MAHATMA GANDHI UNIVERSITY

Kottayam, Kerala

B.Tech. -Degree Courses 2010-2011

Revised Scheme
And
Syllabus for Combined I & II Sem
Course Regulations

of

B.Tech. -Degree Courses

(With effect from 2010 admissions)
1. Conditions for Admissions

Candidates for admission to the B.Tech. degree course shall be required to have passed the Higher Secondary Examination of State Board of Kerala or 12th Standard V.H.S.E., C.B.S.E., I.C.S.E. or examinations recognized equivalent by any Universities of Kerala thereto with mathematics, physics and chemistry as optional subjects, with 50% marks in Mathematics and 50% marks in Physics, Chemistry, and Mathematics put together. Candidates belonging to scheduled caste and scheduled tribe need only a pass in the qualifying examination.

Candidates have to qualify the State Level Entrance examination conducted by the Commissioner of Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent. They shall also satisfy the conditions regarding age and physical fitness as prescribed by the Mahatma Gandhi University.

Criteria for selection and method of admission to merit/management seats for Engineering degree courses conducted by Government/Aided/Self-financing colleges affiliated to Mahatma Gandhi University shall be governed by the rules/regulations framed by the Commissioner of Entrance Examinations or other competent authority appointed by the Government of Kerala, in consultation with the University and without contravening with the stipulation of the All India Council for Technical Education (AICTE). In all matters related to selection and admission, the decisions of the University shall be final. The students admitted by affiliated colleges violating the above regulations will not be eligible for registration to University Examinations and contravention of the regulations shall lead to withdrawal/suspension of affiliation.

2. Admission to Diploma Holders

A candidate who has a diploma in engineering awarded by the State Board of Technical Examination or an examination recognized equivalent by the State Board of Technical Education after undergoing regular course of 3 years in an institute approved by AICTE, securing a cumulative minimum of 50% marks in the second and third years diploma examination shall be eligible to be admitted to the first year B.Tech. programme of the Mahatma Gandhi University (hereafter, the University, unless otherwise specified) if he/she has qualified the entrance examination conducted by the Commissioner of Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent.

Diploma holders with 60% marks (50% in case of SC/ST) are also eligible for admission to the 3rd semester (regular full-time batch) engineering degree course (B.Tech.) under the lateral entry scheme provided they qualify the Entrance Examination conducted for the lateral entry scheme by the state Government. These students are not required to study any deficiency papers of the combined first and second semesters. Admission of all candidates under the lateral entry scheme shall be completed latest by commencement of 3rd semester classes.

3. Subjects of Study

The subjects of study, both theory and practical, shall be in accordance with the prescribed
scheme and syllabi of each branch of study.

4. Duration of the Course

The course for the B.Tech degree shall extend over a period of four academic years comprising of eight semesters. The first and second semesters shall be combined; the scheme and syllabi for combined first and second semesters \(S_1\&S_2\) will be common for all branches of study. The maximum duration permissible for taking the B.Tech. Degree is fixed as 8 years. For lateral entry students maximum duration permissible for taking the B.Tech. Degree is fixed as 7 years.

Classes of combined first and second semesters shall be started latest by 1\(^{st}\) August in all affiliated engineering colleges of Mahatma Gandhi University; however admission to first year shall be completed by 31\(^{st}\) August.

The minimum number of working days in combined first and second semesters shall be 150 days. In 3\(^{rd}\) to 8\(^{th}\) semesters, there shall be minimum 90 working days.

5. Branches of Study

1. Civil Engineering (CE)
2. Mechanical Engineering (ME)
3. Electrical and Electronics Engineering (EE)
4. Electronics and Communication Engineering (EC)
5. Electronics & Instrumentation Engineering (EI)
6. Instrumentation and Control Engineering (IC)
7. Applied Electronics and Instrumentation Engineering (AI)
8. Computer Science and Engineering (CS)
9. Information Technology (IT)
10. Polymer Engineering (PO)
11. Automobile Engineering (AU)
12. Aeronautical Engineering (AN)

6. Course Calendar

The course calendar, published by the University, shall be followed by all affiliated engineering colleges. Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of faculty members working in the college along with their qualification and years of teaching experience, to the University. This is a mandatory requirement which should be strictly followed by Head of each Institution. Head of each Institution shall ensure
the availability of sufficient number of regular faculty members having experience and qualifications (as per AICTE guidelines) in the institution.

7. Assessment of Students

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as home assignment, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.) as decided by the faculty handling the course, and regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record.

Semester-End examinations of theory and practical subjects will be conducted by the University. Semester-End examinations of combined first and second semesters and 3rd to 6th semesters will be conducted only once in a year; failed or improvement candidates will have to appear for the Semester-End examinations along with regular students. However, Semester-End examinations of 7th and 8th semesters will be conducted once in every semester. Head of institution should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.

Internal assessment marks of each theory subject should have a class average limited to 80%. If the class average of internal assessment marks of any theory subjects is greater than 80%, standard normalization procedure should be applied to limit it to 80%. If the class average is not greater than 80%, absolute marks should be given.

For practical subjects, internal assessment marks and Semester-End examination marks individually should have a class average limited to 75%. If the class average of internal assessment marks or Semester-End examination marks of practical subjects is greater than 75%, the standard normalization procedure should be applied to limit the class average to 75%. If it is not greater than 75%, absolute marks should be given.

All the students in the nominal roll of the class on the closing day of semester should be considered for normalization of internal marks. All the students who have passed the Semester-End practical examination should be considered for normalisation of marks of Semester-End practical examinations.

Internal assessment marks of theory and practical subjects, both absolute and normalised, should be published in the college 10 days before sending it to the University so as to enable the students to report any corrections.

(a) Assessment in Theory Subjects

The marks allotted for internal continuous assessment and Semester-End university examinations shall be 50 marks and 100 marks respectively with a maximum of 150 marks for each theory subject.

The weightage to award internal continuous assessment marks should be as follows:
Test papers (minimum two) – 60%

Assignments (minimum two) such as home assignment, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc. – 20%

Regularity in the class – 20%

The sessional marks allotted for attendance shall be awarded in direct proportion to the percentage of attendance secured by the candidate in the subject. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject.

(b) Assessment in Practical Subjects

Internal continuous assessment and Semester-End practical examinations will have weightage in the student’s performance of practical subjects, with 50 marks allotted for internal continuous assessment and 100 marks for Semester-End examinations. The weightage to award internal continuous assessment marks should be as follows:

Test papers – 30%

Regular work/drawing/workshop record/lab record/
Class performance – 50%
Regularity in the class – 20%

An external examiner and an internal examiner, appointed by the University, shall conduct the Semester-End examinations of practical subjects. These examiners should necessarily have minimum two years teaching experience at engineering degree level.

Award of marks in the Semester-End practical examinations (except Project) should be as follows:

Viva voce – 30%
Procedure and tabulation form,
Conducting experiment, results and inference – 70%

No candidate will be permitted to attend the Semester-End practical examinations unless he/she produces certified record of the laboratory.
Strict measures will be taken by the University to monitor the laboratory facilities, laboratory experiments conducted, standard of Semester-End practical examinations, etc. in every affiliated engineering college. In this regard, an expert team comprising of at least three subject experts from government/government-aided engineering colleges from within/outside the University shall be formulated to assess these aspects in affiliated engineering colleges. This expert team should visit each engineering college at least once in a semester and submit a detailed report to the University regarding the laboratory facilities, laboratory experiments conducted, and standard of Semester-End practical examinations in each college.

8. Pattern of Questions for Semester-End Examinations of Theory Subjects

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

(a) covering all sections of the course syllabus
(b) unambiguous and free from any defects/errors
(c) emphasizing knowledge testing, problem solving & quantitative methods
(d) containing adequate data/other information on the problems assigned
(e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows:

PART A: Short answer questions (one/two sentences) 5 x 3 marks=15 marks
All questions are compulsory. There should be at least one question from each module.

PART B: Analytical/Problem solving questions 5 x 5 marks=25 marks
All questions are compulsory. There should be at least one question from each module.

PART C: Descriptive/Analytical/Problem solving questions 5 x 12 marks=60 marks
Two questions from each module with choice to answer one question.
Maximum Total Marks: 100

Weightage for categories such as problem solving, descriptive, drawing, or diagrammatic questions shall be specified along with the syllabus of any subject, if necessary. Model question paper shall be prepared for each subject at the time of framing the syllabus. This same model question paper along with the syllabus must be sent to the question-paper setter every time for framing the questions. The model question paper shall be made available to students.

It is permitted to have an entirely different pattern of questions especially for subjects involving drawing, design, etc. However, the modified pattern to be followed shall be clearly
specified along with the syllabus of the particular subject. All question paper setters should supplement the scheme and key for the evaluation

9. Minimum for Pass

A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures not less than 40% marks for the subject in the university examination and not less than 50% of the total marks of the subject i.e. university examination marks and sessional marks in that subject put together.

A candidate shall be declared to have passed in a semester examination in full in first appearance (first registration is considered as first appearance) if he satisfies the above criteria for each theory and practical subjects

Candidates will be assigned grades according to the marks scored.

For Seminar, Project, and Viva Voce (in 7th & 8th semester), the minimum for a pass shall be 50% of the total marks assigned to the respective examination.

If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this ‘Save a Semester examination’ within one week after the publication of eighth semester results.

10. Credit System

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

11. Grading

The university shall award the letter grade to students based on the marks secured by them in both internal assessment and Semester-End examinations taken together in the subjects registered. Each letter grade indicates a qualitative assessment of the student’s performance and is associated with a specified number of grade points. The grading system along with the grade points for each grade, applicable to passed candidates is shown below. All passed candidate will be allotted a grade S, A, B, C, D, or E according to the total marks scored by him/her.

If a candidate does not pass a subject as per the conditions given in Section (9), he/she will be assigned an Unsatisfactory grade ‘U’ irrespective of his/her total marks. If a student does not pass a subject in two attempts, the maximum grade he/she can get is ‘C’ when he/she passes the subject in any subsequent examination, whatever be the marks scored by him/her.

A student is considered to have completed a subject successfully and earned the credits if
he/she secures a letter grade other than ‘U’ in that course. Letter grade ‘U’ has zero grade point and the candidate has to write the examination again to improve the grade. A student's performance is measured by the number of credits that he/she has earned and by the cumulative grade point average (CGPA) maintained by him/her.

<table>
<thead>
<tr>
<th>Total marks scored by the passed candidate</th>
<th>Corresponding Grade allotted</th>
<th>Grade Points</th>
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<tbody>
<tr>
<td>136-150</td>
<td>S</td>
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<tr>
<td>96-105</td>
<td>C</td>
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<tr>
<td>86-95</td>
<td>D</td>
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<tr>
<td>75-85</td>
<td>E</td>
<td>4.5</td>
</tr>
</tbody>
</table>

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

(a) A Semester Grade Point Average (SGPA) shall be computed for all the students for each semester, as follows:

\[
\text{SGPA} = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}
\]

where, \( n \) is the number of subjects registered during the semester, \( C_i \) is the number of credits allotted to \( i^{th} \) subject as per the scheme, and \( G_i \) is the grade points corresponding to the grade awarded to the student for the subject.

(b) A Cumulative Grade Point Average (CGPA) shall be computed for all the students at the end of each semester by taking into consideration their performance in the present and the past semesters as follows:

\[
\text{CGPA} = \frac{\sum_{i=1}^{m} C_i G_i}{\sum_{i=1}^{m} C_i}
\]

where, \( m \) is the number of courses registered up to that semester, \( C_i \) is the number of
credits allotted to the subject as per the scheme, and $G_i$ is the grade points corresponding to the grade awarded to the student for the subject.

An up-to-date assessment of overall performance of a student is obtained by calculating CGPA. CGPA is weighted average of the grade points obtained in all the subjects registered by the students since he entered the B.Tech. course.

(c) Both the SGPA and CGPA shall be rounded off to the second place of decimal and recorded as such for ease of presentation. Whenever the CGPAs are to be used for the purpose of determining the merit ranking in a group of students, only the rounded off values shall be made use of.

13. Improvement

Candidates shall be allowed to improve the grade of any two theory subjects in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more marks in the improvement chance, marks scored in the improvement chance will be considered for grading in the subject; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and internal continuous assessment.

14. Attendance

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

(a) He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter; and shall be physically present for a minimum of 65% of the total working periods. In addition, he/she also shall be physically present in at least 20% of total attendance for each subject.

(b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.

(c) His/her conduct must be satisfactory

It shall be open to the Vice Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

• The shortage shall not be more than 10%
• Shortage shall not be condoned more than twice during the entire course.
• Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester.
15. Eligibility for Promotion to Higher Semester – Procedure for completing the course

(a) A student who has secured 75% of attendance and has exhibited satisfactory progress in the class will be eligible for promotion to the next higher semester.

(b) However, before being admitted to the VIII semester classes, the student should have passed in all subjects in the combined first and second semester examination in full.

Note: As this is an academic prerequisite, no exemption should be granted in this case, whatever be the causes.

A candidate shall complete the programme and pass all examinations within Eight (8) years since his first admission to the B.Tech programme.

16. Registration for end Semester examination

Every candidate should register for all subjects of the Semester-End examinations of each semester. A candidate who does not register will not be permitted to attend the Semester-End examinations; he/she shall not be permitted to attend the next semester.

A candidate shall be eligible to register for any higher semester (i.e. 3rd semester onwards) if he/she has satisfactorily completed the course of study and registered for the examination of the immediate previous semester. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

17. Additional Requirements for the degree

In addition to the requirement prescribed for the award of B.Tech. degree, each student must complete compulsory social service for a total duration of 15 days during 3rd to 7th semesters of the course, A record is to be kept showing the details of social service activities undertaken and it should be approved by the Staff Advisor. Head of Institution should verify this compulsory requirement before permitting the student to register for the eighth semester.

Students are expected to undertake industrial training(s) of total 10 days minimum duration or industrial visits (to minimum 2 industries) for studying about the industries of importance to the branch concerned during 4th to 7th semester. Students may also undertake an educational tour, the tour period shall be considered as part of the working periods of a semester. The tour maybe conducted during the vacation/holidays taking not more than 3 working days, combined with the vacation/holidays if required, between 5th and 8th semesters for visiting industries (at least two) of importance to the branch concerned. Faculty members shall accompany the students for the industrial visits/educational tour. Each student shall submit detailed bound report(s) of the training/visit/tour to the Head of Department within two weeks after the programme. These bound report(s), signed by the staff advisor or faculty in charge of tour/training/visit and by the head of department, shall also be brought during the final Viva-Voce.

18. Examination Monitoring Cell
Head of the each institution should formulate an Examination Monitoring Cell at the institution for supervising all examinations, especially the internal examinations. This cell, with a senior staff member as Convener, shall consist of minimum three members (one shall be a lady). The collective responsibilities of the examination monitoring cell are

(a) officiate as the examination squad to keep a vigil on all Semester-End examinations. If any malpractices are found/reported by invigilators, inform these to the Head of Institution along with a report about the incident. Head of Institution shall forward all such complaints to the University.

(b) schedule all examinations conducted as part of internal assessment of students.

(c) to receive any complaint from students regarding issues like out-of-syllabus questions, printing mistakes, etc. of Semester-End examinations of theory and practical subjects. The cell shall investigate these complaints and if necessary forward it to university with specific comments.

(d) to receive any complaints from students regarding internal examinations, enquire such incidents, and give a report to the Head of Institution for necessary action.

To conduct all the theory examinations, a Chief Superintendent and a Senior Assistant Superintendent should be appointed internally by the Head of Institution. At least one external Additional Chief Superintendent from government/government-aided engineering colleges within the University should be appointed by the University for conducting theory examinations in all affiliated self financing Engineering Colleges.

19. Electives

All students shall choose four elective subjects, one in the sixth, one in the seventh and two in eighth semesters from a set of elective subjects prescribed in the syllabus and offered by the institution. There should be at least 25% students of the class for an elective subject to be offered. However, any student having a CGPA of not less than 7.5 shall be permitted to select an elective of his/her choice and register under a faculty subject to the permission from the faculty and Head of Department. The student will have to study this subject on his own (self-study mode) or the classes of this subject shall be taken during off-hours.

A student can opt for interdisciplinary electives, termed as global electives in the syllabus, maximum one during 8th semesters subject to the permission from both Heads of Departments and the faculty handling the elective subject. Minimum number of students for a global elective shall be 15 and maximum 60.

New electives may be introduced according to the needs of emerging fields in technology. The name of the elective and its syllabus should be approved by the university before the subject is offered as an elective.

20. Class Committee
Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and two student representatives (one of them should be a girl in a mixed class). There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

(a) to review periodically the progress and conduct of students in the class.

(b) to discuss any problems concerning any subjects in the semester concerned.

(c) to identify weaker students of the class and suggest remedial measures.

(d) to review teaching effectiveness and coverage of syllabus.

(e) discuss any other issue related to the students of the class.

21. Eligibility for the Degree

No candidate shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than four academic years in an institution in the state of Kerala and recognized by affiliated /recognized to the Mahatma Gandhi University and has passed all subjects as per the prescribed syllabus.

No candidate under lateral entry scheme shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than three academic years in an institution affiliated to the Mahatma Gandhi University and has passed all subjects of 3rd to 8th semesters as per the prescribed syllabus.

22. Classification of Successful Candidates

(a) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 8.0 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class with Honours.

(b) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 6.5 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class.

(c) All other candidates who qualify for the degree passing all the subjects of the eight semesters
and not covered as per Sections 22 (a) and (b) shall be declared to have passed the B.Tech. degree examination in second class.

(d) Classification of the lateral entry student shall be given based on the CGPA of 3rd to 8th semesters. The final mark-list of lateral entry students should indicate that (i) the student was admitted through lateral entry scheme (ii) classification is based on CGPA of 3rd to 8th semesters. In case of lateral entry students, clause 22(a) and 22(b) shall hold good except for the number of academic years which shall be 4 academic years after the commencement of the course of study.

It may be indicated in each mark-list that the internal assessment marks and Semester-End examination marks of practical subjects are normalised.

23. Grievance Cell

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

24. Anti-Ragging Cell

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

*Notwithstanding all that has been stated above, the University has right to modify any of the above regulations from time to time as per University rules.*
### Equivalency of Diploma Streams for Lateral entry B.Tech. Admission

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Specialisation in Diploma</th>
<th>Branch Equate for B.Tech. Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Applied Electronics</td>
<td>Electronics and Communication Engineering</td>
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<tr>
<td>2</td>
<td>Electronics</td>
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<tr>
<td>3</td>
<td>Medical Electronics</td>
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<tr>
<td>4</td>
<td>Electronics and Avionics</td>
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<tr>
<td>5</td>
<td>Telecommunication Technology</td>
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<tr>
<td>6</td>
<td>Electronics and Instrumentation</td>
<td></td>
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<tr>
<td>7</td>
<td>Electronics and Medical Instrumentation</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Electronics Production Technology</td>
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<tr>
<td>9</td>
<td>Medical Instrumentation</td>
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<td>10</td>
<td>Power Electronics</td>
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<tr>
<td>11</td>
<td>Biomedical Engineering</td>
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<tr>
<td>12</td>
<td>Civil</td>
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<td>13</td>
<td>Architecture</td>
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<tr>
<td>14</td>
<td>Quantity Survey and Construction Management</td>
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<td>15</td>
<td>Mechanical</td>
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<td>Automobile</td>
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<td>17</td>
<td>Tool and Die</td>
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<td>Wood and Paper Technology</td>
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<td>Computer Hardware Maintenance</td>
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<td>Information Technology</td>
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<td>25</td>
<td>Chemical Engineering</td>
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Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010

Common for All Branches

SCHEME S1S2

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours/week</th>
<th>Marks</th>
<th>End-sem duration-hours</th>
<th>Credits</th>
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<td>Engineering Mathematics I</td>
<td>2 1 - 50</td>
<td>100</td>
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<tr>
<td>EN010 102</td>
<td>Engineering Physics</td>
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EN010 101 ENGINEERING MATHEMATICS – I

Teaching Scheme Credits: 5
2 hour lecture and 1 hour tutorial per week

Objectives

- To impart mathematical background for studying engineering subjects.

MODULE 1 (18 hours) - MATRIX


MODULE 2 (18 hours) - PARTIAL DIFFERENTIATION

Partial differentiation : chain rules – statement of Eulers theorem for homogeneous functions – Jacobian –Application of Taylors series for function of two variables – maxima and minima of function of two variables (proof of results not expected)
MODULE 3 (18 hours) - MULTIPLE INTEGRALS


MODULE 4 (18 hours) - ORDINARY DIFFERENTIAL EQUATIONS

Linear differential equation with constant coefficients- complimentary function and particular integral – Finding particular integral using method of variation of parameters – Euler Cauchy equations- Legenders equations

MODULE 5 (18 hours) - LAPLACE TRANSFORMS


REFERENCES

1. Erwin Kreyszig ;Advanced Engineering Mathematics Wiley Eastern Ltd
3. N. P. Bali ;Engineering Mathematics ,Laxmi Publications Ltd
4. Goyal & Gupta ; Laplace and Fourier Transforms

EN010 102 ENGINEERING PHYSICS

Teaching Scheme  Credits: 4
1 hour lecture and 1 hour tutorial per week

Objectives

• To provide students knowledge of physics of a problem and an overview of physical phenomena.
MODULE I (12 hours) LASERS AND HOLOGRAPHY


Holography- Basic principle -Recording and reconstruction- comparison with ordinary photography-Applications of Hologram

MODULE II (12 hours) NANOTECHNOLOGY AND SUPERCONDUCTIVITY

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C_{60}, metallic nanocomposites and polymer nanocomposites- Applications of nanotechnology


MODULE III (12 hours) CRYSTALLOGRAPHY AND MODERN ENGINEERING MATERIALS

A. Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices- Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius- Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg’s law- Bragg’s x-ray spectrometer- Crystal structure analysis.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties)

Shape memory alloys- Shape memory effect, pseudo elasticity

MODULE IV (12 hours) ULTRASONICS
A. Ultrasonics- Production of ultrasonics- Magnetostriction method – Piezoelectric method-
Properties of ultrasonics- Non destructive testing- Applications

B. Spectroscopy- Rayleigh scattering (Qualitative) - Raman effect – Quantum theory of Raman
effect- Experimental study of Raman effect and Raman spectrum- Applications of Raman effect

C. Acoustics- Reverberation- Reverbaration time- Absorption of sound- Sabine’s formula(no
derivation)- Factors affecting acoustics properties

MODULE V (12 hours) FIBRE OPTICS

Principle and propagation of light in optical fibre- Step index (Single Mode and Multi Mode fibre)
and graded index fibre- N.A. and acceptance angle—Characteristics of optical fibres (Pulse
dispersion, attenuation, V-number, Bandwidth-distance product) –

Applications of optical fibres- Fibre optic communication system (Block diagram)- Optical fibre
sensors (any five) – Optical fibre bundle.

REFERENCES

S.Chand& Company Ltd.
2) Nanomaterials- A.K.Bandhopadyaya – New Age International Publishers
3) Engineering Physics – A. Marikani
Limited
5) Engineering physics- Dr. M Arumugam - Anuradha Agencies
6) Nano ; The Essentials- T. Pradeep
7) Material Science-M Arumugham- Anuradha Agencies
8) Lasers and Non-Linear optics By B.B Laud- New Age International (P) Limited

EN010 103 Engineering Chemistry & Environmental Studies
(Common to all branches)

Teaching scheme  Credits:4
1hr lecture and 1hr tutorial per week (total 60 hrs)

Objectives

- To impart a scientific approach and to familiarize the applications of chemistry in the field of technology
- To create an awareness about the major environmental issues for a sustainable development.

Module 1 Electrochemical Energy Systems (13 hrs)

Electrochemical cells - Galvanic cell - Daniel cell – EMF - determination by potentiometric method - Nernst equation – derivation- Single electrode potential-Types of electrodes-Metal/metal ion electrode, Metal/metal sparingly soluble salt electrode, Gas electrode and Oxidation/reduction electrode - Reference electrodes - Standard hydrogen electrode and Calomel electrode - Glass electrode – Determination of pH using these electrodes - Concentration cell – Electrolytic concentration cell without transfer - Derivation of EMF using Nernst equation for concentration cell - Cells and Batteries - Primary and secondary cells - Lead acid accumulator, Ni-Cd cell, Lithium–MnO₂ cell and Rechargeable Lithium ion cell – Polarization – Overvoltage - Decomposition potential - Numerical problems based on Nernst equations and pH determination.

Module 2 Corrosion and Corrosion Control (10 hrs)

Introduction - Types of corrosion – Chemical and Electrochemical corrosion – Chemical corrosion – Oxidation corrosion, By other gases and Liquid metal corrosion – Pilling-Bedworth rule - Electrochemical corrosion – Mechanism - absorption of O₂ and evolution of H₂ - Types of electrochemical corrosion- Galvanic corrosion, Concentration cell corrosion, Differential aeration corrosion, Pitting corrosion, Waterline corrosion and Stress corrosion - Factors influencing the rate of corrosion - Nature of the metal and Nature of the environment - Corrosion control methods – Selection of metal and proper design, Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Modifying the environment, corrosion inhibitors and Protective coating - Metallic coating – Anodic coating and cathodic coating - Hot dipping (Galvanizing and Tinning), Electroplating, Electroless plating, Metal spraying, Metal cladding Cementation- sheradizing - chromizing- calorizing and Vacuum metallization - Non-metallic coating - Anodization

Module 3 Engineering Materials (13 hrs)

High polymers – Introduction - Degree of polymerization – Functionality – Tacticity - Types of polymerization (mechanisms not required) – Addition, Condensation and Copolymerization - Glass transition temperature-(Tg) Definition only, Compounding and moulding of plastics - Compression, Injection, Extrusion, Transfer and Blow moulding.

Fiber Reinforced Plastics - Glass reinforced plastics (GRP) - Manufacturing methods - Hand lay up, Spray up and Filament winding - properties and uses.

Conducting Polymers – Polyacetylene and Polyaniline - Applications (mechanism not required)

Rubber - Natural rubber – Properties – Vulcanization - Synthetic rubber - Preparation, properties and uses of Polyurethane rubber, NBR and Silicone rubber.

Carbon Nanotubes - Single walled (SWCNT) and Multi walled (MWCNT) - Properties and uses.
Module 4 Environmental Pollution (12 hrs)

Pollution - Types of pollution – a brief study of the various types of pollution - Air pollution - Sources and effects of major air pollutants – Gases - Oxides of carbon, nitrogen and sulphur – Hydrocarbons – Particulates -Control of air pollution - Different methods - Water pollution - Sources and effects of major pollutants - Inorganic pollutants- heavy metals cadmium , lead, mercury - Ammonia, Fertilizers and Sediments (silt) - Organic pollutants – Detergents, pesticides, food waste, - Radioactive materials - Thermal pollutants - Control of water pollution - General methods

Eutrophication - Definition and harmful effects

Desalination of water - Reverse osmosis and Electrodialysis

Module 5 Environmental Issues (12 hrs)


Renewable energy sources - Solar cells – Importance - Photo voltaic cell - a brief introduction


Note: This course should be handled and examination scripts should be evaluated by the faculty members of Chemistry

Text Books


References

2. Polymer science –V. R. Gowariker, New Age International Ltd.
6. Nanotechnology - Er. Rakesh Rathi, S. Chand & Company Ltd.
8. Environmental Chemistry - Dr. B. K. Sharma, Goel publishers.
EN010 104 ENGINEERING MECHANICS

(Common to all branches)

Teaching Scheme Credits: 6
3 hour lecture and 1 hour tutorial per week

Objective:
25. To develop analytical skills to formulate and solve engineering problems.

Module I (23 hrs)

Module II (23 hrs)
Principle of Virtual work – Elementary treatment only – application of virtual work in beams, ladders
Centroid of Lines, Areas and Volumes – Pappus Guldinus Theorems
Moment of Inertia of laminas – Transfer theorems – radius of Gyration – problems
Centre of Gravity – Mass moment of Inertia of circular and rectangular plates – solid rectangular prisms – Cylinders – Cones

Module III (23 hrs)

Module IV (28hrs)
Kinematics – Rectilinear motion of a particle under Variable Acceleration
Relative Velocity - problems
Circular motion with Uniform and Variable Acceleration – Relations between Angular and Rectilinear motion – Normal and Tangential accelerations
Combined motion of Rotation and Translation – Instantaneous centre of zero velocity – Wheels rolling without slipping
Introduction to Mechanical Vibrations – Free vibrations – Simple Harmonic motion

Module IV (23 hrs)

References:


EN010 105: ENGINEERING GRAPHICS
Teaching Scheme Credits: 6
1 hour lecture and 3 hour drawing per week
Objectives
  • To provide students of all branches of engineering with fundamental knoeledge of engineering drawing
  • To impart drawing skills to students

MODULE 1 (24 hours)
Scales-Plain scales-Diagonal Scales-Forward and Backward Vernier Scales.
Conic Sections:-Construction of conics when eccentricity and distance from directrix are given
.Construction of ellipse (1) given major axis and foci (2) given major axis and minor axis (3) given a pair of conjugate diameters (4) by the four centre method. Construction of parabola given the axis and base. Construction of hyperbola-(1) given the asymptotes and a point on the curve. (2) Given ordinate, abscissa and transverse axis. Construction of rectangular hyperbola. Construction of tangents and normals at points on these curves.

Miscellaneous curves:-Cycloids, Inferior and superior Trochoids-Epicycloid-Hypocycloid-Involute of circle and plain figures-Archimedian Spiral and Logarithmic Spiral- Tangents and normals at points on these curves.

MODULE 2 (24 hours)
Orthographic projections of points and lines:-Projections of points in different quadrants- Projections of straight lines parallel to one plane and inclined to the other plane-straight lines inclined to both the planes-true length and inclination of lines with reference planes using line rotation and plane rotation methods – Traces of lines. 

Orthographic projections of planes-Polygonal surfaces and circular lamina.

MODULE 3 (24 hours)
Orthographic projections of solids:-Projections of prisms , cones ,cylinders ,pyramids ,tetrahedron ,octahedron and spheres with axis parallel to one plane and parallel or perpendicular to the other plane-the above solids with their axes parallel to one plane and inclined to the other plane –axis inclined to both the reference planes-use change of position method OR auxiliary method.

Sections of solids:-Sections of prisms ,cones , cylinders ,pyramids ,tetrahedron and octahedron with axis parallel to one plane and parallel or perpendicular or inclined to the other plane with section planes perpendicular to one plane and parallel , perpendicular or inclined to the other plane –True shapes of sections.

MODULE 4 (24 hours)
Developments of surfaces of (1)simple solids like prisms ,pyramids , cylinder and cone (2) sectioned regular solids (3)above solids with circular or square holes with their axes intersecting at right angles.-Developments of funnels and pipe elbows.

Isometric Projections:-Isometric Scales-Isometric views and projections of plane figures,simple&truncated solids such as prisms, pyramids, cylinder, cone, sphere, hemisphere and their combinations with axis parallel to one the planes and parallel or perpendicular to the other plane.

MODULE 5 (24 hours)
Perspective projections:-Perspective projections of prisms,pyramids,cylinder and cone with axis parallel to one plane and parallel or perpendicular or inclined to the other plane by visual ray method OR vanishing point method

Intersection of surfaces:-Intersection of prism in prism &cylinder in cylinder-Axis at right angles only.

REFERENCES
EN010 106: BASIC CIVIL ENGINEERING
(Common to all branches)

Teaching scheme: Credits: 4
1 hour lecture and 1 hour tutorial per week

Objective:
To familiarize all engineering students with the basic concepts of civil engineering so that they can perform better in this great profession “Engineering”.

Module 1 (12 hours)

Module 2 (12 hours)

Module 3 (12 hours)
Building Components: Foundation: Bearing capacity and settlement - definitions only-footings-isolated footing, combined footing - rafts, piles and well foundation, machine foundation (Brief description only).

Module 4 (12 hours)
Surveying: Classification –principles of surveying- chain triangulation- instruments used, field work – bearing of survey lines –WCB and reduced bearing -Leveling: field work - reduction of
levels - height of instrument method.

Introduction to total station - basic principles of remote sensing, GPS and GIS.

**Module 5 (12 hours)**

Site plan preparation for buildings (Sketch only) – Kerala Municipal Building Rules (1999)-general provisions regarding site and building requirements – coverage and floor area ratio – basic concepts of “intelligent buildings” and “green buildings”- disposal of domestic waste water through septic tank and soak pit. Classification of roads - basics of traffic engineering – road markings, signs, signals and islands, road safety-accidents, causes and remedies– (brief description only)

**References**

1. Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2. Punmia B. C., Surveying Vol –I, Laxmi Publications
3. Rangwala, Building Materials, Charotar Book stall
6. B C Punmia., Basic Civil Engineering, Khanna Publishers

**EN010 107 Basic mechanical engineering**

*(Common to all branches)*

**Teaching scheme  Credits- 4**

1 hour lecture and 1 hour tutorial per week

**Objective**

To impart basic knowledge in mechanical engineering

**Module 1 (12 hours)**

Thermodynamics: Basic concepts and definitions, Gas laws, specific heat –Universal gas constant- Isothermal, adiabatic and polytrophic processes, work done, heat transferred, internal energy and entropy - Cycles: Carnot, Otto and Diesel- Air standard efficiency.

Basic laws of heat transfer (Fourier’s law of heat conduction, Newton’s law of cooling Steffen Boltzmann’s law)

**Module 2 (12 hours)**

I.C. Engines: Classification of I.C Engines, Different parts of I.C engines, Working of two stroke
and four stroke engines - petrol and diesel engines - air intake system, exhaust system, fuel supply system, ignition system, lubrication system, cooling system and engine starting system - Performance of I.C. engines, advantage of MPFI and CRDI over conventional system.

Refrigeration: Unit of refrigeration, COP, Block diagram and general descriptions of air refrigeration system, vapour compression and vapour absorption systems - Required properties of a refrigerant, important refrigerants - Domestic refrigerator - Ice plant.

Air conditioning system: Concept of Air conditioning, psychometry, psychometric properties, psychometric chart, psychometric processes, human comfort - winter and summer air conditioning systems (general description), air conditioning application.

Module 3 (12 hours)

Power transmission elements: Belt Drive - velocity ratio of belt drive, length of belt, slip in belt - simple problems - Power transmitted - Ratio of tensions - Centrifugal tension Initial tension - Rope drive, chain drive and gear drive - Types of gear trains (simple description only).

Module 4 (12 hours)

Power plants: General layout of hydraulic, diesel, thermal and nuclear power plants - nonconventional energy sources (general description only).

Hydraulic turbines and pumps: Classifications of hydraulic turbines - types of hydraulic turbines - runaway speed, specific speed, draft tube, cavitations, selection of hydraulic turbines. Classification of pumps - positive displacement and rotodynamic pumps (description only) - applications

Steam turbines: Classification of steam turbines, description of common types of steam turbines: Impulse and reaction, compounding methods.

Module 5 (12 hours)

Simple description of general purpose machines like lathe, shaping machines, drilling machines, grinding machines and milling machines, Basic concepts of CNC, DNC, CIM and CAD/CAM

Manufacturing Processes: Moulding and casting, forging, rolling, welding - arc welding - gas welding (fundamentals and simple descriptions only)

Text book

1 P.L. Bellany, *Thermal Engineering*, Khanna Publishes
2 Benjamin J., *Basic Mechanical Engineering*, Pentex

Reference Books

1 R.C. Patel, *Elements of heat engines*, Acharya Publishers -
2 G.R Nagapal, *Power plant engineering*, Khnna publishes
4 Dr.P.R Modi &Dr.M.S. Seth, *Hydraulics & Fluid Mechanics including Hydraulic Machines*, Standard Book House
EN010 108: Basic Electrical Engineering
(Common to all branches)

Teaching Scheme Credits: 4
I hour lecture and 1 hour tutorial per week

Objectives

- To provide students of all branches of engineering with an overview of all the fields of electrical engineering
- To prepare students for learning advanced topics in electrical engineering

Module I (10 hours)


Magnetic circuits – mmf, field strength, flux density, reluctance, permeability – comparison of electric and magnetic circuits – force on current carrying conductor in magnetic filed.

Module II (12 hours)


Alternating current fundamentals – generation of AC –frequency, period, average and r m s value, form factor, peak factor, phasor representation – j operator – power and power factor – solution of RLC series and parallel circuits.

Module III (13 hours)

DC machine – principle of operation of DC generator – constructional details – e m f equation – types of generators.


Transformer – principle of operation – e m f equation Constructional details of single phase and three phase transformer – losses and efficiency – application of power transformer, distribution transformer, current transformer and potential transformer.
Module IV (13 hours)


Synchronous generator (Alternator) – principles of operation and types.

Module V (12 hours)

Generation of electric power – types of generation – hydroelectric, thermal and nuclear (Block schematic and layout only) - Non conventional energy sources – solar, wind, tidal, wave and geothermal.


Requirements of good lighting system – working principle of incandescent lamp, Fluorescent lamp and mercury vapour lamp-energy efficient lamps (CFL,LED lights) – need for energy management and power quality – home energy management.

Text Books

3. Hughes – Electrical and Electronic Technology – Pearson Education

Reference Books

1. R.V. Srinivasa Murthy – Basic Electrical Engineering – Sunguine Technical
EN010 109: Basic Electronics Engineering and Information Technology

(Common to all branches)

Teaching Scheme Credits: 5
2 hour lecture and 1 hour tutorial per week

Objectives

• To provide students of all branches of engineering with an overview of all the fields of electronics engineering and information technology


References
EN010 110: Mechanical Workshop
(Common to all branches)

Teaching scheme  Credits: 1
3 hours practical per week

Objectives

• To provide students of all branches of engineering in house experience of basic mechanical instruments and activities

Plywood and ply boards.

Fitting  Practice in chipping – filing – cutting – male and female joints.

Smithy  Forging of square and hexagonal prism. Study of forging principles, materials and operations.

Foundry  Preparation of simple sand moulds – moulding sand characteristics, materials, gate, runner, riser, core, chaplets and casting defects.

Demonstration and study of machine tools – lathe, drilling, boring, slotting, shaping, milling and grinding machines, CNC machines and machining centers.

Demonstration and study of arc and gas welding techniques.
EN010 111: Electrical and Civil Workshops
(Common to all branches)

Teaching scheme  Credits: 1
3 hours practical per 2 weeks for each

Objectives

• To provide students of all branches of engineering in house experience of basic electrical and civil instruments and activities

Electrical Workshop
1. Wiring and estimation of one lamp and one plug, Control of two lamps in series and in parallel.
2. Staircase wiring.
4. Insulation megger - earth megger, measurement of insulation resistance and earth resistance. Study of volt meter, ammeter, watt meter and energy meter.
5. Working principle and wiring of Fluorescent, CFL and Mercury vapour lamp.
6. Study and wiring of distribution board including power plug using isolator, MCB and ELCB – Estimation of a typical 1BHK house wiring system.
7. Familiarization, soldering, testing and observing the wave forms on a CRO of a HW and FW Uncontrolled Rectifier (using diodes) with capacitor filter.
8. Observing the wave forms on a CRO of Experiment 7 without capacitor filter and find the average and RMS value of the voltage waveform.
9. Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

Civil Workshop

Masonry: English bond – Flemish bond – wall junction – one brick – one and a half brick – two brick and two and a half brick – Arch setting.

Plumbing: Study of water supply and sanitary fittings – water supply pipe fitting – tap connections – sanitary fittings – urinal, wash basin – closet (European and
Indian), Manholes.

**Surveying:** Study of surveying instruments – chain – compass – plane table – levelling – minor instruments. Demonstration of Theodolite and Total Station.

**Familiarization of latest building materials:** Flooring materials – Roofing materials – Paneling boards.