# MODEL CURRICULUM

for

UNDERGRADUATE DEGREE COURSES IN

**ELECTRICAL AND INSTRUMENTATION ENGINEERING**

(Engineering & Technology)

[JULY 2019]

B.Tech Electrical and Instrumentation Engineering

**SCHEME OF EXAMINATIONS**



**Department of Instrumentation (U.S.I.C)**

**Kurukshetra University**

**Kurukshetra**

Kurukshetra University Scheme of Exam

Model Curriculum for First Year

**Undergraduate Degree Courses in**

**ELECTRICAL AND INSTRUMENTATION ENGINEERING**

**Engineering & Technology**

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**Model Curriculum for First Year**

**Undergraduate Degree Courses in Engineering & Technology**

**Chapter -1**

**General, Course structure & Theme &**

**Semester-wise credit distribution**

1. **Definition of Credit**:

|  |  |
| --- | --- |
| 1 Hr. Lecture (L) per week | 1 credit |
| 1 Hr. Tutorial (T) per week | 1 credit |
| 1. Hr. Practical (P) per week
2. Hours Practical(Lab)/week
 | 0.5 credits1 credit |

1. **Range of credits –**

A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

1. Structure of Undergraduate Engineering program:

|  |  |  |
| --- | --- | --- |
| S.No. | Category | Suggested Breakupof Credits(Total 160) |
| 1 | Humanities and Social Sciences including Management courses | 7 |
| 2 | Basic Science courses | 22 |
| 3 | Engineering Science courses including workshop, drawing, basics ofelectrical/mechanical/computer etc | 22.5 |
| 4 | Professional core courses | 67 |
| 5 | Professional Elective courses relevant to chosen specialization/branch | 31.5 |
| 6 | Open subjects – Electives from other technical and /or emergingsubjects |  |
| 7 | Project work, seminar and internship in industry or elsewhere | 10 |
| 8 | Mandatory Courses[Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge] | (non-credit) |
|  | Total | 173.5\* |

*\*Minor variation is allowed as per need of the respective disciplines.*

1. Credit distribution in the First year of Undergraduate Engineering program:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Lecture****(L)** | **Tutorial****(T)** | **Laboratory/Practical****(P)** | **Total credits****(C )** |
| Chemistry –I | 3 | 1 | 3 | 5.5 |
| Physics | 3 | 1 | 3 | 5.5 |
| Maths-1 | 3 | 1 | 0 | 4 |
| Maths -2 | 3 | 1 | 0 | 4 |
| Programming for Problem solving | 3 | 0 | 4 | 5 |
| English | 3 | 0 |  2 | 3 |
| Engineering Graphics &Design | 1 | 0 | 4 | 3 |
| Workshop/ practical | 1 | 0 | 4 | 3 |
| Basic Electrical Engg. | 3 | 1 | 2 | 5 |
| \*Biology | 2 | 1 | 0 | 3 |
| \*Engg. Mechanics | 3 | 1 | 0 | 4 |
| \*Maths-3 | 3 | 1 | 0 | 4 |

*\*These courses may be offered preferably in the 3rd semester & onwards.*

1. Course code and definition:

|  |  |
| --- | --- |
| **Course code** | **Definitions** |
| L | Lecture |
| T | Tutorial |
| P | Practical |
| BS | Basic Science Courses |
| ES | Engineering Science Courses |
| HSM | Humanities and Social Sciences includingManagement courses |
| IN | Instrumentation Engineering |
| PC | Professional core courses |
| PE | Professional Elective courses |
| OE | Open Elective courses |
| LC/ PR | Laboratory course |
| MC | Mandatory courses |
| PROJ | Project |

1. **Category of Courses:**

**BASIC SCIENCE COURSES**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl.No. | CourseCode | Course Title | Hours per week | Credits | Preferredsemester |
|  |  |  | L | T | P |  |   |
| 1 | EI-BS-102 | Chemistry-I | 3 | 1 | 3 | 5.5 | II |
| 2 | EI -BS-101 | Physics | 3 | 1 | 3 | 5.5 | I |
| 3 | EI -BS-103 | Mathematics –I | 3 | 1 | 0 | 4 | I |
| 4 | EI -BS-104 | Mathematics –2 | 3 | 1 | 0 | 4 | II |

**ENGINEERING SCIENCE COURSES**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl.No. | CourseCode | Course Title | Hours per week | Credits | Preferredsemester |
|  |  |  | L | T | P |  |  |
| 1 | EI -ES-105 | Basic Electrical Engineering | 3 | 1 | 2 | 5 | I |
| 2 | EI -ES-107 | Engineering Graphics & Design | 1 | 0 | 4 | 3 | I |
| 3 | EI -ES-106 | Programming for Problem Solving | 3 | 0 | 4 | 5 | II |
| 4 | EI -PR-08 | Workshop/ManufacturingPractices | 1 | 0 | 4 | 3 | II |
| 5 | EI -ES-108 | Basic Electronics Engineering | 2 | 0 | 1 | 3 | II |
| 6 | EI -ES-203 | Basic Instrumentation Engineering | 2 | 0 | 1 | 3 | III |

**HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl.No. | CourseCode | Course Title | Hours per week | Credits | PreferredSemester |
|  |  |  | L | T | P |  |  |
| 1 | EI-HSM-109 | English | 3 | 0 | 2 | 3 | I |

1. **Structure of curriculum**

**Mandatory Induction Program**

**3 weeks duration**

* Physical activity
* Creative Arts
* Universal Human Values
* Literary
* Proficiency Modules
* Lectures by Eminent People
* Visits to local Areas
* Familiarization to Dept./Branch & Innovations

**Semester I (First year]**

**B.Tech. ELECTRICAL AND INSTRUMENTATION ENGINEERING UG**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Category**  | **Course No.** | **Course title** | **Credits** | **Teaching Schedule** |
| **L** | **T** | **P** | **Total** |
| 1 | Basic Science Course | EI-BS-101 | Physics-I | 4 | 3 | 1 | - | 4 |
| 2 | Basic Science course | EI-BS-103 | Mathematics-I | 4 | 3 | 1 | - | 4 |
| 3 | EngineeringScience Courses | EI-ES-105 | Basic Electrical Engineering | 4 | 3 | 1 | - | 4 |
| 4 | Engineering Science Courses | EI-ES-107 | Engg. Graphics and Design | 1 | 1 | - | - | 1 |
| 5 | Humanities courses | EI-HSM-109 | English | 3 | 3 | - | - | 3 |
| 6 | Physics Lab | EI-PR-01 | Physics Lab | 1.5 | - | - | 3 | 3 |
| 7 | Engineering Drawing lab | EI-PR-03 | Engineering Drawing lab | 2 | - | - | 4 | 4 |
| 8 | Basic Electrical Lab | EI-PR-05 | Basic Electrical Lab | 1 | - | - | 2 | 2 |
| 9 | Language Lab  | EI-PR-07 | Language Lab  | 0 | - | - | 2 | 2 |
|  |  |  | Total | 20.5 | 13 | 3 | 11 | 27 |

**Semester II (First year]**

**B.Tech. ELECTRICAL AND INSTRUMENTATION ENGINEERING UG**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.No.** | **Category**  | **Course No.** | **Course title** | **Credits** | **Teaching Schedule** |
| **L** | **T** | **P** | **Total** |
| 1 | Basic Science courses | EI-BS-102 | Chemistry | 4 | 3 | 1 |  | 4 |
| 2 | Basic Science courses | EI-BS-104 | Mathematics-II | 4 | 3 | 1 |  | 4 |
| 3 | EngineeringScience Courses | EI-ES-106 | Programming for Problem Solving | 4 | 3 | 1 |  | 4 |
| 4 | Engineering ScienceCourses | EI-ES-108 | Basic Electronics Engineering | 3 | 2 | 1 |  | 3 |
| 5 | Environmental Sciences MC | EI-EVS-112 | Environmental Science | -- | 3 | 0 |  | 3 |
| 6 | Chemistry Lab | EI-PR-02 | Chemistry Lab | 1.5 |  |  | 3 | 3 |
| 7 | Computer programming Lab | EI-PR-04 | Computer programming Lab | 1.5 | - | - | 3 | 3 |
| 8 | Basic Electronic lab  | EI-PR-06 | Basic Electronic lab  | 1 | - | - | 2 | 2 |
| 9 | Workshop Practice Lab. | EI-PR-08 | Workshop Practice Lab. | 1 | - | - | 2 | 2 |
|  |  |  | Total | 20 | 14 | 4 | 10 | 28 |

**Chapter -2**

**Detailed first year curriculum contents**

1. **Mandatory Induction program**

(Please refer **Appendix-A** for guidelines. Details of Induction program also available in the curriculum of Mandatory courses.)

[Induction program for students to be offered right at the start of the first year.]

**3 weeks duration**

* Physical activity
* Creative Arts
* Universal Human Values
* Literary
* Proficiency Modules
* Lectures by Eminent People
* Visits to local Areas
* Familiarization to Dept./Branch & Innovations

**Guide to Induction Program**

1. **Introduction**

*(Induction Program was discussed and approved for all colleges by AICTE in March 2017. It was discussed and accepted by the Council of IITs for all IITs in August 2016. It was originally proposed by a Committee of IIT Directors and accepted at the meeting of all IIT Directors in March 2016.*1 *This guide has been prepared based on the Report of the Committee of IIT Directors and the experience gained through its pilot implementation in July 2016 as accepted by the Council of IITs. Purpose of this document is to help insti-*

*tutions in understanding the spirit of the accepted Induction Program and implementing it.)*

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond.

The graduating student must have knowledge and skills in the area of his study. However, he must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he would understand and fulﬁll his responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed.

There is a mad rush for engineering today, without the student determining for himself his interests and his goals. This is a major factor in the current state of demotivation towards studies that exists among UG students.

The success of gaining admission into a desired institution but failure in getting the desired branch, with peer pressure generating its own problems, leads to a peer envi- ronment that is demotivating and corrosive. Start of hostel life without close parental supervision at the same time, further worsens it with also a poor daily routine.

To come out of this situation, a multi-pronged approach is needed. One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character.

1A Committee of IIT Directors was setup in the 152nd Meeting of IIT Directors on 6th September 2015 at IIT Patna, on how to motivate undergraduate students at IITs towards studies, and to develop verbal ability. The Committee submitted its report on 19th January 2016. It was considered at the 153rd Meeting of all IIT Directors at IIT Mandi on 26 March 2016, and the accepted report came out on 31 March 2016. The Induction Program was an important recommendation, and its pilot was implemented by three IITs, namely, IIT(BHU), IIT Mandi and IIT Patna in July 2016. At the 50th meeting of the Council of IITs on 23 August 2016, recommendation on the Induction Program and the report of its pilot implementation were discussed and the program was accepted for all IITs.

### 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 insti- tution, 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 awarness, sensitivity and understanding of the self, people around them, society at large, and nature.2

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.

2Induction Program as described here borrows from three programs running earlier at diﬀerent insti- tutions: (1) Foundation Program running at IIT Gadhinagar since July 2011, (2) Human Values course running at IIIT Hyderabad since July 2005, and (3) Counselling Service or mentorship running at several IITs for many decades. Contribution of each one is described next.

* 1. IIT Gandhinagar was the ﬁrst IIT to recognize and implement a special 5-week Foundation Program for the incoming 1st year UG students. It took a bold step that the normal classes would start only after the ﬁve week period. It involved activities such as games, art, etc., and also science and other creative workshops and lectures by resource persons from outside.
	2. IIIT Hyderabad was the ﬁrst one to implement a compulsary course on Human Values. Under it, classes were held by faculty through discussions in small groups of students, rather than in lecture mode. Moreover, faculty from all departments got involved in conducting the group discussions under the course. The content is non-sectarian, and the mode is dialogical rather than sermonising or lecturing. Faculty were trained beforehand, to conduct these discussions and to guide students on issues of life.
	3. Counselling at some of the IITs involves setting up mentor-mentee network under which 1st year students would be divided into small groups, each assigned a senior student as a student guide, and a faculty member as a mentor. Thus, a new student gets connected to a faculty member as well as a senior student, to whom he/she could go to in case of any diﬃculty whether psychological, ﬁnancial, academic, or otherwise.

The Induction Program deﬁned here amalgamates all the three into an integrated whole, which leads to its high eﬀectiveness in terms of building physical activity, creativity, bonding, and character. It develops sensitivity towards self and one’s relationships, builds awareness about others and society beyond the individual, and also in bonding with their own batch-mates and a senior student besides a faculty member. Scaling up the above amalgamation to an intake batch of 1000 plus students was done at IIT(BHU),

Varanasi starting from July 2016.

##### 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 everyday 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 do’s and dont’s, 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. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them.3

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.

3The Universal Human Values Course is a result of a long series of experiments at educational institutes starting from IIT-Delhi and IIT Kanpur in the 1980s and 1990s as an elective course, NIT Raipur in late 1990s as a compulsory one-week oﬀ campus program. The courses at IIT(BHU) which started from July 2014, are taken and developed from two compulsory courses at IIIT Hyderabad ﬁrst introduced in July 2005.

##### 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.

### 3 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

*09:00 am - 03:00 pm Academic registration*

04:30 pm - 06:00 pm Orientation

Day 2

09:00 am - 10:00 am Diagnostic test (for English etc.) 10:15 am - 12:25 pm Visit to respective depts.

*12:30 pm - 01:55 pm Lunch*

02:00 pm - 02:55 pm Director’s address

03:00 pm - 05:00 pm Interaction with parents

03:30 pm - 05:00 pm Mentor-mentee groups - Introduction within group.

(Same as Universal Human Values groups)

##### 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.

* + 1. 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.

*Sessn. Time Activity Remarks*

Day 3 onwards

*06:00 am Wake up call*

* + - 1. 06:30 am - 07:10 am Physical activity (mild exercise/yoga)

*07:15 am - 08:55 am Bath, Breakfast, etc.*

* + - 1. 09:00 am - 10:55 am Creative Arts /Universal Human Values
			2. 11:00 am - 12:55 pm Universal Human Values / Creative

Arts

*01:00 pm - 02:25 pm Lunch*

Half the groups do Creative Arts Complementary alternate

|  |  |  |  |
| --- | --- | --- | --- |
| IV | 02:30 pm - 03:55 pm | Afternoon Session | See below. |
| V | 04:00 pm - 05:00 pm | Afternoon Session | See below. |
|  | *05:00 pm - 05:25 pm* | *Break / light tea* |  |
| VI | 05:30 pm - 06:45 pm | Games / Special Lectures |  |
|  | *06:50 pm - 08:25 pm* | *Rest and Dinner* |  |
| VII | 08:30 pm - 09:25 pm | Informal interactions (in hostels) |  |

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

* + 1. Afternoon Activities (Non-Daily)

The following ﬁve activities are scheduled at diﬀerent times of the Induction Program, and are not held daily for everyone:

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

Here is the approximate activity schedule for the afternoons (may be changed to suit local needs):

*Activity Session Remarks*

Familiarization with Dept/Branch & Innovations

IV For 3 days (Day 3 to 5)

Visits to Local Area IV, V and VI

For 3 days - interspersed (e.g., 3 Saturdays)

Lectures by Eminent People IV As scheduled - 3-5 lectures

Literary (Play / Book Reading / Lecture)

IV For 3-5 days

Proﬁciency Modules V Daily, but only for those who need it

##### Closing Phase

*Time Activity*

Last But One Day

08:30 am - 12 noon Discussions and ﬁnalization of presen-

tation within each group

02:00 am - 05:00 pm Presentation by each group in front of 4

other groups besides their own (about 100 students)

Last Day

Whole day Examinations (if any). May be ex- panded to last 2 days, in case needed.

##### 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/discipline4.

Here we list some important suggestions which have come up and which have been experimented with.

* + 1. Follow Up after Closure – Same Semester

It is suggested that the groups meet with their 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.)

* + 1. 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 Induc- tion 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.

### 4 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 demotivated 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 compe- tition 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 nature, 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.

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4We 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.

**Detailed first year curriculum contents**

1. **Mandatory Induction program**

(Please refer **Appendix-A** for guidelines. Details of Induction program also available in the curriculum of AICTE Mandatory courses.)

[Induction program for students to be offered right at the start of the first year.]

**3 weeks duration**

* Physical activity
* Creative Arts
* Universal Human Values
* Literary
* Proficiency Modules
* Lectures by Eminent People
* Visits to local Areas
* Familiarization to Dept./Branch & Innovations

B.Tech Electrical and Instrumentation Engineering

**SCHEME OF EXAMINATIONS**

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-BS-101 | Physics-I | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-BS-103 | Mathematics-I | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-ES-105 | Basic Electrical Engineering | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-ES-107 | Engg. Graphics and Design | 1 | 1 | - | - | 1 | 20 | 30 |  | 50 | 3 Hrs |
| EI-HSM-109 | English | 3 | 3 | - | - | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PR-01 | Physics Lab | 1.5 | - | - | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-03 | Engineering Drawing lab | 2 | - | - | 4 | 4 | 40 |  | 60 | 100 | 3 Hrs |
| EI-PR-05 | Basic Electrical Lab | 1 | - | - | 2 | 2 | 20 |  | 30 | 50 | 3 Hrs |
| EI-PR-07 | Language Lab  | 0 | - | - | 2 | 2 | -- |  | -- | -- | -- |
|  | Total | 20.5 | 13 | 3 | 11 | 27 | 270 | 270 | 135 | 675 |  |

**B.Tech. 1ST YEAR (SEMESTER–II) (w.e.f.2019-20)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-BS-102 | Chemistry | 4 | 3 | 1 |  | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-BS-104 | Mathematics-II | 4 | 3 | 1 |  | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-ES-106 | Programming for Problem Solving | 4 | 3 | 1 |  | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-ES-108 | Basic Electronics Engineering | 3 | 2 | 1 |  | 3 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-EVS-112 | Environmental Science | -- | 3 | 0 |  | 3 | 30+10 | 60 | -- | 100 | 3 Hrs |
| EI-PR-02 | Chemistry Lab | 1.5 |  |  | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-04 | Computer programming Lab | 1.5 | - | - | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-06 | Basic Electronic lab  | 1 | - | - | 2 | 2 | 20 | -- | 30 | 50 | 3 Hrs |
| EI-PR-08 | Workshop Practice Lab. | 1 | - | - | 2 | 2 | 20 | -- | 30 | 50 | 3 Hrs |
|  | Total | 20 | 14 | 4 | 10 | 28 | 300 | 300 | 150 | 750 |  |

B.Tech Electrical and Instrumentation Engineering

**SCHEME OF EXAMINATIONS**

**B.Tech. 2ND YEAR (SEMESTER–III) (w.e.f.2020-21)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PC-201 | Power System I | 3 | 2 | 1 | -- | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-203 | Basic Instrumentation Engineering | 3 | 2 | 1 |  | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-205 | Network Analysis  | 3 | 2 | 1 |  | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-207 | Transducers and Applications | 3 | 2 | 1 |  | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-OE-209 | **Open Elective I** | 3 | 2 | 1 |  | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PR-09 | Instrumentation Lab | 1 | -- | -- | 2 | 2 | 20 |  | 30 | 50 | 3 Hrs |
| EI-PR-11 | Network Analysis Lab | 1 | -- | -- | 2 | 2 | 20 |  | 30 | 50 | 3 Hrs |
| EI-PR-13 | Transducer lab | 1 | -- | -- | 2 | 2 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-15 | Open Elective I Lab | 1 | -- | -- | 2 | 2 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-17 | Power System Lab | 1 |  |  | 2 | 2 | 30 |  | 45 | 75 | 3 Hrs |
|  | Total | 20 | 10 | 5 | 10 | 25 | 330 | 300 | 195 | 825 |  |

**Open Elective I**

Linear Integrated Circuits

Computer Networks

**B.Tech. 2ND YEAR (SEMESTER–IV) (w.e.f.2020-21)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PC-202 | Power Electronics-I | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-204 | Electrical Measurements & Instrumentation | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-206 | Program Elective I | 3 | 2 | 1 | -- | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-208 | Electrical Machines | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-OE-210 | Open Elective II | 3 | 2 | 1 | -- | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PR-10 | Power Electronics Lab | 1 | -- |  | 2 | 2 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-12 | Control System Lab-1 | 1 | -- |  | 2 | 2 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-14 | Open Elective II Lab | 1 | -- |  | 2 | 2 | 20 | -- | 30 | 50 | 3 Hrs |
| EI-PR-16 | Machines lab | 1.5 | -- |  | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Total | 22.5 | 13 | 5 | 09 | 27 | 310 | 300 | 165 | 775 |  |

**Program Elective I**

Control System Components

Industrial Electrical Systems

Electrical Energy Conservation and Auditing

**Open Elective II**

Digital Techniques

Computer Organization

Electronic Devices

B.Tech Electrical and Instrumentation Engineering

**SCHEME OF EXAMINATIONS**

**B.Tech. 3RD YEAR (SEMESTER–V) (w.e.f.2021-22)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-OE-301 | Open Elective III | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-303 | Power Electronics-II | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PE-305 | Program Elective II | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-307 | Power System II | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-309 | Linear Automatic Control System | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PR-19 | Power Electronic Lab-II | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-21 | Power System Lab II | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-23 | Program Elective II Lab | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-25 | Control System Lab | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR-27 | Industrial Training | \*\* |  |  |  |  | 40\*\* | 60\*\* |  | 100\*\* | 3 Hrs |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Total | 26 | 15 | 5 | 12 | 32 | 320 | 300 | 180 | 800 |  |

**\*\* Industrial training is non-credit/ audit course.**

**Open Elective III**

Environment Monitoring Instrumentation

Electromagnetic Field Theory

Math III

Energy Efficient Systems

**Program Elective II**

Microprocessors

Analog and Digital Communication

Utilization of Electrical Engineering

**B.Tech. 3RD YEAR (SEMESTER–VI) (w.e.f.2021-22)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PC-302 | Program Elective III | 3 | 2 | 1 | -- | 3 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-PC-304 | Electrical Machines II | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-PC-306 | Power Plant Engineering | 3 | 2 | 1 | -- | 3 | 40 | 60 | --- | 100 | 3 Hrs |
| EI-PC-308 | Digital Signal Processing | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-PC-310 | Microcontroller & Embedded System | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI-PR-18 | Electrical Machines Lab II | 1.5 | -- | -- | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-20 | Micro-controller Lab | 1.5 | -- | -- | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PR-22 | Signal Processing Lab | 1.5 | -- | -- | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI-PROJ-02 | Minor Project | 3 | -- | -- | 6 | 6 | 50 | -- | 100 | 150 | 3 Hrs |
|  | Total | **25.5** | **13** | **5** | **15** | **33** | 340 | 300 | 235 | 875 |  |

**Program Elective III**

Instrument & System Design

Pneumatic and Hydraulic Instrumentation

Mechanical Measurements in Instrumentation

Electrical and Hybrid Vehicles

B.Tech Electrical and Instrumentation Engineering

**SCHEME OF EXAMINATIONS**

**B.Tech. 4TH YEAR (SEMESTER–VII) (w.e.f.2022-23)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-OE-401 | Open Elective IV | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI -PE-403 | Program Elective IV | 3 | 2 | 1 | -- | 3 | 40 | 60 | -- | 100 | 3 Hrs |
| EI -PC-405 | Electric Drives | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| IN-PC-407 | Advance Process dynamics and Control | 4 | 3 | 1 | -- | 4 | 40 | 60 | -- | 100 | 3 Hrs |
| EI -PR-29 | Electric Drives Lab | 1.5 | -- | -- | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI -PR-31 | Open Elective IV | 1.5 | -- | -- | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |
| EI -PR-01 | Project Work Case Study | 2 | -- | -- | 4 | 4 | 40 |  | 60 | 100 | 3 Hrs |
| EI -PR-33 | Industrial Training | -- |  |  |  |  | 40\*\* |  | 60\*\* | 100\*\* | 3 Hrs |
|  | Total | **20** | **11** | **4** | **10** | **25** | **260** | **240** | **150** | **650** |  |

**\*\* Industrial training is non-credit/ audit course.**

**Open Elective IV**

Computer Graphics & CAD CAM

Remote Sensing

Optical Instrumentation

**Program Elective IV**

Biomedical Instrumentation

Reliability Engineering

Wind and Solar Energy Systems

Power Quality and FACTS

**B.Tech. 4TH YEAR (SEMESTER–VIII) (w.e.f.2022-23)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-OE-402 | Open Elective V | 3 | 2 | 1 | -- | 3 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PE-404 | Program Elective V | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PC-406 | Industrial Process Control | 4 | 3 | 1 | -- | 4 | 40 | 60 |  | 100 | 3 Hrs |
| EI-PR-28 | Process Control Lab | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |
| EI-PR—30 | Open Elective V Lab | 1.5 | -- | -- | 3 | 3 | 30 |  | 45 | 75 |  |
| EI-PR-32 | Seminar | 1.0 | -- | -- | 2 | 2 | 20 |  | 30 | 50 |  |
| EI-PROJ-06 | Major Project | 4 | -- | -- | 8 | 8 | 40 |  | 60 | 100 | 3 Hrs |
|  | Total | **19** | **8** | **3** | **16** | **27** | **240** | **180** | **180** | **600** |  |

Open Elective V

Artificial Intelligence

Robotics

Fuzzy Logic Control

Program Elective V

Switch Gear and Protection

Machine Design

High Voltage Engineering

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

EI-BS-101 Physics-I

Course Outcomes

It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of physical problems and applications that they would find useful in their disciplines.

The student will learn

* Basic concepts of EM theory – application to EM-Waves
* Basic Concepts of Quantum theory – application to solids
* Further fallouts like energy band structures in solids – classification
* Basic concepts of Optics – applications in Fiber optics and lasers

|  |
| --- |
| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-BS-101 | Physics-I | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

Detailed Course contents:

 ***Module 1:* Electrostatics and Magnetostatics (5 lectures)**

Electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace’s and Poisson’s equations for electrostatic potential and uniqueness of their solution Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving si0mple electrostatics problems in presence of dielectrics. Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes’ theorem; the equation for the vector potential and its solution for given current densities. Magnetization and associated bound currents; auxiliary magnetic field  ; Boundary conditions on  and .

**Moddule:2 Electromagnetic Theory (5 lectures)**

Faraday’s law in terms of EMF produced by changing magnetic flux; equivalence of Faraday’s law and motional EMF; Lenz’s law; to satisfy continuity equation; displace current and magnetic field arising from time- dependent electric field; calculating magnetic field due to changing electric fields in quasi- static approximation. Maxwell’s equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave.

**Module 3: Wave nature of particles and the Schrodinger equation (5 lectures)**

 Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time- independent Schrodinger equation for wavefunction, Expectation values, Free-particle wavefunction and wave-packets, Uncertainty principle. Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials.

**Module: 4 Introduction to solids. (6 lectures)**

Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch’s theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands Numerical solution for energy in one-dimensional periodic lattice by mixing plane waves.

Module 5: Optics (6 lectures)

Huygens’ principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young’s double slit experiment, Newton’s rings, Michelson interferometer, Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power. Polarization, quarter wave plate, half wave plate, Nicol prism, Polarimeter.

Module 6: Lasers and Fibre Optics (6 lectures)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, quality factor, power absorbed by oscillator.

Einstein’s theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers ( He-Ne, CO2), solid-state lasers(ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

FIBRE OPTICS**:** Propagation of light in fibres, numerical aperture, single mode and multi-mode fibres, applications.

Suggested Text Books

1. David Griffiths, Introduction to Electrodynamics
2. Eisberg and Resnick, Introduction to Quantum Physics
3. D. J. Griffiths, Quantum mechanics
4. A. Ghatak, Optics

Suggested Reference Books:

* 1. Halliday and Resnick, Physics
	2. W. Saslow, Electricity, magnetism and light
	3. Ian G. Main, Oscillations and waves in physics
	4. H.J. Pain, The physics of vibrations and waves
	5. E. Hecht, Optics
	6. O. Svelto, Principles of Lasers

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

**EI-BS-103 Mathematics-I**

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

* + To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
	+ The fallouts of Rolle’s Theorem that is fundamental to application of analysis to Engineering problems.
	+ To deal with functions of several variables that are essential in most branches of engineering.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2018-19)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-BS-103 | Mathematics-I | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |

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**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

|  |  |
| --- | --- |
| **Course code** | EI-BS-103 |
| Category | Basic Science Course |
| **Course title** | **Mathematics -1** |
| **Scheme and Credits** | **L** | **T** | **P** | **Credits** | Semester - I |
| **3** | **1** | **0** | **4** |
| **Pre-requisites (if****any)** | **-** |

Detailed contents:

**MODULE-I**

**Applications of Differentiation :** Taylor’s & Maclaurin’s series, Expansion by use of known series, Expansion by forming a differential equation, Asymptotes, Curvature, Radius of Curvature for Cartesian, Parametric & polar curves, Centre of curvature & chord of curvature, Tracing of Cartesian & polar curves (standard curves).

**MODULE – II**

**Partial Differentiation & its Applications :** Functions of two or more variables Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, change of variables.

Homogeneous functions, Euler’s theorem, Jacobian, Taylor’s & Maclaurin’s series for functions of two variables (without proof), Errors and approximations, Maxima-minima of functions of two variables, Lagrange’s method of undetermined multipliers, Differentiation under the integral sign.

**MODULE – III**

**Multiple Integrals and their Applications :** Double integral, change of order of integration Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

**MODULE – IV**

**Vector Calculus :** Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations, Del applied twice to point functions, Del applied to product of point functions.

Integration of vectors, line integral, surface integral, volume integral, Green’s, Stoke’s and Gauss divergence theorems (without proof), and their simple applications.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics : F. Kreyszig.

2. Higher Engineering Mathematics : B.S. Grewal.

**REFERENCE BOOKS:**

1. Engineering Mathematics Part-I : S.S. Sastry.

2. Differential and Integral Calculus : Piskunov.

3. Advanced Engineering Mathematics : R.K. Jain and

 S.R.K. Iyengar

4. Advanced Engg. Mathematics : Michael D. Greenberg

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

**EI-ES-105 Basic Electrical Engineering**

Course Outcomes

* + To understand and analyze basic electric and magnetic circuits
	+ To study the single phase and three phase electric circuits.
	+ To study the working principles of electrical machines.
	+ To introduce the components of low voltage electrical installations

|  |
| --- |
| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-ES-105 | Basic Electrical Engineering | 4 | 3 | 1 | - | 4 | 40 | 60 |  | 100 | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt all questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

**EI-ES-105 Basic Electrical Engineering**

**Details of the Course Contents:**

DC Circuits (6 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

AC Circuits (7 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections. 3-phase power equation, measurement of power by two wattmeter method,

Transformers (6 hours)

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Electrical Installations (5 hours)

Components of domestic wiring and earthing system. Elementary calculations for energy consumption, power factor improvement.

Suggested Text / Reference Books

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering” , Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “ Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “ Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
4. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
6. Electrical Technology (Vol-I) : B.L Theraja & A K Theraja, S.Chand

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

**EI-ES-107 Engineering Graphics and Design**

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

* + to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
	+ to prepare you to communicate effectively
	+ to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

The student will learn :

* + Introduction to engineering design and its place in society
	+ Exposure to the visual aspects of engineering design
	+ Exposure to engineering graphics standards
	+ Exposure to solid modelling
	+ Exposure to computer-aided geometric design
	+ Exposure to creating working drawings
	+ Exposure to engineering communication

**PROGRAM EDUCATIONAL OBJECTIVES**

1. To prepare graduates for a successful technical and/or professional career.
2. To prepare graduates for higher education and research.
3. To prepare graduates to engage in resolving industrial and social issues.

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| --- |
| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-ES-107 | Engg. Graphics and Design | 1 | 1 | - | - | 1 | 20 | 30 |  | 50 | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A and Section-B, Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 2-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and applications etc. of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 1-question out of 2-questions in Section-B Section-A carries 16 marks. Section-B carries 14 marks.**

|  |  |
| --- | --- |
| **Course code** | EI-ES-107 |
| Category | Engineering Science Courses |
| **Course title** | **Engineering Graphics & Design (Theory & Lab.)** |
| **Scheme and Credits** | **L** | **T** | **P** | **c**redits | Semester - I |
| **1** | **0** | **0** | **1** |
| **Pre-requisites (if****any)** | **-** |

**Engineering Graphics & Design [A total of 10 lecture hours & 60 hours of lab.]**

**[[L : 1; T:0; P : 4 (3 credits)]**

Detailed contents

Traditional Engineering Graphics:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

**(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)**

**B.Tech. 1ST YEAR (SEMESTER–I) (w.e.f.2019-20)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-HM-109 | English | 3 | 3 | - | - | 3 | 40 | 60 |  | 100 | 3 Hrs |

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

|  |  |
| --- | --- |
| **Course code** | EI-HSM-109 |
| Category | Humanities and Social Sciences including Management courses |
| **Course title** | **English** |
| **Scheme and Credits** | **L** | **T** | **P** | Credits | Semester - I |
| **3** | **0** | **2** | **3** |
| **Pre-requisites (if any)** | **-** |

##### English Detailed contents

1. **Vocabulary Building**
	1. The concept of Word Formation
	2. Root words from foreign languages and their use in English
	3. Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
	4. Synonyms, antonyms, and standard abbreviations.
2. Basic Writing Skills
	1. Sentence Structures
	2. Use of phrases and clauses in sentences
	3. Importance of proper punctuation
	4. Creating coherence
	5. Organizing principles of paragraphs in documents
	6. Techniques for writing precisely
3. Identifying Common Errors in Writing
	1. Subject-verb agreement
	2. Noun-pronoun agreement
	3. Misplaced modifiers
	4. Articles
	5. Prepositions
	6. Redundancies
	7. Clichés
4. Nature and Style of sensible Writing
	1. Describing
	2. Defining
	3. Classifying
	4. Providing examples or evidence
	5. Writing introduction and conclusion
5. Writing Practices
	1. Comprehension
	2. Précis Writing
	3. Essay Writing
6. Oral Communication

(This unit involves interactive practice sessions in Language Lab)

* Listening Comprehension
* Pronunciation, Intonation, Stress and Rhythm
* Common Everyday Situations: Conversations and Dialogues
* Communication at Workplace
* Interviews
* Formal Presentations

Suggested Readings:

1. *Practical English Usage.* Michael Swan. OUP. 1995.
2. *Remedial English Grammar.* F.T. Wood. Macmillan.2007 (iii)*On Writing Well.* William Zinsser. Harper Resource Book. 2001
3. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
5. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**Physics Lab EI-PR-01**

Course Outcomes

It aims to get the practical ability to the students with standard concepts and tools at an intermediate to advanced level to perform the experiments related to the theory paper INE-BSC-101 Physics. The student will learn

1. Experiments in Optics/ principles
2. Experiments in acoustics/ applications
3. Experiments in Lasers/ optical principles
4. Experiments in Magnetism/ applications
5. Experiments in Semiconductor conductivity/ properties

|  |  |  |  |  |  |
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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-01 | Physics Lab | 1.5 | - | - | 3 | 3 | 30 |  | 45 | 75 | 3 Hrs |

Suggested list of experiments from the following:

1. Frank-Hertz experiment; photoelectric effect experiment; recording hydrogen atom spectrum
2. LC circuit and LCR circuit;
3. Resonance phenomena in LCR circuits;
4. Magnetic field from Helmholtz coil; To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus
5. To find the wavelength of sodium light by Newton's rings experiment.
6. To find the wavelength of sodium light by Fresnel's biprism experiment.
7. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
8. To find the wavelength of sodium light by Michelson interferometer.
9. To find the resolving power of a telescope.
10. To find the specific rotation of sugar solution by using a polarimeter.
11. To compare the capacitances of two capacitors by De'sauty bridge and hence to find the dielectric constant of a medium.
12. To find the frequency of A.C. mains by using sonometer.
13. To Find Value of high Resistance by substitution method
14. To Find the value of high resistance by leakage method
15. To Convert a galvenometer in to an Ammeter of given range.
16. To study He Ne laser
17. To find the value of e/m for electrons by Helical method, Measurement of Lorentz force in a vacuum tube.
18. To find the ionization potential of Argon/Mercury using a thyratron tube..
19. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
20. To find the value of Planck's constant by using a photo electric cell.
21. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
22. To find the value of Hall Co-efficient of semi-conductor.
23. To find the band gap of intrinsic semi-conductor using four probe method.
24. To calculate the hysteresis loss by tracing a B-H curve.
25. To find the temp coeff. of resistance by using Pt resistance thermometer by post office box

**RECOMMENDED BOOKS:**

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).

3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

**EI-PR-03 Engineering Drawing lab**

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-03 | Engineering Drawing lab | 2 | - | - | 4 | 4 | 40 |  | 60 | 100 | 3 Hrs |

EI-PR-03 Engineering Drawing lab: Course Contents

Module 1: Introduction to Engineering Drawing covering,

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

**Module 2: Orthographic Projections covering,**

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

Module 3: Projections of Regular Solids covering,

those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module 4:Sections and Sectional Views of Right Angular Solids covering,

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module 5: Isometric Projections covering,**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Module 6: Overview of Computer Graphics covering,

listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Module 7: Customisation & CAD Drawing

consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Module 8: Annotations, layering & other functions covering

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

**Module 9: Demonstration of a simple team design project that illustrates**

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

**EI-PR-05 Basic Electrical Lab**

Laboratory Outcomes

* + Get an exposure to common electrical components and their ratings.
	+ Make electrical connections by wires of appropriate ratings.
	+ Understand the usage of common electrical measuring instruments.
	+ Understand the basic characteristics of transformers and electrical machines.
	+ Get an exposure to the working of power electronic converters.

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-05 | Basic Electrical Lab | 1 | - | - | 2 | 2 | 20 |  | 30 | 50 | 3 Hrs |

**EI-PR-05 Basic Electrical Lab**

**Basic Electrical Engineering Laboratory [ L : 0; T:0 ; P : 2 (1 credit)]**

**LIST OF EXPERIMENTS**

1. To verify KCL and KVL.
2. To verify Thevenin’s & Norton's Theorems.
3. To verify Superposition theorems.
4. To study frequency response of a series R-L-C circuit and determine resonant frequency& Q- factor for various Values of R,L,C.
5. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q -Factor for various values of R,L,C.
6. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
7. To perform O.C. and S.C. tests on transformer.
8. To perform speed control of DC motor.
9. To perform O.C. and S.C. tests of a three phase induction motor.
10. Measurement of power in a 3 phase system by two watt meter method.

Demonstrations:

* Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
* Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
* Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
* Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
* Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
	+ Torque Speed Characteristic of separately excited dc motor.
	+ Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed.
	+ Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

**EI-PR-07 LANGUAGE LAB: COMMUNICATION SKILLS LABORATORY**

**Course Outcomes**

**After successful completion of this course, the students should be able to**

CO1: Imparting the role of communicative ability as one of the soft skills needed for placement

CO2: Developing communicative ability and soft skills needed for placement

CO3: Making students Industry-Ready through inculcating team-playing capacity

**Pre-requisite courses:**

- Functional English I

- Functional English II

**PROGRAM OUTCOMES**

1. Graduates will attain skills to conduct experiments/investigations and interpret data with reference to systems and standards

2. Graduates will have ability to communicate effectively in written, oral and instrumentation formats to put forth solutions and prepare detailed engineering report in the process and automation industries.

1. Graduates will be able to apply the knowledge, skill and attitude as a team player in initiating, executing and managing projects in the areas of design, manufacture, marketing and entrepreneurship in multi-disciplinary environments.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  | **M** |  |  |  |  |  |  | **M** |  |
| **CO2** |  |  |  | **W** |  |  |  |  |  | **M** | **S** |  |
| **CO3** |  |  |  | **S** |  |  |  |  |  | **W** | **S** |  |

**Course Assessment methods:**

**Direct Indirect**

Presentation, Role Play, Course end survey

Mock interview, GD etc.

**GRAMMAR IN COMMUNICATION 9 periods**

Grammar and Usage – Building Blocks, Homonyms, Subject and Verb Agreement, Error Correction - Grammar Application, Framing Questions – Question words, Verbal Questions, Tags, Giving Replies –Types of Sentences, Listening Comprehension –Listening and Ear training.

**ASSERTIVE COMMUNICATION 9 periods**

Listening Comprehension in Cross–Cultural Ambience, Telephonic Conversations/Etiquette, Role Play Activities, Dramatizing Situations- Extempore – Idioms and Phrases

**CORPORATE COMMUNICATION 9 periods**

Video Sensitizing, Communicative Courtesy – Interactions – Situational Conversations, Time Management, Stress Management Techniques, Verbal Reasoning, Current Affairs – E Mail Communication / Etiquette.

**PUBLIC SPEAKING 9 periods**

Giving Seminars and Presentations, Nuances of Addressing a Gathering - one to one/ one to a few/ one to many, Communication Process, Visual Aids & their Preparation, Accent Neutralization, Analyzing the Audience, Nonverbal Communication.

**CHAPTER TITLE 5 INTERVIEW & GD TECHNIQUES 9 periods**

Importance of Body Language –Gestures & Postures and Proxemics, Extempore, Facing the Interview Panel, Interview FAQs, Psychometric Tests and Stress Interviews, Introduction to GD, Mock GD Practices.

Total Hrs: 45

**REFERENCES**

1. Bhatnagar R.P. & Rahul Bhargava, “English for Competitive Examinations”, Macmillian Publishers, India, 1989, ISBN: 9780333925591

2. Devadoss K. & Malathy P., “Career Skills for Engineers”, National Book Publishers, Chennai, 2013.

3. Aggarwal R.S., “A Modern Approach to Verbal & Non–Verbal Reasoning”, S.Chand Publishers, India, 2012, ISBN : 8121905516

**B.Tech. 1ST YEAR (SEMESTER–II) (w.e.f.2019-20)**

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| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| **EI-BS-102** | **Chemistry** | **4** | **3** | **1** |  | **4** | **40** | **60** | **--** | **100** | **3 Hrs** |

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

* + Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
	+ Rationalise bulk properties and processes using thermodynamic considerations.
	+ Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
	+ Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
	+ List major chemical reactions that are used in the synthesis of molecules.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| **EI-BS-102** | **Chemistry** | **4** | **3** | **1** |  | **4** | **40** | **60** | **--** | **100** | **3 Hrs** |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

|  |  |
| --- | --- |
| **Course code** | EI-BS-102 |
| Category | Basic Science Course |
| **Course title** | **Chemistry-I (Theory & Lab.)****Contents**1. Chemistry-I (Concepts in chemistry for engineering)
2. Chemistry Laboratory
 |
| **Scheme and Credits** | **L** | **T** | **P** | **Credits** | Semester –II |
| **3** | **1** | **3** | **5.5** |
| **Pre-requisites (if any)** | **-** |

1. **EI-BS-102 Chemistry-I (Concepts in chemistry for engineering) [L : 3; T:1; P : 0 (4 credits)]**

Detailed contents

1. Atomic and molecular structure (12 lectures)

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

1. Spectroscopic techniques and applications (8 lectures)

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

1. Intermolecular forces and potential energy surfaces (4 lectures)

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

1. Use of free energy in chemical equilibria (6 lectures)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.

Use of free energy considerations in metallurgy through Ellingham diagrams.

1. Periodic properties (4 Lectures)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

1. Stereochemistry (4 lectures)

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

1. Organic reactions and synthesis of a drug molecule (4 lectures)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane (iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.

Krishnan

1. Physical Chemistry, by P. W. Atkins
2. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition <http://bcs.whfreeman.com/vollhardtschore5e/default.asp>

**EI-BS-104 Mathematics -II**

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in matrices/ linear algebra, ordinary and partial differential equations. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

* + The mathematical tools needed in matricesand their usage.
	+ The effective mathematical tools for the solutions of differential equations that model physical processes.
	+ The tools of differentiation and functions of PDE variables that are used in various techniques dealing engineering problems.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

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| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-BS-104 | Mathematics-II | 4 | 3 | 1 |  | 4 | 40 | 60 | -- | 100 | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

|  |  |
| --- | --- |
| **Course code** | **EI-BS-104** |
| Category | Basic Science Course |
| **Course title** | **Mathematics -2****(Calculus, Ordinary Differential Equations and Complex Variable )** |
| **Scheme and Credits** | **L** | **T** | **P** | Credits | Semester-II |
| **3** | **1** | **0** | **4** |
| **Pre-requisites (if any)** | **-** |

**Module-I**

Matrices & its Applications : Rank of a matrix, elementary transformations, elementary matrices, inverse using elementary transformations, normal form of a matrix, linear dependence and in dependence of vactors, consistency of linear system of equations, linear and orthogonal transformations, eigen values and eigen vectors, properties of eigen values.

**Module -II**

Ordinary Differential Equations & its Applications : Exact differential equations. Equations reducible to exact differential equations. Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories.

Linear differential equations of second and higher order. Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legender's linear equations, simultaneous linear equations with constant co-efficients.

**Module -III**

Laplace Transforms and its Applications : Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivaties, transforms of integrals, multiplication by tn, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

**Module -IV**

Partial Differential Equations and Its Applications : Formation of partial differential equations, Lagrange’s linear partial differential equation, First order non-linear partial differential equation, Charpit’s method. Method of separation of variables and its applications to wave equation and one dimensional heat equation, two dimensional heat flow, steady state solutions only.

**TEXT BOOKS:**

1. Advanced Engg. Mathematics F Kreyszig

2. Higher Engg. Mathematics B.S. Grewal

**REFERENCE BOOKS :**

1. Differential Equations – H.T.H. Piaggio.

2. Elements of Partial Differential Equations – I.N. Sneddon.

3. Advanced Engineering Mathematics – R.K. Jain, S.R.K.Iyengar.

4. Advanced Engg. Mathematics – Michael D. Greenberg.

**EI-ES-106 Programming for Problem Solving**

Course Outcomes

The student will learn

* + To formulate simple algorithms for arithmetic and logical problems.
	+ To translate the algorithms to programs (in C language).
	+ To test and execute the programs and correct syntax and logical errors.
* To implement conditional branching, iteration and recursion.
* To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
* To use arrays, pointers and structures to formulate algorithms and programs.
* To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
* To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **COs** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

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| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

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| --- | --- | --- | --- | --- | --- |
| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-ES-106 | Programming for Problem Solving | 4 | 3 | 1 |  | 4 | 40 | 60 | -- | 100 | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions uniformly spread among the entire syllabus, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the entire syllabus, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

|  |  |
| --- | --- |
| **Course code** | EI-ES-106 |
| Category | Engineering Science Course |
| **Course title** | **Programming for Problem Solving (Theory & Lab.)** |
| **Scheme and Credits** | **L** | **T** | **P** | Credits | Semester – II[The lab component should have one hour of tutorial followed or preceded by laboratoryassignments.] |
| **3** | **0** | **4** | **5** |
| **Pre-requisites (if****any)** | **-** |

**i)Programming for Problem Solving**

Detailed contents

***Unit 1***Introduction to Programming **(4 lectures)**

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - **(1 lecture).**

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. **(1 lecture)**

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- **(2 lectures) *Unit 2:***Arithmetic expressions and precedence **(2 lectures)**

**Unit 2:**Conditional Branching and Loops **(6 lectures)**

Writing and evaluation of conditionals and consequent branching **(3 lectures)**

Iteration and loops **(3 lectures)**

***Unit 3***Arrays **(6 lectures)**

Arrays (1-D, 2-D), Character arrays and Strings

***Unit 4***Basic Algorithms **(6 lectures)**

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

***Unit 5***Function **(5 lectures)**

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

***Unit 6***Recursion **(4 -5 lectures)**

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

***Unit 7***Structure **(4 lectures)**

Structures, Defining structures and Array of Structures

***Unit 8***Pointers **(2 lectures)**

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

***Unit 9***File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

**Text Books:**

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
2. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.
3. Theory and problems of programming with C, Byron C Gotterfried, TMH
4. Teach yourself all about computers by Barry Press and Marcia Press, 2000, IDG Books India.
5. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
6. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

**B.Tech. 1ST YEAR (SEMESTER–II) (w.e.f.2019-20)**

**EI-ES-108 Basic Electronics Engineering**

**Course Outcomes:**

It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of electronics and semiconductor applications that they would find useful in their disciplines.

At the end of this course students will demonstrate the ability to

* 1. Understand the principles of semiconductor Physics
	2. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

**PROGRAM EDUCATIONAL OBJECTIVES**

1. To prepare graduates for a successful technical and/or professional career.
2. To prepare graduates for higher education and research.
3. To prepare graduates to engage in resolving industrial and social issues.

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| CO/PO Mapping(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak |
| **Cos** | **Programme Outcomes (POs)** |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** |  |  | **S** |  |  |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |

**Course Assessment methods:**

|  |  |
| --- | --- |
| **Direct**  | **Indirect** Course end survey |
| Internal test I  |  |
| Internal test II |  |
| Internal test III |  |
| Assignment |  |
| Tutorial |  |
| Seminar |  |
| End Semester Exam |  |

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** |  | **Allotment of marks** |
| **L** | **T** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |  |  |
| EI-ES-108 | Basic Electronics Engineering | 3 | 2 | 1 | 40 | 60 | -- | 100 |  |  | 3 Hrs |

**Note:** The Examiner(s) will set the question paper in three sections, Section-A, Section-B, and Section-C. Section-A is compulsory. Section-A comprises 4-short answer type questions uniformly spread among the entire syllabus. Section-B comprises 4-questions among the 4-modules, asking for conceptual questions, definitions, derivations, principles, construction and working etc. Section-C comprises 4-questions uniformly spread among the 4-modules, asking for the derivations, numericals and applications of the various topics covered therein. The student has to **answer/ attempt 4-questions out of 4-questions in Section-A, 2-questions out of 4-questions in Section-B and** **2-questions out of 4-questions in Section-C. Section-A carry12 marks. Section-B and Section-C carry 24 marks each.**

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| --- | --- |
| **Course code** | EI-ES-108 |
| Category | Engineering Science Course |
| **Course title** |  |
| **Scheme and Credits** | **L** | **T** | **P** | **Credits** | Semester-II |
| **2** | **1** | **2** | **3** |
| **Pre-requisites** |  |

**EI-ES-108 Basic Electronics Engineering -** Detailed contents

### MODULE-I

Semiconductors p-type, n-type, pn junction diodes, pn junction as a circuit element, its characteristics, half wave and full wave and bridge type rectifier circuits basic filter circuits, Doide as voltage multiplier, clipper & clamper circuit. Zener diode as a voltage regulator. LED its characteristics construction & applications

### MODULE -II

Characteristics of transistors in different configuration. Concept of d.c. and a.c. load line and operating point selection. Various amplifiers configurations their h-parameter equivalent circuits determination of voltage gain current gain input resistance and output resistance & power gain. Concept of feedback in amplifiers, different oscillators circuits (without analysis)

### MODULE -III

Differential amplifier and its transfer characteristics. IC Op-Amps, its ideal & practical specifications and measurement of parameters. Op-Amp in different modes as inverting amplifier non inverting amplifier scale changer, differentiator & integrator.

**MODULE -IV**

Characteristics of JFET, MOSFET, Various amplifier configurations using FET. Characteristics and Construction of SCR, TRIAC, UJT. Their basic areas applications.

Reference :

1. Electronic Devices & Circuits - Boylstad & Nashelsky.

1. Integrated Electronics By Millman & Halkias.
2. Electronic Principles – Malvino
3. Principles of Electronics – V.K. Mehta, Shalu Melta.
4. Electronic Circuits – Donald L. Shilling & Charles Belowl

EI-EVS-112 Environmental Studies

# **L T P major test: 60 marks**

 **Minor test + curricular activities: 30 + 10 Marks**

**3 Total: 100 marks**

 **Duration of exam : 3 Hrs.**

**Sessional of 15 marks for Field report evaluation (internal assessment)**

Unit 1 : The Multidisciplinary nature of environmental studies

Definition, scope and importance.

Need for public awareness.

**Unit 2 : Natural Resources**

 **Renewable and non-renewable resources :**

 Natural resources and associated problems.

1. Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
2. Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
3. Mineral resources : Use and exploitation, environmental effects of extracting and mineral resources, case studies.
4. Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
5. Energy resources : Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
6. Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
	* Role of an individual in conservation of natural resources.
	* Equitable use of resources for sustainable lifestyles.

**Unit 3 : Ecosystems**

* Concept of an ecosystem.
* Structure and function of an ecosystem.
* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following ecosystem :
1. Forest ecosystem
2. Grassland ecosystem
3. Desert ecosystem
4. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**Unit : 4 Biodiversity and its conservation**

* + Introduction – Definition : genetic, species and ecosystem diversity.
	+ Biogeographical classification of India.
	+ Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
	+ Biodiversity at global, National and local levels.
	+ India as a mega-diversity nation.
	+ Hot-spots of biodiversity.
	+ Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
	+ Endangered and endemic species of India.
	+ Conservation of biodiversity : in-situ and ex-situ conservation of biodiversity.

**Unit 5 : Environmental Pollution** Definition

* Causes, effects and control measures of :
1. Air pollution
2. Water pollution
3. Soil pollution
4. Marine pollution
5. Noise pollution
6. Thermal pollution
7. Nuclear hazards
	* Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
	* Role of an individual in prevention of pollution.
	* Pollution case studies.
	* Disaster management : floods, earthquake, cyclone and landslides

**Unit 6 : Social Issues and the Environment**

* From Unsustainable to Sustainable development
* Urban problems related to energy
* Water conservation, rain water harvesting, watershed management
* Resettlement and rehabilitation of people; its problems and concerns. Case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of Pollution) Act.
* Water (Prevention and Control of Pollution) Act
* Wildlife Protection Act
* Forest Conservation Act
* Issues involved in enforcement of environmental legislation
* Public awareness.

**Unit 7 : Human Population and the Environment**

* Population growth, variation among nations
* Population explosion – Family Welfare Programme
* Environment and human health.
* Human Rights.
* Value Education.
* HIV/AIDS
* Women and Child Welfare.
* Role of Information Technology in Environment and human health.
* Case Studies.

**Drugs and their effects; Useful and harmful drugs; Use and abuse of drugs; stimulant and depressant drugs. Concept of drug de-addiction. Legal position on drugs and laws related to drugs.**

**Unit 8 : Field Work**

* Visit to a local area to document environmental assets-river / forest / grassland / hill / mountain.
* Visit to a local polluted site – Urban / Rural / Industrial / Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems – pond, river, hill slopes, etc.

Examination Pattern : The question paper should carry 60 marks

The structure of the question paper being.

PART – A : Short Answer Pattern 20 Marks

PART – B : Essay type with inbuilt choice 40 Marks

PART – C : Field Work 15 Marks

###### INSTRUCTIONS FOR THE EXAMINERS

Part – A Question 1 is compulsory and will contain ten short-answer type question of 2 marks each covering the entire syllabus.

Part – B Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidates will be required to answer, any four of them. Each essay type question will be of the 10 marks.

 The examination will be conducted by the college concerned at its own level earlier than the annual examination and each student will be required to score minimum of 35% marks each in theory and Practical. The marks obtained in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these will be shown in the detailed marks certificate of the student.

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| **Chemistry Lab** | **EI-PR-02** |

Laboratory Outcomes

* The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
* Estimate rate constants of reactions from concentration of reactants/products as a function of time
* Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
* Synthesize a small drug molecule and analyse a salt sample

**B.Tech. 1ST YEAR (SEMESTER–II) (w.e.f.2018-19)**

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-02 | Chemistry Lab | 1.5 |  |  | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |

**Chemistry Laboratory[ L : 0; T:0 ; P : 3 (1.5 credits)]**

Choice of 10-12 experiments from the following:

* + Determination of surface tension and viscosity
	+ Thin layer chromatography
	+ Ion exchange column for removal of hardness of water
	+ Determination of chloride content of water
	+ Colligative properties using freezing point depression
	+ Determination of the rate constant of a reaction
	+ Determination of cell constant and conductance of solutions
	+ Potentiometry - determination of redox potentials and emfs
	+ Synthesis of a polymer/drug
	+ Saponification/acid value of an oil
	+ Chemical analysis of a salt
	+ Lattice structures and packing of spheres
	+ Models of potential energy surfaces
	+ Chemical oscillations- Iodine clock reaction
	+ Determination of the partition coefficient of a substance between two immiscible liquids
	+ Adsorption of acetic acid by charcoal
	+ Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

**LIST OF EXPERIMENTS**

1. Determination of Ca++ and Mg++ hardness of water using EDTA solution.
2. Determination of alkalinity of water sample.
3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting & eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by Red Wood viscometer (No. 1 & No. 2).
6. To determine flash point & fire point of an oil by Pensky -Marten's flash point apparatus.
7. To prepare Phenol-formaldehyde and Urea formaldehyde resin.
8. To find out saponification No. of an oil.
9. Estimation of calcium in lime stone and dolomite.
10. Determination of concentration of KMnO4 solution spectrophotometrically.
11. Determination of strength of HCl solution by titrating it against NaOH solution conductometerically.
12. To determine amount of sodium and potassium in a, given water sample by flame photometer.
13. Estimation of total iron in an iron alloy.

**SUGGESTED BOOKS :**

1. A Text Book on Experimental and Calculation – Engineering Chemistry, S.S. Dara, S. Chand & Company (Ltd.)
2. Essential of Experimental Engineering Chemistry, Shashi Chawla, Dhanpat Rai Publishing Company.
3. Theory & Practice Applied Chemistry – O.P. Virmani, A.K. Narula (New Age)

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| **Computer Programming Lab** | **EI-PR-04** |

Laboratory Outcomes

* + To formulate the algorithms for simple problems
	+ To translate given algorithms to a working and correct program
	+ To be able to correct syntax errors as reported by the compilers
	+ To be able to identify and correct logical errors encountered at run time
	+ To be able to write iterative as well as recursive programs
	+ To be able to represent data in arrays, strings and structures and manipulate them through a program
	+ To be able to declare pointers of different types and use them in defining self- referential structures.
	+ To be able to create, read and write to and from simple text files.

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-04 | Computer programming Lab | 1.5 | - | - | 3 | 3 | 30 | -- | 45 | 75 | 3 Hrs |

1. **Laboratory - Programming for Problem Solving[ L : 0; T:0 ; P : 4 (2credits)]**

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

**Tutorial 1:** Problem solving using computers:

**Lab1:** Familiarization with programming environment

**Tutorial 2:** Variable types and type conversions:

**Lab 2:** Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions:

**Lab 3**: Problems involving if-then-else structures

**Tutorial 4:** Loops, while and for loops:

**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5:** 1D Arrays: searching, sorting:

**Lab 5:** 1D Array manipulation

**Tutorial 6:** 2D arrays and Strings

**Lab 6:** Matrix problems, String operations

**Tutorial 7:** Functions, call by value:

**Lab 7:** Simple functions

**Tutorial 8 &9:** Numerical methods (Root finding, numerical differentiation, numerical integration):

**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10:** Recursion, structure of recursive calls

**Lab 10:** Recursive functions

**Tutorial 11:** Pointers, structures and dynamic memory allocation

**Lab 11:** Pointers and structures

**Tutorial 12:** File handling:

**Lab 12:** File operations

**B.Tech. 1ST YEAR (SEMESTER–II) (w.e.f.2018-19)**

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| **Course No.** | **Course title** | **Credits** | **Teaching Schedule** | **Allotment of marks** | **Duration of Exams** |
| **L** | **T** | **P** | **Total** | **Minor test + Curricular activities** | **Major test** | **Practical** | **Total** |
| EI-PR-06 | Basic Electronic lab  | 1 | - | - | 2 | 2 | 20 | -- | 30 | 50 | 3 Hrs |

Course Outcomes

After successful completion of this course, the students should be able toDesign biasing circuits using BJT and FET.

* Apply this knowledge to the analysis and design of basic amplifiers.
* Design and analyze the response of differential and power amplifiers.
* Identify faults in Electronic circuits.
* Design and implement single stage power amplifier

LIST OF EXPERIMENTS : Experiments beyond the syllabus should be conducted.

1. To study the half wave & full wave rectifier.
2. To study the effect of various filters circuits.
3. To study the characteristics of pnp & npn transistor in common emitter & determine H- parameter from characteristics
4. To study the characteristics of pnp & npn transistor in CB & determine h-parameter from characteristics
5. To determine the Av, Ai of RC coupled CE transistor amplifier
6. Determine the frequency of oscillation in Hartley oscillator
7. Determine the frequency of oscillation in phase shift oscillator
8. Determine the effect of negative feedback on bandwidth & gain in CE, RC coupled amplifier
9. Study IC Op-Amp as a inverting amplifier & scale changer
10. Study IC Op-Amp as a non inverting amplifier
11. Study IC Op-Amp as an integrator
12. Study IC Op-Amp as a differentiator
13. Design of BJT Amplifier using Voltage divider bias.
14. Design of FET Amplifier using Voltage divider bias.
15. Design of transistorized series and shunt regulator
16. Design of HEARING AID with PUSH PULL OUTPUT

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| **Course code** | EI-PR- 08 |
| Category | Engineering Science Courses |
| **Course title** | **Workshop/Manufacturing Practices (Theory & Lab.)** |
| **Scheme and Credits** | **L** | **T** | **P** | Credits | Semester-II |
| **1** | **0** | **2** | **1** |
| **Pre-requisites (if any)** | **-** |

##### Workshop/Manufacturing Practices[ [L : 1; T:0; P : 0 (1 credit)]

Lectures & videos: (10 hours) Detailed contents

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 lectures)**
2. CNC machining, Additive manufacturing **(1 lecture)**
3. Fitting operations & power tools **(1 lecture)**
4. Electrical &Electronics **(1 lecture)**
5. Carpentry **(1 lecture)**
6. Plastic molding, glass cutting **(1 lecture)**
7. Metal casting **(1 lecture)**
8. Welding (arc welding & gas welding), brazing **(1 lecture)**

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| Workshop Practice Lab. | EI-PR-08 |

List of experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools ( lathe, shape or planer or slotter, milling, drilling machines )
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable fo r butt welding and lap welding.
7. To perform pipe welding.
8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
9. To prepare simple engineering components/ shapes by forging.
10. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
11. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.
12. To prepare a job involving side and face milling on a milling machine.

Suggested Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “ Elements of Workshop Technology” , Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, “ Manufacturing Engineering and Technology” , 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
4. Roy A. Lindberg, “ Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
5. Rao P.N., “ Manufacturing Technology” , Vol. I and Vol. II, Tata McGrawHill House, 2017.

Course Outcomes

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

**(ii) Workshop Practice:(60 hours)[ L : 0; T:0 ; P : 4 (2 credits)]**

1. Machine shop **(10 hours)**
2. Fitting shop **(8 hours)**
3. Carpentry **(6 hours)**
4. Electrical & Electronics**(8 hours)**
5. Welding shop **( 8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting **(8 hours)**
7. Smithy **(6 hours)**
8. Plastic molding& Glass Cutting (6 hours)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes

* Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
* They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
* By assembling different components, they will be able to produce small devices of their interest.