13. Courses of Study and Scheme of Assessment

BE BIOMEDICAL ENGINEERING

(2015 REGULATIONS)
(Minimum credits to be earned: 183)

Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER I									
15D101	Calculus and its Applications	3	2	0	4	50	50	100	BS
15D102	Physics	3	0	0	3	50	50	100	BS
15D103	Chemistry	3	0	0	3	50	50	100	BS
15D104	Electric Circuit Analysis	4	0	0	4	50	50	100	ES
15D105	Introduction to Biomedical Engineering	3	0	0	3	50	50	100	PC
15T104	English Language Proficiency	2	2	0	3	50	50	100	HS
15D110	Engineering Graphics	0	0	4	2	100	-	100	ES
15D111	Physics Laboratory I	0	0	2	1	100	-	100	BS
15D112	Chemistry Laboratory I	0	0	2	1	100	-	100	BS
15D214	Personality and Character Development	0	0	Refer Sem 2 and footnote					MC
	Total 30 hrs	**18**	**4**	**8**	**24**	**600**	**300**	**900**	
SEMESTER II									
15D201	Complex Variables and Transforms	3	2	0	4	50	50	100	BS
15D202	Materials Science	3	0	0	3	50	50	100	BS
15D203	Chemistry of Biomolecules	3	0	0	3	50	50	100	BS
15D204	Electron Devices and Circuits	3	0	0	3	50	50	100	ES
15D205	Problem Solving and C Programming	2	2	0	3	50	50	100	ES
15T__	Language Elective	3	0	0	3	50	50	100	HS
15D210	Engineering Practices	0	0	2	1	100	-	100	EEC
15D211	Physics Laboratory II	0	0	2	1	100	-	100	BS
15D212	Chemistry Laboratory II	0	0	2	1	100	-	100	BS
15D213	Electron Devices and Circuits Laboratory	0	0	2	1	100	-	100	ES
15D214	Personality and Character Development	0	0	**	Grade	-	-	-	MC
	Total 29 hrs	**17**	**4**	**8**	**23**	**700**	**300**	**1000**	

CAT-Category; BS – Basic Science; HS – Humanities & Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; EEC – Employability Enhancement Course; MC – Mandatory Course.

** - Total 40 hrs in semesters I & II put together.

Grade: Completed / Not Completed.

BE BIOMEDICAL ENGINEERING (2015 REGULATIONS)

Code No.	Course	Hours / week: Lecture	Tutorial	Practical	Credits	Maximum marks: CA	FE	Total	CAT
SEMESTER II – Summer Term€									
15D215	Professional Skills	6	0	9	2	100	-	100	EEC
15D216	In-Plant Training & Technical Seminar	6	0	9	2	100	-	100	EEC
	Total 30 hrs	**12**	**0**	**18**	**4**	**200**	**-**	**200**	
SEMESTER III									
15D301	Linear Algebra and Numerical Analysis	3	2	0	4	50	50	100	BS
15D302	Object Oriented Programming	2	2	0	3	50	50	100	ES
15D303	Digital Electronics and Logic Design	3	0	0	3	50	50	100	PC
15D304	Signals and Systems	3	2	0	4	50	50	100	PC
15D305	Sensors and Instrumentation	4	0	0	4	50	50	100	PC
15T070	Economics for Engineers	3	0	0	3	50	50	100	HS
15D310	Digital Electronics Laboratory	0	0	2	1	100	-	100	PC
15D311	Sensors and Instrumentation Laboratory	0	0	2	1	100	-	100	PC
	Total 28 hrs	**18**	**6**	**4**	**23**	**500**	**300**	**800**	
SEMESTER IV									
15D401	Probability and Random Processes	3	2	0	4	50	50	100	BS
15D402	Computational Methods for Biomedical Engineering	3	2	0	4	50	50	100	ES
15D403	Analog Circuits	3	2	0	4	50	50	100	PC
15D404	Human Anatomy and Physiology	3	0	0	3	50	50	100	PC
15D405	Biomedical Signal Processing	3	0	0	3	50	50	100	PC
15___	Open Elective I*	3	0	0	3	50	50	100	OE
15D410	Physiology Laboratory	0	0	4	2	100	-	100	PC
15D411	Biomedical Signal Processing Laboratory	0	0	2	1	100	-	100	PC
	Total 30 hrs	**18**	**6**	**6**	**24**	**500**	**300**	**800**	

CA - Continuous Assessment; FE - Final Examination

€ - 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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*** – LTPC for open electives can be either 3 0 0 3 or 2 2 0 3.**

BE BIOMEDICAL ENGINEERING (2015 REGULATIONS)

Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER V									
15D501	Image Processing	2	2	0	3	50	50	100	PC
15D502	Microcontrollers and Applications	3	0	0	3	50	50	100	PC
15D503	Biomedical Equipments	3	2	0	4	50	50	100	PC
15D504	Control Systems	4	0	0	4	50	50	100	PC
15D505	Environmental Sciences and Engineering	3	0	0	3	50	50	100	ES
15____	Open Elective II*	3	0	0	3	50	50	100	OE
15D510	Image Processing Laboratory	0	0	2	1	100	-	100	PC
15D511	Microcontrollers Laboratory	0	0	4	2	100	-	100	PC
	Total 27 hrs	**18**	**4**	**6**	**23**	**500**	**300**	**800**	
SEMESTER VI									
15D601	Medical Informatics	2	2	0	3	50	50	100	ES
15D602	Electromagnetic Fields	2	2	0	3	50	50	100	ES
15D603	Biomechanics	3	0	0	3	50	50	100	PC
15D604	Electronic Communication Systems	4	0	0	4	50	50	100	PC
15D___	Professional Elective I	3	0	0	3	50	50	100	PE
15____	Open Elective III*	3	0	0	3	50	50	100	OE
15D610	Medical Informatics Laboratory	0	0	2	1	100	-	100	PC
15D611	Biomechanics Laboratory	0	0	4	2	100	-	100	PC
15D620	Innovation Practices	0	0	4	2	100	-	100	EEC
	Total 29 hrs	**17**	**4**	**10**	**24**	**600**	**300**	**900**	

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FE - Final Examination

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*** – LTPC for open electives can be either 3 0 0 3 or 2 2 0 3.**

BE BIOMEDICAL ENGINEERING (2015 REGULATIONS)

Code No.	Course	Hours / week				Maximum marks			
		Lecture	Tutorial	Practical	Credits	CA	FE	Total	CAT
SEMESTER VII									
15D701	Medical Device Design	3	0	0	3	50	50	100	PC
15D702	Medical Imaging and Analysis	3	0	0	3	50	50	100	PC
15D703	BioMEMS and Nanotechnology	4	0	0	4	50	50	100	ES
15D___	Professional Elective II	3	0	0	3	50	50	100	PE
15D___	Professional Elective III	3	0	0	3	50	50	100	PE
15D___	Professional Elective IV	3	0	0	3	50	50	100	PE
15D710	Medical Device Design Laboratory	0	0	4	2	100	-	100	PC
15D711	Medical Image Analysis Laboratory	0	0	2	1	100	-	100	PC
15D720	Project Work I	0	0	4	2	100	-	100	EEC
	Total 29 hrs	**19**	**0**	**10**	**24**	**600**	**300**	**900**	
SEMESTER VIII									
15D___	Professional Elective V	3	0	0	3	50	50	100	PE
15D___	Professional Elective VI	3	0	0	3	50	50	100	PE
15D820	Project Work II	0	0	16	8	50	50	100	EEC
	Total 22 hrs	**6**	**0**	**16**	**14**	**150**	**150**	**300**	

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FE - Final Examination

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LANGUAGE ELECTIVES

15T080	Communication Skills for Engineers
15T081	Basic German
15T082	Basic French
15T083	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

15OH31	Biochemistry
15OH32	Biomembrane Electrochemistry
15OH33	Chemical Sensors and Biosensors

COMPUTER APPLICATIONS

15OH46	Computer Graphics and Virtual Reality
15OH47	Data and File Structures
15OH49	High Performance Computing
15OH50	Mainframe Systems
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

15OH81	Data Structures and Algorithms
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 ELECTIVES OFFERED BY ENGINEERING DEPARTMENTS

15TH04	Electro Active Textiles	(Textile Technology)
15ZH01	Multimedia Systems and Applications	(Computer Science and Engineering)

PROFESSIONAL ELECTIVES

15D001	Biophotonics
15D002	Ultrasound in Medicine
15D003	Magnetic Resonance Imaging
15D004	Embedded System Design
15D005	Mobile Application Development
15D006	Programmable Devices Based System Design
15D007	Telemedicine
15D008	Wearable Technologies
15D009	Special Medical Equipments
15D010	Cell Biology and Tissue Engineering
15D011	Medical Physics
15D012	Biomaterials and Artificial Organs
15D013	Rehabilitation Engineering
15D014	Engineering of Nanomaterials
15D015	Drug Delivery Systems
15D016	Medical Data Analytics
15D017	Pattern Recognition
15D018	Advanced Digital Signal Processing
15D019	Database Management Systems
15D020	AI and Expert Systems
15D021	Medical Robotics
15D022	Hospital Systems Management
15D023	Machine Learning
15D024	Advanced Machine Learning

ONE CREDIT COURSES

OFFERED BY THE DEPARTMENT

15DF01	Radiation Protection in Medical Technology
15DF02	Radiation Oncology Physics
15DF03	Respiratory Physiology
15DF04	Speech Production and Processing
15DF05	Medical Textiles
15DF06	Medical Regulatory Standards
15DF07	Data Mining in Healthcare
15DF08	Internet of Things for Healthcare

OFFERED BY HUMANITIES DEPARTMENT

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

SUMMARY OF CREDIT DISTRIBUTION

B.E. BIOMEDICAL 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**	6	7	3	4	3	6	4	0	33	27	36
4	**PC**	3	0	13	13	17	10	9	0	65	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	**1 + 4***	0	0	0	2	2	8	17	18	27
	Total	24	**23+4***	23	24	23	24	24	14	**183**	**175**	**185**

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