

**Rashtreeya Sikshana Samithi Trust**  
**R.V.COLLEGE OF ENGINEERING**  
(Autonomous Institution Affiliated to VTU, Belagavi)  
**R.V. Vidyaniketan Post, Mysore Road**  
**Bengaluru – 560 059**



**Bachelor of Engineering (B.E)**  
**Scheme and Syllabus**  
**(2016 Scheme)**

## Abbreviations

<b>Sl. No.</b>	<b>Abbreviation</b>	<b>Meaning</b>
1	<b>CIE</b>	Continuous Internal Evaluation
2	<b>CS</b>	Computer Science and Engineering
3	<b>CV</b>	Civil Engineering
4	<b>ECE</b>	Electronics and Communication Engineering
5	<b>EE</b>	Electrical and Electronics Engineering
6	<b>HSS</b>	Humanities and Social Sciences
7	<b>ME</b>	Mechanical Engineering
8	<b>SEE</b>	Semester End Examination
9	<b>SS (EL)</b>	Self Study (Experiential Learning)

# **VISION**

A Premier Department in Biotechnology Education, Research and Innovation with a Focus on Sustainable Technologies for the Benefit of Society and Environment.

# **MISSION**

- Create state-of-the-art infrastructure for research and training in Biotechnology
- Develop graduates who are ethically and socially concerned
- Promoting collaboration with academia, industries and research organizations at national and international level
- Contribute to socioeconomic development through sustainable and inclusive technologies

# **PROGRAM EDUCATIONAL OBJECTIVES**

- The graduates of Biotechnology program will
- Have a strong foundation in scientific and engineering fundamentals that prepare them for a successful career in Biotechnology and allied fields
- Function at a technically competent level in formulating and solving problems in Biotechnology
- Organize and utilize the knowledge to develop Biological processes and gene manipulation techniques
- Exhibit professionalism, ethical attitude, oral and written communication skills, team work and develop an outlook for lifelong learning

# PROGRAM OUTCOMES

1. **Engineering Knowledge:** Gain knowledge of Biotechnology and apply Science & Engineering concepts to solve problems related to field of Biotechnology.
2. **Problem Analysis:** Identify, analyze and understand problems related to biotechnology and finding valid conclusions with basic knowledge in Engineering.
3. **Design / Development of solution:** Able to design and develop solution to Biotechnology Engineering problems by applying appropriate tools while keeping in mind safety factor for environment & society.
4. **Conduct investigations of complex problems:** Able to design, perform experiments, analyze and interpret data for investigating complex problems in biotechnology Engineering and related fields.
5. **Modern tool usage:** Able to decide and apply appropriate tools and techniques in biotechnological manipulations.
6. **The engineer and society:** Able to justify societal, health, safety and legal issues and understand his responsibilities in biotechnological engineering practices
7. **Environment and sustainability:** Able to understand the need and impact of biotechnological solutions on environment and societal context keeping in view need for sustainable solution.
8. **Ethics:** Have knowledge and understanding of related norms and ethics in Biotechnology Engineering product/technique development.
9. **Individual and team work:** Able to undertake any responsibility as an individual and as a team in a multidisciplinary environment.
10. **Communication:** Develop oral and written communication skills.

**11. Project management and finance:** Able to demonstrate knowledge of project and finance management, property rights (IPR) when dealing with Biotechnology Engineering problems.

**12. Lifelong learning:** Have thorough knowledge in Biotechnology Engineering and will also be ready to engage themselves in lifelong learning.

## **PROGRAM SPECIFIC OUTCOME**

- The Graduates of Biotechnology Program will
- PSO1: Acquire strong knowledge of mathematics and statistics to deal with engineering problems related to Biotechnology and Bioinformatics and will have enough basic knowledge of computer science and biology to deal with Bioinformatics problems related to Biotechnology.
- PSO2: Acquire good knowledge to deal with Chemical Engineering and Biotechnology problems related to Upstream and Downstream process Technology through laboratory core and elective courses. Interdisciplinary knowledge is upgraded by attending global elective.
- PSO3: Acquire technical knowledge and expertise by applying biotechnological tools to Agriculture Health sector and Fermentation Industry with emphasis on production, Management and Research.

### Credits Distribution as per UGC/VTU

Sl. No.	Category	Percentage (%)	Minimum No. of credits	2016 scheme	
				Without Mini Project	With Mini Project
1	Humanities	5-10	10	9+2	9+2
2	Basic Science	15-20	30	30	30
3	Engineering Science	15-20	30	30	30
4	Professional Core Courses (PC)	30-40	60	78+3=81 (3 credits core in place of Minor project in 7 <sup>th</sup> semester)	81-3=78 (3 Credits for minor project in 7 <sup>th</sup> semester)
5	Professional Elective Courses	10-15	20	20	20
6	Other Electives	5-10	10	10	10
7	Project Work	10-15	20	16+2 Major project +Tech. Seminar	16+2+3 Major project +Tech. Seminar +Mini Project
				200	200

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**THIRD SEMESTER CREDIT SCHEME**

Sl. No	Course Code	Course Title	BoS	CREDIT ALLOCATION				Total Credits
				Lecture	Tutorial	Practical	SS (EL)	
1	16MA31C	Applied Mathematics - III	Maths	3	1	0	0	4
2	16EB32	Biology for Engineers	ME/ BT	2	0	0	0	2
3	16BT33	Biochemistry	BT	3	0	1	1*	5
4	16BT34	Cell and Microbiology	BT	3	0	1	1*	5
5	16BT35	Unit Operations	BT	3	0	1	1*	5
6	16BT36	Thermodynamics	BT	3	1	0	0	4
7	16DMA37 /16DCS 37	Bridge Course Mathematics /Bridge Course C Programming	Maths /CSE	2**	0	0	0	0
		<b>Total No. of Credits</b>		<b>17</b>	<b>02</b>	<b>03</b>	<b>03</b>	<b>25</b>
		<b>No. Of Hrs.</b>		<b>17+2**</b>	<b>04</b>	<b>06</b>	<b>12***</b>	<b>30</b>

**\*Self study attached to Lab \*\* Mandatory audit course for lateral entry diploma students. \*\*\* Non contact hours**

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**FOURTH SEMESTER CREDIT SCHEME**

Sl.No	Course Code	Course Title	BoS	CREDIT ALLOCATION				Total Credits
				Lecture	Tutorial	Practical	SS (EL)	
1.	16BT41	Biostatistics	BT	3	1	0	0	4
2.	16ET42	Environmental Technology	BT	2	0	0	0	2
3.	16BT43	Biophysics. & Instrumentation techniques	BT	3	0	1	1*	5
4.	16BT44	Basics of Computer applications	BT	3	0	1	1*	5
5.	16BT45	Process Principles and Calculations	BT	3	0	0	1*	4
6.	16BT46	Molecular Biology	BT	3	1	0	0	4
7.	16HS47	Professional Practice – II (Teamwork & Professional ethics)\$	HSS					1
8.	16DMA48 /16DCS48	Bridge Course Mathematics /Bridge Course C programming	Maths	2**	0	0	0	0
		<b>Total No. of Credits</b>		<b>17</b>	<b>02</b>	<b>02</b>	<b>03</b>	<b>25</b>
		<b>No. Of Hrs.</b>		<b>17+2**</b>	<b>04</b>	<b>04</b>	<b>12***</b>	<b>27</b>

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\$ 3 days (18hrs) in 3<sup>rd</sup> semester and 3 days (18 Hrs) in 4<sup>th</sup> semester



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**FIFTH SEMESTER CREDIT SCHEME**

Sl. No	Course Code	Course Title	BoS	CREDIT ALLOCATION				Total Credits
				Lecture	Tutorial	Practical	SS (EL)	
1	16HSI51	IPR & Entrepreneurship	HSS	3	0	0	0	3
2	16BT52	Bioinformatics	BT	3	0	1	1*	5
3	16BT53	Genetic Engineering	BT	3	0	1	1*	5
4	16BT54	Reaction Engineering	BT	3	1	0	0	4
5	16BT55	Immunotechnology	BT	3	0	0	0	3
6	16BT5AX	Elective A (PE)	BT	3	0	0	1*	4
7	16GE5BXX	Elective B (OE) Bioinformatics	BT	4	0	0	0	4
		<b>Total No. of Credits</b>		<b>22</b>	<b>01</b>	<b>02</b>	<b>03</b>	<b>28</b>
		<b>No. Of Hrs.</b>		<b>22</b>	<b>02</b>	<b>04</b>	<b>12**</b>	<b>28</b>

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**SIXTH SEMESTER CREDIT SCHEME**

Sl.No	Course Code	Course Title	BoS	CREDIT ALLOCATION				Total Credits
				Lecture	Tutorial	Practical	SS (EL)	
1	16HEM61	Foundations of Management And Economics	HSS	2	0	0	0	2
2	16BT62	Microbial Biotechnology	BT	3	0	1	1*	5
3	16BT63	Process Dynamics & Control	BT/CH	3	0	1	1*	5
4	16BT64	Genomics & Proteomics	BT	3	1	0	0	4
5	16BT6CX	Elective C (PE)	BT	3	0	0	1*	4
6	16BT6DX	Elective D (PE)	BT	4	0	0	0	4
7	16GE6XX	Elective E (OE) Bioinspired Engineering	BT	3	0	0	0	3
8	16HS68	Professional Practice III (Employability skills & Professional Development of Engineers)	HSS	1	0	0	0	1
		<b>Total No. of Credits</b>		<b>22</b>	<b>01</b>	<b>02</b>	<b>03</b>	<b>28</b>
		<b>No. Of Hrs.</b>		<b>22</b>	<b>02</b>	<b>04</b>	<b>12**</b>	<b>28</b>

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**SEVENTH SEMESTER CREDIT SCHEME**

Sl. No.	Course Code	Course Title	BoS	Credit Allocation				Total credits
				Lecture	Tutorial	Practical	SS	
1	16BT71	Plant Biotechnology	BT	4	0	1	0	5
2	16BT72	Downstream Processing	BT	4	0	1	0	5
3	16BT73	Animal Biotechnology	BT	3	0	0	0	3
4	16XX7FX	Elective F (PE)	BT	4	0	0	0	4
5	16XX7GX	Elective G (PE)	BT	4	0	0	0	4
6	16GH7XX	Elective H (OE) Nanotechnology	BT	3	0	0	0	3
		<b>Total Credits</b>		<b>22</b>	<b>00</b>	<b>02</b>	<b>00</b>	<b>24</b>
		<b>No. Of Hrs.</b>		<b>22</b>	<b>00</b>	<b>04</b>	<b>00</b>	<b>26</b>

1Hr. Theory= 1 credit

2Hrs. Practical=1credit

2Hrs. Tutorial=1 credit

4Hrs. SS (EL) = 1 Credit

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**EIGHTH SEMESTER CREDIT SCHEME**

Sl. No.	Course Code	Course Title	BoS	Credit Allocation				Total Credits
				Lecture	Tutorial	Practical	SS	
1	16BTP81	Major Project	BT	0	0	16	0	16
2	16BTS82	Technical Seminar	BT	0	0	2	0	2
3	16HSS83	Innovation and Social Skills	HSS	0	0	2	0	2
		<b>Total Credit</b>				<b>20</b>		<b>20</b>
		<b>No. Of Hrs.</b>		<b>0</b>	<b>0</b>	<b>40</b>	<b>0</b>	<b>40</b>

## List of Professional Electives

	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
	<b>Health &amp; Pharmaceuticals</b>	<b>Food &amp; Agricultural Biotechnology</b>	<b>Industrial Biotechnology</b>	<b>Informatics</b>
<b>Professional elective A</b>	<b>Pharmaceuticals</b>	<b>Agricultural Biotechnology</b>	<b>Process Engineering</b>	<b>Data Structure</b>
<b>Professional elective C</b>	<b>Clinical Technology</b>	<b>Food Engineering</b>	<b>Fermentation Technology</b>	<b>Java and J2EE</b>
<b>Professional elective D</b>	<b>Medical Instrumentation</b>	<b>Food &amp; Dairy Biotechnology</b>	<b>Plant Design &amp; Economics</b>	<b>Systems Biology</b>
<b>Professional elective F</b>	<b>Nanobiotechnology</b>	<b>Plant - Based Vaccines</b>	<b>Equipment Design &amp; Drawing</b>	<b>MAT LAB</b>
<b>Professional elective G</b>	<b>Vaccine Technology</b>	<b>Nutraceuticals</b>	<b>GMP, GLP, Biosafety and Biobusiness</b>	<b>HPC and Big data analysis</b>

