

**13. Courses of Study and Scheme of Assessment**  
**BE INSTRUMENTATION & CONTROL ENGINEERING**

**(2015 REGULATIONS)**  
**(Minimum credits to be earned: 182)**

Code No.	Course	Hours / week				Credits	Maximum marks			
		Lecture	Tutorial	Practical	CA		FE	Total	CAT	
<b>SEMESTER I</b>										
15U101	Calculus and its Applications	3	2	0	4	50	50	100	BS	
15U102	Physics	3	0	0	3	50	50	100	BS	
15U103	Chemistry	3	0	0	3	50	50	100	BS	
15U104	Problem Solving and C Programming	2	2	0	3	50	50	100	ES	
15U105	Electric Circuits	3	2	0	4	50	50	100	ES	
15Z104	English Language Proficiency	2	2	0	3	50	50	100	HS	
15U110	Engineering Practices	0	0	2	1	100	-	100	ES	
15U111	Physics Laboratory I	0	0	2	1	100	-	100	BS	
15U112	Chemistry Laboratory I	0	0	2	1	100	-	100	BS	
15U214	Personality and Character Development	0	0		Refer sem 2 and footnote				MC	
<b>Total 30 hrs</b>		<b>16</b>	<b>8</b>	<b>6</b>	<b>23</b>	<b>600</b>	<b>300</b>	<b>900</b>		
<b>SEMESTER II</b>										
15U201	Complex Variables and Transforms	3	2	0	4	50	50	100	BS	
15U202	Materials Science	3	0	0	3	50	50	100	BS	
15U203	Applied Electrochemistry	3	0	0	3	50	50	100	BS	
15U204	Data Structures and Algorithms	3	0	0	3	50	50	100	ES	
15U205	Electronic Devices and Circuits	4	0	0	4	50	50	100	ES	
15Z_____	Language Elective	3	0	0	3	50	50	100	HS	
15U210	Engineering Graphics and Circuit Simulation	0	0	4	2	100	-	100	ES	
15U211	Physics Laboratory II	0	0	2	1	100	-	100	BS	
15U212	Chemistry Laboratory II	0	0	2	1	100	-	100	BS	
15U213	Electronic Devices and Circuits Laboratory	0	0	4	2	100	-	100	ES	
15U214	Personality and Character Development	0	0	**	Grade	-	-	-	MC	
<b>Total 33 hrs</b>		<b>19</b>	<b>2</b>	<b>12</b>	<b>26</b>	<b>700</b>	<b>300</b>	<b>1000</b>		

CA - Continuous Assessment

FE - Final Examination

\*\* - Total 40 hrs in I & II semesters put together. Grade: Completed / Not Completed.

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Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
<b>SEMESTER II – Summer Term<sup>€</sup></b>									
15U215	Professional Skills	6	0	9	2	100	-	100	EEC
15U216	In-Plant Training & Technical Seminar	6	0	9	2	100	-	100	EEC
<b>Total 30 hrs</b>		<b>12</b>	<b>0</b>	<b>18</b>	<b>4</b>	<b>200</b>		<b>200</b>	

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€ - These courses will be conducted prior to the commencement of the third semester for a period of 4 weeks during summer term.

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		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
<b>SEMESTER III</b>									
15U301	Linear Algebra and Numerical Analysis	3	2	0	4	50	50	100	BS
15U302	Transducer Engineering	3	0	0	3	50	50	100	PC
15U303	Electrical Machines	3	0	0	3	50	50	100	PC
15U304	Thermodynamics and Fluid Mechanics	3	2	0	4	50	50	100	ES
15U305	Environmental Science and Engineering	3	0	0	3	50	50	100	ES
15Z070	Economics for Engineers	3	0	0	3	50	50	100	HS
15U310	Transducer Laboratory	0	0	4	2	100	-	100	PC
15U311	Electrical Machines Laboratory	0	0	4	2	100	-	100	PC
<b>Total 30 hrs</b>		<b>18</b>	<b>4</b>	<b>8</b>	<b>24</b>	<b>500</b>	<b>300</b>	<b>800</b>	
<b>SEMESTER IV</b>									
15U401	Probability and Random Processes	3	2	0	4	50	50	100	BS
15U402	Digital Electronics	3	0	0	3	50	50	100	PC
15U403	Linear ICs and Applications	3	0	0	3	50	50	100	PC
15U404	Electrical and Electronic Measurements	3	0	0	3	50	50	100	PC
15U405	Control Systems I	3	2	0	4	50	50	100	PC
15_____	Open Elective I*	3	0	0	3	50	50	100	OE
15U410	Linear and Digital ICs Laboratory	0	0	2	1	100	-	100	PC
15U411	Measurements and Control Laboratory	0	0	2	1	100	-	100	PC
<b>Total 26 hrs</b>		<b>18</b>	<b>4</b>	<b>4</b>	<b>22</b>	<b>500</b>	<b>300</b>	<b>800</b>	

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Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
<b>SEMESTER V</b>									
15U501	Industrial Instrumentation I	2	2	0	3	50	50	100	PC
15U502	Virtual Instrumentation	3	0	0	3	50	50	100	PC
15U503	Control Systems II	3	2	0	4	50	50	100	PC
15U504	Microprocessors and Microcontrollers	3	0	0	3	50	50	100	PC
15U505	Digital Signal Processing	3	0	0	3	50	50	100	PC
15___	Open Elective II*	3	0	0	3	50	50	100	OE
15U510	Interfacing and Signal Processing Laboratory	0	0	4	2	100	-	100	PC
15U511	Microprocessor and Microcontroller Laboratory	0	0	4	2	100	-	100	PC
<b>Total 29 hrs</b>		<b>17</b>	<b>4</b>	<b>8</b>	<b>23</b>	<b>500</b>	<b>300</b>	<b>800</b>	
<b>SEMESTER VI</b>									
15U601	Industrial Instrumentation II	2	2	0	3	50	50	100	PC
15U602	Process Control	2	2	0	3	50	50	100	PC
15U603	Computer Networks	3	0	0	3	50	50	100	PC
15U604	Principles of Communication Systems	3	0	0	3	50	50	100	PC
15U___	Professional Elective I	3	0	0	3	50	50	100	PE
15___	Open Elective III*	3	0	0	3	50	50	100	OE
15U610	Industrial Instrumentation Laboratory	0	0	4	2	100	-	100	PC
15U611	Process Control Laboratory	0	0	4	2	100	-	100	PC
15U612	Innovation Practices	0	0	4	2	100	-	100	EEC
<b>Total 32 hrs</b>		<b>16</b>	<b>4</b>	<b>12</b>	<b>24</b>	<b>600</b>	<b>300</b>	<b>900</b>	

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Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
<b>SEMESTER VII</b>									
15U701	Embedded System Design	3	0	0	3	50	50	100	EEC
15U702	Logic and Distributed Control System	3	0	0	3	50	50	100	PC
15U703	Analytical Instrumentation	3	0	0	3	50	50	100	ES
15U___	Professional Elective II	3	0	0	3	50	50	100	PE
15U___	Professional Elective III	3	0	0	3	50	50	100	PE
15U___	Professional Elective IV	3	0	0	3	50	50	100	PE
15U710	Embedded Systems Laboratory	0	0	2	1	100	-	100	EEC
15U711	Industrial Automation Laboratory	0	0	2	1	100	-	100	EEC
15U720	Project Work I	0	0	4	2	100	-	100	EEC
<b>Total 26 hrs</b>		<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>	<b>600</b>	<b>300</b>	<b>900</b>	
<b>SEMESTER VIII</b>									
15U___	Professional Elective V	3	0	0	3	50	50	100	PE
15U___	Professional Elective VI	3	0	0	3	50	50	100	PE
15U820	Project Work II	0	0	16	8	50	50	100	EEC
<b>Total 22 hrs</b>		<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>	<b>150</b>	<b>150</b>	<b>300</b>	

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## LANGUAGE ELECTIVES

15Z080	Communication Skills for Engineers
15Z081	Basic German
15Z082	Basic French
15Z083	Basic Japanese

## OPEN ELECTIVES

(Students can opt for all open electives from single stream or several streams)

### MATHEMATICS

15OH01	Advanced Linear Algebra
15OH02	Algebraic Structures
15OH03	Calculus of Variations and Tensor Analysis
15OH04	Graph Theory and its Applications
15OH05	Mathematical Finance
15OH06	Mathematical Modeling and Simulation
15OH07	Number Theory for Computing
15OH08	Operations Research
15OH09	Reliability and Quality Control
15OH10	Soft Computing
15OH11	Stochastic Models

### PHYSICS

15OH20	Analytical Techniques for Materials Characterization
15OH21	Laser Technology
15OH22	Micro Electromechanical Systems
15OH23	Nanomaterials and Applications
15OH24	Physics for Solar PV Systems and Solid-State Lighting Systems
15OH25	Sensors for Engineering Applications
15OH26	Thin Film Technology
15OH27	Nonlinear Science and Engineering Applications
15OH28	Nonlinear Fiber Optics
15OH29	Chaotronics

### CHEMISTRY

15OH33	Chemical Sensors and Biosensors
15OH37	Energy Storing Devices and Fuel Cells
15OH39	Modern Electronic Materials

### COMPUTER APPLICATIONS

15OH46	Computer Graphics and Virtual Reality
15OH47	Data and File Structures
15OH48	Database Management System
15OH49	High Performance Computing
15OH50	Mainframe Systems
15OH51	Mobile Application Development
15OH52	Multicore Programming
15OH53	Object Oriented Programming
15OH54	Programming in Python
15OH55	Responsive Web Design
15OH56	Social Web Mining
15OH57	Software Engineering
15OH58	Java Programming
15OH59	Geographic Information System
15OH60	Programming for Robotics

### HUMANITIES

15OH61	An Introduction to Indian Constitution
15OH62	Entrepreneurship
15OH63	Human Resource Management
15OH64	Industrial Psychology
15OH65	Principles of Management
15OH66	Business Statistics
15OH67	Disaster Management

15OH68 Financial and Managerial Accounting  
15OH69 Marketing Management  
15OH70 Defence Practices and Disaster Management

### **ENGLISH**

15OH75 English and Soft Skills for Employability  
15OH76 English for Competitive Examinations  
15OH77 German Language – International Level A1.1  
15OH78 German Language – International Level A1.2

### **APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCES**

15OH82 Optimization Techniques  
15OH83 Data Science  
15OH84 Data Visualization  
15OH85 Artificial Intelligence  
15OH86 Pervasive Computing  
15OH87 Parallel and Distributed Computing  
15OH88 Cyber Security  
15OH89 Randomized Algorithms  
15OH90 Approximation Algorithms  
15OH91 Network Science  
15OH92 Applied Stochastic Processes  
15OH93 Modelling and Simulation  
15OH94 Graph Algorithms

### **OPEN ELECTIVE OFFERED BY ENGINEERING DEPARTMENT**

15AH03 Electric and Hybrid Vehicles (Department of Automobile Engineering)  
15EH01 Sustainable Energy Systems (Department of Electrical and Electronics Engineering)

### **PROFESSIONAL ELECTIVES**

15U001 Biomedical Instrumentation  
15U002 Fiber Optics and Laser Instruments  
15U003 Instrumentation System Design  
15U004 Power Plant Instrumentation and Control  
15U005 Instrumentation and Control in Petro Chemical Industries  
15U006 Optimal and Adaptive Control Systems  
15U007 System Identification  
15U008 Industrial Chemical Process  
15U009 Applied Soft Computing  
15U010 VLSI Design  
15U011 MEMS and Nanotechnology  
15U012 Operating Systems  
15U013 Robotics and Automation  
15U014 Product Design and Development  
15U015 Power Electronics and Drives  
15U016 Advanced Digital Signal Processing  
15U017 Digital Image Processing  
15U018 Digital Video Analytics  
15U019 Computer Architecture  
15U020 Internet Tools and Java Programming

### **ONE CREDIT COURSES**

#### **OFFERED BY THE DEPARTMENT**

15UF01 Distributed Control System in Industries  
15UF02 Advanced Industrial Automation Systems  
15UF03 Marine Instrumentation and Systems  
15UF04 Medical Image Analysis  
15UF05 System Design and Implementation  
15UF06 Calibration Techniques  
15UF07 Motion Control Systems  
15UF08 Electrical Metrology  
15UF09 Standard Practices for Power Plant Instrumentation

**OFFERED BY THE DEPARTMENT OF HUMANITIES**

15OF01	Export – Import Management
15OF02	Insurance & Risk Management
15OF03	Values and Ethics at Work Place
15OF04	Development of Industrialisation
15OF05	Creativity and Social Enterprise
15OF06	Social and Psychological Well Being
15OF13	Security Analysis and Portfolio Management
15OF14	Implementation of Quality Management System
15OF15	Financial Management
15OF16	Personality Development through Transactional Analysis

**OFFERED BY THE DEPARTMENT OF ENGLISH**

15OF10	Corporate Communication
15OF11	Interpersonal and Organizational Communication
15OF12	Human Values Through Literature

**OFFERED BY THE DEPARTMENT OF MATHEMATICS**

15OF21	Principles of Business Analytics
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**SUMMARY OF CREDIT DISTRIBUTION**

B.E. INSTRUMENTATION AND CONTROL ENGINEERING												
S. No	Course Work subject Area	Credits Per Semester								Total Credit	Credit Range	
		I	II	III	IV	V	VI	VII	VIII		Min	Max
1	HS	3	3	3	0	0	0	0	0	9	9	18
2	BS	12	12	4	4	0	0	0	0	32	27	36
3	ES	8	11	7	0	0	0	3	0	29	27	36
4	PC	0	0	10	15	20	16	3	0	64	54	72
5	PE	0	0	0	0	0	3	9	6	18	18	27
6	OE	0	0	0	3	3	3	0	0	9	9	18
7	EEC	0	0 + 4*	0	0	0	2	7	8	21	18	27
	<b>Total</b>	23	<b>26+4*</b>	24	22	23	24	22	14	<b>182</b>	<b>175</b>	<b>185</b>

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