13. Courses of Study and Scheme of Assessment

BE ROBOTICS AND AUTOMATION **(2019 Regulations)**
(Minimum credits to be earned: 165)

Course Code	Course Title	Periods / week				Maximum Marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER 1									
19R101	Calculus and its Applications	3	1	0	4	50	50	100	BS
19R102	Physics	3	0	0	3	50	50	100	BS
19R103	Applied Chemistry	3	0	0	3	50	50	100	BS
19R104	Introduction to Mechanical Systems	3	0	0	3	50	50	100	ES
19G105	English Language Proficiency	2	1	0	3	50	50	100	HS
19R110	Engineering Graphics	0	0	4	2	100	0	100	ES
19R111	Basic Sciences Laboratory	0	0	4	2	100	0	100	BS
19R112	C Programming Laboratory	0	0	4	2	50	50	100	ES
19IP15	Induction Programme **	0	0	0	0	-	-	-	MC
	Total 28 periods	**14**	**2**	**12**	**22**	**500**	**300**	**800**	
SEMESTER 2									
19R201	Complex Variables and Transforms	3	1	0	4	50	50	100	BS
19R202	Materials Science	2	0	0	2	50	50	100	BS
19R203	Electrical Circuit Theory	3	1	0	4	50	50	100	ES
19R204	Strength of Materials	3	0	0	3	50	50	100	ES
19R205	Manufacturing Technology	3	0	0	3	50	50	100	ES
19G____	Language Elective	0	0	4	2	100	0	100	HS
19R210	Electric Circuits and Networks Laboratory	0	0	4	2	100	0	100	ES
19R211	Engineering Practices	0	0	4	2	100	0	100	EEC
19R215	Activity Point Programme *	-	-	-	Grade	-	-	-	MC
Semester 2- Summer Term									
19R214	Internship €	0	0	0	2£	100	0	100	EEC
	Total 28 periods	**14**	**2**	**12**	**24**	**650**	**250**	**900**	

**	As per norms
*	As per AICTE Norms; Total 60 hrs; Grade: Completed / Not Completed; Not counted for CGPA
CA	Continuous Assessment
FE	Final Examination
€	This course will be conducted prior to the commencement of the third semester for a period of 3 weeks
£	For internship, one credit is equivalent to minimum 40 hours of work as per norms

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Course Code	Course Title	Periods / week				Maximum Marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER 3									
19R301	Linear Algebra and Numerical Analysis	3	1	0	4	50	50	100	BS
19R302	Analog Electronics	3	0	0	3	50	50	100	PC
19R303	Electrical Machines and Power systems	3	0	0	3	50	50	100	PC
19R304	Theory of Machines	3	0	0	3	50	50	100	PC
19R305	Data Structures and Algorithms	2	2	0	4	50	50	100	ES
19O306	Economics for Engineers	3	0	0	3	50	50	100	HS
19R310	Analog Electronics Laboratory	0	0	2	1	100	0	100	PC
19R311	Mechanics and Machines Laboratory	0	0	2	1	100	0	100	PC
19K312	Environmental Science **	2	0	0	0	-	-	-	MC
19R315	Activity Point Programme *	-	-	-	Grade	-	-	-	MC
	Total 26 periods	**19**	**3**	**4**	**22**	**500**	**300**	**800**	
SEMESTER 4									
19R401	Probability and Statistics	2	1	0	3	50	50	100	BS
19R402	Automatic Control Systems	3	1	0	4	50	50	100	PC
19R403	Basics of Robotics	3	0	0	3	50	50	100	PC
19R404	Digital Electronics	3	0	0	3	50	50	100	PC
19R405	Hydraulics and Pneumatics	3	0	0	3	50	50	100	PC
19R406	PLC and SCADA	3	0	0	3	50	50	100	PC
19R410	Digital and Control Systems Laboratory	0	0	2	1	100	0	100	PC
19R411	Hydraulics and Pneumatics Laboratory	0	0	2	1	100	0	100	PC
19R412	PLC and SCADA Laboratory	0	0	4	2	100	0	100	PC
19Q413	Soft Skills Development	0	0	2	1	100	0	100	EEC
19O412	Indian Constitution **	2	0	0	0	-	-	-	MC
19R415	Activity Point Programme *	-	-	-	Grade	-	-	-	MC
	Total 31 periods	**19**	**2**	**10**	**24**	**700**	**300**	**1000**	

** As per norms
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CA Continuous Assessment
FE Final Examination

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Course Code	Course Title	Periods / week				Maximum Marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER 5									
19R501	CNC Machines	3	0	0	3	50	50	100	PC
19R502	Dynamics and Control of Manipulators	2	1	0	3	50	50	100	PC
19R503	Microprocessors and Microcontrollers	3	0	0	3	50	50	100	PC
19R504	Design of Mechanical Transmission Systems	2	1	0	3	50	50	100	PC
19R____	Professional Elective I	3	0	0	3	50	50	100	PE
19R510	CNC and CAD Laboratory	0	0	4	2	100	0	100	PC
19R511	Microprocessors and Microcontrollers Laboratory	0	0	2	1	100	0	100	PC
19R512	Robotics Laboratory	0	0	2	1	100	0	100	PC
19Q513	Business and Managerial Communications	0	0	2	1	100	0	100	EEC
19R515	Activity Point Programme *	-	-	-	Grade	-	-	-	MC
	Total 25 periods	**13**	**2**	**10**	**20**	**650**	**250**	**900**	
SEMESTER 6									
19R601	Power Electronics and Drives	3	0	0	3	50	50	100	PC
19R602	Automation System Design	2	1	0	3	50	50	100	PC
19R603	AI for Robotics	3	1	0	4	50	50	100	PC
19R604	Vision Systems	3	0	0	3	50	50	100	PC
19R605	Sensors and Instrumentation	3	0	0	3	50	50	100	PC
19R____	Professional Elective II	3	0	0	3	50	50	100	PE
19R610	Power Electronics and Drives Laboratory	0	0	4	2	100	0	100	PC
19R611	AI and Vision Systems Laboratory	0	0	4	2	100	0	100	PC
19Q613	Quantitative and Reasoning Skills	0	0	2	1	100	0	100	EEC
19R615	Activity Point Programme *	-	-	-	Grade	-	-	-	MC
	Total 29 periods	**17**	**2**	**10**	**24**	**600**	**300**	**900**	

At the end of 6th semester, the students are required to earn the minimum number of activity points from the AICTE mandated ACTIVITY POINT PROGRAMME to qualify for the award of BE/BTech degree (Refer Section 4 (vii) (c) of 2019 Regulations)

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Course Code	Course Title	Periods / week			Credits	Maximum Marks			
		Lecture	Tutorial	Practical		CA	FE	Total	CAT
SEMESTER 7									
19R701	Mobile Robotics	2	1	0	3	50	50	100	PC
19____	Open Elective I	3	0	0	3	50	50	100	OE
19R___	Professional Elective III	3	0	0	3	50	50	100	PE
19R___	Professional Elective IV	3	0	0	3	50	50	100	PE
19R___	Professional Elective V	3	0	0	3	50	50	100	PE
19R710	Innovation Practices	0	0	4	2	100	0	100	EEC
19R720	Project Work I	0	0	4	2	100	0	100	EEC
	Total 23 periods	**14**	**1**	**8**	**19**	**450**	**250**	**700**	
SEMESTER 8									
19____	Open Elective II	3	0	0	3	50	50	100	OE
19R___	Professional Elective VI	3	0	0	3	50	50	100	PE
19R820	Project Work II	0	0	8	4	50	50	100	EEC
	Total 14 periods	**6**	**0**	**8**	**10**	**150**	**150**	**300**	

CA Continuous Assessment
FE Final Examination

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LANGUAGE ELECTIVES

19G001 Communication Skills for Engineers
19G002 German- Level A1.1
19G003 French Language Level 1
19G004 Basic Japanese

PROFESSIONAL ELECTIVES

ROBOTICS

19R001 Industry 4.0
19R002 Robotic Control Systems
19R003 Industrial Robotics and Material Handling Systems
19R004 Microrobotics
19R005 Cognitive Robotics
19R006 Cloud Robotics
19R007 Medical Robotics
19R008 Robotic Welding Technology

AUTOMATION AND NETWORKING

19R010 Electrical Machines for Automation
19R011 Industrial Networking
19R012 Virtual Instrumentation Systems
19R013 Sensor Networks
19R014 Digital Control Systems
19R015 Automobile Engineering
19R016 Renewable Energy Systems
19R017 Farm Automation
19R018 Advanced Control Systems

SIGNAL PROCESSING

19R020 Image Analytics
19R021 Speech Signal Processing
19R022 Signal Processing
19R023 Embedded Processors
19R024 Advanced Microprocessors and Microcontrollers

COMPUTER SCIENCE

19R030 Internet of Things
19R031 Computer Architecture
19R032 Embedded and Real-time Systems
19R033 Big Data Analytics
19R034 Software Project Management and Quality Assurance
19R035 Neural Networks and Fuzzy Systems
19R036 Internet Tools and Java Programming
19R037 Machine Learning for Robotics

MANUFACTURING AND INDUSTRIAL ENGINEERING

19R040 Lean Manufacturing
19R041 Supply Chain Management
19R042 Process Planning and Cost Estimation
19R043 Maintenance and Safety Engineering
19R044 Industrial Design and Applied Ergonomics
19R045 Product Design and Development
19R046 Computer Integrated Manufacturing
19R047 Additive Manufacturing

ONE-CREDIT COURSES

ROBOTICS AND AUTOMATION ENGINEERING

19RF01 CAD Tools for Industrial Automation
19RF02 Design Concepts and Realization
19RF03 Dynamic Modeling Simulations and Control of Robots
19RF04 Modeling and Simulation of Dynamic Systems Using Adams
19RF05 Robot Operating Systems
19RF06 Computer Vision with OpenCV
19RF07 Underwater Robotics
19RF08 Digital Technology for Automation Drives
19RF09 PC Based Industrial Automation
19RF10 Robot Simulation Using Open Source Tools
19RF11 Introduction to Haptic Interface Design
19RF12 Codesys Programming
19RF13 Open PLC
19RF14 Applied Robotics
19RF15 Evolutionary Optimization Techniques
19RF16 Cable Technology

HUMANITIES

19OFA1 Export – Import Practices
19OFA2 Insurance - Concepts and Practices
19OFA3 Public Finance
19OFA4 Security Analysis and Portfolio Management
19OFA5 Social Entrepreneurship

ENGLISH

19GF01 Interpersonal and Organizational Communication
19GF02 Human Values Through Literature

Summary of Credit Distribution

BE ROBOTICS AND AUTOMATION										
S. No	**Course Category**	**Credits Per Semester**								**Total Credits**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1	HS	3	2	3	0	0	0	0	0	8
2	BS	12	6	4	3	0	0	0	0	25
3	ES	7	12	4	0	0	0	0	0	23
4	PC	0	0	11	20	16	20	3	0	70
5	PE	0	0	0	0	3	3	9	3	18
6	OE	0	0	0	0	0	0	3	3	6
7	EEC	0	2+2£	0	1	1	1	4	4	15
8	MC	-	-	-	-	-	-	-	-	-
	TOTAL	**22**	**22+2£**	**22**	**24**	**20**	**24**	**19**	**10**	**165**

£ Summer Term Course(s)

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