100 | 0 | 0 | 0 | 100 |
| T7908 | 070122503 | Computer Networks | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7907 | 070122504 | Database Management Systems | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7299 | 070122505 | Theory of Computation | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7487 | 070122506 | Data Base Management Systems Lab | | 2 | 0 | 0 | 20 | 30 | 50 |
| T6774 | 070122507 | Principles of Economics | | 2 | 50 | 0 | 0 | 0 | 50 |
| T7482 | 070122508 | Computer Networks Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TH4272 | 070122545 | Certificate in COVID-19 Care for the Community * | | 0 | 0 | 0 | 0 | 0 | Non Letter Grade |
| Total | | | | 22 | 340 | 135 | 30 | 45 | 550 |
| Generic Elective Courses Group | | | | | | | | | |
| T7393 | 070122509 | Computer Based Statistical Packages | | 3 | 30 | 45 | 0 | 0 | 75 |



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| T7499 | 070122510 | Java | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7574 | 070122511 | MATLAB | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7020 | 070122512 | Nanotechnology | | 3 | 30 | 45 | 0 | 0 | 75 |
| T2618 | 070122513 | Project Management | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7223 | 070122514 | Smart Urban Planning | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7240 | 070122515 | Water Resource Planning and Management | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7263 | 070122516 | Introduction to AI and Machine Learning | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7265 | 070122517 | Introduction to Data Science | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7332 | 070122518 | Introduction to Image Processing | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7335 | 070122519 | Introduction to Robotics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7339 | 070122520 | Renewable Energy Systems | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7351 | 070122521 | 3D Printing and Prototyping | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7365 | 070122522 | Electrical and Electronics Materials | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7388 | 070122523 | Quality Management Techniques | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Semester : 6 | | | | | | | | | |
| Generic Core Courses | | | | | | | | | |
| TE7008 | 070122601 | Distributed Systems and Resource Management | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7750 | 070122602 | Web Application Development | | 3 | 75 | 0 | 0 | 0 | 75 |
| T6749 | 070122603 | Design Thinking | | 2 | 50 | 0 | 0 | 0 | 50 |
| T7674 | 070122604 | Cyber Security | | 2 | 50 | 0 | 0 | 0 | 50 |
| TE7291 | 070122605 | Project Based Learning-II | | 2 | 0 | 0 | 50 | 0 | 50 |
| T7802 | 070122606 | Capstone Course | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 14 | 205 | 45 | 70 | 30 | 350 |
| Generic Elective Courses Group- I | | | | | | | | | |
| TE7255 | 070122607 | Data Warehousing and Mining | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7101 | 070122608 | Internet of Things | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7328 | 070122609 | Image Processing | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Generic Elective Courses Group- II | | | | | | | | | |
| TE7013 | 070122610 | Data Warehousing and Mining Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7528 | 070122611 | Internet of Things Lab | | 1 | 0 | 0 | 10 | 15 | 25 |



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|--|-------------|--|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| TE7329 | 070122612 | Image Processing Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 1 | 0 | 0 | 10 | 15 | 25 |
| Generic Elective Courses Group- III | | | | | | | | | |
| T7473 | 070122613 | Artificial Intelligence | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7259 | 070122614 | Human Computer Interface | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7243 | 070122615 | Advanced Algorithms | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Generic Elective Courses Group- IV | | | | | | | | | |
| TE7014 | 070122616 | Artificial Intelligence Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7260 | 070122617 | Human Computer Interface Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7244 | 070122618 | Advanced Algorithms Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 1 | 0 | 0 | 10 | 15 | 25 |
| Open Elective Courses Group | | | | | | | | | |
| T7474 | 070122619 | Basics of Database | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7616 | 070122620 | Fundamentals of Automotive Technology | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7529 | 070122621 | Machine Learning | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7756 | 070122622 | Open Source Technologies | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7584 | 070122623 | Printed Circuit Board (PCB) Design | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7650 | 070122624 | Six sigma | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7700 | 070122625 | Smart Materials | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7195 | 070122626 | GIS Applications | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7264 | 070122627 | Introduction to BIGDATA | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7171 | 070122628 | Introduction to Mathematical Modelling | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7203 | 070122629 | Intelligent Transportation Management | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7334 | 070122630 | Introduction to Mechatronics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7338 | 070122631 | Principles of Modern Communication Systems | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7376 | 070122632 | Introduction to Operations Research | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7377 | 070122633 | Introduction to Optimisation | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Semester : 7 | | | | | | | | | |
| Generic Core Courses | | | | | | | | | |
| T7804 | 070122701 | B.Tech Project | | 4 | 0 | 0 | 40 | 60 | 100 |
| TE7751 | 070122702 | Compiler Construction | | 3 | 30 | 45 | 0 | 0 | 75 |



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|--|-------------|--|----------------|-----------|----------------|---------------|--------------------------|--------------------------|-------------|
| F7044 | 070122703 | Big Data, Hadoop & Apache Spark | | 3 | 75 | 0 | 0 | 0 | 75 |
| T7478 | 070122704 | Compiler Construction Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total | | | | 11 | 105 | 45 | 50 | 75 | 275 |
| Generic Elective Courses Group- I | | | | | | | | | |
| T2585 | 070122705 | Organizational Behaviour | | 2 | 50 | 0 | 0 | 0 | 50 |
| TE7438 | 070122706 | History of Science and Technology | | 2 | 50 | 0 | 0 | 0 | 50 |
| Total Required Credits | | | | 2 | 50 | 0 | 0 | 0 | 50 |
| Generic Elective Courses Group- II | | | | | | | | | |
| TE7253 | 070122707 | Data Science | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7282 | 070122708 | Optimization Techniques and Algorithms | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7097 | 070122709 | Neural Network | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Generic Elective Courses Group- III | | | | | | | | | |
| TE7112 | 070122710 | Neural Networks Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7283 | 070122711 | Optimization Techniques and Algorithms Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7254 | 070122712 | Data Science Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 1 | 0 | 0 | 10 | 15 | 25 |
| Generic Elective Courses Group- IV | | | | | | | | | |
| T7529 | 070122713 | Machine Learning | | 3 | 30 | 45 | 0 | 0 | 75 |
| T7138 | 070122714 | Network Security | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7103 | 070122715 | Natural Language Processing | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Generic Elective Courses Group - V | | | | | | | | | |
| TE7105 | 070122716 | Machine Learning Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| TE7106 | 070122717 | Natural Language Processing Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7506 | 070122718 | Network Security Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total Required Credits | | | | 1 | 0 | 0 | 10 | 15 | 25 |
| Generic Elective Courses Group- VI | | | | | | | | | |
| TE7251 | 070122719 | Computer Graphics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7297 | 070122720 | Software Testing Tools | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7916 | 070122721 | Cloud Computing Tools and Techniques | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |
| Semester : 8 | | | | | | | | | |



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Annexure A

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|-----------------------------|-------------|--------------|----------------|-----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Generic Core Courses | | | | | | | | | |
| T7912 | 070122801 | Internship | | 12 | 0 | 0 | 120 | 180 | 300 |
| T7802 | 070122802 | Seminar | | 2 | 0 | 0 | 50 | 0 | 50 |
| Total | | | | 14 | 0 | 0 | 170 | 180 | 350 |



Celebrating 50 Years of Excellence

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Annexure A

| Semester | Internal Credits | External Credits | Total Credits | Total Marks |
|----------------|------------------|------------------|---------------|-------------|
| Group A | | | | |
| Semester 1 | 3 | 17 | 20 | 500 |
| Semester 2 | 2 | 17 | 19 | 475 |
| Semester 3 | 5 | 19 | 24 | 600 |
| Semester 4 | 6 | 13 | 19 | 475 |
| Semester 5 | 10 | 15 | 25 | 625 |
| Semester 6 | 9 | 16 | 25 | 625 |
| Semester 7 | 5 | 19 | 24 | 600 |
| Semester 8 | 2 | 12 | 14 | 350 |
| Total | 42 | 128 | 170 | 4250 |
| Group B | | | | |
| Semester 1 | 2 | 17 | 19 | 475 |
| Semester 2 | 3 | 17 | 20 | 500 |
| Semester 3 | 5 | 19 | 24 | 600 |
| Semester 4 | 6 | 13 | 19 | 475 |
| Semester 5 | 10 | 15 | 25 | 625 |
| Semester 6 | 9 | 16 | 25 | 625 |
| Semester 7 | 5 | 19 | 24 | 600 |
| Semester 8 | 2 | 12 | 14 | 350 |
| Total | 42 | 128 | 170 | 4250 |



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Annexure B
Optional 'Honours' Specialization

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|------------------------------------|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Semester : 5 | | | | | | | | | |
| Artificial Intelligence and Machine Learning Specialization Core Courses | | | | | | | | | |
| TE7273 | 070122524 | Machine Learning: Classification | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7274 | 070122525 | Machine Learning: Regression | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |
| Semester : 5 | | | | | | | | | |
| Computing Specialization Core Courses | | | | | | | | | |
| T7476 | 070122526 | Cloud Computing | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7250 | 070122527 | Cloud Environment in Public Model | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |
| Semester : 5 | | | | | | | | | |
| Data Science Specialization Core Courses | | | | | | | | | |
| TE7281 | 070122528 | Open Source Tools for Data Science | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7292 | 070122529 | R Programming | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |
| Semester : 5 | | | | | | | | | |
| Game Design and Development Specialization Core Courses | | | | | | | | | |
| TE7267 | 070122530 | Introduction to Game Development | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7285 | 070122531 | Principles of Game Design | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |
| Semester : 5 | | | | | | | | | |
| Internet of Things Specialization Core Courses | | | | | | | | | |
| TE7268 | 070122532 | Introduction to IOT | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7293 | 070122533 | Raspberry Pi and Python | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |
| Semester : 5 | | | | | | | | | |
| Security and Privacy Specialization Core Courses | | | | | | | | | |
| TE7296 | 070122534 | Software Security | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7301 | 070122535 | Usable Security | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |



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Annexure B
Optional 'Honours' Specialization

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|---|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Semester : 6 | | | | | | | | | |
| Artificial Intelligence and Machine Learning Specialization Core Courses | | | | | | | | | |
| TE7266 | 070122634 | Introduction to Deep Learning | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7271 | 070122635 | Machine Learning Clustering and Retrieval | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |
| Semester : 6 | | | | | | | | | |
| Computing Specialization Core Courses | | | | | | | | | |
| TE7246 | 070122636 | Block Chain | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7249 | 070122637 | Cloud Computing Platforms | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |
| Semester : 6 | | | | | | | | | |
| Data Science Specialization Core Courses | | | | | | | | | |
| TE7247 | 070122638 | Business Analytics | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7284 | 070122639 | Power BI | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |
| Semester : 6 | | | | | | | | | |
| Game Design and Development Specialization Core Courses | | | | | | | | | |
| TE7275 | 070122640 | Modern Platforms in Game Development | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7256 | 070122641 | Entrepreneurship in Game Development | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |
| Semester : 6 | | | | | | | | | |
| Internet of Things Specialization Core Courses | | | | | | | | | |
| TE7269 | 070122642 | IOT Security and Privacy | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7295 | 070122643 | Software Defined Networking | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 6 | 60 | 90 | 0 | 0 | 150 |
| Semester : 6 | | | | | | | | | |
| Security and Privacy Specialization Core Courses | | | | | | | | | |
| TE7252 | 070122644 | Cryptography | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7258 | 070122645 | Hardware Security | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 70 | 105 | 0 | 0 | 175 |



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Annexure B
Optional 'Honours' Specialization

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|------------------------|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Semester : 7 | | | | | | | | | |
| Artificial Intelligence and Machine Learning Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Computing Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Data Science Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Game Design and Development Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Internet of Things Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Security and Privacy Specialization Core Courses | | | | | | | | | |
| T7805 | 070122722 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122723 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |



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Annexure B
Optional 'Honours' Specialization

| Semester | Internal Credits | External Credits | Total Credits | Total Marks |
|---|------------------|------------------|---------------|-------------|
| Artificial Intelligence and Machine Learning | | | | |
| Semester 5 | 0 | 6 | 6 | 150 |
| Semester 6 | 0 | 7 | 7 | 175 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Computing | | | | |
| Semester 5 | 0 | 6 | 6 | 150 |
| Semester 6 | 0 | 7 | 7 | 175 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Data Science | | | | |
| Semester 5 | 0 | 7 | 7 | 175 |
| Semester 6 | 0 | 6 | 6 | 150 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Game Design & Development | | | | |
| Semester 5 | 0 | 6 | 6 | 150 |
| Semester 6 | 0 | 7 | 7 | 175 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Internet of Things | | | | |
| Semester 5 | 0 | 7 | 7 | 175 |
| Semester 6 | 0 | 6 | 6 | 150 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Security and Privacy | | | | |
| Semester 5 | 0 | 6 | 6 | 150 |
| Semester 6 | 0 | 7 | 7 | 175 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |



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Annexure C
Optional 'Minor' Specialization

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|--|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Semester : 5 | | | | | | | | | |
| Automobile Engineering with Hybrid and Autonomous Technology Specialization Core Courses | | | | | | | | | |
| TE7355 | 070122536 | Basics of Automotive Engineering | | 3 | 30 | 45 | 0 | 0 | 75 |
| T3276 | 070122537 | Digital Electronics | | 2 | 50 | 0 | 0 | 0 | 50 |
| T7928 | 070122538 | Automotive Engineering Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total | | | | 6 | 80 | 45 | 10 | 15 | 150 |
| Semester : 5 | | | | | | | | | |
| Embedded Systems Specialization Core Courses | | | | | | | | | |
| T7801 | 070122539 | Project Phase- I | | 1 | 0 | 0 | 10 | 15 | 25 |
| T7802 | 070122540 | Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| TE7298 | 070122541 | System Programming | | 4 | 40 | 60 | 0 | 0 | 100 |
| Total | | | | 7 | 40 | 60 | 30 | 45 | 175 |
| Semester : 5 | | | | | | | | | |
| Smart Cities and Urban Analytics Specialization Core Courses | | | | | | | | | |
| TE7220 | 070122542 | Smart Cities : Context Policy and Governance | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7206 | 070122543 | IOT for Smart Cities | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7207 | 070122544 | IOT for Smart Cities Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total | | | | 7 | 60 | 90 | 10 | 15 | 175 |
| Semester : 6 | | | | | | | | | |
| Automobile Engineering with Hybrid and Autonomous Technology Specialization Core Courses | | | | | | | | | |
| TE7669 | 070122646 | Hybrid Technology | | 2 | 20 | 30 | 0 | 0 | 50 |
| F7036 | 070122647 | Autonomous Technology (Self Driven Cars) | | 2 | 50 | 0 | 0 | 0 | 50 |
| TE7435 | 070122648 | Automotive Engine and Transmission System | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 100 | 75 | 0 | 0 | 175 |
| Semester : 6 | | | | | | | | | |
| Embedded Systems Specialization Core Courses | | | | | | | | | |
| T7802 | 070122649 | Specialization Project | | 2 | 0 | 0 | 20 | 30 | 50 |
| TE7325 | 070122650 | Embedded Linux | | 4 | 40 | 60 | 0 | 0 | 100 |
| Total | | | | 6 | 40 | 60 | 20 | 30 | 150 |
| Semester : 6 | | | | | | | | | |



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Annexure C
Optional 'Minor' Specialization

| Catalog Course Code | Course Code | Course Title | Specialization | Credits | Internal Marks | External Mark | Internal Practical Marks | External Practical Marks | Total Marks |
|---|-------------|--|----------------|----------|----------------|---------------|--------------------------|--------------------------|-------------|
| Smart Cities and Urban Analytics | | | | | | | | | |
| Specialization Core Courses | | | | | | | | | |
| T7802 | 070122649 | Specialization Project | | 2 | 0 | 0 | 50 | 0 | 50 |
| T7802 | 070122651 | Specialization Seminar | | 2 | 0 | 0 | 50 | 0 | 50 |
| TE7177 | 070122652 | Application of Sensor Technology to Smart Cities | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total | | | | 7 | 30 | 45 | 100 | 0 | 175 |
| Semester : 7 | | | | | | | | | |
| Automobile Engineering with Hybrid and Autonomous Technology | | | | | | | | | |
| Specialization Core Courses | | | | | | | | | |
| T7805 | 070122724 | Specialization Project | | 5 | 0 | 0 | 50 | 75 | 125 |
| T7802 | 070122725 | Specialization Seminar | | 2 | 0 | 0 | 20 | 30 | 50 |
| Total | | | | 7 | 0 | 0 | 70 | 105 | 175 |
| Semester : 7 | | | | | | | | | |
| Embedded Systems | | | | | | | | | |
| Specialization Core Courses | | | | | | | | | |
| T7802 | 070122726 | Specialization Project | | 2 | 0 | 0 | 20 | 30 | 50 |
| TE7304 | 070122727 | Advanced Microcontrollers and RTOS | | 4 | 40 | 60 | 0 | 0 | 100 |
| TE7305 | 070122728 | Advanced Microcontrollers and RTOS Lab | | 1 | 0 | 0 | 10 | 15 | 25 |
| Total | | | | 7 | 40 | 60 | 30 | 45 | 175 |
| Semester : 7 | | | | | | | | | |
| Smart Cities and Urban Analytics | | | | | | | | | |
| Specialization Core Courses | | | | | | | | | |
| T7803 | 070122729 | Specialization Project | | 3 | 0 | 0 | 30 | 45 | 75 |
| Total | | | | 3 | 0 | 0 | 30 | 45 | 75 |
| Specialization Elective : Smart Cities and Urban Analytics | | | | | | | | | |
| TE7205 | 070122730 | Intelligent Transportation Systems | | 3 | 30 | 45 | 0 | 0 | 75 |
| TE7234 | 070122731 | Urban Hydrology and Hydraulics | | 3 | 30 | 45 | 0 | 0 | 75 |
| Total Required Credits | | | | 3 | 30 | 45 | 0 | 0 | 75 |



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Annexure C
Optional 'Minor' Specialization

| Semester | Internal Credits | External Credits | Total Credits | Total Marks |
|---|------------------|------------------|---------------|-------------|
| Automobile Engineering with Hybrid and Autonomous Technology | | | | |
| Semester 5 | 2 | 4 | 6 | 150 |
| Semester 6 | 2 | 5 | 7 | 175 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 4 | 16 | 20 | 500 |
| Embedded Systems | | | | |
| Semester 5 | 0 | 7 | 7 | 175 |
| Semester 6 | 0 | 6 | 6 | 150 |
| Semester 7 | 0 | 7 | 7 | 175 |
| Total | 0 | 20 | 20 | 500 |
| Smart Cities and Urban Analytics | | | | |
| Semester 5 | 0 | 7 | 7 | 175 |
| Semester 6 | 4 | 3 | 7 | 175 |
| Semester 7 | 0 | 6 | 6 | 150 |
| Total | 4 | 16 | 20 | 500 |