

Dr. Babasaheb Ambedkar Technological University
(Established as a University of Technology in the State of Maharashtra)
(under Maharashtra Act No. XXIX of 2014)
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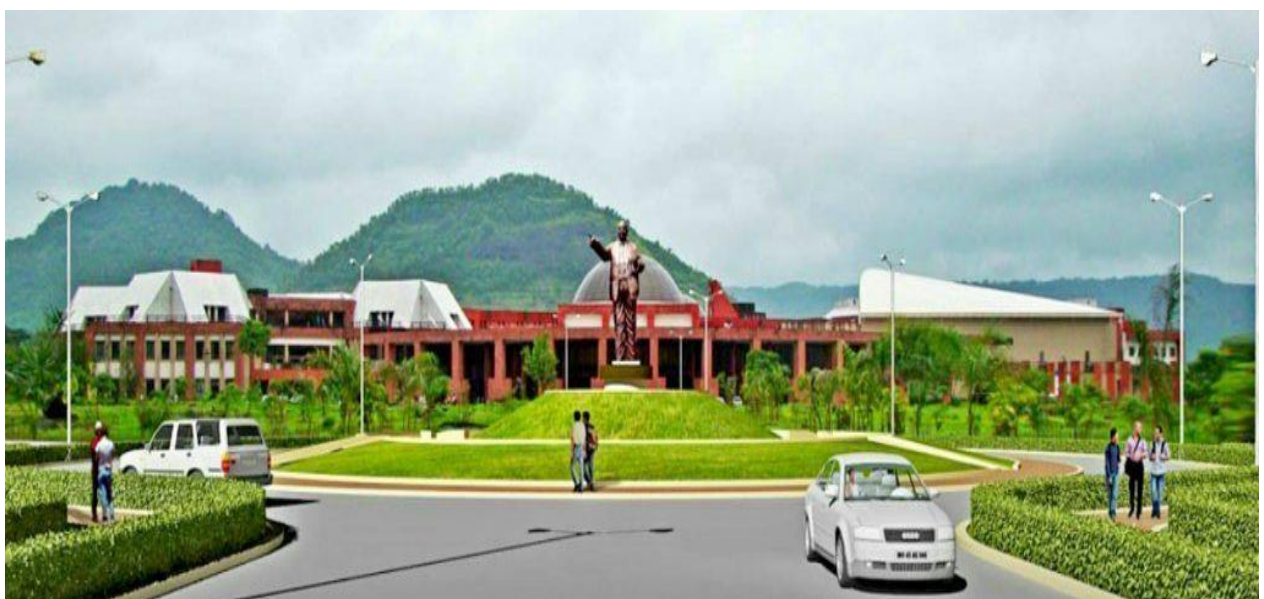


PROPOSED CURRICULUM UNDER GRADUATE PROGRAMME

B.Tech

FIRST YEAR ENGINEERING

WITH EFFECT FROM THE ACADEMIC YEAR 2020-2021.



Rules and Regulations

1. The normal duration of the course leading to B.Tech degree will be EIGHT semesters.
2. The normal duration of the course leading to M.Tech. degree will be FOUR semesters.
3. Each academic year shall be divided into 2 semesters, each of 20 weeks duration, including evaluation and grade finalization, etc. The Academic Session in each semester shall provide for at least 90 Teaching Days, with at least 40 hours of teaching contact periods in a five to six days session per week. The semester that is typically from Mid-July to November is called the ODD SEMESTER, and the one that is from January to Mid-May is called the EVEN SEMESTER. Academic Session may be scheduled for the Summer Session/Semester as well. For 1st year B. Tech and M. Tech the schedule will be decided as per the admission schedule declared by Government of Maharashtra.
4. The schedule of academic activities for a Semester, including the dates of registration, mid-semester examination, end-semester examination, inter-semester vacation, etc. shall be referred to as the Academic Calendar of the Semester, which shall be prepared by the Dean (Academic), and announced at least TWO weeks before the Closing Date of the previous Semester.
5. The Academic Calendar must be strictly adhered to, and all other activities including co-curricular and/or extra-curricular activities must be scheduled so as not to interfere with the Curricular Activities as stipulated in the Academic Calendar.

REGISTRATION:

1. Lower and Upper Limits for Course Credits Registered in a Semester, by a Full-Time Student of a UG/PG Programme:
A full time student of a particular UG/PG programme shall register for the appropriate number of course credits in each semester/session that is within the minimum and maximum limits specific to that UG/PG programme as stipulated in the specific Regulations pertaining to that UG/PG programme.
2. Mandatory Pre-Registration for higher semesters:
In order to facilitate proper planning of the academic activities of a semester, it is essential for the every institute to inform to Dean (Academics) and COE regarding details of total no. of electives offered (Course-wise) along with the number of students opted for the same. This information should be submitted within two weeks from the date of commencement of the semester as per academic calendar.
3. PhD students can register for any of PG/PhD courses and the corresponding rules of evaluation will apply.
4. Under Graduate students may be permitted to register for a few selected Post Graduate courses, in exceptionally rare circumstances, only if the DUGC/DPGC is convinced of the level of the academic achievement and the potential in a student.

Course Pre-Requisites:

1. In order to register for some courses, it may be required either to have exposure in, or to have completed satisfactorily, or to have prior earned credits in, some specified courses.
2. Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
3. REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the Dean (Academic) / Principal.
4. A student will be permitted to register in the next semester only if he fulfills the following conditions:
 - (a) Satisfied all the Academic Requirements to continue with the programme of Studies without termination
 - (b) Cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters;
 - (c) Paid all required advance payments of the Institute and hostel for the current semester;
 - (d) Not been debarred from registering on any specific ground by the Institute.

EVALUATION SYSTEM:

1. Absolute grading system based on absolute marks as indicated below will be implemented from academic year 2019-20, starting from I year B.Tech.

| Percentage of marks | Letter grade | Grade point |
|---------------------|--------------|-------------|
| 91-100 | EX | 10.0 |
| 86-90 | AA | 9.0 |
| 81-85 | AB | 8.5 |
| 76-80 | BB | 8.0 |
| 71-75 | BC | 7.5 |
| 66-70 | CC | 7.0 |
| 61-65 | CD | 6.5 |
| 56-60 | DD | 6.0 |
| 51-55 | DE | 5.5 |
| 40-50 | EE | 5.0 |
| <40 | EF | 0.0 |

2. Class is awarded based on CGPA of all eighth semester of B.Tech Program.

| CGPA for pass is minimum 5.0 | |
|--|--------------|
| CGPA upto <5.50 | Pass class |
| CGPA \geq 5.50 & <6.00 | Second Class |
| CGPA \geq 6.00 & <7.50 | First Class |
| CGPA \geq 7.50 | Distinction |
| [Percentage of Marks = CGPA*10.0] | |

3. A total of 100 Marks for each theory course are distributed as follows:

| | | |
|----|----------------------------------|----|
| 1. | MidSemester Exam (MSE) Marks | 20 |
| 2. | ContinuousAssesment Marks | 20 |
| 3. | EndSemesterExamination(ESE)Marks | 60 |

4. A total of 100 Marks for each practical course are distributed as follows:

| | | |
|----|----------------------------------|----|
| 1. | ContinuousAssesment Marks | 60 |
| 2. | EndSemesterExamination(ESE)Marks | 40 |

It is mandatory for every student of B.Tech to score a minimum of 40 marks out of 100, with a minimum of 20 marks out of 60 marks in End Semester Examination for theory course.

This will be implemented from the first year of B.Tech starting from Academic Year 2019-20

5. Description of Grades:

EX Grade: An 'EX' grade stands for outstanding achievement.

EE Grade: The 'EE' grade stands for minimum passing grade.

The students may appear for the remedial examination for the subjects he/she failed for the current semester of admission only and his/her performance will be awarded with EE grade only.

If any of the students remain absent for the regular examination due to genuine reason and the same will be verified and tested by the Dean (Academics) or committee constituted by the University Authority.

FF Grade: The 'FF' grade denotes very poor performance, i.e. failure in a course due to poor performance. The students who have been awarded 'FF' grade in a course in any semester must repeat the subject in next semester.

6. Evaluation of Performance:

1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

(A) Semester Grade Point Average (SGPA) The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SGPI is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^n c_i g_i]}{[\sum_{i=1}^n c_i]}$$

Where

‘n’ is the number of subjects for the semester,

‘ci’ is the number of credits allotted to a particular subject, and

‘gi’ is the grade-points awarded to the student for the subject based on his performance as

per the above table.

-SGPA will be rounded off to the second place of decimal and recorded as such.

(B) Cumulative Grade Point Average (CGPA): An up to date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (upto two decimal places). Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^m c_i g_i]}{[\sum_{i=1}^m c_i]}$$

Where

‘m’ is the total number of subjects from the first semester onwards up to and including the semester S, ‘ci’ is the number of credits allotted to a particular subject, and ‘gi’ is the grade-points awarded to the student for the subject based on his/her performance as per the above table.

-CGPA will be rounded off to the second place of decimal and recorded as such.

Award of Degree of Honours

Major Degree

The concept of Major and Minors at B.Tech level is introduced , to enhance learning skills of students, acquisition of additional knowledge in domains other than the discipline being pursued by the student, to make the students better employable with additional knowledge and encourage students to pursue cross-discipline research.

A. Eligibility Criteria for Majors

1. The Student should have Minimum CGPA of 7.5 up to 4th Semester
2. Student willing to opt for majors has to register at the beginning of 5th Semester
3. The Student has to complete 5 additional advanced courses from the same discipline specified in the curriculum. These five courses should be of 4 credits each amounting to 20 credits. The students should complete these credits before the end of last semester.
4. Student may opt for the courses from NPTEL/ SWAYAM platform. (if the credits of NPTEL/ SWAYAM courses do not match with the existing subject proper scaling will be done)

Student complying with these criteria will be awarded B.Tech (Honours) Degree.

B. Eligibility Criteria for Minors

1. The Student should have Minimum CGPA of 7.5 up to 4th Semester
2. Student willing to opt for minors has to register at the beginning of 5th Semester
3. The Student has to complete 5 additional courses from other discipline of their interest, which are specified in the respective discipline. These five courses should be of 4 credits each amounting to 20 credits.
4. Student may opt for the courses from NPTEL/ SWAYAM platform. (if the credits of NPTEL/ SWAYAM courses do not match with the existing subject proper scaling will be done)

**Student complying with these criteria will be awarded with B.Tech Degree in -----
Engineering with Minor in ----- --Engineering.**

(For e.g.: B. Tech in Civil Engineering with Minor in Computer Engineering)

For applying for Honours and Minor Degree the student has to register themselves through the proper system.

ATTENDANCE REQUIREMENTS:

1. All students must attend every lecture, tutorial and practical classes.
2. To account for approved leave of absence (e.g.representing the Institute in sports, games or athletics; placement activities; NCC/NSS activities; etc.) and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes actually conducted.

If the student failed to maintain 75% attendance, he/she will be detained for appearing the successive examination.

The Dean (Academics)/ Principal is permitted to give 10% concession for the genuine reasons as such the case may be.

In any case the student will not be permitted for appearing the examination if the attendance is less than 65%.

3. The course instructor handling a course must finalize the attendance 3 calendar days before the last day of classes in the current semester and communicate clearly to the students by displaying prominently in the department and also in report writing to the head of the department concerned.
4. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

TRANSFER OF CREDITS

The courses credited elsewhere, in Indian or foreign University/Institutions/ Colleges/Swayam Courses by students during their study period at DBATU may count towards the credit requirements for the award of degree. The guidelines for such transfer of credits are as follows:

- a) 20 % of the total credit will be considered for respective calculations.

- b) Credits transferred will be considered for overall credits requirements of the programme.
- c) Credits transfer can be considered only for the course at same level i.e. UG, PG etc.
- d) A student must provide all details (original or attested authentic copies) such as course contents, number of contact hours, course instructor /project guide and evaluation system for the course for which he is requesting a credits transfer. He shall also provide the approval or acceptance letter from the other side. These details will be evaluated by the concerned Board of Studies before giving approval. The Board of Studies will then decide the number of equivalent credits the student will get for such course(s) in DBATU. The complete details will then be forwarded to Dean for approval.
- e) A student has to get minimum passing grades/ marks for such courses for which the credits transfers are to be made.
- f) Credits transfers availed by a student shall be properly recorded on academic record(s) of the student.
- g) In exceptional cases, the students may opt for higher credits than the prescribed.

Bachelor of Technology, First year Engineering

Basic Science Course (BSC)

| | | |
|----------|--|----------|
| BTBS101 | Engineering Mathematics – I | (3-1-0)4 |
| BTBS102 | Engineering Physics | (3-1-0)4 |
| BTBS107L | Engineering Physics Lab | (0-0-2)1 |
| BTBS201 | Engineering Mathematics – II | (3-1-0)4 |
| BTBS202 | Engineering Chemistry | (3-1-0)4 |
| BTBS207L | Engineering Chemistry Lab | (0-0-2)1 |
| BTBS301 | Engineering Mathematics – III | (3-1-0)4 |
| BTBS404 | Probability Theory and Random Processes | (3-0-0)3 |

Engineering Science Course (ESC)

| | | |
|----------|---|------------------|
| BTES103 | Engineering Graphics | (2-0-0)2 |
| BTES105 | Energy and Environment Engineering | (2-0-0)2 |
| BTES106 | Basic Civil and Mechanical Engineering | (2-0-0) Audit |
| BTES108L | Engineering Graphics Lab | (0-0-4)2 |
| BTES203 | Engineering Mechanics | (2-1-0)3 |
| BTES204 | Computer Programming | (3-0-0)3 |
| BTES205 | Workshop Practice | (0-0-4)2 |
| BTES206 | Basic Electrical and Electronics Engineering | (2-0-0) Audit |
| BTES208L | Engineering Mechanics Lab | (0-0-2)1 |
| BTES209L | Computer Programming Lab | (0-0-2)1 |

Humanities and Social Science including Management Courses (HSSMC)

| | | |
|----------|---|----------|
| BTHM104 | Communication Skills | (2-0-0)2 |
| BTHM109L | Communication Skills Lab | (0-0-2)1 |
| BTHM403 | Basic Human Rights | (3-0-0)3 |
| BTHM605 | Employability and Skill Development | (3-0-0)3 |
| BTHM705 | Engineering Economics and Financial Mathematics | (3-0-0)3 |
| BTHM70 | Foreign Language Studies | Audit |

Seminar/Mini Project/ Internship

| | | |
|----------|--|----------|
| BTES210S | Seminar | (0-0-2)1 |
| BTES211P | Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time). (Internship – 1) | Audit |
| BTETS307 | Seminar I | (0-0-4)2 |
| BTETS407 | Seminar II | (0-0-4)2 |
| BTETP408 | (Internship – 2) | Audit |
| BTETM507 | Mini Project – 1 | (0-0-4)2 |
| BTETM607 | Mini Project – 2 | (0-0-4)2 |

Suggested Plan of Study , First Year:

| No.of Courses | SEMESTER I | SEMESTER II |
|----------------------|-------------------|------------------------------|
| 1 | BTBS101 | BTBS201 |
| 2 | BTBS102 | BTBS202 |
| 3 | BTES103 | BTES203 |
| 4 | BTHM104 | BTES204 |
| 5 | BTES105 | BTES205 |
| 6 | BTES106 | BTES206 |
| 7 | BTBS107L | BTBS207L |
| 8 | BTES108L | BTES208L |
| 9 | BTHM109L | BTES209L |
| 10 | -- | BTES210S |
| 11 | -- | BTES211P (Internship - 1) |

Degree Requirements:

| <u>Category of courses</u> | <u>Minimum credits to be earned</u> | <u>Credits awarded to First year</u> |
|--|--|---|
| Basic Science Course (BSC) | 25 | 18 |
| Engineering Science Course (ESC) | 19 | 15 |
| Humanities and Social Science including Management Courses (HSSMC) | 12 | 03 |

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| | | |
|--|------------|-----------|
| Professional Core Course (PCC) | 48 | -- |
| Professional Elective Course (PEC) | 17 | -- |
| Open Elective Course (OEC) | 16 | -- |
| Seminar/Mini Project/ Internship/Major Project | 23 | 01 |
| Total | 160 | 37 |

B. Tech in Electronics & Telecommunication Engineering Program Educational Objectives and Outcomes

A. Program Educational Objectives (PEOs)

Graduates will be able to–

- a. Equip graduates with a strong foundation in engineering sciences & allied discipline fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies.
- b. Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
- c. Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

B. Program Outcomes

Engineering Graduate 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 specific needs with appropriate consideration for the public health and safety, and the cultural, social, 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.

C. Program Specific Outcomes (PSOs)

1. Apply basic knowledge related to the discipline to solve engineering/ societal problems.
2. Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities.
3. Excellent adaptability to the changing industrial and real world requirements

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group A

| Semester I | | | | | | | | | |
|--------------------|--|---|----------|-----------|-------------------|------------|------------|------------|-------------------------------------|
| Course Code | Course Title | Teaching Scheme | | | Evaluation Scheme | | | | Credit |
| | | L | T | P | CA | MSE | ESE | Total | |
| Mandatory | Induction Program | 3-weeks duration in the beginning of semester. | | | | | | | |
| BTBS101 | Engineering Mathematics- I | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTBS102 | Engineering Physics | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTES103 | Engineering Graphics | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTHM104 | Communication Skills | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTES105 | Energy and Environment Engineering | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTES106 | Basic Civil and Mechanical Engineering | 2 | - | - | 50 | - | - | 50 | Audit |
| BTBS107L | Engineering Physics Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES108L | Engineering Graphics Lab | - | - | 4 | 60 | - | 40 | 100 | 2 |
| BTHM109L | Communication Skills Lab. | - | - | 2 | 60 | - | 40 | 100 | 1 |
| | | 14 | 2 | 8 | 330 | 100 | 420 | 850 | 18 |
| Semester II | | | | | | | | | |
| BTBS201 | Engineering Mathematics-II | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTBS202 | Engineering Chemistry | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTES203 | Engineering Mechanics | 2 | 1 | - | 20 | 20 | 60 | 100 | 3 |
| BTES204 | Computer Programming in C | 3 | - | - | 20 | 20 | 60 | 100 | 3 |
| BTES205 | Workshop Practices | - | - | 4 | 60 | - | 40 | 100 | 2 |
| BTES206 | Basic Electrical and Electronics Engineering | 2 | - | - | 50 | - | - | 50 | Audit |
| BTBS207L | Engineering Chemistry Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES208L | Engineering Mechanics Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES210S | Seminar | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES211P | Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time). | - | - | - | - | - | - | - | Credits To be evaluated in III Sem. |
| | | 13 | 3 | 10 | 430 | 80 | 440 | 950 | 19 |
| | | 27 | | | | | | | |

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group B

| Semester I | | | | | | | | | |
|--------------------|---|---|-----------|-----------|-------------------|------------|------------|------------|-------------------------------------|
| Course Code | Course Title | Teaching Scheme | | | Evaluation Scheme | | | | Credit |
| | | L | T | P | CA | MSE | ESE | Total | |
| Mandatory | Induction Program | 3-weeks duration in the beginning of semester. | | | | | | | |
| BTBS101 | Engineering Mathematics- I | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTBS102 | Engineering Chemistry | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTES103 | Engineering Mechanics | 2 | 1 | - | 20 | 20 | 60 | 100 | 3 |
| BTES104 | Computer Programming in C | 3 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTES105L | Workshop Practices | - | - | 4 | 60 | - | 40 | 100 | 2 |
| BTES106 | Basic Electrical and Electronics Engineering | 2 | - | - | 50 | - | - | 50 | Audit |
| BTBS107L | Engineering Chemistry Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES108L | Engineering Mechanics Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| | | 13 | 03 | 10 | 370 | 80 | 400 | 850 | 18 |
| | | 25 | | | | | | | |
| Semester II | | | | | | | | | |
| BTBS201 | Engineering Mathematics-II | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTBS202 | Engineering Physics | 3 | 1 | - | 20 | 20 | 60 | 100 | 4 |
| BTES203 | Engineering Graphics | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTHM204 | Communication Skills | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTES205 | Energy and Environment Engineering | 2 | - | - | 20 | 20 | 60 | 100 | 2 |
| BTES206 | Basic Civil and Mechanical Engineering | 2 | - | - | 50 | - | - | 50 | Audit |
| BTBS207L | Engineering Physics Lab | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES208L | Engineering Graphics Lab | - | - | 3 | 60 | - | 40 | 100 | 2 |
| BTHM209L | Communication Skills Lab. | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES210S | Seminar | - | - | 2 | 60 | - | 40 | 100 | 1 |
| BTES211P | Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time) | - | - | - | - | - | - | - | Credits To be evaluated in III Sem. |
| | | 14 | 02 | 09 | 390 | 100 | 460 | 950 | 19 |
| | | 26 | | | | | | | |

Guide to Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days.

We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

- **Physical Activity** This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature.
- **Creative Arts** Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.
- **Universal Human Values:** It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through dos and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program. Besides drawing the

attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

- **Literary:** Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.
- **Proficiency Modules:** This period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.
- **Lectures by Eminent People:** This period can be utilized for lectures by eminent people, ~~say~~ once a week. It would give the students exposure to people who are socially active or in public life.
- **Visits to Local Area** A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.
- **Familiarization to Dept./Branch & Innovations :** The students should be told about different method of study compared to coaching that is needed at IITs. They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

Schedule

The activities during the Induction Program would have an *Initial Phase*, a *Regular Phase* and a *Closing Phase*. The Initial and Closing Phases would be two days each.

Initial Phase

| Time | Activity |
|---------------------|---|
| Day 0 | |
| Whole day | Students arrive - Hostel allotment. (Preferably do pre-allotment) |
| Day 1 | |
| 9.00 AM to 3.00 PM | Academic Registration |
| 4.30 PM to 6.00 PM | Orientation |
| Day 2 | |
| 9.00 AM to 10.00 AM | Diagnostic test (for English etc.) |
| 10.15 AM to 12.25PM | Visits to Respective Departments |
| 12.30 PM to 2.00 PM | Lunch time |
| 2.00 PM to 3.00 PM | Director's Speech |
| 3.00 PM to 4.00 PM | Interaction with Parents |
| 4.00 PM to 5.30 PM | Mentor-Mentee groups- Introduction within group |

Regular Phase

After two days is the start of the Regular Phase of induction. With this phase there would be regular program to be followed every day.

Daily Schedule

Some of the activities are on a daily basis, while some others are at specified periods within the Induction Program. We first show a typical daily timetable.

| Session | Time | Activity | Remark |
|----------------------|---------------------|--|---------------------------------------|
| Day 3 Onwards | | | |
| I | 9.00 AM to 11.00 AM | Creative Arts / Universal Human Values | Half the groups will do creative arts |
| II | 11.00 AM to 1.00 PM | Universal Human Values/ Creative Arts | Complementary Alternate |
| Lunch Time | | | |
| I V | 2.00 PM to 4.00 PM | Afternoon Session | See below |
| V | 4.00 PM to 5.00 PM | Afternoon Session | See below |

Sundays are off. Saturdays have the same schedule as above or have outings.

Afternoon Activities (Non-Daily) : The following five activities are scheduled at different times of the Induction Program, and are not held daily forever:

1. Familiarization to Dept./Branch & Innovations
2. Visits to Local Area
3. Lectures by Eminent People
4. Literary
5. Proficiency Modules

Closing Phase

| Time | Activity |
|-------------------------|--|
| Last But one day | |
| 9.00 AM to 12.00 PM | Discussions and finalizations of presentations within each group |
| 2.00 PM to 5.00 PM | Presentation by each group in front of 4 other groups besides their own (about 100 students) |
| Last Day | |
| Whole day | Examinations if any |

Follow Up after Closure

A question comes up as to what would be the follow up program after the formal 3-week Induction Program is over? The groups which are formed should function as mentor- mentee network. A student should feel free to approach his faculty mentor or the student guide, when facing any kind of problem, whether academic or financial or psychological etc. (For every 10 undergraduate first year students, there would be a senior student as a student guide, and for every 20 students, there would be a faculty mentor.) Such a group should remain for the

entire 4-5 year duration of the stay of the student. Therefore, it would be good to have groups with the students as well as teachers from the same department/discipline Here we list some important suggestions which have come up and which have been experimented with.

□ **Follow Up after Closure – Same Semester:** It is suggested that the groups meet with ~~the~~ faculty mentors once a month, within the semester after the 3-week Induction Program is over. This should be a scheduled meeting shown in the timetable. (The groups are of course free to meet together on their own more often, for the student groups to be invited to their faculty mentor's home for dinner or tea, nature walk, etc.)

□ **Follow Up – Subsequent Semesters:** It is extremely important that continuity be maintained in subsequent semesters. It is suggested that at the start of the subsequent semesters (upto fourth semester), three days be set aside for three full days of activities related to follow up to Induction Program. The students be shown inspiring films, do collective art work, and group discussions be conducted. Subsequently, the groups should meet at least once a month.

Summary

Engineering institutions were set up to generate well trained manpower in engineering with a feeling of responsibility towards oneself, one's family, and society. The incoming undergraduate students are driven by their parents and society to join engineering without understanding their own interests and talents. As a result, most students fail to link up with the goals of their own institution. The graduating student must have values as a human being, and knowledge and meta-skills related to his/her profession as an engineer and as a citizen. Most students, who get de-motivated to study engineering or their branch, also lose interest in learning.

The Induction Program is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing competition and making them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and building of character.

The Universal Human Values component, which acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draw attention to society and 4

We are aware that there are advantages in mixing the students from different depts. However, in mixing, it is our experience that the continuity of the group together with the faculty mentor breaks down soon after. Therefore, the groups be from the same dept. but hostel wings have the mixed students from different depts. For example, the hostel room allotment should be in alphabetical order irrespective of dept. 7nature, and character to follow through. It also makes them reflect on their relationship with their families and extended family in the college (with hostel staff and others). It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seek help.

References:

Motivating UG Students Towards Studies, Rajeev Sangal, IITBHU Varanasi, Gautam Biswas, IIT Guwahati, Timothy Gonsalves, IIT Mandi, Pushpak Bhattacharya, IIT Patna, (Committee of IIT Directors), 31 March 2016, IIT Directors' Secretariat, IIT Delhi.

Course Objectives:

1. To know the application of the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
2. To know and apply the concept partial derivatives and their applications to Maxima/ Minima , series expansion of multi valued functions.
3. To understand Computation of Jacobian of functions of several variables and their applications to engineering problems
4. To identify and sketch of curves in various coordinate system.
5. To evaluate multiple integrals and their applications to area and volume.

Course Outcomes:

Students will be able to :

1. Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
2. Demonstrate the concept partial derivatives and their applications to Maxima/ Minima , series expansion of multi valued functions.
3. Compute Jacobian of functions of several variables and their applications to engineering problems
4. Identify and sketch of curves in various coordinate system.
5. Evaluate multiple integrals and their applications to area and volume.

Unit 1:Linear Algebra- Matrices

[07 Hours]

Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix ; Consistency of non- homogeneous and homogeneous system of linear equations ; Eigen values and eigen vectors ; Properties of eigen values and eigen vectors (without proofs); Cayley- Hamilton's theorem (without proof) and its applications.

Unit 2:Partial Differentiation

[07 Hours]

Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.

Unit 3:Applications of Partial differentiation

[07Hours]

Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.

Unit 4: Reduction Formulae and Tracing of Curves

[07Hours]

Reduction formulae for $\int_0^{\frac{\pi}{2}} \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$, Tracing of standard curves given in Cartesian, parametric & polar forms.]

Unit 5: Multiple Integra

[08 Hours]

Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral , volume as triple integral and surface area.

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3. A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarathi Griha Prakashan,Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

General Instructions:

The tutorial classes in Engineering Mathematics-I are to be conducted batchwise. Each class should be divided into three batches for the purpose.

The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.

The minimum number of assignments should be eight covering all topics.

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of Engineering materials.

Course Outcomes:

Students will be able to :

1. Explain & apply the concept of types of Oscillation, Dielectric properties & ultrasonics
2. Explain & compare between Interference & Polarisation of light, working Principle of Lasers & Fiber optics
3. Interpret, apply & demonstrate principle of motion of charged particles in EF&MF, Bainbridge Mass spectrograph & G M counter
4. Identify Types of crystals & crystal planes using Miller indices, Experimental approach.

Unit I: Oscillation and Ultrasonics: (07 Hrs)

Free oscillation, damped oscillation, Forced oscillation and Resonance, differential wave equation, Ultrasonic waves, production of ultrasonics (Piezoelectric effect, Magnetostriction effect) and its applications

Unit II: Optics, Fibre Optics and Laser: (07 Hrs)

Interference of light in thin film, wedge shaped film, Newton's rings, polarization of light, methods for production of polarized light (Reflection, Refraction & Double refraction), Huygen's theory of double refraction, Principle and structure of optical fibre, acceptance angle, acceptance cone, numerical aperture. Principle of laser, Types of laser – Ruby and He-Ne laser and their applications.

Unit III: Electron Optics, Nuclear and Quantum Mechanics: (07 Hrs)

Motion of electron in Electric field (parallel and perpendicular), Motion of electron in magnetic field, motion of electron in combined effect, Bainbridge mass spectrograph,

G. M counter, Heisenberg's uncertainty principle, Schrödinger's time dependent and time independent wave equations, physical significance of wave function.

Unit IV: Crystal Structure, X-rays and Electrodynamics (07 Hrs)

Unit cell, Bravais lattice, cubic system, number of atoms per unit cell, coordination number, atomic radius, packing density, relation between lattice constant and density, lattice planes and Miller indices, X-ray diffraction, Line and Continuous Spectrum of X-ray, Introduction of Maxwell equations (no derivation).

Unit V: Magnetic, Superconducting and Semiconducting materials: (07 Hrs)

Types of magnetic materials (Diamagnetic, Paramagnetic and Ferromagnetic), B-H curve, Superconductivity, types of superconductors, Meissner effect, properties and applications of superconductor, Band theory of solids, conductivity of semiconductors, Hall effect.

Expected Outcome:

1. The student will be able to understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, Quantum mechanics.
2. The student will be able to understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices and technologies.

Text books:

1. Engineering Physics M.N. Avadhanulu and P.G. Kshirsagar. S.Chand and Company LTD.
2. Engineering Physics – Dr. L. N. Singh. Synergy Knowledgeware-Mumbai.
3. Engineering Physics-R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
4. Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.

Reference books:

1. Introduction to Electrodynamics – David R. Griffiths.
2. Concept of Modern Physics – Arthur Beiser. Tata McGraw-Hill Publishing Company Limited.
3. Optics – Ajoy Ghatak, MacGraw Hill Education (India) Pvt. Ltd.
4. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt. Ltd.
5. Solid State Physics – A.J. Dekker. McMillan India–Limited.
6. The Feynman Lectures on Physics Voll, II, III.
7. Introduction to solid state physics – Charles Kittel. John Willey and Sons

Engineering physics Lab:

Atleast 10 experiments should be performed from the following list

1. Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light
2. Wedge Shaped film - Determination of thickness of thin wire
3. Half shade Polarimeter - Determination of specific rotation of optically active material
4. Laser - Determination of wavelength of He-Ne laser light
5. Magnetron Tube - Determination of 'e/m' of electron
6. G.M. Counter - Determination of operating voltage of G.M. tube
7. Crystal Plane – Study of planes with the help of models related Miller Indices
8. Hall Effect - Determination of Hall Coefficient
9. Four Probe Method - Determination of resistivity of semiconductor
10. Measurement of Band gap energy of Semiconductors
11. Study of I-V characteristics of P-N junction diode
12. Experiment on fibre optics
13. Ultrasonics Interferometer
14. B-H Curve Experiment
15. Susceptibility measurement experiment

First Year B. Tech Classes (Common to all Branches)

Course Objectives:

1. To make use of drawing instruments effectively for drawing and dimensioning.
2. To understand the conventions and methods of engineering drawing.
3. To know the concept of projections of points, lines, planes, solids and section of solids.
4. To understand the Construction isometric and orthographic views of given objects.

Course Outcomes:

Students will be able to :

1. Use of drawing instruments effectively for drawing and dimensioning.
2. Explain conventions and methods of engineering drawing.
3. Apply concept of projections of points, lines, planes, solids and section of solids.
4. Construct isometric and orthographic views of given objects.

Unit 1: Drawing standards and geometrical construction: 4 hrs

Drawing standard SP: 46, Type of lines, lettering, dimensioning, scaling conventions. Geometrical construction: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon.

Unit 2: Orthographic Projections and Projections of Points: 4hrs

Introduction to orthographic projection, drawing of orthographic views of objects from their isometric views. Projection of points lying in four quadrants.

Unit 3: Projections of Straight Lines and Planes and their Traces: 4hrs

Projections of lines parallel and perpendicular to one or both planes, projections of lines inclined to one or both planes. Traces of lines.

Projections of planes parallel and perpendicular to one or both planes, projection of planes inclined to one or both planes.

Unit 4: Projections of Solids 4hrs

Types of solids, projections of solids with axis perpendicular and parallel to HP and VP, solids with axis inclined to one or both the planes. Projections of spheres touching each other.

Unit 5: Sectioning of Solids, Isometric Projections 4hrs

Sectioning of solids: Section planes perpendicular to one plane and parallel or inclined to other plane. Isometric projections: Isometric scale, drawing of isometric projections from given orthographic views.

Reference/Text Books:

1. N. D. Bhatt, *Engineering Drawing*, Charotar Publishing House, 46th Edition, 2003.
2. K. V. Natarajan, *A text book of Engineering Graphic*, Dhanalakshmi Publishers, Chennai, 2006.
3. K. Venugopal and V. Prabhu Raja, *Engineering Graphics*, New Age International (P) Ltd, 2008.
4. Dhananjay A. Jolhe, *Engineering Drawing with an Introduction to Autocad*, Mc Graw Hill Education, 2017

BTES108L Engineering Graphics Lab

| Practical Scheme: | Examination Scheme: |
|--------------------------|--|
| Practical: 3 hrs/batch | Internal Assessment: 60 Marks External Exam: 40 Marks |

Course Contents:

List of Experiment

1. Lines, lettering and dimensioning.
2. Geometrical Constructions.
3. Orthographic projections.
4. Projections of points and straight lines
5. Projections of planes.
6. Projections of solids.
7. Section of solids.
8. Isometric Projections.

BTHM104/204 Communication Skills

2 Credits

Course Objectives:

- 1.To know and apply speaking and writing skills in professional as well as social situations
- 2.To Overcome Mother Tongue Influence and demonstrate neutral accent while exercising English
- 3.To know and apply communication skills for Presentations, Group Discussion and interpersonal interactions.
- 4.To know and apply grammar correctly during Speaking and Writing situations especially in context with Presentations, Public Speaking, Report writing and Business Correspondence

Course Outcomes:

Students will be able to:

- 1.Apply speaking and writing skills in professional as well as social situations
- 2.Overcome Mother Tongue Influence and demonstrate neutral accent while exercising English
- 3.Apply communication skills for Presentations, Group Discussion and interpersonal interactions.
- 4.Apply grammar correctly during Speaking and Writing situations especially in context with Presentations, Public Speaking, Report writing and Business Correspondence

Unit 1: Communication and Communication Processes (04hrs)

Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension. Listening : Importance of Listening, Types of Listening, Barriers to Listening.

Unit 2: Verbal & Non-verbal Communication (04 hrs)

Use of Language in Spoken Communication, Principles and Practice of Group Discussion, Public Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Appropriate Use of Non-verbal Communication, Presentation Skills, Extempore, Elocution.

Unit 3: Study of Sounds in English (02 hrs)

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.

Unit 4: English Grammar (05 hrs)

Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.

Unit 5: Writing Skills, Reading Skills & Listening Skills (04 hrs)

Features of Good Language, Difference between Technical Style and Literary Style, Writing Emails, Formal and Informal English, Technical Reports: Report Writing: Format, Structure and Types Letter Writing: Types, Parts, Layouts, Letters and Applications, Use of Different Expressions and Style, Writing Job Application Letter and Resume.

Text book:

Mohd. Ashraf Rizvi, *Communication Skills for Engineers*, Tata McGraw Hill

Reference Books:

- a. Sanjay Kumar, Pushp Lata, *Communication Skills*, Oxford University Press, 2016
- b. Meenakshi Raman, Sangeeta Sharma, *Communication Skills*, Oxford University Press, 2017
- c. Teri Kwai Gamble, Michael Gamble, *Communication Works*, Tata McGraw Hill Education, 2010
- d. Anderson, Kenneth. Joan Maclean and Tossny Lynch. *Study Speaking: A Course in Spoken English for Academic Purposes*. Cambridge: CUP, 2004.
- e. Aswathapa, K. *Organisational Behaviour*, Himalayan Publication, Mumbai (1991).
- f. Atreya N and Guha, *Effective Credit Management*, MMC School of Management, Mumbai (1994).
- g. Balan, K.R. and Rayudu C.S., *Effective Communication*, Beacon New Delhi (1996).
- h. Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.
- i. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975.
- j. Black, Sam. *Practical Public Relations*, E.L.B.S. London (1972).
- k. Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP, 2007.
- l. Bovee Courtland, L and Thrill, John V. *Business Communication*, Today McGraw Hill, New York, Taxman Publication (1989).

Communication Skill Lab:

Atleast 10 experiments should be performed from the following list

- 1) How to introduce oneself?
- 2) Introduction to Phonemic symbols
- 3) Articulation of sounds in English with proper manner
- 4) Practice and exercises on articulation of sounds
- 5) Read Pronunciations/transcriptions from the dictionary
- 6) Practice and exercises on pronunciations of words
- 7) Introduction to stress and intonation
- 8) Rapid reading sessions
- 9) Know your friend
- 10) How to introduce yourself
- 11) Extempore
- 12) Group discussion
- 13) Participating in a debate
- 14) Presentation techniques
- 15) Interview techniques

BTES105/205 Energy and Environment Engineering

2 Credits

Course Objectives:

1. To Identify conventional ,non conventional energy sources.
2. To understand the power consuming and power developing devices for effective utilization and power consumption
3. To Identify various sources of air, water pollution and its effects.
4. To understand noise,soil, thermal pollution and Identify solid, biomedical and hazardous waste.

Course Outcomes:

Students will be able to:

1. Identify conventional ,non conventional energy sources.
2. Know and discuss power consuming and power developing devices for effective utilization and power consumption
3. Identify various sources of air, water pollution and its effects.
4. Know and discuss noise,soil, thermal pollution and Identify solid, biomedical and hazardous waste.

Unit 1: Conventional Power Generation:

(4 hours)

Steam power station, Nuclear power plant – Gas turbine power plant- Hydro power station: Schematic arrangement, advantages and disadvantages, Thermo electric and thermionic generators, Environmental aspects for selecting the sites and locations of power plants.

Unit 2: Renewable Power Generation:

(4 hours)

Solar, Wind, Biogas and Biomass, Ocean Thermal energy conversion (OTEC), Tidal, Fuel cell, Magneto Hydro Dynamics (MHD): Schematic arrangement, advantages and disadvantages.

Unit 3: Energy conservation

(4 hours)

Scope for energy conservation and its benefits Energy conservation Principle– Maximum energy efficiency, Maximum cost effectiveness, Methods and techniques of energy conservation in ventilation and air conditioners, compressors, pumps, fans and blowers, Energy conservation in electric furnaces, ovens and boilers.,lighting techniques.

Unit 4: Air Pollution

(4 hours)

Environment and Human health - Air pollution: sources- effects- control measures - Particulate emission, air quality standards, and measurement of air pollution.

Unit 5: Water Pollution

(4 hours)

Water pollution- effects- control measures- Noise pollution –effects and control measures, Disposal of solid wastes, Bio-medical wastes-Thermal pollution – Soil pollution -Nuclear hazard.

Reference/Text Books:

1. A Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A Text book of Power System Engineering, Dhanpat Rai Publication.
2. Rai. G. D., Non Conventional Energy Sources, Khanna Publishers, Delhi,2006.
3. Rao S., Parulekar B.B., Energy Technology-Non conventional, Renewable And Conventional, Khanna Publishers, Delhi,2005.

4. Glynn Henry J., Gary W. Heinke, Environmental Science and Engineering, Pearson Education, Inc,2004.
5. J. M. Fowler, Energy and the Environment, McGraw-Hill, 2 nd Edition,1984.
6. Gilbert M. Masters, Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall,2003.

BTES106/206 Basic Civil and Mechanical Engineering

Audit

Course Objectives:

1. To Identify various Civil Engineering materials and choose suitable material among various options.
2. To know and apply principles of surveying to solve engineering problem
3. To Identify various Civil Engineering structural components and select appropriate structural system among various options
4. To Explain and define various properties of basic thermodynamics, materials and manufacturing processes.
5. To know and discuss the working principle of various power consuming and power developing devices

Course Outcomes:

Students will be able to:

1. Identify various Civil Engineering materials and choose suitable material among various options.
2. Apply principles of surveying to solve engineering problem
3. Identify various Civil Engineering structural components and select appropriate structural system among various options
4. Explain and define various properties of basic thermodynamics, materials and manufacturing processes.
5. Know and discuss the working principle of various power consuming and power developing devices

Part I Basic Civil Engineering

Module 1: Introduction to civil engineering

(4hrs)

Various Branches, role of civil engineer in various construction activities, basic engineering properties and uses of materials: earth, bricks, timber, stones, sand, aggregates, cement, mortar, concrete, steel, bitumen, glass, FRP, composite materials.

Module 2: Building Components & Building Planning

(4 hrs)

Foundation and superstructure, functions of foundation, types of shallow and deep foundations, suitability in different situation, plinth, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, ventilation, basics of plumbing and sanitation

Module3: Surveying

(4 hrs)

Principles of survey, elements of distance and angular measurements, plotting of area, base line and offsets, introduction to Plane table surveying, introduction to levelling, concept of bench marks, reduced level, contours

Part II Basic Mechanical Engineering

Unit 1: Introduction to Mechanical Engineering:

(4 hrs)

Introduction to Laws of Thermodynamics with simple examples pertaining to respective branches, IC Engines: Classification, Applications, Basic terminology, 2 and 4 stroke IC engine working principle, Power Plant: Types of Power plant; Gas power plant, Thermal power plant, Nuclear power plant, Automobiles: Basic definitions and objectives

Unit 2:

(4 hrs)

Design Basics, Machine and Mechanisms, Factor of safety, Engineering Materials: types and applications, basics of Fasteners Machining and Machinability, Introduction to Lathe machine, Drilling machine, Milling machine, basics of machining processes such as turning, drilling and milling, Introduction to casting

Text Books

- Anurag Kandyia, “Elements of Civil Engineering”, Charotar Publishing, Anand
- M. G. Shah, C. M. Kale, and S. Y. Patki, “Building Drawing”, Tata McGraw Hill
- Sushil Kumar, “Building Construction”, Standard Publishers Distributors
- M. S. Palani Gamy, “Basic Civil Engineering”, Tata Mc-Graw Hill Publication
- Kanetkar T. P. and Kulkarni S. V., “Surveying and Levelling”, Vols. I, II and III, Vidyarthi Gruh Prakashan, Pune
- Punmia, “Surveying”, Vol.- I, Vol.-II, Vol.-III, Laxmi Publications
- G. K. Hiraskar, “Basic Civil Engineering”, Dhanpat Rai Publications
- Gopi Satheesh, “Basic Civil Engineering”, Pearson Education
- P. K. Nag “Engineering Thermodynamics”, Tata McGraw Hill, New Delhi 3rd ed. 2005
- Ghosh, A K Malik, “Theory of Mechanisms and Machines”, Affiliated East West Press Pvt. Ltd. New Delhi.
- Serop Kalpakaji and Steven R Schimd “ A manufacturing Engineering and Techology” Addison Wesley Laongman India 6th Edition 2009
- V. B. Bhandari, “ Deisgn of Machine Elements”, Tata McGraw Hill Publications, New Delhi.

BTBS201 Engineering Mathematics – II

4 Credits

Course Objectives:

1. To know and discuss the need and use of complex variables to find roots ,to separate complex quantities and to establish relation between circular and hyperbolic functions.
2. To understand and solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
3. To determine Fourier series representation of periodic functions over different intervals.
4. To Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence & curl in various engineering streams.
5. To know and apply the principles of vector integration to transform line integral to surface integral ,surface to volume integral & vice versa using Green's , Stoke's and Gauss divergence theorems.

Course Outcomes:

Students will be able to:

1. Discuss the need and use of complex variables to find roots ,to separate complex quantities and to establish relation between circular and hyperbolic functions.
2. Solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
3. Determine Fourier series representation of periodic functions over different intervals.
4. Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence & curl in various engineering streams.
5. Apply the principles of vector integration to transform line integral to surface integral ,surface to volume integral & vice versa using Green's , Stoke's and Gauss divergence theorems.

Unit 1: Complex Numbers

[07 Hours]

Definition and geometrical representation ; De-Moivre's theorem(without proof) ; Roots of complex numbers by using De-Moivre's theorem ; Circular functions of complex variable – definition ; Hyperbolic functions ; Relations between circular and hyperbolic functions ; Real and imaginary parts of circular and hyperbolic functions ; Logarithm of Complex quantities.

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications

[07 Hours]

Linear equations; Reducible to linear equations (Bernoulli's equation); Exact differential equations; Equations reducible to exact equations ; Applications to orthogonal trajectories , mechanical systems and electrical systems.

Unit 3: Linear Differential Equations with Constant Coefficients

[07 Hours]

Introductory remarks - complementary function, particular integral ; Rules for finding complementary functions and particular integrals ; Method of variation of parameters ; Cauchy's homogeneous and Legendre's linear equations.

Unit 4: Fourier Series

[07 Hours]

Introductory remarks- Euler's formulae ; Conditions for Fourier series expansion - Dirichlet's conditions ; Functions having points of discontinuity ; Change of interval ; Odd and even functions expansions of odd and even periodic functions ; Half-range series.

Unit 5: Vector Calculus

[07 Hours]

Scalar and vector fields: Gradient , divergence and curl ; Solenoidal and irrotational vector fields; Vector identities (statement without proofs) ; Green's lemma , Gauss' divergence theorem and Stokes' theorem (without proofs)

Text Books

- a. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
- b. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
- c. A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
- d. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
- e. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

- a. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
- b. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
- c. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

General Instructions:

1. The tutorial classes in Engineering Mathematics-II are to be conducted batchwise. Each class should be divided into three batches for the purpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.
3. The minimum number of assignments should be eight covering all topics.

Course Objectives:

1. To know the demonstration of knowledge of Chemistry in technical fields.
2. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. To understand and develop the importance of water in industrial and domestic usage.
4. To identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
5. To examine a fuel and suggest alternative fuels.

Course Outcomes:

Students will be able to:

1. Demonstrate knowledge of chemistry in technical fields.
2. Bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. Develop the importance of water in industrial and domestic usage.
4. Identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
5. Examine a fuel and suggest alternative fuels.

Unit 1: Water Treatment

(7L)

Introduction, Hard and Soft water, Disadvantages of hard water –In Domestic use, In Industrial use, Softening of water – Zeolite process, Ion exchange process, Hot Lime –Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolved oxygen (DO) and its determination by Winkler's method.

Unit 2: Phase Rule

(6L)

Phase Rule, statement, Explanation of the terms – Phase, Component, Degrees of freedom. One component system – Water and Sulphur. Reduced Phase rule equation, Two component alloy system-Phase diagram of Silver- Lead alloy system.

Unit 3: Corrosion and its Control

(7L)

Introduction, Fundamental reason of corrosion, Electrochemical Corrosion(Wet corrosion), Direct Chemical Corrosion(Dry corrosion), Factors affecting the rate of corrosion, Types of corrosion- Galvanic, Microbiological Corrosion, Methods to minimise the rate of corrosion- Proper designing, Cathodic and Anodic protection method.

Unit 4: Fuels and Lubricants

(7L)

Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, solid fuel- Coal and Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, Liquid fuel- Refining of Petroleum.

Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants, Properties of lubricants: Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.

Unit 5: Electrochemistry

(7L)

Introduction – Definition and units of Ohm's Law, Specific Resistance, Specific Conductance, Equivalent and Molecular Conductance. Method of conductance measurement by Wheatstone bridge method, Cell constant, Conductometric titrations, Nernst equation and its application for the calculation of half-cell potential, Glass electrode, Fuel cell (H₂O₂), Advantages of fuel cell, Ostwald's theory of acid- base indicator.

Text books:

1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2. Bhal & Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
3. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015

Reference books:

1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.
2. O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.
4. S.S.Dara, Engineering Chemistry, McGraw Hill Publication, New Delhi.

Engineering Chemistry Lab:

At least 10 experiments should be performed from the following list

1. Determination of Hardness of water sample by EDTA method.
2. Determination of Chloride content in water sample by precipitation titration method.
3. Determination of Dissolve Oxygen in water by Iodometric method.
4. Determination of Percent purity of Bleaching Powder.
5. pH – metric Titration (Acid Base titration)
6. Conductometric Titration (Acid Base titration)
7. Surface tension
8. Viscosity
9. To determine Acidity of water sample.
10. To determine Calorific value of a fuel.
11. Determination of Acid value of an oil sample.
12. Determination of Saponification value of an oil sample.
13. Experiment on water treatment by using Ion exchange resins.
14. To find out P-T curve diagram of steam.
15. To determine Alkalinity water sample.
16. Determination of rate of corrosion of metal.

Reference Books:

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.
2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.
3. Practical in Engineering Chemistry, S. S. Dara.

Course Objectives:

1. To know and apply fundamental Laws of Engineering Mechanics
2. To know and apply Conditions of static equilibrium to analyze given force system
3. To compute Centre of gravity and Moment of Inertia of plane surfaces
4. To compute the motion characteristics of a body/particle for a Rectilinear and Curvilinear Motion
5. To know and discuss relation between force and motion characteristics

Course Outcomes:

Students will be able to:

1. Apply fundamental Laws of Engineering Mechanics
2. Apply Conditions of static equilibrium to analyze given force system
3. Compute Centre of gravity and Moment of Inertia of plane surfaces
4. Compute the motion characteristics of a body/particle for a Rectilinear and Curvilinear Motion
5. Know and discuss relation between force and motion characteristics

Module1:BasicConcepts

(7Lectures)

Objectives of Engineering Analysis and Design, Idealization of Engineering Problems, Simplification of real 3D problems to 2-D and 1-D domain, Basis of Assumptions, types of supports, types of load, free body diagram, Laws of Motion, Fundamental principles, Resolution and composition of a forces, Resultant, couple, moment, Varignon's theorem, force systems, Centroid of composite shapes, moment of inertia of planer sections and radius of gyration

Module2: Equilibrium

(7 Lectures)

Static equilibrium, analytical and graphical conditions of equilibrium, Lami's theorem, equilibrium of coplanar concurrent forces, coplanar non concurrent forces, parallel forces, beams reactions Simple trusses (plane and space), method of joints for plane trusses, method of sections for plane trusses Friction: Coulomb law, friction angles, wedge friction, sliding friction and rolling resistance

Module3: Kinematics

(7 Lectures)

Types of motions, kinematics of particles, rectilinear motion, constant and variable acceleration, relative motion, motion under gravity, study of motion diagrams, angular motion, tangential and radial acceleration, projectile motion, kinematics of rigid bodies, concept of instantaneous center of rotation, concept of relative velocity,

Module4: Kinetics

(6 Lectures)

Mass moment of inertia, kinetics of particle, D'Alembert's principle: applications in linear motion, kinetics of rigid bodies, applications in translation, applications in fixed axis rotation

Module5: Work, Power, Energy

(6 Lectures)

Principle of virtual work, virtual displacements for particle and rigid bodies, work done by a force, spring, potential energy, kinetic energy of linear motion and rotation, work energy equation, conservation of energy, power, impulse momentum principle, collision of elastic bodies.

Text Books

- S. Timoshenko, D. H. Young, “Engineering Mechanics”, McGraw Hill, 1995.
- Tayal A. K., “Engineering Mechanics”, Umesh Publications, 2010.
- Bhavikatti S. S., Rajashekarappa K. G., “Engineering Mechanics”, New Age International Publications, 2nd Edition.
- Beer, Johnston, “Vector Mechanics for Engineers”, Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.
- Irving H. Shames, “Engineering Mechanics - Statics and Dynamics”, Pearson Education, Fourth edition, 2003.
- McLean, Nelson, “Engineering Mechanics”, Schaum’s outline series, McGraw Hill Book Company, N Delhi, Publication.
- Singer F. L., “Engineering Mechanics - Statics & Dynamics”, Harper and Row Pub. York.
- Khurmi R. S., “Engineering Mechanics”, S. Chand Publications, N. Delhi

Engineering Mechanics Lab:

Atleast 10 experiments should be performed from the following list

1. Polygon law of coplanar forces
2. Bell crank lever.
3. Support reaction for beam.
4. Problems on beam reaction by graphics statics method
5. Simple / compound pendulum.
6. Inclined plane (to determine coefficient of friction).
7. Collision of elastic bodies (Law of conservation of momentum).
8. Moment of Inertia of fly wheel.
9. Verification of law of Machine using Screw jack
10. Assignment based on graphics statics solutions
11. Any other innovative experiment relevant to Engineering Mechanics.
12. Centroid of irregular shaped bodies.
13. Verification of law of Machine using Worm and Worm Wheel
14. Verification of law of Machine using Single and Double Gear Crab.
15. Application of Spreadsheet Program for concepts like law of moments, beam reactions, problems in kinematics, etc

BTES104/204 Computer Programming in C

2 Credits

Course Objectives:

1. To give a broad perspective about the uses of computers in engineering industry and C Programming.
2. To develop the basic concept of algorithm, algorithmic thinking and flowchart.
3. To apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.
4. To make familiar the more advanced features of the C language.
5. To identify tasks in which the numerical techniques learned are applicable and apply them to write programs and hence use computers effectively to solve the task.

Course Outcomes:

Students will be able to:

1. Gain a broad perspective about the uses of computers in engineering industry and C Programming.
2. Develop the basic concept of algorithm, algorithmic thinking and flowchart.
3. Apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.
4. Use the more advanced features of the C language.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs and hence use computers effectively to solve the task.

Unit 1: Process of programming:

(4 Lectures)

Editing, Compiling, Error Checking, executing, testing and debugging of programs. IDE commands. Eclipse for C Program development, Flowcharts, Algorithms. (4 Lectures)

Unit 2: Types, Operators and Expressions:

(4 Lectures)

Variablenames, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and orderofevaluation.

Unit 3: Control Flow:

(4 Lectures)

Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue goto and Labels. Functions and Program Structure: Basic of functions, functions returning non-integers external variables scope rules.

Unit 4: Arrays in C:

(4 Lectures)

Initializing arrays, Initializing character arrays, multidimensional arrays.

Unit 5: Structures C:

(4 Lectures)

Basics of structures, structures and functions arrays of structures, Pointer in C. Pointers to integers, characters, floats, arrays, structures.

Special Note: Topic of Pointers in C is only for lab exercises and not for end semester examinations.

Reference/Text Books:

1. Brain W. Kernighan & Dennis Ritchie, The C Programming Language, Prentice Hall, 2nd Edition, 1988.
2. R. S. Bichkar, Programming with C, Orient Blackswan, 1st Edition, 2012.
3. Herbert Schildt, C the Complete Reference, McGraw-Hill Publication, 2000.
4. Balguruswamy, Programming in C, PHI.
5. Yashwant Kanitkar, Let Us C, PHI

Computer Programming in C Lab:

Atleast 10 experiments should be performed from the following list

1. Assignment on Flow Chart.
2. A Simple program to display a message "Hello world" on screen.
3. A Program to take input from user and display value entered by user on screen.
4. Basic example for performing different C Operations using operator. (With and without using scanf()).
5. Basic Program on Operator. (Using scanf()).
 - a) Program to find and print area, perimeter and volume of geometric objects.
 - b) Program to check a number entered by user is Perfect number or not.
6. Program to find maximum and minimum between two numbers given by user using if-else and conditional Operators.
7. Program to swap two numbers.
8. Program to print square and factorial of an entered number using while loop.

9. Program to check a number is Palindrome number or not.
10. Program to check Armstrong number.
11. Program to check and generate prime numbers up to n.
12. Program to find GCD of two entered numbers.
13. Program to find maximum and minimum from n entered numbers.
14. Program to print alternate numbers from n entered numbers.
15. Program to search an element in an Array using linear and binary search.
16. Program to print entered numbers in ascending order using sorting.
17. Program to print addition, subtraction and multiplication of Matrices.
18. Program to find length of string. (With and without using library function).
19. Programs demonstrating use of Structures, Arrays of Structures and Structure containing arrays.
20. Programs demonstrating use of pointers to integers, floats, char, strings, structures and arrays.

Course Objectives:

1. To know and apply basic ideas and principles of electrical engineering.
2. To Identify protection equipment and energy storage devices.
3. To differentiate electrical and electronics domains and explain the operation of diodes and transistors.
4. To acquire knowledge of digital electronics
5. To design simple combinational and sequential logic circuits.

Course Outcomes:

Students will be able to:

1. Apply basic ideas and principles of electrical engineering.
2. Identify protection equipment and energy storage devices.
3. Differentiate electrical and electronics domains and explain the operation of diodes and transistors.
4. Acquire knowledge of digital electronics
5. Design simple combinational and sequential logic circuits.

Unit 1: Elementary Electrical Concepts:

[07 Hours]

Fundamental of Electrical system Potential difference, Ohm's law, Effect of temperature on resistor, resistance temperature coefficient, Electrical wiring system: Study of different wire gauges and their applications in domestic and industry. Energy Resources and Utilization: Conventional and nonconventional energy resources; Introduction to electrical energy generation from different resources, transmission, distribution and utilization, Advantages & Disadvantages of AC & DC transmission. Concept of Supply Demand, Power Factor, Need of unity factor.

Unit 2: Measurement of Electrical Quantities:

[07 Hours]

Measurement of Voltage, Current, and Power; Measurement of 3 phase power; Study of Energy meters. Study of Electrical Storage devices: Batteries such as Nickel-cadmium (NiCd), Lithium-ion (Li-ion), Lithium Polymer (Li-pol.) batteries. Study of circuit breakers & Actuators (MCB & MPCB, Power Contactors & Aux contactors, Electro-Mechanical & Solid state Relays)

Unit 3: Diodes and Circuits:

[07 Hours]

The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers, Equations for IDCVDC VRMS, IRMS, Efficiency and Ripple Factor for each configuration. Filters: Capacitor Filter, Choke Input Filter, Capacitor Input Filter (π Filter), Zener Diode, Characteristics, Specifications, Zener Voltage Regulator, Types of Diodes: LED, Photodiode

Unit 4: Semiconductor Devices and Applications:

[07 Hours]

Transistors: Introduction, Classification, CE, CB, and CC configurations, α , β , concept of gain and bandwidth. Operation of BJT in cut-off, saturation and active regions (DC analysis). BJT as an amplifier, biasing techniques of BJT, BJT as a switch. Introduction to Digital Electronics: Number System, Basic logic Gates, Universal Gates, Boolean Postulates, De-Morgan Theorems

Reference/Text Books:

1. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
2. Brijesh Iyer and S. L. Nalbalwar, A Text book of Basic Electronics, Synergy Knowledgeware Mumbai, 2017. ISBN:978-93-8335-246-3
3. Vincent DeToro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition, 2011.
4. Boylstad, Electronics Devices and Circuits Theory, Pearson Education.
5. Edward Hughes, Electrical Technology, Pearson Education.
6. D. P. Kothari and Nagrath, Theory and Problems in Electrical Engineering, PHI Publication, 2011.
7. B. L. Theraja, Basic Electronics, S. Chand Limited, 2007.
8. Millman Halkias, Integrated Electronics-Analog and Digital Circuits and Systems, McGraw-Hill Publication, 2000.
9. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
10. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
11. Printed Circuit Boards Design & Technology, Walter C. Bosshart, McGraw-Hill Publication.

Note: Students are advised to use internet resources whenever required

BTES206L Workshop Practice

| Teaching Scheme: | Examination Scheme: |
|------------------------|--|
| Practical: 4 hrs/batch | Internal Assessment: 60 Marks External Exam: 40 Marks |

Instruction to Students:

Each student is required to maintain a „workshop diary“ consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

List of Practical: (any six)

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.
2. A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
3. A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.
4. Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i) Tray ii) Funnel and similar articles.
5. Exercise in Arc welding (MMAW) to make a square butt joint.
6. Exercise in Resistance (Spot) welding to make a lap joint.
7. A job using power operated tools related to sheet metal work, Welding, Fitting, Plumbing, Carpentry and patternmaking.
8. A job on turning of a Mild Steel cylindrical job using center lathe.

Contents:

- a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.
- b) **Welding:** Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.
- c) **Fitting and Plumbing:** Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safety precautions.
- d) **Sheet Metal Work:** Simple development and cutting, bending, Beading, Flanging, Lancing and shearing of sheet metal, Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, Fluxes and their use.
- e) **Machine shop:** Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions

Reference/Text Books:

1. K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.
Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

Dr. Babasaheb Ambedkar Technological University, Lonere

First Year -Bachelor of Technology

with effect from the Academic Year 2020-2021

Course Mapping with NPTEL /SWAYAM Online Platform

First Year of B. Tech. (All Branches) Group A (Sem-I and Sem-II)

| Sr. No. | SEMESTER | Course Code | Name of Subject as per Curriculum | SWAYAM/ NPTEL Course | Name of Institute offering course | Name of Instructor | Relevance (%) | Duration of Course |
|---------|----------|-------------|--|--|-----------------------------------|------------------------|---------------|----------------------|
| 1 | Sem I | BTBS101 | Engineering Mathematics-I | Engineering Mathematics – I (noc20-ma37) | IIT KGP | Prof. Jitendra Kumar | 90 | 12 weeks |
| 2 | | BTBS102 | Engineering Physics | Solid state Physics | IIT KGP | Dr. Amal Kumar Dar | 50 | 12 weeks |
| 3 | | BTES103 | Engineering Graphics | Engineering drawing and computer graphics (noc20-me79) | IIT KGP | Dr. Rajaram Lakka Raju | 70 | 12 weeks |
| 4 | | BTHM104 | Communication Skill | Developing Soft skills and personality | IIT Kanpur | Prof. T. Ravichandran | 80 | 08 weeks |
| | | | | Soft skills (noc20-hs60) | IITR | Dr. Bindo Mishra | 80 | 12 weeks |
| 5 | | BTES105 | Energy and Environmental Engineering | Conventional Energy Sources | IIT KGP | Prof Pratab Haridoss | 20 | 08 weeks |
| | | | | Non Conventional Energy Sources | IIT KGP | Prof Pratab Haridoss | 20 | 08 weeks |
| | | | | Solar Energy | IIT KGP | Dr. V. V Satyamurthy | 10 | 04 weeks |
| | | | | Wind Energy | IIT KGP | | 10 | 04 weeks |
| 6 | | BTES106 | Basic Civil and Mechanical Engineering | - | - | | - | Course not available |
| 7 | Sem II | BTBS201 | Engineering Mathematics-II | Engineering Mathematics – II (111105134) | IIT KGP | Prof. Jitendra Kumar | 70 | Video lectures |
| 8 | | BTBS202 | Engineering Chemistry | - | - | | - | Course not available |
| 9 | | BTES203 | Engineering Mechanics | Applied mechanics (noc20-me46) | IITM | Prof. K. Ramesh | 80 | 12 weeks |
| 10 | | BTES204 | Computer Programming in C | Introduction to Programming | IIT KANPUR | Prof. Anup Basu | 80 | 08 weeks |

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|----|--|---------|--|---|---------------|--------------------------|----|----------|
| | | | | In C (noc20-cs91) | | | | |
| 11 | | BTES206 | Basic Electrical & Electronics Engineering | Fundamentals of Electrical Engineering (noc20-ee68) | IIT KGP | Prof. Debpriya Das | 25 | 12 weeks |
| | | | | Basic Electrical circuits | IIT KGP | Prof. Ankush Sharma | 25 | 12 weeks |
| | | | | Digital circuits | IIT M | Prof, Nagendra Krishraru | 25 | 14 weeks |
| | | | | Fundamentals of semiconductor devices | IISc Bengluru | Prof. Digbijoy N. Nath | 25 | 12 weeks |

First Year of B. Tech. (All Branches) Group B (Sem-I and Sem-II)

| Sr. No. | SEMESTER | Course Code | Name of Subject as per Curriculum | SWAYAM/ NPTEL Course | Name of Institute offering course | Name of Instructor | Relevance (%) | Duration of Course |
|---------|---------------------------|-------------|--|---|-----------------------------------|----------------------|---------------|----------------------|
| 1 | Sem I | BTBS101 | Engineering Mathematics-I | Engineering Mathematics – II (111105134) | IIT KGP | Prof. Jitendra Kumar | 70 | Video lectures |
| 2 | | BTBS102 | Engineering Chemistry | - | - | | - | Course not available |
| 3 | | BTES103 | Engineering Mechanics | Applied mechanics (noc20-me46) | IITM | Prof. K. Ramesh | 80 | 12 weeks |
| 4 | | BTES104 | Computer Programming in C | Introduction to Programming In C (noc20-cs91) | IIT KANPUR | Prof. Anup Basu | 80 | 08 weeks |
| 5 | | BTES106 | Basic Electrical & Electronics Engineering | Fundamentals of Electrical Engineering (noc20-ee68) | IIT KGP | Prof. Debpriya Das | 25 | 12 weeks |
| | Basic Electrical circuits | | | IIT KGP | Prof. Ankush Sharma | 25 | 12 weeks | |
| | Digital circuits | | | IIT M | Prof, Nagendra Krishraru | 25 | 14 weeks | |

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|----|--------------|--|--------------------------------------|--|--|------------------------|-----------------------|----------------------|----------|
| | | | | Fundamentals of semiconductor devices | IISc Bengluru | Prof. Digbijoy N. Nath | 25 | 12 weeks | |
| 7 | Sem II | BTBS201 | Engineering Mathematics-II | Engineering Mathematics – I (noc20-ma37) | IIT KGP | Prof. Jitendra Kumar | 90 | 12 weeks | |
| 8 | | BTBS202 | Engineering Physics | Solid state Physics | IIT KGP | Dr. Amal Kumar Dar | 50 | 12 weeks | |
| 9 | | BTES203 | Engineering Graphics | Engineering drawing and computer graphics (noc20-me79) | IIT KGP | Dr. Rajaram Lakka Raju | 70 | 12 weeks | |
| 10 | | BTBM204 | Communication Skill | | Developing Soft skills and personality | IIT Kanpur | Prof. T. Ravichandran | 80 | 08 weeks |
| | | | | | Soft skills (noc20-hs60) | IITR | Dr. Bindo Mishra | 80 | 12 weeks |
| 11 | | BTES205 | Energy and Environmental Engineering | | Conventional Energy Sources | IIT KGP | Prof Pratab Haridoss | 20 | 08 weeks |
| | | | | | Non Conventional Energy Sources | IIT KGP | Prof Pratab Haridoss | 20 | 08 weeks |
| | Solar Energy | | | | IIT KGP | Dr. V. V Satyamurthy | 10 | 04 weeks | |
| | Wind Energy | | | | IIT KGP | | 10 | 04 weeks | |
| 12 | BTES206 | Basic Civil and Mechanical Engineering | - | - | | | - | Course not available | |

Note: Blank field indicates there is no direct course addressing the course content available of NPTEL/ SWAYAM Platform

Registration link:

Engineering Mathematics-I

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_ma37/preview&sa=D&ust=1591543184294000&usg=AFQjCNGHDgqXqI9K0fcvY-oaKjT-bJYvzw

Engineering Mathematics –II

<https://nptel.ac.in/courses/111/105/111105134/>

Engineering Mechanics

https://swayam.gov.in/nd1_noc20_me46/preview

Engineering Graphics

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_me79/preview&sa=D&ust=1591543184334000&usg=AFQjCNFYPjKDLGuCij6dBV0D2BysdeB_2Q

Basics of Electrical Engineering

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_ee68/preview&sa=D&ust=15

[91543184179000&usg=AFQjCNEZyH4O7lwTSdoD1Uo5CbXX7xUdnw](https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_hs60/preview&sa=D&ust=1591543184179000&usg=AFQjCNEZyH4O7lwTSdoD1Uo5CbXX7xUdnw)

Communication skills

<https://nptel.ac.in/courses/109/104/109104030/#>

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_hs60/preview&sa=D&ust=1591543184224000&usg=AFQjCNFu4uUp-i8EbTSW-yIVq-iTXaD1gQ

Computer Programming in C

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_cs56/preview&sa=D&ust=1591543184129000&usg=AFQjCNHjS11ome1khLIBuRhZBNKsSM7tcQ

Engineering Physics

https://swayam.gov.in/nd1_noc20_ph15/preview