Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

Syllabus for B. Tech in Robotics

(Applicable from the academic session 2020-2021)

Curriculum Structure

| | | First | Year First Semester | | | | |
|---------------------------------|---|-----------------|---|-------------------------------|------|----|---------|
| | Mand | atory Indu | ction Program- 3 weeks dur | ation | | | |
| Sl No. | Category | Subject Code | Subject Name | Total Number of | | | Credits |
| | | | | L | T | P | |
| Theory | | | | | | | |
| 1 | Basic Science course | BS-PH101 | Physics-I | 3 | 1 | 0 | 4 |
| 2 | Basic Science course | BS-M102 | Mathematics –IB | 3 | 1 | 0 | 4 |
| 3 | Engineering Science Courses | ES-EE101 | Basic Electrical Engineering | 3 | 1 | 0 | 4 |
| | | Total Ti | heory | 9 | 3 | 0 | 12 |
| Practica | 1 | | | | | | |
| 1 | Basic Science course | BS-PH191 | Physics-I Laboratory | 0 | 0 | 3 | 1.5 |
| 2 | Engineering Science Courses | ES-EE191 | Basic Electrical Engineering Laboratory | 0 | 0 | 2 | 1 |
| 3 | Engineering Science Courses | ES-ME192 | Workshop/ Manufacturing Practices | 1 | 0 | 4 | 3 |
| | | Total Pro | actical | 1 | 0 | 9 | 5.5 |
| | | | Total of First Semester | 10 | 3 | 9 | 17.5 |
| | | First ' | Year Second Semester | | | | |
| Sl No. Category Subject Subject | | | Subject Name | Total Number of contact hours | | | Credits |
| | | Code | | L | T | P | 1 |
| Theory | | 1 | | | | | 1 |
| 1 | Basic Science course | BS-CH201 | Chemistry-I (Gr-A) | 3 | 1 | 0 | 4 |
| 2 | Basic Science course | BS-M202 | Mathematics –IIB | 3 | 1 | 0 | 4 |
| 3 | Engineering Science Courses | ES-CS201 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4 | Humanities and Social Sciences including Management courses | HM-HU201 | English | 2 | 0 | 0 | 2 |
| | | Total Ti | heory | 11 | 2 | 0 | 13 |
| Practica | l | | | | ı | ı | 1 |
| 1 | Basic Science course | BS-CH291 | Chemistry-I Laboratory | 0 | 0 | 3 | 1.5 |
| 2 | Engineering Science Courses | ES-CS291 | Programming for Problem Solving | 0 | 0 | 4 | 2 |
| 3 | Engineering Science Courses | ES-ME291 | Engineering Graphics & Design (Gr-A) | 1 | 0 | 4 | 3 |
| 4 | Humanities and Social Sciences including Management courses | HM-HU291 | Language Laboratory | 0 | 0 | 2 | 1 |
| | | Total Pro | nctical | 1 | 0 | 13 | 7.5 |
| | | 12 | 2 | 13 | 20.5 | | |

Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

Syllabus for B. Tech in Robotics

| No. Category Subject Code | | | Secoi | nd Year Third Semester | | | | |
|---|----------|---------------------------|-------------------|--|----|---|---------|---------|
| Theory | SI No | Category | 5 dbject i tallie | | | | Credits | |
| Basic Science course BS-M301 Numerical Methods & Optimization 3 | 51. 110. | | | , and the second | L | T | P | |
| Basic Science course BS-BIO301 Biology | Theory | | | | | ı | | |
| Second Courses ES-ROB301 Thermodynamics 3 0 0 3 | 1 | Basic Science course | BS-M301 | | 3 | 1 | 0 | 4 |
| Science Courses ES-ME301 Engineering Mechanics 3 0 0 3 | 2 | | BS-BIO301 | Biology | 3 | 0 | 0 | 3 |
| Science Courses | 3 | Science Courses | ES-ROB301 | Thermodynamics | 3 | 0 | 0 | 3 |
| Second Vear Fourth Semester Subject Code Subject Name Subject Name Science Courses PC-ROB 401 Fluid Power & Control Science Courses PC-ROB 401 Fluid Power & Control Science Courses PC-ROB 401 Fluid Power & Control Science Courses PC-ROB 402 Strength of Materials Science Courses PC-ROB 402 Strength of Materials Science Courses PC-ROB 402 Strength of Materials Science Courses PC-ROB 401 Fluid Power & Control Science Courses PC-ROB 402 Strength of Materials Science Courses PC-ROB 401 Fluid Power & Control Science Courses PC-ROB 402 Strength of Materials Science PC-ROB 402 Strength of Materials Science Science PC-ROB 402 Science PC-ROB 402 | 4 | Science Courses | ES-ME301 | Engineering Mechanics | 3 | 1 | 0 | 4 |
| Core courses PC-ROB302 Manufacturing Processes 4 0 0 3 20 | 5 | Core courses | PC-ROB301 | Analog & Digital Electronics | 3 | 1 | 0 | 3 |
| Professional Core courses | 6 | | PC-ROB302 | Manufacturing Processes | 4 | 0 | 0 | 3 |
| Professional Core courses | | | Total T | Theory | 19 | 3 | 0 | 20 |
| Core courses | Practica | | | | | | | |
| Core Courses PC-ROB392 Processes PC-ROB393 Machine Drawing Lab - | 1 | | PC-ROB391 | Analog & Digital Electronics Lab | 0 | 0 | 3 | 1.5 |
| Core courses | 2 | Core Courses | PC-ROB392 | | 0 | 0 | 3 | 1 |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | 3 | | | | 0 | 0 | 3 | 1.5 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | Total P | ractical | 0 | 0 | 9 | 4 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | Total of Third Semester | 19 | 3 | 9 | 24 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | | | | | |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | Secon | d Year Fourth Semester | | | | |
| Code L T P P | Sl. No. | Category | | Subject Name | 1 | | | Credits |
| Engineering Science Courses ES-ROB401 Materials Engineering 3 0 0 3 | | | | | | | | |
| Science Courses ES-ROB401 Materials Engineering 3 0 0 3 | Theory | | | | Г | , | | |
| 2 Core courses PC-ROB 401 Fluid Power & Control 3 1 0 4 3 Professional Core courses PC-ROB 402 Strength of Materials 3 1 0 4 4 Professional Core courses PC-EE 403 Electrical & Electronics Measurements 3 1 0 3 5 Professional Core courses PC-EE 401 Electric Machines 3 1 0 3 1 Professional Core courses PC-ROB491 Robotics Laboratory I (Strength of Materials) 0 0 3 1.5 2 Mandatory courses MC 481 Environmental Science 0 0 2 0 3 Professional Core courses PC-EE 491 Electric Machines Laboratory 0 0 2 1 4 Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE 493 Electrical & Electronics Measurements lab 0 0 0 </td <td>1</td> <td>Science Courses</td> <td>ES-ROB401</td> <td>Materials Engineering</td> <td>3</td> <td>0</td> <td>0</td> <td>3</td> | 1 | Science Courses | ES-ROB401 | Materials Engineering | 3 | 0 | 0 | 3 |
| Core courses PC-ROB 402 Strength of Materials 3 | 2 | Core courses | PC-ROB 401 | Fluid Power & Control | 3 | 1 | 0 | 4 |
| 4 Core courses PC-EE 403 Measurements 3 1 0 3 5 Professional Core courses PC-EE401 Electric Machines 3 1 0 3 Total Theory 15 4 0 17 Practical/Sessional 1 Professional Core courses PC-ROB491 Robotics Laboratory I (Strength of Materials) 0 0 3 1.5 2 Mandatory courses MC 481 Environmental Science 0 0 2 0 3 Professional Core courses PC-EE491 Electric Machines Laboratory II (Fluid Power & Control) 0 0 2 1 4 Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 Total Practical 0 0 12 5 | 3 | | PC-ROB 402 | Strength of Materials | 3 | 1 | 0 | 4 |
| 5 Core courses PC-EE401 Electric Machines 3 1 0 3 Total Theory 15 4 0 17 Practical/Sessional 1 Professional PC-ROB491 Robotics Laboratory I 0 0 3 1.5 2 Mandatory courses MC 481 Environmental Science 0 0 2 0 3 Professional Core courses PC-EE491 Electric Machines Laboratory 0 0 2 1 4 Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 5 Total Practical 0 0 12 5 | 4 | | PC-EE 403 | | 3 | 1 | 0 | 3 |
| Practical/Sessional 1 Professional Core courses PC-ROB491 Robotics Laboratory I (Strength of Materials) 0 0 3 1.5 2 Mandatory courses MC 481 Environmental Science 0 0 2 0 3 Professional Core courses PC-EE491 Electric Machines Laboratory 0 0 2 1 4 Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 5 Total Practical 0 0 12 5 | 5 | | PC-EE401 | Electric Machines | 3 | 1 | 0 | 3 |
| 1Professional Core coursesPC-ROB491Robotics Laboratory I (Strength of Materials)0031.52Mandatory coursesMC 481Environmental Science00203Professional Core coursesPC-EE491Electric Machines Laboratory00214Professional Core coursesPC-ROB492Robotics Laboratory II (Fluid Power & Control)0031.55Professional Core coursesPC-EE493Electrical & Electronics Measurements lab0021Total Practical00125 | | | Total T | Theory | 15 | 4 | 0 | 17 |
| 1 Core courses PC-ROB491 (Strength of Materials) 0 0 3 1.5 2 Mandatory courses MC 481 Environmental Science 0 0 2 0 3 Professional Core courses PC-EE491 Electric Machines Laboratory 0 0 2 1 4 Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 Total Practical 0 0 12 5 | Practica | | | | | | | |
| Professional Core courses PC-EE491 Electric Machines Laboratory Professional Core courses PC-ROB492 Robotics Laboratory II (Fluid Power & Control) Professional Core courses PC-ROB492 Electrical & Electronics Measurements lab PC-EE493 Total Practical Total Practical O 0 2 1 O 0 3 1.5 | 1 | | | (Strength of Materials) | 0 | 0 | 3 | 1.5 |
| PC-EE491 Electric Machines Laboratory 0 0 2 1 Professional Core courses PC-EE492 Robotics Laboratory II (Fluid Power & Control) 0 0 3 1.5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 Total Practical 0 0 0 12 5 | 2 | - | MC 481 | Environmental Science | 0 | 0 | 2 | 0 |
| 4 Core courses PC-ROB492 (Fluid Power & Control) 0 0 3 1.5 5 Professional Core courses PC-EE493 Electrical & Electronics Measurements lab 0 0 2 1 Total Practical 0 0 12 5 | 3 | courses | PC-EE491 | • | 0 | 0 | 2 | 1 |
| Core courses PC-EE493 Measurements lab 0 0 2 1 Total Practical 0 0 12 5 | | Professional | | Robotics Laboratory II | | | | 1.5 |
| | 4 | Core courses | PC-ROB492 | | U | U | 3 | 1.3 |
| Total of Fourth Semester 15 4 12 22 | | Core courses Professional | | Electrical & Electronics | | | | |
| | | Core courses Professional | PC-EE493 | Electrical & Electronics Measurements lab | 0 | 0 | 2 | 1 |

Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly West Bengal University of Technology)

Syllabus for B. Tech in Robotics

| | | Thir | d Year Fifth Semester | | | | | |
|-----------|---|-----------------|---|-----|---------------------|-----|---------|--|
| SI No. | Category | Subject Code | Subject Name | col | ıl Numb ntact ho | urs | Credits | |
| | | Code | | L | T | P | | |
| Theory | D C : 1C | Т | | | 1 | 1 | 1 | |
| 1 | Professional Core courses | PC-ROB501 | Design of Machine Elements | 3 | 1 | 0 | 3 | |
| 2 | Professional Core courses | PC-EE501 | Power Electronics | 3 | 1 | 0 | 3 | |
| 3 | Professional Core courses | PC-ROB502 | Kinematics & Theory of Machines | 3 | 1 | 0 | 3 | |
| 4 | Humanities and Social Sciences including Management courses | HM-HU501 | Humanities I | 3 | 0 | 0 | 2 | |
| 5 | Professional Core courses | PC-EC501 | Microprocessor & Microcontrollers | 3 | 1 | 0 | 3 | |
| 6 | Mandatory courses | MC501 | Essence of Indian Knowledge Tradition | 2 | - | - | 0 | |
| | | Total Th | neory | 17 | 4 | 0 | 14 | |
| Practical | / Sessional | | | | | | | |
| 1 | Professional Core courses | PC-ROB591 | Robotics Laboratory III- Practice of Manufacturing Processes and Systems Laboratory | 0 | 0 | 3 | 1.5 | |
| 2 | Professional Core courses | PC-ROB592 | Machine Drawing II | 0 | 0 | 3 | 1.5 | |
| 3 | Professional Core courses | PC-ROB593 | Microprocessor & Microcontrollers Lab | 0 | 0 | 3 | 1 | |
| 4 | Professional Core courses | PC-EE591 | Power Electronics Laboratory | 0 | 0 | 2 | 1 | |
| 5 | Project (Summer internship) | PW-ROB581 | Project-I (30 hrs. Total) | 0 | 0 | 2 | 1 | |
| | | Total Pra | uctical | 0 | 0 | 13 | 6 | |
| | | | Total of Fifth Semester | 17 | 4 | 13 | 20 | |
| | | Third | d Year Sixth Semester | | | | | |
| Sl.No. | Category | Subject | Subject Name | | ıl Numb ntact ho | | Credits | |
| 51.110. | | Code | | L | T | P | | |
| Theory | | | | | | | | |
| 1 | Professional Core courses | PC-CS601 | Artificial Intelligence & Machine Learning | 4 | 0 | 2 | 3 | |
| 2 | Professional Core courses | PC-ROB602 | Computer Vision | 3 | 1 | 0 | 3 | |
| 3 | Professional Elective courses | PE-ROB601 | Elective-I/ Mechatronic Systems/Digital Signal Processing /Human Computer Interaction/ Pattern Recognition | 3 | 0 | 0 | 3 | |
| 4 | Professional Elective courses | PE-ROB602 | Elective-II/ Bio-Medical Electronics/ Material Handling/ 3D Printing and Design/ CAD/CAM | 3 | 0 | 0 | 3 | |

Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly West Bengal University of Technology) Syllabus for B. Tech in Robotics

| 5 | Humanities and Social Sciences including Management courses | HM-HU601 | Humanities II (OR) | 3 | 0 | 0 | 3 |
|---|--|------------|---|---|----|---|---|
| 6 | Mandatory courses | MC601 | Constitution of India | 2 | - | - | 0 |
| | | 18 | 1 | 0 | 15 | | |
| | | | Practical/ Sessional | | | | |
| 1 | Professional Core courses | PC-ROB691 | Computer Vision Lab | 0 | 0 | 3 | 1 |
| 2 | Professional Core courses | PC- CS691 | Artificial Intelligence & Machine Learning Laboratory | 0 | 0 | 2 | 1 |
| 3 | Project (Summer internship) | PW- ROB681 | Project-II (90 hrs. Total) | 0 | 0 | 4 | 2 |
| | Total Practical | | | | 0 | 9 | 4 |
| | | 18 | 1 | 9 | 19 | | |

Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly West Bengal University of Technology)

Syllabus for B. Tech in Robotics

| | | Fourth ` | Year Seventh Semester | | | | | |
|----------|--|-----------------|--|-------------------------------|----------|-----------|---------|--|
| Sl No. | Category | Subject Code | Subject Name | Total Number of contact hours | | | Credits | |
| | | Code | | L | T | P | | |
| Theory | Dun formi and Com | | | | | | | |
| 1 | Professional Core courses | PC- ROB701 | Automation in Manufacturing | 3 | 0 | 0 | 3 | |
| 2 | Professional Core courses | PC-ROB702 | Embedded System | 3 | 0 | 0 | 3 | |
| 3 | Professional Elective courses | PE- ROB701 | Elective-III/ Speech and Natural Language Processing/ Neural Network and Fuzzy Logic Control/Wireless Sensor Networks/Industrial Automation & Control | 3 | 0 | 0 | 3 | |
| 4 | Open Elective courses | OE-ROB 701 | Open Elective- I/ Industrial Pollution and Control / Entrepreneurship/ Object Oriented Programming/ Cyber Law & Intellectual Property Rights | 3 | 0 | 0 | 3 | |
| 5 | Humanities and Social Sciences including Management courses | HM-HU701 | Economics for Engineers | 2 | 0 | 0 | 2 | |
| | | Total Theo | ory | 14 | 0 | 0 | 14 | |
| Practica | al/ Sessional | I | | | | T T | | |
| 1 | Professional Core courses | PE- ROB791 | Robotics laboratory IV- (Advanced Manufacturing Techniques) | 0 | 0 | 3 | 1.5 | |
| 2 | Project | PW- ROB781 | Project-III | 0 | 0 | 6 | 3 | |
| | | Total Pract | | 0 | 0 | 9 | 4.5 | |
| | | D 41 | Total of Seventh Semester | 14 | 0 | 9 | 18.5 | |
| | | Fourth | Year Eighth Semester | | | | 1 | |
| Sl No. | Cotogomy | Subject | Subject Name | | tal Num | | Credits | |
| | Category | Code | Subject Name | L | ontact h | ours P | Credits | |
| Theory | <u> </u> | | | L | | | | |
| 1 | Professional Elective courses | PE- ROB801 | Elective IV/ Multi-agent Intelligent Systems/Internet of Things(IoT)/ Cloud Computing | 3 | 0 | 0 | 3 | |
| 2 | Professional Elective courses | PE- ROB802 | Elective V/ Mobile Communication and Networks/ Antennas and Propagation/ Fiber Optic Communication | 3 | 0 | 0 | 3 | |
| 3 | Open Elective courses | OE- ROB801 | Open Elective-II/ Big Data Analysis/Robotics/ Web Technology | 3 | 0 | 0 | 3 | |
| 4 | Open Elective courses | OE- ROB802 | Open Elective- III/ Micro- Electronics and VLSI Design/ Microwave Integrated Circuits/ Nano Electronics | 3 | 0 | 0 | 3 | |
| | | Total Theo | Drv | 12 | 0 | 0 | 12 | |
| | Total Theory | | | | | | 1 | |

Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly West Bengal University of Technology) Syllabus for B. Tech in Robotics

| Practical/ Sessional | | | | | | | | | |
|----------------------|---------------------------|------------|--------------------|-----|------|----|-----|--|--|
| 1 | Project | PW- ROB881 | Project-IV | 0 | 0 | 10 | 5 | | |
| 2 | Professional Core courses | PW- ROB882 | Comprehensive viva | 0 | 0 | 0 | 1.5 | | |
| | | 0 | 0 | 10 | 6.5 | | | | |
| | | 12 | 0 | 10 | 18.5 | | | | |
| | Total | | | 117 | 17 | 84 | 160 | | |