V.S.B. ENGINEERING COLLEGE, KARUR.

(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai.

NH – 67, Covai Road, Karudayampalayam PO, Karur - 639 111.

CURRICULUM AND SYLLABI

REGULATIONS – 2023

(Students Admitted in the Batch of 2025 -2026 Onwards)

Department of

Biomedical Engineering

I. Vision and Mission of the Institute

Vision

We endeavor to impart futuristic technical education of the highest quality to the student community and to inculcate discipline in them to face the world with self-confidence and thus we prepare them for life as responsible citizens to uphold human values and to be of service at large. We strive to bring of the Institution as an Institution of academic excellence of International standard.

Mission

We transform persons into personalities by the state-of the art infrastructure, time consciousness, quick response and the best academic practices through assessment and advice.

II. Vision and Mission of the Department

Vision

To create a centre of academic excellence in the fields of Biomedical engineering through innovative research contributions, industry-oriented teaching and training for betterment in healthcare.

Mission

1.	To motivate faculty members and students to explode their creativity to develop innovative products by utilizing modern technologies to serve the society.
2.	To inculcate the industrial need of the biomedical engineers among the students through relevant training and value added courses.
3.	To produce technically intense engineers by practising innovative teaching methodologies.

III. Program Educational Objectives (PEOs)

PEO1:	To enable the graduates to demonstrate their skills in design and develop medical devices for health care system through the core foundation and knowledge acquired in engineering and biology.
PEO2:	To enable the graduates to exhibit leadership in health care team to solve health care problems and make decisions with societal and ethical responsibilities.
PEO3:	To Carryout multidisciplinary research, addressing human healthcare problems and sustain technical competence with ethics, safety and standards.

PEO4:	To ensure that graduates will recognize the need for sustaining and expanding their technical competence and engage in learning opportunities throughout their careers.

I. Program Outcomes(POs)

Graduates of the Biomedical Engineering will be able to

PO1:	**Engineering knowledge** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2:	**Problem analysis** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3:	**Design/development of solutions** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4:	**Conduct investigations of complex problems** Use research-based knowledge and research methods, including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5:	**Modern tool usage** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations.
PO6:	**The engineer and society** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7:	**Environment and sustainability** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8:	**Ethics** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9:	**Individual and team work** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10:	**Communication** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11:	**Project management and finance** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12:	**Life-long learning** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

II. Program Specific Outcomes(PSOs)

Graduates of the Biomedical Engineering will be able to

PSO1:	To design and develop diagnostic and therapeutic devices that reduces physician burnout and enhance the quality of life for the end user by applying fundamentals of Biomedical Engineering.
PSO2:	To apply software skills in developing algorithms for solving healthcare related problems in various fields of medical sector.
PSO3:	To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions for current societal and scientific issues thereby developing indigenous medical instruments that are on par with the existing technology

III. PEOs mapped with POs and PSOs

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PEO1	3	3	3	2	3	2	2	1	2	2	2	2	3	3	3
PEO2	3	3	3	3	1	1	1	1	1	1	1	1	3	3	3
PEO3	2	2	3	3	2	2	2	3	2	2	1	2	3	3	3
PEO4	1	1	1	1	1	1	1	3	3		3	3	3	3	3

1-low 2-medium 3-high '-' – no correlation

IV. Mapping of Course Outcomes(Cos) with Program Outcomes(POs)

Sem	Course Name	PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I	Induction Programme															
	Professional English I	2	2	2	2	1	3	3	3	2	3	1	3	-	-	-
	Matrices and Calculus	3	2	1	1	-	-	-	-	-	-	-	1	-	-	-
	Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-
	Engineering Chemistry	3	1	-	-	1	1	1	-	-	-	1	1	-	-	-
	Programming in C	3	3	3	2	2	-	-	-	-	2	-	1	-	-	-
	Heritage of Tamils	1.8	1.8	1	1	-	-	2.4	2.2	1	1.2	1	1	-	-	-
	Programming in C Laboratory	2	2	1.4	1	1	-	-	1	2.2	2	-	-	-	-	-
	Physics and Chemistry Laboratory	2	1	2	1	2	1	1	-	-	-	-	-	1	-	-
		2	3	2	1	2	-	-	1	2	1	-	-	-	-	-
	English Laboratory[$]	1	-	-	-	1	-	2	2	2	3	2	3	-	-	3
II	Professional English - II	2	3	2	1	1.6	-	-	1	2.2	2	-	-	-	-	-
	Computational Methods	3	2	2	2	2	1	-	-	-	-	-	1	-	-	-
	Biosciences for Medical Engineering	3	2.4	1.4	1	1	-	1	-	-	1	-	-	3	3	2
	Basic Electrical and Electronics Engineering	3	2	2	2	-	-	-	-	2	2	-	-	3	3	-
	Medical Physics	2	2	1.8	1	2	-	-	1	2	2.2	-	-	-	-	-
	Engineering Graphics	3	2.2	2.2	1.2	1.4	-	-	-	-	2	-	1	3	2.6	-
	தமிழர் மரபு /Heritage of Tamils	2	1	1	-	2	-	-	-	1	-	-	-	1	1	1

	NCC Credit Course Level 1#															
	Engineering Practices Laboratory	2	-	3	-	-	2	-	-	1	-	-	-	2	-	-
	Biosciences Laboratory	3	2	2	-	-	-	-	-	2	2	-	-	3	2.2	-
	Communication Laboratory	1	-	-	-	-	-	2	2	2	3	2	3	-	-	-
III	Transforms and Partial Differential Equations	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
	Fundamentals of Electronic Devices and Circuits	3	3	2.2	-	-	-	-	-	-	-	-	-	1	-	-
	Sensors and Measurements	3	3	2.4	1	-	-	-	-	-	-	-	-	1	-	-
	Electric Circuit Analysis	3	3	2.4	2.2	-	-	-	-	-	-	-	0.4	1	-	-
	Human Anatomy and Physiology	3	3	2.4	-	-	1	-	1	-	-	-	1	1	-	-
	Object-oriented programming	3	3	1	1	1	-	-	-	-	-	-	-	-	1	1
	Fundamentals of Electronic Devices and Circuits Laboratory	3	2	1	1	-	-	-	-	1	2	1	-	2	-	-
	Sensors and Measurements Laboratory	3	2	1	1	-	-	-	-	1	2	1	-	2	-	-
	Object-Oriented Programming Laboratory	2.4	2.2	2.4	2.8	3	1	1	1	1	-	-	-	3	3	-
	Professional Development$															
	Random Processes and Linear Algebra	3	3	1	3	1	-	-	-	-	-	-	2	3	2	2
	Biomedical Instrumentation	2.6	2.4	1	1	1	-	-	-	-	-	-	1	2	2.4	-
	Analog and Digital Integrated Circuits	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
	Bio Control Systems	3	3	2	2	1	-	-	-	-	2	-	-	2	3	-
	Signal Processing	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-

IV	Environmental Sciences and Sustainability	3	2	1	-	-	1	3	-	-	1	1	1	3	3	-
	Biomedical Instrumentation Laboratory	1	2	2.2	1.2	3	0.3	-	-	0.6	-	-	-	3	3	1
	Analog and Digital Integrated Circuits Laboratory	2	2.4	2.4	2.4	2.2	1	3	3	1	1	1	1	3	2	-
V	Embedded Systems and IoMT	3	2	1	1	1	-	-	-	-	-	-	1	1	1	-
	Diagnostic and Therapeutic Equipment	3	2	1	-	1	-	-	-	-	-	-	1	2	-	1
	Professional Elective I															
	Professional Elective II															
	Professional Elective III															
	Mandatory Course-I[&]															
	Embedded systems and IOMT Laboratory	3	3	1	1	1	-	-	-	1	1	1	-	1	-	-
	Diagnostic and Therapeutic Equipment Laboratory	3	3	1	1	1	-	-	-	1	1	1	1	2	-	1
VI	Artificial Intelligence and Machine Learning	3	1	2	1	-	-	-	3	2	2	3	2	1	1	1
	Fundamentals of Healthcare Analytics	3	3	-	3	2.2	1	-	-	1	1	-	2	3	3	1
	Medical Image Processing	2.2	2.2	1	1	2	1	1.2	2.2	2.2	2	1	2.2	1	2	1
	Open Elective – I*															
	Professional Elective IV															
	Professional Elective V															
	Professional Elective VI															
	Mandatory Course-II [&]															
	NCC Credit Course Level 3[#]															
	Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Human Values and Ethics	2	3	3	2	1	2	-	-	-	1	-	-	2	2	-
	Open Elective –II**															

VII	Open Elective –III**															
	Hospital Training	2	2	1	1	1	1	1	1	1	2	2	3	3	1	2
	Project Work – I	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
VIII	Open Elective –IV**															
	Management –Elective #															
	Project Work – II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1-low 2-medium 3-high '- '– no correlation

B.E. BIOMEDICAL ENGINEERING

Regulations 2023

For the students admitted from 2023 onwards

CHOICE-BASED CREDIT SYSTEM

CURRICULUM FOR I – VIII SEMESTERS

SEMESTER I

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1.	23IP101	Induction Programme	-	-	-	-	-	-	0
THEORY									
2.	23HST101	Professional English – I	HSMC	40/60	3	0	0	3	3
3.	23MAT101	Matrices and Calculus	BSC	40/60	3	1	0	4	4
4.	23PHT101	Engineering Physics	BSC	40/60	3	0	0	3	3
5.	23CYT101	Engineering Chemistry	BSC	40/60	3	0	0	3	3
6.	23GET101	Programming in C	ESC	40/60	3	0	0	3	3
7.	23GET102	தமிழர் மரபு /Heritage of Tamils	HSMC	40/60	1	0	0	1	1
PRACTICALS									
8.	23GEP101	Programming in C Laboratory	ESC	60/40	0	0	4	4	2
9.	23BSP101	Physics and Chemistry Laboratory	BSC	60/40	0	0	4	4	2
TOTAL					**16**	**1**	**8**	**25**	**21**

SEMESTER II

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23HST201	Professional English – II	HSMC	40/60	2	0	0	2	2
2.	23MAT201	Computational Methods	BSC	40/60	3	1	0	4	4
3.	23BMT201	Biosciences for Medical Engineering	PCC	40/60	3	0	0	3	3
4.	23EET202	Basic Electrical and Electronics Engineering	ESC	40/60	3	0	0	3	3
5.	23BMT202	Medical Physics	PCC	40/60	3	0	0	3	3
6.	23GET201	Engineering Graphics	ESC	40/60	2	0	4	6	4
7.	23GET202	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technologies	HSMC	40/60	1	0	0	1	1
8.		NCC Credit Course Level 1#	-		2	0	0	2	2*
PRACTICALS									
9.	23GEP201	Engineering Practices Laboratory	ESC	60/40	0	0	4	4	2
10.	23BMP201	Biosciences Laboratory	PCC	60/40	0	0	4	4	2
TOTAL				-	**17**	**1**	**12**	**30**	**24**

NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER III

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23MAT301	Transforms and Partial Differential Equations	BSC	40/60	3	1	0	4	4
2.	23BMT301	Fundamentals of Electronic Devices and Circuits	ESC	40/60	3	0	0	3	3
3.	23BMT302	Sensors and Measurements	PCC	40/60	3	0	0	3	3
4.	23BMT303	Electric Circuit Analysis	ESC	40/60	3	0	0	3	3
5.	23BMT304	Human Anatomy and Physiology	PCC	50/50	3	0	2	5	4
6.	23CST304	Object-Oriented programming	ESC	40/60	3	0	0	3	3
PRACTICALS									
7.	23BMP301	Fundamentals of Electronic Devices and Circuits Laboratory	ESC	60/40	0	0	3	3	1.5
8.	23BMP302	Sensors and Measurements Laboratory	PCC	60/40	0	0	3	3	1.5
9.	23CSP303	Object-Oriented Programming Laboratory	ESC	60/40	0	0	3	3	1.5
TOTAL				**-**	**18**	**1**	**11**	**30**	**24.5**

SEMESTER IV

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23MAT401	Random Processes and Linear Algebra	BSC	40/60	3	1	0	4	4
2.	23BMT401	Biomedical Instrumentation	PCC	40/60	3	0	0	3	3
3.	23BMT402	Analog and Digital Integrated Circuits	PCC	40/60	3	0	0	3	3
4.	23BMT403	Bio Control Systems	PCC	40/60	3	0	0	3	3
5.	23BMT404	Signal Processing	PCC	50/50	3	0	2	5	4
6.	23GET401	Environmental Science and Engineering	BSC	40/60	2	0	0	2	2
PRACTICALS									
7.	23BMP401	Biomedical Instrumentation Laboratory	PCC	60/40	0	0	3	3	1.5
8.	23BMP402	Analog and Digital Integrated Circuits Laboratory	PCC	60/40	0	0	3	3	1.5
TOTAL				**-**	**17**	**1**	**8**	**26**	**22**

SEMESTER V

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23BMT501	Embedded Systems and IoMT	PCC	40/60	3	0	0	3	3
2.	23BMT502	Diagnostic and Therapeutic Equipment	PCC	40/60	3	0	0	3	3
3.		Professional Elective I	PEC	40/60	-	-	-	-	3
4.		Professional Elective II	PEC	40/60	-	-	-	-	3
5.		Professional Elective III	PEC	40/60	-	-	-	-	3
6.		Mandatory Course I &	MC		3	0	0	3	0
PRACTICALS									
7.	23BMP501	Embedded systems and IOMT Laboratory	PCC	60/40	0	0	3	3	1.5
8.	23BMP502	Diagnostic and Therapeutic Equipment Laboratory	PCC	60/40	0	0	4	4	2
9.	23BMP503	Mini Project	EEC	60/40	0	0	4	4	2
TOTAL				**-**	**9**	**-**	**11**	**20**	**20.5**

SEMESTER VI

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23CST402	Artificial Intelligence and Machine Learning	PCC	50/50	3	0	2	5	4
2.	23BMT601	Fundamentals of Healthcare Analytics	PCC	40/60	3	0	0	3	3
3.	23BMT602	Medical Image Processing	PCC	50/50	3	0	2	5	4
4.		Open Elective – I*	OEC	40/60	3	0	0	3	3
5.		Professional Elective IV	PEC	40/60	-	-	-	-	3
6.		Professional Elective V	PEC	40/60	-	-	-	-	3
7.		Professional Elective VI	PEC	40/60	-	-	-	-	3
8.		Mandatory Course-II &	MC	40/60	3	0	0	3	0
9.	23BMP601	Mini Project	EEC	60/40	0	0	4	4	2
TOTAL				**-**	**15**	**-**	**8**	**23**	**25**

SEMESTER VII

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23GET701	Human Values and Ethics	HSMC	40/60	2	0	0	2	2
2.		Management - Elective#	HSMC	40/60	3	0	0	3	3
3.		Open Elective -II **	OEC	40/60	3	0	0	3	3
PRACTICALS									
6.	23BMP701	Hospital Training	EEC	60/40	0	0	0	0	2
7.	23BMP702	Project Work – I	EEC	60/40	0	0	8	8	4
TOTAL				-	**8**	**0**	**8**	**16**	**14**

SEMESTER VIII

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.		Open Elective -III**	OEC	40/60	3	0	0	3	3
2.		Open Elective -IV**	OEC	40/60	3	0	0	3	3
PRACTICALS									
1.	23BMP801	Project Work II	EEC	60/40	0	0	12	12	6
TOTAL					**6**	**0**	**12**	**18**	**12**

***Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes.

ELECTIVE - MANAGEMENT COURSES

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23EMT001	Principles of Management	HSMC	40/60	3	0	0	3	3
2	23EMT002	Total Quality Management	HSMC	40/60	3	0	0	3	3
3	23EMT003	Engineering Economics and Financial Accounting	HSMC	40/60	3	0	0	3	3
4	23EMT004	Human Resource Management	HSMC	40/60	3	0	0	3	3
5	23EMT005	Knowledge Management	HSMC	40/60	3	0	0	3	3
6	23EMT006	Industrial Management	HSMC	40/60	3	0	0	3	3

MANDATORY COURSES I

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23MCT001	Introduction to Women and Gender Studies	MC	40/60	3	0	0	3	0
2	23MCT002	Elements of Literature	MC	40/60	3	0	0	3	0
3	23MCT003	Film Appreciation	MC	40/60	3	0	0	3	0
4	23MCT004	Disaster Management	MC	40/60	3	0	0	3	0
5	23MCT005	Disaster Management and Preparedness	MC	40/60	3	0	0	3	0

MANDATORY COURSES II

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23MCT006	Well Being with traditional practices (Yoga, Ayurveda and Siddha)	MC	40/60	3	0	0	3	0
2	23MCT007	History of Science and Technology in India	MC	40/60	3	0	0	3	0
3	23MCT008	Political and Economic Thought for a Humane Society	MC	40/60	3	0	0	3	0
4	23MCT009	State, Nation Building and Politics in India	MC	40/60	3	0	0	3	0
5	23MCT010	Industrial Safety	MC	40/60	3	0	0	3	0
TOTAL									

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Bio Engineering	**Vertical II Medical Device Innovation and Development**	**Vertical III Management (Healthcare)**	**Vertical IV Mechanics**	**Vertical V Signal and Image Processing**	**Verticals VI Communication**	**Verticals VII Advanced Healthcare Devices**
Biomaterials	Foundation Skills in Integrated Product Development	Clinical Engineering	Biomechanics	Bio Signal Processing	Communication Systems	Bio MEMS
Artificial Organs and Implants	Medical Device Design	Hospital Planning and Management	Rehabilitation Engineering	Computer Vision	Wearable Devices	Critical Care Equipment
Biomedical Optics and Photonics	Patient safety, Standards and Ethics	Medical Waste Management	Physiological Modelling	Speech and Audio Signal Processing	Body Area Networks	Human Assist Devices
Neural Engineering	Medical Device Regulations	Economics and Management for Engineers	Assistive Technology	Medical Imaging Systems	Virtual Reality and Augmented Reality in Healthcare	Advancements in Healthcare Technology
Principles of Tissue Engineering	Medical Innovation and Entrepreneurship	Biostatistics	Ergonomics	Brain Computer Interface and Applications	Telehealth Technology	Robotics in Medicine
Genetic Engineering	Rapid Prototyping	Forensic Science in Healthcare	Haptics	Biometrics	Medical Informatics	Therapeutic Equipment

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation / diversifiedgroup. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2021, Clause 4.10.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: BIOENGINEERING

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME001	Biomaterials	PEC	40/60	3	0	0	3	3
2	23BME002	Artificial Organs and Implants	PEC	40/60	3	0	0	3	3
3	23BME003	Biomedical Optics and Photonics	PEC	40/60	2	0	2	4	3
4	23BME004	Neural Engineering	PEC	40/60	3	0	0	3	3
5	23BME005	Principles of Tissue Engineering	PEC	40/60	3	0	0	3	3
6	23BME006	Genetic Engineering	PEC	40/60	3	0	0	3	3

VERTICAL 2: MEDICAL DEVICE INNOVATION AND DEVELOPMENT

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME007	Foundation Skills Integrated Product Development	PEC	40/60	3	0	0	3	3
2	23BME008	Medical Device Design	PEC	40/60	3	0	0	3	3
3	23BME009	Patient safety, Standards and Ethics	PEC	40/60	3	0	0	3	3
4	23BME010	Medical Device Regulations	PEC	40/60	3	0	0	3	3
5	23BME011	Medical Innovation and Entrepreneurship	PEC	40/60	3	0	0	3	3
6	23BME012	Rapid Prototyping	PEC	40/60	3	0	0	3	3

VERTICAL 3: MANAGEMENT (HEALTHCARE)

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME013	Clinical Engineering	PEC	40/60	3	0	0	3	3
2	23BME014	Hospital Planning and Management	PEC	40/60	3	0	0	3	3
3	23BME015	Medical Waste Management	PEC	40/60	3	0	0	3	3
4	23BME016	Economics and Management for Engineers	PEC	40/60	3	0	0	3	3
5	23BME017	Bio Statistics	PEC	40/60	2	0	2	4	3
6	23BME018	Forensic Science in Healthcare	PEC	40/60	3	0	0	3	3

VERTICAL 4: MECHANICS

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME019	Biomechanics	PEC	50/50	2	0	2	4	3
2	23BME020	Rehabilitation engineering	PEC	40/60	3	0	0	3	3
3	23BME021	Physiological modelling	PEC	40/60	3	0	0	3	3
4	23BME022	Assistive Technology	PEC	40/60	3	0	0	3	3
5	23BME023	Ergonomics	PEC	40/60	3	0	0	3	3
6	23BME024	Haptics	PEC	40/60	3	0	0	3	3

VERTICAL 5: SIGNAL AND IMAGE PROCESSING

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME025	Bio signal Processing	PEC	40/60	3	0	0	3	3
2	23BME026	Computer Vision	PEC	50/50	2	0	2	4	3
3	23BME027	Speech and Audio Signal Processing	PEC	40/60	3	0	0	3	3
4	23BME028	Medical Imaging Systems	PEC	40/60	3	0	0	3	3
5	23BME029	Brain Computer Interface and Applications	PEC	40/60	3	0	0	3	3
6	23BME030	Biometrics	PEC	40/60	3	0	0	3	3

VERTICAL 6: COMMUNICATION

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME031	Communication Systems	PEC	40/60	3	0	0	3	3
2	23ECO009	Wearable devices	PEC	40/60	3	0	0	3	3
3	23BME032	Body Area Networks	PEC	40/60	3	0	0	3	3
4	23BME033	Virtual reality and Augmented Reality in Healthcare	PEC	40/60	3	0	0	3	3
5	23BME034	Telehealth Technology	PEC	50/50	2	0	2	4	3
6	23BME035	Medical Informatics	PEC	40/60	3	0	0	3	3

VERTICAL 7: ADVANCED HEALTHCARE DEVICES

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23BME036	Bio MEMS	PEC	40/60	3	0	0	3	3
2	23BME037	Critical Care Equipment	PEC	40/60	3	0	0	3	3
3	23BME038	Human Assist Devices	PEC	40/60	3	0	0	3	3
4	23BME039	Advancements in Healthcare Technology	PEC	50/50	2	0	2	4	3
5	23BME040	Robotics in Medicine	PEC	40/60	3	0	0	3	3
6	23BME041	Therapeutic Equipment	PEC	40/60	3	0	0	3	3

OPEN ELECTIVES

(Students shall choose the Open Elective Courses, such that the course contents are not similar to any other course contents/title under other course categories)

OPEN ELECTIVE - I

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23EC0001	Space Science	OEC	40/60	3	0	0	3	3
2	23MEO020	Introduction to Industrial Engineering	OEC	40/60	3	0	0	3	3
3	23BMO005	Food, Nutrients and Health	OEC	40/60	3	0	0	3	3
4	23CEO011	Environment and Social Impact Assessment	OEC	40/60	3	0	0	3	3
5	23EEO011	Renewable Energy System	OEC	40/60	3	0	0	3	3
6	23EEO12	Introduction to Industrial Instrumentation and Control	OEC	40/60	3	0	0	3	3
7	23MAO007	Graph Theory	OEC	40/60	3	0	0	3	3
8	23CSO005	Deep Learning	OEC	40/60	3	0	0	3	3
9	23CSO007	Digital Marketing	OEC	40/60	3	0	0	3	3

OPEN ELECTIVE - II

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23MGO008	Resource Management Techniques	40/60	40/60	3	0	0	3	3
2	23MGO009	Fintech Regulations	40/60	40/60	3	0	0	3	3
3	23BTO007	Holistic Nutrition	40/60	40/60	3	0	0	3	3
4	23CSO008	ICT in Agriculture	40/60	40/60	3	0	0	3	3
5	23EEO013	Introduction to Control Engineering	40/60	40/60	3	0	0	3	3
6	23BMO006	Pharmaceutical Nanotechnology	40/60	40/60	3	0	0	3	3
7	23ECO010	Robotics Process Automation	40/60	40/60	3	0	0	3	3

OPEN ELECTIVE - III

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23HSO001	English for Competitive Examinations	OEC	40/60	3	0	0	3	3
2	23MGO001	NGOs and Sustainable Development	OEC	40/60	3	0	0	3	3
3	23MGO002	Democracy and Good Governance	OEC	40/60	3	0	0	3	3
4	23EEO001	Renewable Energy Technologies	OEC	40/60	3	0	0	3	3
5	23MEO001	Applied Design Thinking	OEC	50/50	2	0	2	4	3
6	23MEO002	Reverse Engineering	OEC	40/60	3	0	0	3	3
7	23MEO003	Sustainable Manufacturing	OEC	40/60	3	0	0	3	3

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
8	23EEO002	Electric and Hybrid Vehicle	OEC	40/60	3	0	0	3	3
9	23ECO002	Space Engineering	OEC	40/60	3	0	0	3	3
10.	23MGO004	Industrial Management	OEC	40/60	3	0	0	3	3
11.	23MGO003	Quality Engineering	OEC	40/60	3	0	0	3	3
12.	23CHO001	Fire Safety Engineering	OEC	40/60	3	0	0	3	3
13.	23CEO001	Introduction to non-Destructive testing	OEC	40/60	3	0	0	3	3
14.	23MEO004	Mechatronics	OEC	40/60	3	0	0	3	3
15.	23MEO005	Foundation of Robotics	OEC	40/60	3	0	0	3	3
16.	23MEO006	Fundamentals of Aeronautical Engineering	OEC	40/60	3	0	0	3	3
17.	23CEO002	Remote Sensing Concepts	OEC	40/60	3	0	0	3	3
18.	23CEO003	Urban Agriculture	OEC	40/60	3	0	0	3	3
19.	23CEO004	Drinking Water Supply and Treatment	OEC	40/60	3	0	0	3	3
20.	23EEO003	Electric Vehicle technology	OEC	40/60	3	0	0	3	3
21.	23EEO004	Introduction to PLC Programming	OEC	40/60	3	0	0	3	3
23.	23CHO002	Nano Technology	OEC	40/60	3	0	0	3	3
23.	23MEO007	Functional Materials	OEC	40/60	3	0	0	3	3
24.	23BMO001	Biomedical Instrumentation	OEC	40/60	3	0	0	3	3
25.	23BTO001	Traditional Indian Foods	OEC	40/60	3	0	0	3	3
26.	23BTO002	Introduction to food processing	OEC	40/60	3	0	0	3	3

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
27.	23BTO003	IPR for Pharma Industry	OEC	40/60	3	0	0	3	3
28.	23CHO003	Basics of Textile Finishing	OEC	40/60	3	0	0	3	3
29.	23CHO004	Industrial Engineering for Garment Industry	OEC	40/60	3	0	0	3	3
30.	23CHO005	Basics of Textile Manufacture	OEC	40/60	3	0	0	3	3
31.	23CHO006	Introduction to Petroleum Refining and Petrochemicals	OEC	40/60	3	0	0	3	3
32.	23EEO005	Energy Conservation and Management	OEC	40/60	3	0	0	3	3
33.	23CHO007	Basics of Plastics Processing	OEC	40/60	3	0	0	3	3
34.	23ECO003	Signals and Systems	OEC	40/60	3	0	0	3	3
35.	23ECO004	Fundamentals of Electronic Devices and Circuits	OEC	40/60	3	0	0	3	3
36.	23MAO001	Operations Research	OEC	40/60	3	0	0	3	3
37.	23MAO002	Algebra and Number Theory	OEC	40/60	3	0	0	3	3
38.	23MAO003	Linear Algebra	OEC	40/60	3	0	0	3	3
39.	23CEO002	Lean Concepts, Tools and Practices	OEC	40/60	3	0	0	3	3

OPEN ELECTIVE - IV

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23HSO002	Project Report Writing	OEC	40/60	3	0	0	3	3
2	23MAO004	Advanced Numerical Methods	OEC	40/60	3	0	0	3	3
3	23MAO005	Random Processes	OEC	40/60	3	0	0	3	3
4	23MAO006	Queuing and Reliability Modelling	OEC	40/60	3	0	0	3	3
5	23MGO004	Production and Operations Management for Entrepreneurs	OEC	40/60	3	0	0	3	3
6	23MGO005	Multivariate Data Analysis	OEC	40/60	3	0	0	3	3
7	23MEO009	Additive Manufacturing	OEC	40/60	3	0	0	3	3
8	23MEO010	New Product Development	OEC	40/60	3	0	0	3	3
9	23MEO011	Industrial Design & Rapid Prototyping Techniques	OEC	50/50	2	0	2	4	3
10	23MEO012	Micro and Precision Engineering	OEC	40/60	3	0	0	3	3
11	23MEO013	Cost Management of Engineering Projects	OEC	40/60	3	0	0	3	3
12	23EEO011	Batteries and Management system	OEC	40/60	3	0	0	3	3
13	23EEO006	Sensors and Actuators	OEC	40/60	3	0	0	3	3
14	23ECO005	Space Vehicles	OEC	40/60	3	0	0	3	3
15.	23MGO006	Management Science	OEC	40/60	3	0	0	3	3
16.	23MEO014	Production Planning and Control	OEC	40/60	3	0	0	3	3

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
17.	23MGO007	Operations Management	OEC	40/60	3	0	0	3	3
18.	23BMO003	Industrial Hygiene	OEC	40/60	3	0	0	3	3
19.	23CHO008	Chemical Process Safety	OEC	40/60	3	0	0	3	3
20.	23EEO007	Electrical, Electronic and Magnetic materials	OEC	40/60	3	0	0	3	3
21.	23CHO009	Nanomaterials and applications	OEC	40/60	3	0	0	3	3
23.	23CEO011	Hydraulics and Pneumatics	OEC	40/60	3	0	0	3	3
24.	23EEO008	Sensors	OEC	40/60	3	0	0	3	3
25.	23ECO006	Concepts in Mobile Robotics	OEC	40/60	3	0	0	3	3
26.	23MEO015	Marine Propulsion	OEC	40/60	3	0	0	3	3
27.	23MEO016	Marine Merchant Vehicles	OEC	40/60	3	0	0	3	3
28.	23MEO017	Elements of Marine Engineering	OEC	40/60	3	0	0	3	3
29.	23ECO007	Drone Technologies	OEC	40/60	3	0	0	3	3
30.	23CEO005	Geographical Information System	OEC	40/60	3	0	0	3	3
31.	23CEO006	Agriculture Entrepreneurship Development	OEC	40/60	3	0	0	3	3
32.	23CEO010	Biodiversity Conservation	OEC	40/60	3	0	0	3	3
33.	23EEO009	Introduction to control systems	OEC	40/60	3	0	0	3	3
34.	23MEO021	Introduction to Industrial Automation Systems	OEC	40/60	3	0	0	3	3
35.	23EEO010	Energy Technology	OEC	40/60	3	0	0	3	3

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
36.	23CEO007	Environment and Agriculture	OEC	40/60	3	0	0	3	3
37.	23BTO004	Fundamentals of Food Engineering	OEC	40/60	3	0	0	3	3
38.	23BTO005	Food safety and Quality Regulations	OEC	40/60	3	0	0	3	3
39.	23BTO006	Nutraceuticals	OEC	40/60	3	0	0	3	3
40.	23CHO010	Basics of Dyeing and Printing	OEC	40/60	3	0	0	3	3
41.	23CEO011	Fibre Science	OEC	40/60	3	0	0	3	3
42.	23CEO012	Garment Manufacturing Technology	OEC	40/60	3	0	0	3	3
43.	23CEO009	Industrial safety	OEC	40/60	3	0	0	3	3
44.	23CEO013	Unit Operations in Petro Chemical Industries	OEC	40/60	3	0	0	3	3
45.	23MEO018	Plastic Materials for Engineers	OEC	40/60	3	0	0	3	3
46.	23MEO018	Properties and Testing of Plastics	OEC	40/60	3	0	0	3	3
47.	23ECO008	VLSI Design	OEC	40/60	3	0	0	3	3
48.	23CEO008	Basics of Integrated Water Resources Management	OEC	40/60	3	0	0	3	3

SUMMARY

Name of the Programme										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	4	3					5		12
2	BSC	12	4	4	6					26
3	ESC	5	9	12						26
4	PCC		8	8.5	16	9.5	11			53
5	PEC					9	9			18
6	OEC						3	3	6	12
7	EEC					2	2	6	6	16
8	Non-Credit (Mandatory)					✓	✓			
Total		21	24	24.5	22	20.5	25	14	12	163

VERTICALS FOR MINOR DEGREE

(In addition to all the verticals of other programmes)

Vertical I Fintech and Block chain	Vertical II	Vertical III	Vertical IV	Vertical V
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics For Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Constitution of India	Datamining For Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management For Business	Administrative Theories	Marketing And Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation And Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

Vertical I: FINTECH AND BLOCKCHAIN

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23CMG001	Financial Management	PEC	40/60	3	0	0	3	3
2	23CMG002	Fundamentals of Investment	PEC	40/60	3	0	0	3	3
3	23CMG003	Banking, Financial Services and Insurance	PEC	40/60	3	0	0	3	3
4	23CMG004	Introduction to Blockchain and its Applications	PEC	40/60	3	0	0	3	3
5	23CMG005	Fintech Personal Finance and Payments	PEC	40/60	3	0	0	3	3
6	23CMG006	Introduction to Fintech	PEC	40/60	3	0	0	3	3

Vertical II: ENTREPRENEURSHIP

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23CMG007	Foundations of Entrepreneurship	PEC	40/60	3	0	0	3	3
2	23CMG008	Team Building & Leadership Management for Business	PEC	40/60	3	0	0	3	3
3	23CMG009	Creativity & Innovation in Entrepreneurship	PEC	40/60	3	0	0	3	3
4	23CMG010	Principles of Marketing Management For Business	PEC	40/60	3	0	0	3	3
5	23CMG011	Human Resource Management for Entrepreneurs	PEC	40/60	3	0	0	3	3

6	23CMG012	Financing New Business Ventures	PEC	40/60	3	0	0	3	3

Vertical III: PUBLIC ADMINISTRATION

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23CMG013	Principles of Public Administration	PEC	40/60	3	0	0	3	3
2	23CMG014	Constitution of India	PEC	40/60	3	0	0	3	3
3	23CMG015	Public Personnel Administration	PEC	40/60	3	0	0	3	3
4	23CMG016	Administrative Theories	PEC	40/60	3	0	0	3	3
5	23CMG017	Indian Administrative System	PEC	40/60	3	0	0	3	3
6	23CMG018	Public Policy Administration	PEC	40/60	3	0	0	3	3

Vertical IV: BUSINESS DATA ANALYTICS

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23CMG019	Statistics For Management	PEC	40/60	3	0	0	3	3
2	23CMG020	Datamining For Business Intelligence	PEC	40/60	3	0	0	3	3
3	23CMG021	Human Resource Analytics	PEC	40/60	3	0	0	3	3
4	23CMG022	Marketing And Social Media Web Analytics	PEC	40/60	3	0	0	3	3
5	23CMG023	Operation And Supply Chain Analytics	PEC	40/60	3	0	0	3	3
6	23CMG024	Financial Analytics	PEC	40/60	3	0	0	3	3

Vertical V: ENVIRONMENT AND SUSTAINABILITY

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1	23CES001	Sustainable Infrastructure Development	PEC	40/60	3	0	0	3	3
2	23CES002	Sustainable Agriculture and Environmental Management	PEC	40/60	3	0	0	3	3
3	23CES003	Sustainable Bio Materials	PEC	40/60	3	0	0	3	3
4	23CES004	Materials for Energy Sustainability	PEC	40/60	3	0	0	3	3
5	23CES005	Green Technology	PEC	40/60	3	0	0	3	3
6	23CES006	Environmental Quality Monitoring and Analysis	PEC	40/60	3	0	0	3	3
7	23CES007	Integrated Energy Planning for Sustainable Development	PEC	40/60	3	0	0	3	3
8	23CES008	Energy Efficiency for Sustainable Development	PEC	40/60	3	0	0	3	3