

Walchand College of Engineering

(Government Aided Autonomous Institute)

Vishrambag, Sangli. 416415



1947

Platinum Jubilee Year

Academic Book

2021-22

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About WCE

Walchand College of Engineering Sangli (WCE), established in 1947 and aided by the Government of Maharashtra, is one of the oldest and premier engineering institutions in India. With a rich history of over 70 years and a beautiful campus of over 90-acres, WCE Sangli, is providing transformational learning experience in various disciplines of engineering.

WCE offers 6 UG programs leading to Bachelor of Technology in Civil, Electrical, Mechanical, Electronics, Computer Science and Engineering and Information Technology and 10 PG programs leading to Master of Technology in Environmental Engineering, Structural Engineering, Heat Power Engineering, Design Engineering, Production Engineering, Power System Engineering, Control System Engineering, Electronics Engineering, Computer Science and Engineering, and Computer Science and Information Technology.

It also offers PhD programs under Shivaji University, Doctoral Fellowship of All India Council for Technical Education (AICTE) and under Quality Improvement Program (QIP) scheme of Ministry of Human Resource Development (MHRD). At present, around 1900 students are studying in various BTech programs, around 480 students in MTech programs and nearly 75 scholars are pursuing their PhD programs.

Walchand College of Engineering is affiliated to Shivaji University Kolhapur and is approved by AICTE, New Delhi. The institute is given the autonomous status by University Grants Commission since 2007. Majority of the programs are accredited by National Board of Accreditation. It also carries the distinction of getting 'A' grade by National Assessment and Accreditation Board, Bangalore.

WCE was selected for Technical Quality Improvement Program (TEQIP) of MHRD through NPIU for TEQIP-I in 2004 with funding of Rs. 8.54 Cr., for TEQIP-II with funding of Rs. 12 Cr. WCE was also selected for TEQIP-III in 2017 with a funding of 7.0 Cr. WCE has consistently performed well in implementation of these projects. Based on the performance, the institute has received additional funding of Rs. 0.7 Cr. in TEQIP-III. Under TEQIP-III, WCE was mentoring Jabalpur College of Engineering, Jabalpur.

Through the Transformational Teaching Learning (TTL) processes, WCE aims at overall development of students with focus on Education, Employability and Employment. The Track Based Curriculum and Choice Based Credit System along with Value Added Professional and Life Skill Courses at WCE, enable students to choose appropriate path of their career. WCE also has highly qualified and dedicated faculty members who are constantly involved in research and are associated with practicing engineering. Most of the faculty members hold Doctoral degrees and M Tech degrees from various IITs and IISc.

The students of WCE get placed in reputed Multinational and Indian Companies such as Google, Microsoft, Linkedin, Amazon, John Deere, Rakuten, PG, Mahindra, TCS, Infosys and many other companies. With a high percentage of placements, WCE students also get very good packages, with the highest package being 43 LPA in the year 2019.

WCE has a vibrant student club culture, having actively involved in various technical and co-curricular student activities. There are also department-wise student associations and professional student chapters, who organize programs to keep up with the current trends in technology and also for enhancing the student personality.

The alumni of WCE are placed at high positions in reputed companies and institutions around the world. With their contribution towards the development of institution, WCE Sangli is strongly marching on the path of excellence in engineering education.

WCE has achieved a series of milestones; the credit of which undoubtedly goes to dedicated faculty, encouraging management and our brilliant students. No wonder WCE Sangli is the most preferred destination for engineering education today! ...

Preface

Welcome to the academics of the new Academic Year 21-22. The purpose of this Academic Book is to provide the students and other stakeholders the information about the importance of curriculum of AY 21-22. This book will be helpful to know about philosophy of WCE academics and how the students can make best use of it to plan and study accordingly to have a successful career.

The book highlights the philosophy of the curriculum, purpose of the various courses and information about the updates in the curriculum from last year.

This book includes information on the credit system, course contents and guidelines to make best use of the curriculum designed for them. Section 3 explains the general philosophy of the curriculum. Section 4 includes the basic information about various programmes in the institute. Sections 6, 7, 8, 9 include the information related to FY, SY, TY and Final Year BTech programmes. These also include features of the credit system of that year and how the students can take advantages of specific arrangements in curriculum for better career. Sections 10, 11 include the information about curriculum of FY and SY MTech programmes. Section 12 includes the information about the Doctoral programmes in various departments.

Hope that the students and all the stakeholders will make use of this book and also share any suggestions for improving this book in the coming academic years. Even though one is a student all over his life, it is still necessary to excel in the academics of your class in this year. Make best use of the provisions in the academics of WCE and best wishes for the academics of this year...!!

Philosophy

It is our pleasure to present this dynamic and vibrant curriculum scheme and mechanisms, which have absorbed most of the vital inputs from its various stakeholders. The curriculum provides opportunity of transformational learning experience from best instructors, through classroom, online as well as blended learning models. The proposed curriculum is aligned in terms of the reforms suggested by following agencies/ stakeholders,

1. University Grant Commission (UGC) for Choice Based Credit System (CBCS)
2. All India Council for technical Education (AICTE) for guidelines on Curriculum
3. National Board of Accreditation (NBA) directives for Outcome Based Education (OBE)
4. Latest syllabus for national competitive examinations such as Graduate Aptitude Test for Engineering (GATE)
5. Industries/ recruiters

In alignment with AICTE mandate and as applicable to TEQIP-III (Technical Education Quality Improvement Program) institutions, the curriculum provides, courses related to technology, human relations, foreign language, innovation and intellectual property rights, start-up, and entrepreneurial skills.

The curriculum includes variety of courses, including core courses, professional electives, mandatory courses, open electives and internships. The enterprising students can learn innovative product design and its commercialization, through project based learning.

The students can choose the courses in order to decide his/her interests and career path. An undergraduate student can obtain the BTech degree upon successful earning of 160 credits.

The academic system also provides opportunity to students to acquire additional competencies through value added professional as well as life skill courses, which can lead to following specialization certification.

1. Honors certification with successful earning of additional 20 credits in the same domain as the parent domain.
2. Minor certification with successful earning of additional 20 credits in the domain other than the parent domain.

The additional credits earned by taking value added courses, are mentioned on the grade card, helping students to get admission in good foreign universities as per their career plan.

In alignment with NBA requirements regarding the graduate attributes, the Course Outcomes based on specific skills have been associated to the every course in the curricula. To offer more freedom of choice to students, track based choice of professional electives and open electives at institute level have been introduced in the proposed curriculum.

The curriculum includes futuristic and industry 4.0 relevant courses such as Engineering System Development, Electric Vehicle Technology, Metro Rail, Artificial Intelligence, Smart Product Development as Professional or Open electives.

We hope that, with the active participation of all the stakeholders, the curriculum and the implementation mechanisms will strongly equip the WCE graduates with unique set of skills, improving their overall personality and employability. This will certainly attract better recruiters and create positive impact on the placements, and improve overall personality of WCE graduates to make them better humans and better citizens of World...

Academic Team of WCE

Programmes

WCE offers various academic programmes leading to related degrees. A programme is a prescribed set of courses leading to a graduate, post graduate or doctoral degree. WCE offers mainly BTech, MTech and PhD in various disciplines of engineering. All the programmes are approved by the All India Council for Technical Education (AICTE), New Delhi.

WCE, being autonomous since 2007, decides its curriculum, teaching learning process and examination system. The actual degree is awarded by Shivaji University, Kolhapur. The apex body for academic related policy decisions of WCE is the Academic Board. There are also Boards of Studies in each department for proposing the curriculum for related programmes.

4.1 UG Programmes

At present, WCE is offering 6 undergraduate programmes approved by AICTE and are as given below:

1. BTech Civil Engineering
2. BTech Mechanical Engineering
3. BTech Electrical Engineering
4. BTech Electronics Engineering
5. BTech Computer Science and Engineering
6. BTech Information Technology

4.2 PG Programmes

WCE is offering 10 post graduate programmes approved by AICTE and are as given below:

1. MTech Environmental Engineering
2. MTech Structural Engineering
3. MTech Design Engineering
4. MTech Heat Power Engineering
5. MTech Production Engineering
6. MTech Control System Engineering
7. MTech Power System Engineering
8. MTech Electronics Engineering
9. MTech Computer Science and Engineering
10. MTech Computer Science and Information Technology

4.3 PhD Programmes

In addition to above UG and PG programs, PhD programs are also offered in 5 disciplines of the institute.

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering

Curriculum

The description of each course type is given below: Every programme has a prescribed curriculum. It prescribes all the courses / labs / projects/ internship and other requirements for award of the degree and sets out the semester-wise, nominal sequence of the courses.

The curriculum is having mainly two parts:

1. Credit System
2. Course Content

The credit system includes the information about all the courses arranged class-wise and semester-wise. The credit system includes,

1. Course category as per AICTE guidelines
2. Course code
3. Course name
4. Course type (Core/Elective/Value added etc.)
5. The teaching scheme (Lecture/Practical etc.)
6. The evaluation scheme (Tests/Exams etc.)
7. Lists of elective courses
8. Notes about the credit system

The course content includes the course-wise syllabus having, course name, course code, textbooks and reference books, course outcomes and their mapping to programme outcomes, teaching / evaluation scheme, and module-wise topics in the course.

The details of courses/course content can get updated from time to time based on the need of the industry, society, government etc. and as per the technological changes happening in the world. For the information of students and other stakeholders, the curriculum of 2021-22 is made available at,

<http://www.walchandsangli.ac.in/academics2122.asp>

5.1 Credit System and Course Types

In general, a certain quantum of academic work measured in terms of credits is laid down as the requirements for a particular degree. A student earns credits by satisfactorily completing courses/ other academic activities every semester. The amount of credits associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly the credit associated with any of the other activities is normally dependent upon the quantum of work expected to be put-in for each of the activity. Students can pursue a course in offline, online as well as blended mode.

There are various types of the courses as shown below.

1. Professional Core (Theory)
2. Professional Core (Lab)
3. Professional Elective (Theory)
4. Professional Elective (Lab)
5. Open Elective
6. AICTE mandatory courses
7. Value Added Courses
 - (a) Value Added Professional Courses
 - (b) Value Added Life Skill Courses
8. Courses for Minor certification
9. Courses for Honors certification

The description of each course type is given below:

5.1.1 Professional Core (Theory)

These are the mandatory courses in the domain of the program which focus on understanding, application, analysis, evaluation and design of engineering systems.

5.1.2 Professional Core (Lab)

These are the mandatory courses that provide laboratory experience and include performing lab activities, use of modern tools, simulations, mini-projects, final year project, internships, industrial training etc.

Additionally, some departments may prescribe industrial experience based courses such as conducted tours to industries, industrial work to expose them to various technologies employed in the industry, internship and industry mentored mini projects.

5.1.3 Professional Elective (Theory)

These are the elective courses focusing on the theoretical part of technology based topics. These courses are arranged in the form of various tracks. Students can choose the elective courses of their interests from any of the tracks.

5.1.4 Professional Electives (Lab)

These are the courses, designed to provide laboratory experiences through performing lab activities and computer simulation etc. as per the choice of students from amongst the course offered by the department during that semester.

5.1.5 Professional Open Elective

These are the courses offered by the programmes other than parent programme. These courses are added to the curriculum to encourage interdisciplinary approach and enhance the understanding of students in the domains other than his or her own discipline. These courses

help students to cultivate the interdisciplinary thinking and also help them become more versatile to meet the demands of Industry 4.0.

5.1.6 AICTE mandatory courses

These are the courses mandated by AICTE and carry no credits. However, these courses are mandatory for becoming eligible for awarding BTech degree.

For UG, these include following courses:

1. Environmental Science
2. Constitution of India

For PG, these include following courses in FY MTech:

1. Value Education
2. Constitution of India

5.1.7 Value Added Courses

These courses are typically outside the regular curriculum of a programme and are very useful to gain additional knowledge, skills in the area of students' interest. These courses are conducted through Centre for Continuing Education (CCE). Such courses can have credits and after successfully completion of a value added credit course, the credits shall be mentioned on grade card. These credits shall not be considered for computing SGPA/CGPA. However, these credits can be very useful for getting admission to higher education, in reputed universities. By taking value added courses students can earn a minor or honors certification also. (Refer section 5.1.8 and 5.1.9). There are two types of value added courses:

1. Value Added Professional Courses
2. Value Added Life-Skill Courses

5.1.7.1 Value Added Professional Courses

The Value Added Professional Courses are the courses, useful for the engineering profession, such as technology, management, finance, law, intellectual property rights etc. These courses are not part of the BTech curriculum, but useful for additional knowledge. These can be taken by students of any department and any class to enhance their professional knowledge and skills as per their interests and career plan.

5.1.7.2 Value Added Life Skill Courses

The Value Added Life-Skill courses are the courses, useful to enhance their life-skills (competencies) and can be taken by students of any department and any class. These courses are in the area of music, arts, photography, yoga, film making, presentation skills, social sciences and other areas which help students to improve their personal skills, soft skills and other kinds of life-skills.

5.1.8 Courses for Minor certification

These are the Value Added professional credit courses approved for minor certification. A student who earns additional 20 credits from such courses in the domain other than the parent domain can become eligible for minor certification.

5.1.9 Course for Honors Certification

These are the Value Added professional credit courses approved for honors certification. A student who earns additional 20 credits from such courses in the same domain as the parent domain can become eligible for honors certification.

5.2 Degree and Certifications

Based on the types of courses completed by a student, one of the following types of degree and certification may be awarded. Please note that, the degree shall be awarded by Shivaji University and the certification shall be issued by the Institute.

1. BTech Degree: This includes all the courses as per BTech curriculum.
2. BTech Degree + Minor Certification: This includes the BTech degree and 20 additional credits earned by completing approved value added courses from single domain other than the parent domain. This can be useful for getting knowledge of other disciplines which can be useful for placement, start-up or entrepreneurship.
3. BTech Degree + Honors Certification: This includes the BTech degree and 20 additional credits earned by completing approved value added courses from own domain. This can be useful for students planning for higher education in the same domain or a specialized area of placement.

5.3 Choice Based Credit System

The choice based credit system (CBCS) allows a student to choose courses of his choice from

1. Professional Elective Courses
2. Open Elective Courses
3. Value Added Courses

Typically there are 6 to 9 professional elective courses and 5 open elective courses. Professional electives allow students to choose track

of their interest (refer section 5.4). Choosing these courses properly helps students to excel in the technology of their interests.

The open elective courses allow the students to gain the knowledge of other disciplines/domains of engineering. Open electives help students to take-up multidisciplinary projects and inculcate system level thinking for giving holistic engineering solutions. The list of professional and open electives is available on our website.

Additionally the students can earn credits by choosing any value added course for gaining additional knowledge and skills as per their interests and career plan.

5.4 Track based Curriculum

The curriculum of each program has various tracks. A track is a specialization in a programme for which the courses are arranged in the increasing order of level within a specialization. For example, in BTech Civil Engineering programme, the specializations can be Transportation Engineering, Environmental Engineering, Construction Management etc. and the courses within a specialization viz. Transportation Engineering can be Fundamentals of transportation, Rail transport, Metro rail transport design, Airport Design etc.

As an example, the courses in various tracks in Civil Engineering are shown in figure 5.1. The track system provides the students; the flexibility to choose the elective courses based on their aptitude, interests and their career plan.

The tracks start from TY BTech (Sem. V), since the curriculum of first year is common to all programmes and the second year BTech normally have introductory level courses from the respective domain.

The tracks in the third year BTech may have intermediate level courses and final year BTech may have advanced courses, depending on availability of resource. The students can choose the elective courses from any track from the various available tracks, based on



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Elective Course List for Final Year B.Tech. (Civil Engineering) Sem-VII AY 2021-22

Sr.No.	Track	Course Code	Course Name
Elective 3			
1	Structural Engineering	4CV411	Earthquake Engineering
2	Structural Engineering	4CV412	Advanced Structural Analysis
3	Environmental Engineering	4CV413	Advances in Water and Wastewater Treatment
4	Environmental Engineering	4CV414	Air Pollution and Control
5	Infrastructure Engineering	4CV415	Maintenance and Rehabilitation of Structures
6	Infrastructure Engineering	4CV416	Sustainability and Energy in Buildings
7	Transportation Engineering	4CV417	Bridge and Airport Engineering
8	Structural Engineering	4CV418	Earth Retaining Structures
Elective 4			
1	Structural Engineering	4CV419	Computer Applications in Structural Engineering
2	Structural Engineering	4CV420	Geosynthetics and Reinforced Soil Structures
3	Environmental Engineering	4CV421	Environmental Management Systems
4	Infrastructure Engineering	4CV422	Construction Equipment and Techniques
5	Transportation Engineering	4CV423	Highway Construction and Pavement Design
6	Structural Engineering	4CV424	Design of Concrete Structure- II
7	Infrastructure Engineering	4CV425	Engineering Economics and Valuation
8	Environmental Engineering	4CV426	Solid and Hazardous Waste Management

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Date: 04/09/2021

Figure 5.1: Tracks for BTech Civil

their interest. The number of electives may be different for various disciplines.

5.5 How to read the credit system

The sample credit system is shown in figure 5.2 on page 22. In this figure, the category indicates the course category such as PC (Program Core), HS (Humanities), OE (Open Elective) etc. This is used by every department for analysing the percentage of each category so that, the courses of each category are in proper proportion as per AICTE guidelines.

The course code is a unique identifier associated with every course. It starts with a number that indicate the revision number of the curriculum. For example, 4CV301 means this course introduced in the 4th major revision of the curriculum. The next 2 letters indicate the department, next number indicate the year of BTech (1:FY, 2:SY and so on) and last 2 digits indicate the course. (The course code naming scheme is under revision and may get updated from 2022-23)

The L, T, P, I columns indicate the number of hours per week for Lecture, Tutorial, Practical and Interaction. The credits column indicates the credits associated with that course.

The T1, T2 and ESE columns indicate the marks associated with each assessment for that theory course.

The LA1, LA2 and ESE columns indicate the marks associated with each assessment for that lab course.

The details of this will be available in the Academic and Examination Rule and Regulations Book.

At the end of credit system of each semester, there is list of professional elective courses and open elective courses (if available). This helps students to know the electives of each semester easily. Also at the end of credit system of semester VIII, there is a mapping of each course in the curriculum to the GATE syllabus topic, helping



Walchand College of Engineering
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Credit System for T.Y. B.Tech. (Civil Engineering) Sem-VI AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T/L/A1	T2/LA2	ESE
Professional Core (Theory)												
1	PC	5CV321	Foundation Engineering	2	0	0	0	2	2	20	20	60
2	PC	5CV322	Sewage and Sewage Treatment	2	0	0	0	2	2	20	20	60
3	PC	5CV323	Design of Concrete Structures	2	1	0	0	3	3	20	20	60
Professional Core (Lab)												
4	PC	5CV371	Highway Materials and Traffic Engineering Lab	0	0	2	0	2	1	30	30	40
5	PR	5CV347	Mini Project 4:Civil Engineering Software Application	0	0	2	0	2	1	30	30	40
6	PR	5CV348	Mini-Project 5: Steel Structures Design and Drawings	0	0	2	0	2	1	30	30	40
7	HS	5HS302	Humanities 2: Human Relations at Work	0	0	0	3	3	3	30	30	40
Professional Elective (Theory)												
8	PE	Refer list	Elective 2	2	0	0	0	2	2	20	20	60
Professional Elective (Lab)												
9	PE	Refer list	Elective 3 Lab	0	0	2	0	2	1	30	30	40
Open Elective												
10	OE	Refer list	Open Elective 3	2	0	0	0	2	2	20	20	60
11	OE	Refer list	Open Elective 4	3	0	0	0	3	3	20	20	60
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total												
				13	1	8	3	25	21			

Figure 5.2: Sample Credit System

students to plan their study accordingly.

5.6 Outcome Based Education

WCE follows the Outcome Based Education (OBE) and accordingly implements its teaching learning process. Outcome based education is targeted at achieving desirable outcomes (in terms of knowledge, skills, attitudes) at the end of a program.

Teaching with this awareness and making the associated effort constitutes outcome based education. This involves the use of a regular methodology for ascertaining the attainment of outcomes and improving the academic system accordingly.

5.6.1 Programme Outcomes

Each programme has 12 program outcomes (PO1 to PO12). These are the statements which tell what the students should be able to do at the end of the 4 year BTech programme are as follows:

At the end of their programme, the Engineering Graduates will be able to:

1. Engineering knowledge: ***Apply*** the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: ***Identify, formulate, review*** research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: ***Design solutions*** for complex engineering problems and design system components or processes that meet the specified needs with appropriate con-

- sideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. 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.
 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and *modern engineering and IT tools* including prediction and modeling to complex engineering activities with an understanding of the limitations.
 6. 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.
 7. 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.
 8. Ethics: Apply ethical principles and commit to *professional ethics* and responsibilities and norms of the engineering practice.
 9. Individual and team work: Function effectively as an individual, and as a member or *leader in diverse teams*, and in multidisciplinary settings.
 10. 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.
 11. 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.

12. 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.

In addition to these, each program has few Programme Specific Outcomes (PSOs). To attain the POs and PSOs, each course in the curriculum has Course Outcomes (COs). According to the COs, faculty conducts the course, for attaining better level of COs.

FY BTech

6.1 FY Curriculum

The First Year of BTech is the foundation of the engineering career and hence is an important year in the life of every engineering student. The FY BTech curriculum consists of the courses in basic sciences, engineering sciences, which are essential for every discipline of engineering.

Other than such courses, there is a course on *Arduino Based Systems*, covering both theory and lab exercises. This course is designed to make students familiar with the latest trends in electronics for designing systems using simple, easy to use, yet hi-tech electronic circuits. This course can help students to gain necessary knowledge and skills for making electronic automation based projects in their own domain in the subsequent semesters. This course will also help them design projects for various competitions/hackathons in the subsequent semesters.

The FY students are required to understand the importance of FY curriculum (Section 6.3) and use it to build a **strong engineering foundation for a bright and successful career**.

6.2 FY Credit System

These FY courses are common to all disciplines of engineering, so that student can avail facility of branch change depending on prevailing rules. The FY BTech credit system has two groups.

1. Group A
2. Group B


Both these groups have same courses but the sequence of courses is slightly different. The purpose of forming such groups is to facilitate smooth conduct of courses of all FY students during both semesters. The groups are formed by the FY coordinator and informed to students.

The FY credit system for group A and Group B are shown in figures 6.1 and 6.2.

6.3 Importance of FY curriculum

The understanding of all FY courses is very important from the point of view of the BTech degree with higher CGPA. It is also useful to develop proper Engineering Approach. The main reasons why FY courses are important are given below:

1. The courses in FY are fundamental courses and therefore understanding of FY courses is very useful for the understanding of other courses in the subsequent years.
2. The FY curriculum being common to all disciplines, the knowledge of FY courses is useful for understanding concepts of other disciplines of engineering. For example, the civil engineering students will understand the essentials of electrical engineering and so on.
3. In the recent Industry 4.0 scenario, it is essential for an engineer to have fundamental knowledge of multiple disciplines of engineering. Therefore, proper study of all FY courses will help students to be a better and multifaceted engineer.
4. The FY credit system carries 39 credits out of total 160 credits to be earned. *So it is almost 25% of the total credits.* If better grades are obtained in the first year, the overall CGPA can be better at the end of your degree programme. However, if the CGPA is less in first year itself, it is very hard to score higher CGPA in subsequent semesters. *Therefore, the students should*



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Credit System for F.Y. B.Tech. (All Programmes) for Group A in Sem-I and Group B in Sem-II AY 2021-22												
Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr.	T1/LA1	T2/LA2	ESE
Professional Core (Theory)												
1	BS	5PH101	Engineering Physics	3	0	0	0	3	3	20	20	60
2	BS	5MA101	Engineering Mathematics-I	3	1	0	0	4	4	20	20	60
3	ES	5CV101	Engineering Mechanics	3	0	0	0	3	3	20	20	60
4	HS	5HS101	Communication Skills	2	1	0	0	3	3	20	20	60
5	ES	5CS101	Programming for Problem Solving	2	0	0	0	2	2	20	20	60
Professional Core (Lab)												
6	ES	5CV151	Engineering Mechanics Lab	0	0	2	0	2	1	30	30	40
7	ES	5ME152	Workshop Practice	0	0	2	0	2	1	30	30	40
8	ES	5CS151	Programming for Problem Solving Lab	0	0	2	0	2	1	30	30	40
9	BS	5PH151	Engineering Physics Lab	0	0	2	0	2	1	30	30	40
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total				13	2	8	0	23	19			

Notes:

For Lab courses: There shall be only internal continuous assessment (LA1, LA2, ESE). LA1 and LA2 together shall be Lab ESE. The ESE is a separate head of passing.
For Theory courses: There shall be two tests (T1 and T2) and one ESE. The ESE is a separate head of passing.

The Value Added Courses are Optional Courses. The mode of teaching (LTP) is decided by the resource person.
The credits earned from these courses will be shown on grade card. For SGPA and CGPA calculation, these courses will be excluded.
The list of Value added courses will be updated from time to time. The courses may be on paid basis. These courses will be offered as per availability of faculty.

For further details, refer to Academic and Examination rules and regulations.

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Figure 6.1: FY BTech Credit System



Walchand College of Engineering, Sangli
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Credit System for F.Y. B.Tech. (All Programmes) for Group B in Sem-I and Group A in Sem-II AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr- Tl/LA1/T2/LA2	ESE	
Professional Core (Theory)											
1	BS	5CHI01	Engineering Chemistry	3	0	0	0	3	3	20	60
2	BS	5MA102	Engineering Mathematics-II	3	1	0	0	4	4	20	60
3	ES	5ME101	Engineering Graphics and CAD	0	0	0	0	2	2	20	60
4	BS	5EL101	Basic Electrical Engineering	3	0	0	0	3	3	20	60
5	ES	5EN101	Arduino Based Systems	2	0	0	0	2	2	20	60
6	BS	5BS104	Life Science	2	0	0	0	2	2	20	60
Professional Core (Lab)											
7	ES	5ME151	Engineering Graphics and CAD Lab	0	0	2	0	2	1	30	40
8	ES	5EL151	Basic Electrical Engineering Lab	0	0	2	0	2	1	30	40
9	BS	5CHI151	Engineering Chemistry Lab	0	0	2	0	2	1	30	40
10	ES	5EN151	Arduino Based Systems Lab	0	0	2	0	2	1	30	40
Value Added Professional Courses #											
Value Added Life-Skill Courses #											
				Total	15	1	8	0	24	20	

Notes:

For Lab courses: There shall be only internal continuous assessment (LA1, LA2, ESE). LA1 and LA2 together shall be Lab ISE. The ESE is a separate head of passing.
For Theory courses: There shall be two tests (T1 and T2) and one ESE. The ESE is a separate head of passing.

The Value Added Courses are Optional Courses. The mode of teaching (LTPD) is decided by the resource person.

The credits earned from these courses will be shown on grade card. For SGPA and CGPA calculation, these courses will be excluded.

The list of Value added courses will be updated from time to time. The courses may be on paid basis. These courses will be offered as per availability of faculty.

For further details, refer to Academic and Examination rules and regulations.

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Figure 6.2: FY BTech Credit System

note that, it is necessary to earn good grades in the first year itself, for overall high performance in the programme.

6.4 Web-links

1. [Click here for Group A Credit System](#)
2. [Click here for Group B Credit System](#)
3. [Click here for Group A and B Course Contents](#)

7.1 SY Curriculum

From SY BTech onwards, the courses are discipline specific. The levels of the courses go on increasing as the students go to higher class. At SY Level, the curriculum of any discipline typically should have fundamental courses in that particular discipline. These courses encompass all the tracks. This helps students to later on choose the track of their interest and career plan. The SY students need to understand the importance of SY curriculum and use facilities in it to the best of their abilities.

In the second year of engineering, there are normally no electives. This is because, the students are to prepare themselves with the fundamentals of the discipline and the various sub-areas of it.

An important feature of SY curriculum is the special course of *Presentation and Report Writing*. The course is a lab course, thereby providing students to *actually do the activities* such as presentations, writing reports, learning various online modern tools, learning from industries how they do presentations etc. This course is expected to help students to be better presenters and technical writers. This also can help them for presenting their mini-projects, competitions and projects in their subsequent semesters.

Also there is a mandatory course on environment science, to help them to be sensitive towards the environment and applying it in their engineering career.

7.2 SY Credit System

A Credit system for SY BTech Civil is shown in figure 7.1 and 7.2. For credit systems of other disciplines, the web-links are given in section 7.4.

7.3 Importance of SY Curriculum

The SY credit system includes one mathematical course in semester III and semester IV each. These courses may be core mathematics courses or any analytical course useful for the concerned discipline, based on the need of the programme.

The SY curriculum includes fundamental course suitable for second year of engineering and also to make WCE curriculum in line with AICTE model curriculum. These courses also form a ***strong basis of GATE examination***, other Competitive Examinations such ***Engineering Services Exams***; as well as very useful for ***Campus Interviews***. Therefore, all SY students should meticulously study these courses for following seasons:

1. It will build appropriate understanding of all fundamental courses related to their own discipline.
2. It will give a ***practical approach for the related theory courses***, which will be useful for doing mini-projects in the SY, TY and major project in the Final Year of the degree programme.
3. These courses are also useful from ***Campus Interview*** point of view, as most of the questions in the interviews are related to fundamentals of the discipline. The SY courses being fundamental courses, they are mostly technology independent. So even if the technology is upgraded, this understanding is going to be useful for a longer duration of your career. Moreover, if the student cannot answer the interview questions based on



Walchand College of Engineering
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Credit System for S.Y. B.Tech. (Civil Engineering) Sem-III AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T/L/A1	T2/LA2	ESE
Professional Core (Theory)												
1	BS	5MA201	Probability and Statistics	2	0	0	0	2	2	20	20	60
2	PC	5CV202	Fluid Mechanics	2	1	0	0	3	3	20	20	60
3	ES	5CV203	Building Materials and Construction	3	0	0	0	3	3	20	20	60
4	ES	5CV204	Engineering Geology	2	0	0	0	2	2	20	20	60
5	PC	5CV205	Engineering Surveying	3	0	0	0	3	3	20	20	60
6	ES	5CV206	Solid Mechanics	2	1	0	0	3	3	20	20	60
Professional Core (Lab)												
7	PC	5CV252	Fluid Mechanics Lab	0	0	2	0	2	1	30	30	40
8	ES	5CV253	Building Materials and Construction Lab	0	0	2	0	2	1	30	30	40
9	PC	5CV254	Engineering Geology Lab	0	0	2	0	2	1	30	30	40
10	PC	5CV255	Surveying Lab	0	0	2	0	2	1	30	30	40
AICTE Mandatory Courses @												
11	MC	5IC201	Environment Science	2	0	0	0	2	0	20	20	60
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total												
				16	2	8	0	26	20			

Figure 7.1: SY BTech Civil Sem III



Credit System for S.Y. B.Tech. (Civil Engineering) Sem-IV AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T/L/AI/T2/LA2	ESE
Professional Core (Theory)											
1	BS	5MA202	Applied Mathematics	2	0	0	0	2	2	20	60
2	PC	5CV221	Hydraulics and Hydraulic Machinery	3	0	0	3	3	20	20	60
3	PC	5CV222	Building Planning and Design	2	0	0	2	2	20	20	60
4	PC	5CV223	Water Resources Engineering	2	1	0	0	3	3	20	60
5	PC	5CV224	Structural Analysis	2	1	0	0	3	3	20	60
6	PC	5CV225	Concrete Technology	2	0	0	0	2	2	20	60
Professional Core (Lab)											
7	PC	5CV271	Hydraulics Lab	0	0	2	0	2	1	30	40
8	PC	5CV272	Mini Project I-Building Planning and Design	0	0	2	0	2	1	30	40
9	PC	5CV274	Advanced Surveying Lab	0	0	2	0	2	1	30	40
10	ES	5CV275	Material Testing Lab	0	0	2	0	2	1	30	40
11	HS	5CV277	Presentation and Report Writing	0	0	0	1	1	1	30	40
Value Added Professional Courses #											
Value Added Professional Courses #											
Value Added Lab-Skill Courses #											
Total				13	2	8	1	24	20		

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Figure 7.2: SY BTech Civil Sem IV

fundamental courses, he or she will not be shortlisted for further levels of recruitment.

4. These courses are also essential from the point of self-employment or entrepreneurship. When one is planning to start own business, unless the fundamentals are appropriate, it is very difficult to cope with the upcoming technologies. Hence the SY curriculum is also useful for ***entrepreneurship and startups***.
5. The SY credit system includes a special course of presentation skills in the 4th semester. This course is added based on the feedback of HRs visiting our campus. Whether a student opts for a job or gets self-employed, presentation skills are essential. Better presentation skills also can fetch ***better scope in the campus placement***. This course is useful for improving the presentation skills and will help make the students a better communicator.

7.4 Web-links

7.4.1 SY BTech Credit systems

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

7.4.2 SY BTech Course Contents

1. Civil Engineering

2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

TY BTech

8.1 TY Curriculum

From TY BTech onwards, the courses become more specific and more detailed. The levels of the courses also are higher than SY BTech. At TY Level, the curriculum of any discipline has intermediate level courses in that particular discipline. These courses typically have few core courses and remaining elective courses based on the various tracks. Third Year of BTech program is very important and reasons for the same are given in the subsequent sections. The students should understand the importance of their third year of BTech and use this period to the best of their capacity.

The core courses in the TY Curriculum help students to acquire the minimum required knowledge, understanding and skills for meeting Industry requirements and demands of the core recruiters. The elective courses allow students to choose the course based on their interests and career plan. This also gives students an opportunity for developing a specialization which can help them to get higher package jobs in core industries.

The main feature of TY Curriculum is provision of 2 mini-projects in both odd and even semesters. It means the TY students need to complete 4 mini-projects of 1 credit each. This is expected to give enough practical experience required for final year project. With the skill sets acquired through these mini-projects, the students will be able to do better final year projects and it is expected that, they will be able to think of a real product considering all engineering, social, economical constraints, rather than just a project in their final year.

One more important feature of TY Curriculum is the mandatory humanities courses on *foreign language* and *Human Relations at Work*. It is important to note that, both these courses are *Lab* courses. It means the students need to do activities rather than just

writing a paper. Both these course, being activity oriented, the lab course nature will help students to gain enough expertise and skills in these two important aspects of human life.

The next important aspect of TY curriculum is the provision of 4 open electives. These are the courses from domains other than the parent domain. These courses being electives, the student can choose any course from the available open elective courses. Such open electives will help students to gain the interdisciplinary knowledge there by making them a better system level thinkers rather than just experts in their own domain. This provision will also help them take-up an interdisciplinary final year project.

8.2 TY Credit System

A sample Credit system for TY BTech Civil is shown in figure 8.1 and 8.2. For credit systems of other disciplines, the web-links are given in section 8.4.

8.3 Usefulness of TY Curriculum

The TY curriculum primarily includes intermediate level course inclined towards analysis and design of engineering sub-systems. It typically includes core courses with higher depth of engineering study, few elective courses, mini-projects etc.

Therefore, appropriate study of TY courses is necessary for following reasons:

1. Sincere study of TY courses can help students to build higher level of understanding of engineering courses and acquire required skillset for ***analysis, design and prototyping of engineering sub-systems***. It can help develop the logical think-



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Credit System for T.Y. B.Tech. (Civil Engineering) Sem-V AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T1/LA1	T2/LA2	ESE
Professional Core (Theory)												
1	PC	5CV301	Soil Mechanics	2	0	0	0	2	2	20	20	60
2	PC	5CV302	Water Treatment Technology	2	0	0	0	2	2	20	20	60
3	PC	5CV303	Design of Steel Structures	2	0	0	0	2	2	20	20	60
4	PC	5CV304	Highway Engineering	2	0	0	0	2	2	20	20	60
Professional Core (Lab)												
5	PC	5CV351	Water Quality Analysis Lab	0	0	2	0	2	1	30	30	40
6	PR	5CV352	Soil Mechanics Lab	0	0	2	0	2	1	30	30	40
7	PR	5CV345	Mini Project 2: Concrete Technology	0	0	2	0	2	1	30	30	40
8	PR	5CV346	Mini Project 3	0	0	2	0	2	1	30	30	40
9	HS	5HS301	Humanities-1: German Language	0	0	0	3	3	3	30	30	40
Professional Elective (Theory)												
10	PE	Refer list	Elective 1	2	0	0	0	2	2	20	20	60
Open Elective												
11	OE	Refer list	Open Elective 1	2	0	0	0	2	2	20	20	60
12	OE	Refer list	Open Elective 2	3	0	0	0	3	3	20	20	60
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total												
				15	0	8	3	26	22			

Figure 8.1: TY BTech Civil Sem V



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Sr. No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T/1A/1T/2A/2	ESE
Professional Core (Theory)											
1	PC	5CV321	Foundation Engineering	2	0	0	0	2	2	20	20
2	PC	5CV322	Sewage and Sewage Treatment	2	0	0	0	2	2	20	20
3	PC	5CV323	Design of Concrete Structures	2	1	0	0	3	3	20	60
Professional Core (Lab)											
4	PC	5CV371	Highway Materials and Traffic Engineering Lab	0	0	2	0	2	1	30	40
5	PR	5CV347	Mini Project 4/Civil Engineering Software Application	0	0	2	0	2	2	1	30
6	PR	5CV348	Mini-Project 5: Steel Structures Design and Drawings	0	0	2	0	2	1	30	40
7	HS	5HS402	Humanities 2: Human Relations at Work	0	0	0	3	3	3	30	40
Professional Elective (Theory)											
8	PE	Refer list	Elective 2	2	0	0	0	2	2	20	20
Professional Elective (Lab)											
9	PE	Refer list	Elective 3 Lab	0	0	2	0	2	1	30	40
Open Elective											
10	OE	Refer list	Open Elective 3	2	0	0	0	2	2	20	20
11	OE	Refer list	Open Elective 4	3	0	0	0	3	3	20	60
Value Added Professional Courses #											
Value Added Life-Skill Courses #											
Total				13	1	8	3	25	21		

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Figure 8.2: TY BTech Civil Sem VI

- ing process that is extremely important from industry point of view. Industry needs engineers who have ***strong fundamentals and a streamlined logical thinking ability***. Such ability is essential for solving engineering problems and it is a highly desirable ability for ***placement in core companies***.
2. Proper study of TY courses can be useful for students to build the ***capacity to do things on their own***. This ability is very useful in ***selection for internship in reputed companies in the final year***.
 3. It provides students opportunity to select the desired elective courses, based on their aptitude, interests and career plan. Therefore the Third Year of engineering is extremely important, in ***deciding the career path of the students***.
 4. TY curriculum also has courses with course content aligned to GATE syllabus. Therefore, proper study of TY courses can be helpful to students for ***higher score in GATE examination*** allowing them to get into ***post graduate studies in reputed institutes both in India and abroad***. Also, it will open the doors of jobs in research, defense and public undertakings of Government of India.
 5. In TY curriculum, there are Open Elective courses. These courses are very useful for ***broadening the knowledge in various other disciplines of engineering***. In today's industrial scenario, many systems are automated and are on-line. So knowledge of software, database, web technology etc. will help students of non-CSE/IT students. Similarly knowledge of electronics and electrical engineering is useful for Civil/CSE/IT/Mechanical students to cope up with emerging fields such as electric vehicle technology and web based automation in construction transportation and other systems. The knowledge of other disciplines of engineering can help students to do their final year project in a better manner and can fetch ***internship in software, service and product based***

companies.

6. Third year curriculum can also assist students to take part in *various National and International competitions*, providing them opportunities to prove themselves and provide National and International exposure. The students should explore this possibility and accordingly *blend the curricular and co-curricular activities for better career.*
7. Third year is also a good time for students for *Networking with junior students* for helping them and Networking with seniors for getting guidance. The TY students can *organize or conduct various co-curricular programs* useful for SY students, thereby, learning the skills of *event management, teamwork* and also establishing *strong bonding with their peer students.*
8. Third year students can also use this year for *solving socially relevant problems* with innovative methods. The students can also use this time for *Converting innovative ideas into Patents*. Our institute can *support for filing the patent* which can be very useful for the campus placement and also for getting *opportunities in the reputed research laboratories and institutions for PG and PhD* for the students having *research aptitude and plans for pursuing higher studies.*
9. Even if one is interested in taking a job, filing patent can help, as a patent of high commercial value can be bought by big companies, providing significant financial benefits. Also a patent is taken as a proof of the creativity and can fetch high package jobs as well as the student can get into R department of his or her company.
10. The students who wish to go *abroad for higher studies* can use TY for working with faculty for small research projects. This will be useful for getting *recommendation letters for higher studies abroad.*

11. The period of third year can be used by students for ***Active participation in club services*** and helping faculty to ***organize technical activities*** related to topics in curriculum and related latest technological trends.
12. The mini-projects in TY curriculum can help the students for ***enhancing presentation skills*** and preparing technical documentation which is essential now-a-days for any type of career. Considering the above points the TY students should take maximum advantage of the TY curriculum and accordingly study the courses as well as utilize the time for the above mentioned curricular and co-curricular activities.

8.4 Web-links

Links to the Credit System of TY BTech is given below:

8.4.1 TY BTech Credit systems

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

8.4.2 TY BTech Course Contents

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering

4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

Final Year BTech

9.1 Final Year Curriculum

In the final year BTech, the courses become more specific and more detailed than TY and have advanced topics based on the technological trends in Industry. The levels of the courses also are higher than TY BTech. The Final Year of BTech program is important from actual placement point of view and for learning professional skills required for industry. The students should understand the importance of their final year of BTech and use this period to the best of their abilities.

The core courses in the Final Year Curriculum help students to acquire the advanced level knowledge, understanding and skills. It also gives opportunity for students to experience the engineering system analysis, design and prototyping.

The Final Year curriculum typically has required core courses and more number of elective courses for more flexibility to students. Most of the part of Final Year curriculum is the major project work. The project and elective courses allow students an opportunity for developing expertise and honing professional skills to be ready to enter the professional world.

9.2 Final Year Credit System

A sample Credit system for Final Year BTech Civil is shown in figure 9.1 and 9.2. For credit systems of other disciplines, the web-links are given in section 8.4.



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Credit System for Final Year B.Tech. (Civil Engineering) Sem-VII AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	TI/LAI	T2/LA2	ESE
Professional Core (Theory)												
1	PC	4CV401	Transportation Engineering	3	0	0	0	3	3	20	20	60
2	HS	4HS401	Fundamentals of Management and Economics for Engineers	4	0	0	0	4	4	20	20	60
Professional Core (Lab)												
3	PR	4CV451	Mini Project 4: Reinforced Concrete Design and Drawing	0	0	2	0	2	1	30	30	40
4	PR	4CV452	Highway Engineering Lab	0	0	2	0	2	1	30	30	40
5	PR	4CV453	Mini Project 5: Construction Project Management	0	0	2	0	2	1	30	30	40
6	PR	4CV441	Project 1 and Seminar	0	0	6	0	6	3	30	30	40
Professional Elective (Theory)												
7	PE	Refer list	Elective 3	3	0	0	0	3	3	20	20	60
8	PE	Refer list	Elective 4	3	0	0	0	3	3	20	20	60
Open Elective												
9	OE	Refer list	Open Elective 3	3	0	0	0	3	3	20	20	60
AICTE Mandatory Courses @												
10	MC	4IC401	Constitution of India	2	0	0	0	2	0	20	20	60
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total												
				18	0	12	0	30	22			

Figure 9.1: Final Year BTech Civil Sem VII

Walchand College of Engineering
(Government Aided Autonomous Institute)

Credit System for Final Year B.Tech. (Civil Engineering) Sem-VIII AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T1/LA1	T2/LA2	ESE
Professional Core (Theory)												
Professional Core (Lab)												
1	PC	4CV471	Civil Engineering Software Lab	0	0	2	0	2	1	30	30	40
2	PR	4CV491	Project 2	0	0	16	0	16	8	30	30	40
3	PC	4CV492	Skill Based Learning	0	0	0	1	1	1	30	30	40
4	PC	4CV493	Summer Internship	0	0	0	1	1	1	30	30	40
Professional Elective (Theory)												
5	PE	Refer list	Elective 5	3	0	0	0	3	3	20	20	60
6	PE	Refer list	Elective 6	3	0	0	0	3	3	20	20	60
Value Added Professional Courses #												
Value Added Life-Skill Courses #												
Total												
				6	0	18	2	26	17			

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Figure 9.2: Final Year BTech Civil Sem VIII

9.3 Usefulness of Final Year Curriculum

The Final Year BTech curriculum primarily includes specialized courses inclined towards analysis and design of engineering systems. It typically includes core courses with higher depth of engineering study, few elective courses, mini-projects, final year project etc.

Therefore, appropriate study of Final Year courses is necessary for following reasons:

1. Sincere study of Final Year courses can help students to build advanced level of understanding of engineering courses and acquire required skillset for ***analysis, design and prototyping of socially relevant engineering systems***. It can help develop the professional presentation and documentation skills which are highly useful in getting ***placement in dream companies***.
2. Proper study of final year courses can be useful for students to build the ***capacity to do things on their own and complete the commitment***. This ability is very useful for being successful in the engineering career and as a better human being.
3. It provides students opportunity to select the desired elective courses, based on their aptitude, interests and career plan. Therefore the Final Year of engineering is useful, in ***progressing further in the desired career path***.
4. Final Year of BTech is also ***a time to appear for GATE examination*** and test where one stands. Even if you are not interested in higher studies, appearing GATE is useful because, it can be one of the positive points for campus interviews. 5. Also, it will open the doors of jobs in research, defense and public undertakings of Government of India.
5. Third year is also a good time for students for ***Networking with junior students for helping them and Networking with Alumni and PG/PhD students*** for getting guid-

- ance. The Final Year students can become office bearers of students clubs or can take responsibility to ***organize or conduct various co-curricular programs*** useful for other students, thereby, learning the skills of ***event management, teamwork*** and also establishing ***stronger bonding with their peer students***.
6. Final year students can continue to use this year for ***solving socially relevant problems with innovative methods***. The students can also use this time for ***Converting innovative ideas into Patents***. Our institute can ***support for filing the patent*** which can be very useful for the campus placement and also for getting ***opportunities in the reputed research laboratories and institutions for PG and PhD*** for the students having ***research aptitude and plans for pursuing higher studies***.
 7. Even if one is interested in taking a job, filing patent can help, as a patent of high commercial value can be bought by big companies, providing significant financial benefits. Also a patent is taken as a proof of the creativity and can fetch high package jobs as well as the student can get into R department of his or her company.
 8. The students who wish to go abroad for higher studies can use their final year for working with faculty for research or industrial consultancy projects. This will be useful for getting recommendation letters for higher studies abroad, and also give them experience of live industry projects during their graduation period itself.
 9. The period of third year can be used by students for ***Active participation in club services*** and helping faculty to ***organize technical activities*** related to topics in curriculum and related latest technological trends.
 10. The ***Mega project*** in Final Year curriculum is an important activity. The students should use this ***opportunity to in-***

culcate professional skills to look for a socially relevant or industrial problem, understand the problem, do literature survey to know what is done for this problem, think of the possible solutions, choose the most effective and economical and ethical solution and design the system for it. It will give the students an opportunity for work as higher levels of learning from the Bloom's Taxonomy.

11. The mega project also can help the students for enhancing teamwork, time management, planning and implementation, presentation skills and preparing proper technical documentation and most importantly, the professional ethics which are essential now-a-days for any type of career.

Considering the above points the final year students should take maximum advantage of our curriculum by preparing themselves to enter in the *dynamic, challenging, fascinating and rewarding professional engineering world as well as to contribute to Nation Building and making life of the mankind a better one.*

9.4 Web-links

9.4.1 Final Year BTech Credit systems

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

9.4.2 Final Year BTech Course Contents

1. Civil Engineering
2. Mechanical Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Computer Science and Engineering
6. Information Technology

FY MTech

10.1 FY MTech Curriculum

The FY MTech curriculum primarily aims at strong foundations of research and advanced topics as per the trends in industry. The FY MTech curriculum is revised in 20-21, which now includes the features making it more industry oriented.

The core courses in the First Year Curriculum help students to know about how systematic research study can be done through the “Research Methodology” Course. The other courses include essential core courses that are aimed at study of specialized topics in engineering and technology. It also has elective courses those allow students to choose the track, based on their interests and career plan. It also gives them an opportunity to experience the practical aspects to various advanced tools and techniques that can help them for their dissertation work in the second year.

10.2 FY MTech Credit System

A sample Credit system for First Year MTech Civil (Environmental Engineering) is shown in figure 10.1 and 10.2. For credit systems of other disciplines, the web-links are given in section 10.4.

10.3 Usefulness of Curriculum

The First Year MTech curriculum is primarily inclined towards preparing the students for systematic research that can help them for solving the practical and socially useful problems. It also includes



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Credit System for F.Y. MTech. (Environmental Engineering) Sem-I AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	TI/LAI	T2/LA2	ESE
Professional Core (Theory)												
1	PC	5EV501	Physico-Chemical Methods for Water and Wastewater Treatment	3	0	0	0	3	3	20	20	60
2	PC	5EV502	Municipal Solid Waste Management	3	0	0	0	3	3	20	20	60
Professional Core (Lab)												
3	PC	5EV560	Research Methodology	0	0	0	2	2	2	30	30	40
4	PR	5EV551	Activity Based Lab for PC/MWWT	0	0	2	0	2	1	30	30	40
5	PR	5EV552	Activity Based Lab for MSWM	0	0	2	0	2	1	30	30	40
6	HS	5EV553	Presentation and Technical Report Writing	0	0	0	1	1	1	30	30	40
7	PC	5EV554	Professional Skills 1	0	0	0	1	1	1	30	30	40
Professional Elective (Theory)												
8	PE	Refer list	Elective 1	3	0	0	0	3	3	20	20	60
9	PE	Refer list	Elective 2	3	0	0	0	3	3	20	20	60
AICTE Mandatory Courses @												
10	MC	5IC501	Value Education	2	0	0	0	2	0	20	20	60
Value Added Professional Courses # (Listed separately)												
Value Added Life-Skill Courses # (Listed separately)												
Total				14	0	4	4	22	18			

Figure 10.1: FY MTech Enviromental Engg. Sem I



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Credit System for F.Y. M.Tech. (Environmental Engineering) Sem-II AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	TI/LA1	T2/LA2	ESE
Professional Core (Theory)												
1	PC	5EV521	Biological Methods for Wastewater Treatment	3	0	0	0	3	3	20	20	60
2	PC	5EV522	Air Pollution and Control	3	0	0	0	3	3	20	20	60
Professional Core (Lab)												
3	PR	5EV571	Activity Based Lab BMWT	0	0	2	0	2	1	30	30	40
4	PR	5EV572	Activity Based Lab APC	0	0	2	0	2	1	30	30	40
5	PR	5EV573	Industrial Project	0	0	0	2	2	2	30	30	40
6	PC	5EV574	Professional Skills 2	0	0	0	1	1	1	30	30	40
Professional Elective (Theory)												
7	PE	Refer list	Elective 3	2	0	0	0	2	2	20	20	60
8	PE	Refer list	Elective 4	2	0	0	0	2	2	20	20	60
Professional Elective (Lab)												
9	PR	Refer list	Activity Based Elective Lab 1	0	0	0	2	2	2	30	30	40
Open Elective												
10	OE	Refer list	Open Elective	2	0	0	0	2	2	20	20	60
AICTE Mandatory Courses @												
11	MC	5IC502	Constitution of India	2	0	0	0	2	0	20	20	60
Value Added Professional Courses # (Listed separately)												
Value Added Life-Skill Courses # (Listed separately)												
				Total								
				14	0	4	5	23	19			

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Figure 10.2: FY MTech Enviromental Engg. Sem II

specialized core and elective courses with higher depth of engineering study.

One of the highlights of FY MTech is the course on ***industrial project***. This course is included in curriculum to prepare the students for the second year dissertation work through ***Industry Oriented Project Based Learning***.

In view of this, it is necessary for MTech students to sincerely study in their first year of MTech. Appropriate study of First Year courses is necessary for following reasons:

1. Sincere study of First Year MTech courses can help students to build advanced level of understanding of core engineering courses and also acquire required skillset for design and prototyping of engineering subsystems in their specialization. It is also highly useful in getting exposure to Industrial Problems and Systematic way of problem solving.
2. Proper study of first year courses can be useful for students to build further the capacity to do literature survey and ***critical thinking*** about the existing systems/ algorithms, techniques etc. Such ability is essential ***to get placement into RD department*** of an industry.
3. It provides students opportunity to select the desired elective courses, based on their aptitude, interests and career plan. Therefore the first year of Master's is useful, in deciding the further ***sub-specializations in the desired career path***.
4. First year is also a good time for students for networking with senior MTech students getting guidance.
5. First year MTech students can continue to use this year for designing solutions for ***socially relevant problems*** with innovative methods. The students can also use this time for ***Converting innovative ideas into Patents***. Our institute can ***support for filing the patent*** which can be very useful for the campus placement and also for getting ***opportunities in the reputed research laboratories and institutions for***

PhD for the students having *plans for pursuing higher studies*.

6. Even if one is interested in taking a job, filing patent can help, as a patent of high commercial value can be bought by big companies, providing significant financial benefits. Also a patent is taken as a proof of the creativity and ***can fetch high package jobs*** as well as the student can get into R and D department of his or her company.
7. The students who wish to go abroad for PhD can use their first year for working with faculty for research or industrial consultancy projects. This will be useful for getting recommendation letters for higher studies abroad, and also can give them ***experience of live industry projects*** during their graduation period itself.

10.4 Web-links

10.4.1 FY MTech Credit systems

1. Environmental Engineering
2. Structural Engineering
3. Design Engineering
4. Heat Power Engineering
5. Production Engineering
6. Control System Engineering
7. Power System Engineering
8. Electronics Engineering
9. Computer Science & Engineering
10. Computer Science & Information Technology

10.4.2 FY MTech Course Contents

The course contents are being updated and will be available on our site soon.

1. Environmental Engineering
2. Structural Engineering
3. Design Engineering
4. Heat Power Engineering
5. Production Engineering
6. Control System Engineering
7. Power System Engineering
8. Electronics Engineering
9. Computer Science & Engineering
10. Computer Science & Information Technology

SY MTech

11.1 SY MTech Curriculum

The SY MTech is primarily dedicated for the dissertation work and internship in Industry or a reputed Research Institute.

The SY MTech curriculum is mostly dedicated to research and development of engineering solution to industrial or societal problems. This is done as a part of dissertation work, that is divided in two phases. There may be few elective courses in SY MTech.

11.2 FY MTech Credit System

A sample Credit system for First Year MTech Civil (Environmental Engineering) is shown in figure 11.1 and 11.2. For credit systems of other disciplines, the web-links are given in section 11.4.

11.2.1 Dissertation Phase-I

Dissertation Phase-II is conducted during the third semester. During this semester, the students are expected to discuss with their respective guides and industry mentor (in case of internships), and decide the topic of dissertation and prepare the synopsis for the same. The students will get an opportunity to learn how to

1. Identify and understand a socially relevant or industrial problem allowing the student to take-up dissertation in the area of interest or as per the need of the sponsoring industry.
2. Document the objectives of the dissertation and justify them by studying and analyzing an extensive literature review in the



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Credit System for S.Y. M.Tech. (Environmental Engineering) Sem-III AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	T1/LA1	T2/LA2	ESE
Professional Core (Theory)												
1	PC	5EV601	Legal, Financial Aspects of Industrial Project	2	0	0	0	2	2	20	20	60
Professional Core (Lab)												
2	PR	5EV690	Dissertation Phase 1	0	0	20	0	20	10	30	30	40
3	PC	5EV602	Industry Orientation Course	0	0	0	1	1	1	30	30	40
Professional Elective (Theory)												
4	PE	Refer list	Elective 5	2	0	0	0	2	2	20	20	60
Professional Elective (Lab)												
5	PR	Refer list	Activity Based Elective Lab 2	0	0	2	0	2	1	30	30	40
Value Added Professional Courses # (Listed separately)												
Value Added Life-Skill Courses # (Listed separately)												

Total				4	0	22	1	27	16			

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Figure 11.1: FY MTech Enviromental Engg. Sem III



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Credit System for S.Y. M.Tech. (Environmental Engineering) Sem-IV AY 2021-22

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	TI/LA1	T2/LA2	ESE
Professional Core (Theory)												
Professional Core (Lab)												
1	PR	5EV691	Dissertation Phase 2	0	0	24	0	24	12	30	30	40
2	PR	5EV671	Techno-Socio Activity	0	0	0	1	1	1	30	30	40
Professional Elective (Theory)												
3	PE	Refer list	Elective 6	3	0	0	0	3	3	20	20	60
Value Added Professional Courses # (Listed separately)												
Value Added Life-Skill Courses # (Listed separately)												
Total												
				3	0	24	1	28	16			

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Figure 11.2: FY MTech Enviromental Engg. Sem IV

area of dissertation.

3. Formulate the hypothesis, methodology and execute the study through conduct of analytical/Experimental work to achieve the objectives.
4. Prepare the activity plan based on the available time and resources to complete the dissertation as per schedule.
5. Prepare the reports of each phase scientifically and present the work in a professional manner.

11.2.2 Dissertation Phase-II

Dissertation Phase-II is conducted during the fourth semester. During this semester the students are expected to work further to realize the objectives mentioned in the synopsis of the dissertation. During these phases, the students will get an opportunity to learn, practice and experience how to

1. Execute the study through conduct of analytical/experimental work to achieve the objectives.
2. Analyze, interpret and critique the findings of the study.
3. Prepare the reports of each phase scientifically and present the work in a professional manner.
4. Justify and defend the outcomes of the dissertation through self-learning and support the justification with appropriate demonstrations, records and documentation.

11.3 Usefulness of Curriculum

The second year of the MTech is important from the perspective of *converting a graduate engineering into an expert professional* in a specialized field of engineering and technology.

The curriculum thus allows availing following benefits:

1. The students will get an *opportunity to do research/product design in the specialized field of engineering/technology*.
2. The way in which the dissertation is carried out *closely mimics the work in industry or a RD center*, in the sense that, the students has to individually work as per target objectives and timeline.
3. This can give students *higher level of confidence and competency* of solving complex engineering problems.
4. The students get an opportunity to work with industry through a year-long internship.
5. It helps to create awareness about the *intellectual property rights and ethics* in research.
6. The students can develop their, *independent and critical thinking skills*, which can help them get *placement in core companies* with a specialized job profile.

11.4 Web-links

11.4.1 SY MTech Credit systems

1. Environmental Engineering
2. Structural Engineering
3. Design Engineering
4. Heat Power Engineering
5. Production Engineering
6. Control System Engineering
7. Power System Engineering
8. Electronics Engineering
9. Computer Science & Engineering
10. Computer Science & Information Technology

11.4.2 SY MTech Course Contents

1. Environmental Engineering
2. Structural Engineering
3. Design Engineering
4. Heat Power Engineering
5. Production Engineering
6. Control System Engineering
7. Power System Engineering
8. Electronics Engineering
9. Computer Science & Engineering
10. Computer Science & Information Technology

The purpose of pursuing a PhD Programme is contribute to knowledge, to challenge one's own capacity, creativity and push oneself to new heights. It also helps the research scholars to enter into R and D teams of prestigious companies and provides an opportunity to convert their innovative ideas into real life.

In the current era of Industry 4.0, industry needs holistic thinkers to come up with innovative yet technically feasible and commercially viable ideas for products and services.

Also due to the high demand of AI and ML related technology these days, the PhD scholars can explore the use of AI/ML and respective domains of technology to get into highly specialized research/product design/ Service oriented job profiles.

There are three schemes of PhD at the WCE research centre.

1. AICTE Doctoral Fellowship
2. Quality Improvement Programme
3. PhD under Shivaji University

In all the above schemes, the PhD degree is awarded by Shivaji University and the research work can be carried at WCE research centre.

12.1 AICTE Doctoral Fellowship (ADF)

The National Doctoral Fellowship (NDF) was commenced from the academic year 2018. From 2020-21, the same scheme is transformed as AICTE Doctoral Fellowship by involving Universities in the selection, registration etc. of the scholars under the broad thrust areas

for the research along with specified number of seats per technical University/other University.

The scheme is for full time meritorious students for Ph.D. program in the identified research institutes of AICTE with the objectives to promote research culture in AICTE approved Institution nurture talents for technical research and collaborative research between Institute and Industries leading to start-ups.

12.1.1 Objectives

The objectives of the ADF scheme are:

1. To promote research culture in AICTE approved Institutions.
2. To promote collaborative research between Institute and Industries leading to start-ups.
3. To nurture talents for technical research.

12.1.2 Thrust Areas for Research

Some of the broad thrust areas (but not limited to this) for research are as follows:

1. Green Technologies
2. Big Data, Machine Learning Data Sciences
3. Block Chain
4. Artificial Intelligence
5. Energy Production and Storage
6. Electronics Photonics
7. Nuclear Engineering and Allied Technologies
8. Robotics and Mechatronics
9. Augmented Reality (AR)/ Virtual Reality (VR)
10. Energy Efficiency, Renewable and sustainable Energy

11. Electric and Hybrid Mobility
12. Smart Cities, Housing and Transportation
13. Internet of Things (IoT)
14. 3D Printing
15. Quantum Computing
16. Smart Technologies for Agriculture and Food Industry
17. Water purification, conservation and management
18. Public Policy
19. Social Organizational Psychology Behavior
20. Cyber Security

12.1.3 Web-links

[Link to AICTE-ADF detailed Rules, Fellowship etc.](#) [Link to Entrance Exam for AICTE ADF Scheme.](#)

12.2 QIP

The Government of India launched the Quality improvement Programme in the year 1970. One of the main objectives of the programme is to upgrade the expertise and capabilities of the faculty members of the degree level institutions in the country. The programme is now being implemented and monitored by All India Council for Technical Education.

In “Quality Improvement Programme”, only sponsored teachers are eligible for admission to both Master’s and Doctoral Degree Programmes, with the aim to enable the teachers to acquire Master’s and Doctoral degrees and imbibe in them a culture of research and better teaching educational capabilities by exposing them to the environment of the institutes of study.

There are three main activities under QIP serving the faculty of degree level Engineering, Pharmacy and Polytechnic Institutions:

1. Providing opportunities to faculty members of the degree-level engineering institutions to improve their qualification by offering admissions to Master's and Ph.D. degree Programme.
2. Organizing Short Term Courses at the Major QIP Centers for serving teachers.
3. Curriculum Development (CD) Cell activities which help to improve class room teaching and learning.

Link to Additional information related QIP scholarship etc.

12.3 PhD under Shivaji University

The students can pursue PhD under Shivaji University with WCE as research centre.

12.3.1 Web-links

The detailed process of admission can be found at

1. <http://www.unishivaji.ac.in/admission/>
2. <http://www.unishivaji.ac.in/syllabusnew/MPhil-PhD-Coursework-Syllabus>

Summary

The summary related to important points for each year of BTech is given below:

Sr. No.	Class	Importance of Curriculum
1	FY BTech	<ul style="list-style-type: none">• High CGPA in FY can lead to High overall CGPA• Builds strong engineering foundation that can help throughout the career
2	SY BTech	<ul style="list-style-type: none">• Strong domain-related knowledge and skill, that is useful for campus placement• Useful for GATE and other examinations
3	TY BTech	<ul style="list-style-type: none">• Domain-specific advanced knowledge and skills• Prepares further for campus placement or start-up
4	Final Year BTech	<ul style="list-style-type: none">• Opportunity for innovation through mega project• Presentation skills and teamwork

The summary related to important points for each year of MTech is given below:

Sr. No.	Class	Importance of Curriculum
1	FY MTech	<ul style="list-style-type: none"> • <i>High CGPA</i> in FY can lead to High overall CGPA • Provides <i>research orientation</i> and specialized courses useful for <i>Campus Placement</i>
2	SY MTech	<ul style="list-style-type: none"> • Experience the Engineering System Analysis and Design • Opportunity for innovation through dissertation work • Develops the skill of presenting the specialized technical knowledge in a professional way.

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Acknowledgements

The curriculum of WCE has come up with contributions from various stakeholders such as students, faculty, functionaries, industry and alumni. We express our sincere gratitude towards all who helped for this purpose.

This book is an attempt to convey the importance and other aspects of curriculum to the students and other stakeholders. Your constructive suggestions/comments can be sent on email, deanacademics@walchandsangli.ac.in with subject, “Academic Book 2021-22”.

“Engineers provide important leadership to society through their central role in scientific and technological innovation. By creating, developing, and managing complex technologies and products, engineers contribute to the betterment of humanity and to shaping our world.”

-Ref: <http://catalog.mit.edu/schools/engineering/>