

**B. Tech. (Robotics and Automation) – 2019 Batch  
(Revised Course Components & Curriculum)**

**PROGRAMME STRUCTURE**

| S. No. | Category  | Credits      |
|--------|---|--------------|
| 1      | Humanities and Social Sciences including Management courses   | 12           |
| 2      | Basic Science Courses   | 23           |
| 3      | Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.                          | 24           |
| 4      | Professional Core Courses   | 57           |
| 5      | Project work, seminar and internship +in industry or appropriate work place/ academic and research institutions in India/abroad | 20           |
| 6      | Professional Elective courses relevant to chosen specialization/branch  | 18           |
| 7      | Open subjects – Electives from other technical and /or emerging Courses   | 12           |
| 8      | Mandatory Courses [Environmental Studies, Induction Program Indian Constitution, Value Education, etc.]                         | (non-credit) |
|        | <b>Total</b>  | <b>166</b>   |

**COURSE COMPONENTS**

**Table 1**

| Sl. No. | Course Code | Humanities and Social Sciences- 12 Credits | L:T:P | Credits   |
|---------|-------------|--|-------|-----------|
|         |             | Name of the Course                         |       |           |
| 1       | 18EN1001    | English                                    | 2:0:0 | 2         |
| 2       | 18EN1002    | English Language Lab                       | 0:0:2 | 1         |
| 3       | 18MS2001    | Professional Ethics                        | 3:0:0 | 3         |
| 4       | 18MS2002    | Industrial Management                      | 3:0:0 | 3         |
| 5       | 18MS2012    | Engineering Economics                      | 3:0:0 | 3         |
|         |             | <b>Total Credits</b>                       |       | <b>12</b> |

**Table 2**

| Sl. No. | Course Code | Basic Sciences – 26 credits   | L:T:P | Credits   |
|---------|-------------|---|-------|-----------|
|         |             | Name of the Course  |       |           |
| 1.      | 19MA1013    | Multivariable Calculus and Differential Equations   | 3:1:0 | 4         |
| 2.      | 19MA1014    | Matrices, Transforms and Numerical Methods  | 3:1:0 | 4         |
| 3.      | 19MA2011    | Probability, Random Variables and Statistics  | 3:1:0 | 4         |
| 4.      | 19PH1012    | Engineering Physics - Properties of Matter, Mechanics, Lasers and Fiber Optics            | 3:0:0 | 3         |
| 5.      | 19CH1008    | Applied Chemistry for Instrumentation Engineering   | 3:0:0 | 3         |
| 6.      | 19CH1007    | Applied Chemistry Laboratory  | 0:0:2 | 1         |
| 7.      | 19PH1013    | Engineering Physics - Properties of Matter, Mechanics, Lasers and Fiber Optics Laboratory | 0:0:2 | 1         |
| 8.      | 19RO1001    | Material Science  | 3:0:0 | 3         |
|         |             | <b>Total Credits</b>  |       | <b>23</b> |

**Table 3**

| Sl. No. | Course Code | Engineering Sciences & Technical Arts – 25 credits | L:T:P | Credits |
|---------|-------------|--|-------|---------|
|         |             | Name of the Course                                 |       |         |
| 1.      | 18RO2002    | Introduction to Mechanical Systems                 | 3:0:0 | 3       |

|                      |          |  |       |           |
|----------------------|----------|--|-------|-----------|
| 2.                   | 18ME1002 | Engineering Graphics (AutoCAD)             | 0:0:2 | 1         |
| 3.                   | 19RO1002 | Engineering Practices                      | 1:0:3 | 2.5       |
| 4.                   | 18CS1004 | Programming for Problem Solving            | 3:0:0 | 3         |
| 5.                   | 18CS1002 | Programming for Problem Solving Laboratory | 0:0:3 | 1.5       |
| 6.                   | 18EC2032 | Electron Devices and Circuits              | 3:0:0 | 3         |
| 7.                   | 18EC2034 | Digital Electronics and Microprocessors    | 3:0:0 | 3         |
| 8.                   | 19RO2019 | Python Programming for Robotics            | 2:0:2 | 3         |
| 9.                   | 18EE2001 | Electrical Circuit Analysis                | 3:1:0 | 4         |
| <b>Total Credits</b> |          |  |       | <b>24</b> |

**Table 4**

| Sl.No                | Course Code | Program Core – 51 credits                          |  | L:T:P | Credits   |
|----------------------|-------------|--|--|-------|-----------|
|                      |             | Name of the Course                                 |  |       |           |
| 1.                   | 19RO2001    | Theory and Programming of CNC Machines             |  | 3:0:0 | 3         |
| 2.                   | 18EE2021    | Electrical Machines and Power Systems              |  | 3:0:0 | 3         |
| 3.                   | 18ME2032    | Mechanics of Solids                                |  | 3:0:0 | 3         |
| 4.                   | 18RO2003    | Automatic Control Systems                          |  | 3:1:0 | 4         |
| 5.                   | 18EC2033    | Electron Devices and Circuits Laboratory           |  | 0:0:2 | 1         |
| 6.                   | 18RO2004    | Electrical Machines and Control Systems Laboratory |  | 0:0:2 | 1         |
| 7.                   | 18RO2005    | Sensor Signal Conditioning Circuits                |  | 3:0:0 | 3         |
| 8.                   | 18RO2006    | Sensors and Protocols for Instrumentation          |  | 3:0:0 | 3         |
| 9.                   | 18ME2031    | Kinematics and Dynamics of Machinery               |  | 3:0:0 | 3         |
| 10.                  | 18ME2028    | Hydraulics and Pneumatics                          |  | 3:0:0 | 3         |
| 11.                  | 18ME2029    | Hydraulics and Pneumatics Laboratory               |  | 0:0:2 | 1         |
| 12.                  | 18RO2007    | Sensor Signal Conditioning Circuits Laboratory     |  | 0:0:2 | 1         |
| 13.                  | 18RO2008    | Robot Kinematics and Dynamics                      |  | 3:0:0 | 3         |
| 14.                  | 18ME2030    | Mechanics and Engineering Design Laboratory        |  | 0:0:2 | 1         |
| 15.                  | 19RO2016    | Microcontrollers for Robotics                      |  | 3:0:0 | 3         |
| 16.                  | 19RO2017    | Microcontrollers Laboratory for Robotics           |  | 0:0:2 | 1         |
| 17.                  | 18RO2009    | Vision Systems                                     |  | 3:0:0 | 3         |
| 18.                  | 18RO2010    | Programmable Logic Controllers                     |  | 3:0:0 | 3         |
| 19.                  | 18RO2011    | Automation System Design                           |  | 3:0:0 | 3         |
| 20.                  | 18RO2012    | PLC and Robotics Laboratory                        |  | 0:0:2 | 1         |
| 21.                  | 18RO2013    | Totally Integrated Automation                      |  | 3:0:0 | 3         |
| 22.                  | 18RO2014    | Totally Integrated Automation Laboratory           |  | 0:0:2 | 1         |
| 23.                  | 18RO2015    | Field and Service Robotics                         |  | 3:0:0 | 3         |
| 24.                  | 19RO2012    | Artificial Intelligence in Robotics                |  | 3:0:0 | 3         |
| <b>Total Credits</b> |             |  |  |       | <b>57</b> |

**Table 5**

| Sl.No                | Course Code        | Project                          |  | Credits   |
|----------------------|--------------------|----------------------------------|--|-----------|
|                      |                    | Name of the Course               |  |           |
| 1                    | 19RO2998           | Project –Phase I                 |  | 0:0:4: 2  |
| 2                    | 19RO2999           | Project –Phase II                |  | 0:0:32:16 |
| 3                    | MP2911/<br>SIP2911 | Mini Project / Summer Internship |  | 2         |
| <b>Total Credits</b> |                    |                                  |  | <b>20</b> |

**LIST OF PROFESSIONAL ELECTIVES  
B. Tech (Robotics and Automation) – 2019**

| S. No. | Course Code | Course Title                | Credits |
|--------|-------------|-----------------------------|---------|
| 1      | 19RO2002    | Autonomous Vehicles         | 3:0:0   |
| 2      | 19RO2003    | Automotive Embedded Systems | 3:0:0   |

|    |          |   |       |
|----|----------|---|-------|
| 3  | 19RO2004 | Robotic Control System                            | 3:0:0 |
| 4  | 19RO2005 | Industrial Robotics and Material Handling Systems | 3:0:0 |
| 5  | 19RO2006 | Micro Robotics                                    | 3:0:0 |
| 6  | 19RO2007 | Cognitive Robotics                                | 3:0:0 |
| 7  | 19RO2008 | Cloud Robotics                                    | 3:0:0 |
| 8  | 19RO2009 | Medical Robotics                                  | 3:0:0 |
| 9  | 19RO2010 | Machine Learning for Robotics                     | 3:0:0 |
| 10 | 19RO2011 | Robot Operating Systems                           | 3:0:0 |
| 11 | 19RO2013 | Industrial Energy Management System               | 3:0:0 |
| 12 | 19RO2014 | Robotics and Automation in Food Industry          | 3:0:0 |
| 13 | 19RO2015 | Neural Networks and Fuzzy Systems                 | 3:0:0 |
| 14 | 18BM2014 | Real Time Embedded Systems                        | 3:0:0 |

#### LIST OF PROFESSIONAL ELECTIVES

| S. No. | Course Code | Course Title                                      | Credits |
|--------|-------------|---|---------|
| 1      | 19RO2001    | Theory and Programming of CNC Machines            | 3:0:0   |
| 2      | 19RO2002    | Autonomous Vehicles                               | 3:0:0   |
| 3      | 19RO2003    | Automotive Embedded Systems                       | 3:0:0   |
| 4      | 19RO2004    | Robotic Control System                            | 3:0:0   |
| 5      | 19RO2005    | Industrial Robotics and Material Handling Systems | 3:0:0   |
| 6      | 19RO2006    | Micro Robotics                                    | 3:0:0   |
| 7      | 19RO2007    | Cognitive Robotics                                | 3:0:0   |
| 8      | 19RO2008    | Cloud Robotics                                    | 3:0:0   |
| 9      | 19RO2009    | Medical Robotics                                  | 3:0:0   |
| 10     | 19RO2010    | Machine Learning for Robotics                     | 3:0:0   |
| 11     | 19RO2011    | Robot Operating Systems                           | 3:0:0   |
| 12     | 19RO2012    | Artificial Intelligence in Robotics               | 3:0:0   |
| 13     | 19RO2013    | Industrial Energy Management System               | 3:0:0   |
| 14     | 19RO2014    | Robotics and Automation in Food Industry          | 3:0:0   |
| 15     | 19RO2015    | Neural Networks and Fuzzy Systems                 | 3:0:0   |

#### List of Additional Elective Courses for B. Tech Robotics and Automation – 2018 & 2019 Batch

| S. No. | Code     | Course   | Credits |
|--------|----------|--|---------|
| 1.     | 19RO2018 | Industrial Internet of Things                  | 3:0:0   |
| 2.     | 19RO2019 | Python Programming for Robotics                | 2:0:2   |
| 3.     | 19RO2020 | Data Analytics for Robotics and Automation     | 3:0:0   |
| 4.     | 19RO2021 | Augmented Reality/Virtual Reality for Robotics | 3:0:0   |

#### SEMESTERWISE CURRICULUM

##### Semester I (First year]

| Sl.No | Course Code | Name of the Course  | Hours per week |   |   | Total Credits |
|-------|-------------|---|----------------|---|---|---------------|
|       |             |   | L              | T | P |               |
| 1     | 19MA1013    | Multivariable Calculus and Differential Equations   | 3              | 1 | 0 | 4             |
| 2     | 19PH1012    | Engineering Physics - Properties of Matter, Mechanics, Lasers and Fiber Optics            | 3              | 0 | 0 | 3             |
| 3     | 19PH1013    | Engineering Physics - Properties of Matter, Mechanics, Lasers and Fiber Optics Laboratory | 0              | 0 | 2 | 1             |
| 4     | 18CS1004    | Programming for Problem Solving   | 3              | 0 | 0 | 3             |
| 5     | 18CS1002    | Programming for Problem Solving Laboratory  | 0              | 0 | 3 | 1.5           |
| 6     | 18ME1002    | Engineering Graphics (AutoCAD)  | 0              | 0 | 2 | 1             |

|   |  |                      |  |  |  |             |
|---|--|----------------------|--|--|--|-------------|
| 7 |  | Mandatory Course I   |  |  |  | 0           |
|   |  | <b>Total Credits</b> |  |  |  | <b>13.5</b> |

**Semester II (First year]**

| Sl.No | Course Code | Name of the Course                                | Hours per week |   |   | Total Credits |
|-------|-------------|---|----------------|---|---|---------------|
|       |             |   | L              | T | P |               |
| 1     | 18EN1001    | English   | 2              | 0 | 0 | 2             |
| 2     | 18EN1002    | English Language Laboratory                       | 0              | 0 | 2 | 1             |
| 3     | 19MA1014    | Matrices, Transforms and Numerical Methods        | 3              | 1 | 0 | 4             |
| 4     | 19CH1008    | Applied Chemistry for Instrumentation Engineering | 3              | 0 | 0 | 3             |
| 5     | 19CH1007    | Applied Chemistry Laboratory                      | 0              | 0 | 2 | 1             |
| 6     | 19RO1002    | Engineering Practices                             | 1              | 0 | 3 | 2.5           |
| 7     | 18RO2002    | Introduction to Mechanical Systems                | 3              | 0 | 0 | 3             |
| 8     | 19RO1001    | Material Science                                  | 3              | 0 | 0 | 3             |
| 9     |             | Mandatory Course II                               |                |   |   | 0             |
|       |             | <b>Total Credits</b>                              |                |   |   | <b>19.5</b>   |

**Semester III (Second year]**

| Sl.No | Course Code | Name of the Course                           | Hours per week |   |   | Total Credits |
|-------|-------------|--|----------------|---|---|---------------|
|       |             |  | L              | T | P |               |
| 1     | 19MA2011    | Probability, Random Variables and Statistics | 3              | 1 | 0 | 4             |
| 2     | 18EE2001    | Electric Circuit Analysis                    | 3              | 1 | 0 | 4             |
| 3     | 18RO2003    | Automatic Control Systems                    | 3              | 1 | 0 | 4             |
| 4     | 18EC2032    | Electron Devices and Circuits                | 3              | 0 | 0 | 3             |
| 5     | 18EE2021    | Electric Machines and Power Systems          | 3              | 0 | 0 | 3             |
| 6     | 18EC2034    | Digital Electronics and Microprocessors      | 3              | 0 | 0 | 3             |
| 7     | 18EC2033    | Electron Devices and Circuits Laboratory     | 0              | 0 | 2 | 1             |
| 8     | 18ME2032    | Mechanics of Solids                          | 3              | 0 | 0 | 3             |
| 9     |             | Soft Skills (Mandatory)                      | 0              | 0 | 0 | 0             |
| 10    |             | Mandatory Course III                         |                |   |   | 0             |
|       |             | <b>Total Credits</b>                         |                |   |   | <b>25</b>     |

**Semester IV (Second year]**

| Sl.No | Course Code | Name of the Course                                 | Hours per week |   |   | Total Credits |
|-------|-------------|--|----------------|---|---|---------------|
|       |             |  | L              | T | P |               |
| 1     | 18RO2005    | Sensor Signal Conditioning Circuits                | 3              | 0 | 0 | 3             |
| 2     | 18ME2031    | Kinematics and Dynamics of Machinery               | 3              | 0 | 0 | 3             |
| 3     | 18RO2006    | Sensors and Protocols for Instrumentation          | 3              | 0 | 0 | 3             |
| 4     | 18RO2008    | Robot Kinematics and Dynamics                      | 3              | 0 | 0 | 3             |
| 5     | 18RO2004    | Electrical Machines and Control Systems Laboratory | 0              | 0 | 2 | 1             |
|       |             | Open Elective 1                                    | 3              | 0 | 0 | 3             |

|    |                    |  |   |   |   |           |
|----|--------------------|--|---|---|---|-----------|
| 6  | 18ME2030           | Mechanics and Engineering Design Laboratory    | 0 | 0 | 2 | 1         |
| 7  | 18RO2007           | Sensor Signal Conditioning Circuits Laboratory | 0 | 0 | 2 | 1         |
| 8  | 19RO2019           | Python Programming for Robotics                | 2 | 0 | 2 | 3         |
| 9  | MP2911/<br>SIP2911 | Mini Project / Summer Internship               | 0 | 0 | 4 | 2         |
| 10 |                    | Mandatory Course IV                            |   |   |   | 0         |
|    |                    | <b>Total Credits</b>                           |   |   |   | <b>23</b> |

#### Semester V (Third year)

| Sl.No | Course Code | Name of the Course                       | Hours per week |   |   | Total Credits |
|-------|-------------|--|----------------|---|---|---------------|
|       |             |  | L              | T | P |               |
| 1     | 19RO2001    | Theory and Programming of CNC Machines   | 3              | 0 | 0 | 3             |
| 2     | 18ME2028    | Hydraulics and Pneumatics                | 3              | 0 | 0 | 3             |
| 3     | 19RO2016    | Microcontrollers for Robotics            | 3              | 0 | 0 | 3             |
| 4     | 18RO2010    | Programmable Logic Controllers           | 3              | 0 | 0 | 3             |
| 5     | 18RO2011    | Automation System Design                 | 3              | 0 | 0 | 3             |
| 6     |             | Professional Elective 1                  | 3              | 0 | 0 | 3             |
| 7     | 18MS20002   | Industrial Management                    | 3              | 0 | 0 | 3             |
| 8     | 19RO2017    | Microcontrollers Laboratory for Robotics | 0              | 0 | 2 | 1             |
| 9     | 18ME2029    | Hydraulics and Pneumatics Laboratory     | 0              | 0 | 2 | 1             |
| 10    |             | Mandatory Course V                       |                |   |   | 0             |
|       |             | <b>Total Credits</b>                     |                |   |   | <b>23</b>     |

#### Semester VI (Third year]

| Sl.No | Course Code | Name of the Course                       | Hours per week |   |   | Total Credits |
|-------|-------------|--|----------------|---|---|---------------|
|       |             |  | L              | T | P |               |
| 1     | 18RO2009    | Vision Systems                           | 3              | 0 | 0 | 3             |
| 2     | 18RO2013    | Totally Integrated Automation            | 3              | 0 | 0 | 3             |
| 3     | 18RO2015    | Field and Service Robotics               | 3              | 0 | 0 | 3             |
| 4     |             | Professional Elective 2                  | 3              | 0 | 0 | 3             |
| 6     |             | Open Elective 2                          | 3              | 0 | 0 | 3             |
| 7     | 18RO2012    | PLC and Robotics Laboratory              | 0              | 0 | 2 | 1             |
| 8     | 18RO2014    | Totally Integrated Automation Laboratory | 0              | 0 | 2 | 1             |
| 9     | 18MS2001    | Professional Ethics                      | 3              | 0 | 0 | 3             |
| 10    |             | General Aptitude (Mandatory)             | 0              | 0 | 0 | 0             |
| 11    |             | Mandatory Course VI                      |                |   |   | 0             |
|       |             | <b>Total Credits</b>                     |                |   |   | <b>20</b>     |

#### Semester VII (Fourth year]

| Sl.No | Course Code | Name of the Course                  | Hours per week |   |   | Total Credits |
|-------|-------------|-------------------------------------|----------------|---|---|---------------|
|       |             |                                     | L              | T | P |               |
| 1     | 19RO2012    | Artificial Intelligence in Robotics | 3              | 0 | 0 | 3             |
| 2     |             | Professional Elective – 3           | 3              | 0 | 0 | 3             |

|   |          |                           |   |   |   |           |
|---|----------|---------------------------|---|---|---|-----------|
|   |          | Professional Elective – 4 | 3 | 0 | 0 | 3         |
| 3 |          | Professional Elective – 5 | 3 | 0 | 0 | 3         |
| 4 |          | Open Elective 3           | 3 | 0 | 0 | 3         |
| 5 |          | Open Elective 4           | 3 | 0 | 0 | 3         |
| 6 | 19RO2998 | Project – Phase I         | 0 | 0 | 4 | 2         |
| 7 | 18MS2012 | Engineering Economics     | 3 | 0 | 0 | 3         |
|   |          | <b>Total Credits</b>      |   |   |   | <b>23</b> |

**Semester VIII (Fourth year]**

| Sl.No | Course Code | Name of the Course        | Hours per week |   |    | Total Credits |
|-------|-------------|---------------------------|----------------|---|----|---------------|
|       |             |                           | L              | T | P  |               |
| 1     |             | Professional Elective – 6 | 3              | 0 | 0  | 3             |
| 4     | 19RO2999    | Project – Phase II        | 0              | 0 | 32 | 16            |
| 5     |             | <b>Total Credits</b>      |                |   |    | <b>19</b>     |