

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI**  
**CHOICE BASED CREDIT SYSTEM (CBCS)**  
**SCHEME OF TEACHING AND EXAMINATION 2017-2018 (Approved)**

**B.E.: Biomedical Engineering**

**III SEMESTER**

Sl. No.	Course Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17MAT31	Engineering Mathematics-III	Mathematics	04	-	03	60	40	100	4
2	17BM32	Electronic Instrumentation and Measurements	BM	04	-	03	60	40	100	4
3	17BM33	Analog Electronic Circuits	BM	04	-	03	60	40	100	4
4	17BM34	Digital Design and HDL	BM	04	-	03	60	40	100	4
5	17BM35	Human Anatomy and Physiology	BM	04	-	03	60	40	100	4
6	17BM36	Network Analysis	BM	03	-	03	60	40	100	3
7	17BML37	Analog Electronic Circuits Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
8	17BML38	Digital Design and HDL Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
9	17KL / CPH39/49	Kannada / Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	1
<b>TOTAL</b>				<b>25</b>	<b>6</b>	<b>25</b>	<b>510</b>	<b>340</b>	<b>850</b>	<b>28</b>

**1. Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.

**2. Audit Course:**

(i) \*All lateral entry students (except B.Sc. candidates) have to register for Additional Mathematics – I, which is 03 contact hours per week.

1	17MATDIP31	Additional Mathematics –I	Mathematics	03	--	03	60	--	60	--
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(ii) Language English (Audit Course) be compulsorily studied by all lateral entry students (except B.Sc. candidates)

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**IV SEMESTER**

Sl. No	Subject Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17MAT41	Engineering Mathematics-IV	Mathematics	04	-	03	60	40	100	4
2	17BM42	Signal Conditioning and Data Acquisition Circuits	BM	04	-	03	60	40	100	4
3	17BM43	Embedded Controllers	BM	04	-	03	60	40	100	4
4	17BM44	Control Systems	BM	04	-	03	60	40	100	4
5	17BM45	Biomedical Transducers and Measurements	BM	04	-	03	60	40	100	4
6	17BM46	Scientific and Analytical Instrumentation	BM	03	-	03	60	40	100	3
7	17BML47	Embedded Controllers Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
8	17BML48	Biomedical Transducers and Measurements Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
9	17KL / CPH39/49	Kannada / Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	1
<b>TOTAL</b>				<b>24</b>	<b>06</b>	<b>25</b>	<b>510</b>	<b>340</b>	<b>850</b>	<b>28</b>

**1. Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.

**2. Audit Course:**

(i) \*All lateral entry students (except B.Sc. candidates) have to register for Additional Mathematics – I, which is 03 contact hours per week.

1	17MATDIP41	Additional Mathematics –II	Mathematics	03	--	03	60	--	60	--
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(ii) Language English (Audit Course) be compulsorily studied by all lateral entry students (except B.Sc. candidates)

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**V SEMESTER**

Sl. No	Subject Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17ES51	Management and Entrepreneurship Development	BM/ Humanities	04	-	03	60	40	100	4
2	17BM52	Fundamentals of Signals & DSP	BM	04	-	03	60	40	100	4
3	17BM53	Clinical Instrumentation-I	BM	04	-	03	60	40	100	4
4	17BM54	Biomedical Equipment's	BM	04	-	03	60	40	100	4
5	17BM55X	Professional Elective-I	BM	03	-	03	60	40	100	3
6	17BM56X	Open Elective-I	BM	03	-	03	60	40	100	3
7	17BML57	Signal Conditioning Circuits and Data Acquisition Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
8	17BML58	Clinical Instrumentation Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
<b>TOTAL</b>				<b>22</b>	<b>06</b>	<b>24</b>	<b>480</b>	<b>320</b>	<b>800</b>	<b>26</b>

Professional Elective-I		Open Elective-I	
17BM551	VLSI Design	17BM561	Computer Organization
17BM552	Rehabilitation Engineering	17BM562	Virtual Bio-Instrumentation
17BM553	Hospital Design, Planning and Management	17BM563	Operating Systems
17BM554	Biomedical Nanotechnology	17BM564	Medical Physics
		17NC561	Essentials of NCC (common to all branches)

\*\*\*Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives).

Selection of an open elective is not allowed, if:

- The candidate has no pre – requisite knowledge.
- The candidate has studied similar content course during previous semesters.
- The syllabus content of the selected open elective is similar to that of Departmental core course(s) or to be studied Professional elective(s).

Registration to open electives shall be documented under the guidance of Programme Coordinator and Adviser.

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**VI SEMESTER**

Sl. No	Subject Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17BM61	Analog and Digital Communication Systems	BM	04	-	03	60	40	100	4
2	17BM62	Medical Image Processing	BM	04	-	03	60	40	100	4
3	17BM63	OOPs with C++	BM	04	-	03	60	40	100	4
4	17BM64	Clinical Instrumentation-II	BM	04	-	03	60	40	100	4
5	17BM65X	Professional Elective-II	BM	03	-	03	60	40	100	3
6	17BM66X	Open Elective-II	BM	03	-	03	60	40	100	3
7	17BML67	Medical Image Processing Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
8	17BML68	OOPs with C++Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
<b>TOTAL</b>				<b>22</b>	<b>6</b>	<b>24</b>	<b>480</b>	<b>320</b>	<b>800</b>	<b>26</b>

Professional Elective-II		Open Elective-II	
17BM651	Biosensors and Smart Sensors	17BM661	Mobile Communication
17BM652	Distributed Sensor Networks	17BM662	Software Engineering
17BM653	Bioinformatics	17BM663	Embedded System Design and Programming
17BM654	Biomechanics and Biodynamics	17BM664	Statistics and Numerical Methods
		17CS661	Mobile Application Development (common to all branches)

\*\*\*Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives).

Selection of an open elective is not allowed, if:

- The candidate has no pre – requisite knowledge.
- The candidate has studied similar content course during previous semesters.
- The syllabus content of the selected open elective is similar to that of Departmental core course(s) or to be studied Professional elective(s).

Registration to open electives shall be documented under the guidance of Programme Coordinator and Adviser.

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**VII SEMESTER**

Sl. No	Subject Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17BM71	Biomedical Digital Signal Processing	BM	04	-	03	60	40	100	4
2	17BM72	Computer Communication Networks in Healthcare	BM	04	-	03	60	40	100	4
3	17BM73	ARM Processor	BM	04	-	03	60	40	100	4
4	17BM74X	Professional Elective-III	BM	03	-	03	60	40	100	3
5	17BM75X	Professional Elective-IV	BM	03	-	03	60	40	100	3
6	17BML76	Biomedical DSP Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
7	17BML77	ARM Processor Lab	BM	-	1Hr-Instruction 2Hr-Practical	03	60	40	100	2
8	17BMP78	Project Work Phase-I + Project Seminar	BM	-	03	--	--	100	100	2
<b>TOTAL</b>				<b>18</b>	<b>9</b>	<b>21</b>	<b>420</b>	<b>380</b>	<b>800</b>	<b>24</b>

Professional Elective-III		Professional Elective-IV	
17BM741	Database Management System in Healthcare	17BM751	Biostatistics
17BM742	Medical Informatics and Expert Systems	17BM752	Lasers and Optical Fibers in Medicine
17BM743	Hardware-Software Co-design	17BM753	Ergonomics
17BM744	Biometric Systems	17BM754	Big-data and Cloud Computing

- **Project Phase – I and Project Seminar:** Comprises of Literature Survey, Problem identification, Objectives and Methodology. CIE marks shall be based on the report covering Literature Survey, Problem identification, Objectives and Methodology and Seminar presentation skill.

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**VIII SEMESTER**

Sl. No	Subject Code	Title	Teaching Department	Teaching Hours /Week		Examination				Credit
				Theory	Practical/ Drawing	Duration (in Hrs)	SEE Marks	CIE Marks	Total Marks	
1	17BM81	Medical Imaging Systems	BM	4	-	3	60	40	100	4
2	17BM82	Biomaterials and Artificial Organs	BM	4	-	3	60	40	100	4
3	17BM83X	Professional Elective-V	BM	3	-	3	60	40	100	3
4	17BM84	Internship / Professional Practice	BM	Industry Oriented		3	50	50	100	2
5	17BMP85	Project Work Phase-II	BM	-	6	3	100	100	200	6
6	17BMS86	Seminar	BM	-	4	-	-	100	100	1
<b>TOTAL</b>				<b>11</b>	<b>10</b>	<b>15</b>	<b>330</b>	<b>370</b>	<b>700</b>	<b>20</b>

<b>Professional Elective-V</b>	
17BM831	Bio-MEMS
17BM832	Medical Device Regulations
17BM833	Picture Archiving and Communication Systems
17BM834	Neural Networks and AI in Biomedical Engg.

- **Internship / Professional Practice:** The 4 Weeks internship to be completed between the VI and VII semester vacation, and/or VII and VIII semester vacation period.