

**R23 (B.Tech ECE)**

**Curriculum & Syllabus for B.Tech under  
JIS Autonomy**

**Electronics and Communication Engineering  
(Effective From 2023-24 Admission Batch)**

**R23 (All B. Tech.)****Curriculum & Syllabus for B. Tech Under Autonomy****Incorporation of NEP 2020****First Year Curriculum Structure (Effective from 2023-24 admission batch)****Group A: CSE, CSE (AIML), CST, DS, FT, AGR, BME****Group B: ECE, EE, IT, ECS, CE, ME**

| 1st Year 1st Semester      |                |                            |            |  |                    |   |   |       |               |
|----------------------------|----------------|----------------------------|------------|--|--------------------|---|---|-------|---------------|
| Sl. No.                    | Broad Category | Category                   | Paper Code | Subject  | Contact Hours/Week |   |   |       | Credit Points |
|                            |                |                            |            |  | L                  | T | P | Total |               |
| <b>A. THEORY</b>           |                |                            |            |  |                    |   |   |       |               |
| 1                          | ENGG           | Major                      | EC101      | Basic Electrical and Electronics Engineering     | 3                  | 0 | 0 | 3     | 3             |
| 2                          | ENGG           | Minor                      | CS(EC)101  | Programming for Problem Solving                  | 3                  | 0 | 0 | 3     | 3             |
| 3                          | SCI            | Multidisciplinary          | PH(EC)101  | Engineering Physics                              | 3                  | 0 | 0 | 3     | 3             |
| 4                          | SCI            | Multidisciplinary          | M(EC)101   | Engineering Mathematics- I                       | 3                  | 0 | 0 | 3     | 3             |
| 5                          | HUM            | Value Added Course         | HU104      | Environmental Science                            | 2                  | 0 | 0 | 2     | 2             |
| 6                          | HUM            | Value Added Courses        | HU105      | Indian Knowledge System                          | 1                  | 0 | 0 | 1     | 1             |
| <b>B. PRACTICAL</b>        |                |                            |            |  |                    |   |   |       |               |
| 1                          | ENGG           | Major                      | EC191      | Basic Electrical and Electronics Engineering Lab | 0                  | 0 | 3 | 3     | 1.5           |
| 2                          | SCI            | Skill Enhancement Course   | PH(EC)191  | Engineering Physics Lab                          | 0                  | 0 | 3 | 3     | 1.5           |
| 3                          | ENGG           | Skill Enhancement Course   | CS(EC)191  | Programming for Problem Solving Lab              | 0                  | 0 | 3 | 3     | 1.5           |
| 4                          | ENGG           | Skill Enhancement Course   | ME(EC)191  | Engineering Graphics & Design Lab                | 0                  | 0 | 3 | 3     | 1.5           |
| 5                          | HUM            | Ability Enhancement Course | HU(EC)191  | Soft Skill and Aptitude                          | 0                  | 0 | 2 | 2     | 1             |
| Total of Theory, Practical |                |                            |            |  |                    |   |   | 29    | 22            |

| 1st Year 2nd Semester             |                |                            |            |  |                    |   |   |           |               |
|-----------------------------------|----------------|----------------------------|------------|--|--------------------|---|---|-----------|---------------|
| Sl. No.                           | Broad Category | Category                   | Paper Code | Subject                                | Contact Hours/Week |   |   |           | Credit Points |
|                                   |                |                            |            |  | L                  | T | P | Total     |               |
| <b>A.THEORY</b>                   |                |                            |            |  |                    |   |   |           |               |
| 1                                 | ENGG           | Major                      | EC201      | Circuit Theory & Network               | 3                  | 0 | 0 | 3         | 3             |
| 2                                 | SCI            | Multidisciplinary          | CH(EC)201  | Engineering Chemistry                  | 2                  | 0 | 0 | 2         | 2             |
| 3                                 | SCI            | Multidisciplinary          | M(EC)201   | Engineering Mathematics –II            | 3                  | 0 | 0 | 3         | 3             |
| 4                                 | HUM            | Ability Enhancement Course | HU201      | Professional Communication             | 2                  | 0 | 0 | 2         | 2             |
| 5                                 | ENGG           | Value Added Course         | HU202      | Values and Ethics                      | 2                  | 0 | 0 | 2         | 2             |
| 6                                 | ENGG           | Value Added Course         | HU203      | Constitution of India                  | 1                  | 0 | 0 | 1         | 1             |
| <b>B. PRACTICAL</b>               |                |                            |            |  |                    |   |   |           |               |
| 1                                 | SCI            | Skill Enhancement Course   | CH(EC)291  | Engineering Chemistry Lab              | 0                  | 0 | 2 | 2         | 1             |
| 2                                 | ENGG           | Skill Enhancement Course   | ME(EC)291  | Workshop & Manufacturing Practices Lab | 0                  | 0 | 3 | 3         | 1.5           |
| 3                                 | ENGG           | Major                      | EC291      | Circuit Theory & Network Lab           | 0                  | 0 | 3 | 3         | 1.5           |
| 4                                 | HUM            | Ability Enhancement Course | HU291      | Professional Communication Lab         | 0                  | 0 | 2 | 2         | 1             |
| <b>Total of Theory, Practical</b> |                |                            |            |  |                    |   |   | <b>23</b> | <b>18</b>     |

| 2 <sup>nd</sup> Year 3 <sup>rd</sup> Semester |                |                            |            |   |                    |   |   |       |               |
|---|----------------|----------------------------|------------|---|--------------------|---|---|-------|---------------|
| Sl. No.                                       | Broad Category | Category                   | Paper Code | Subject   | Contact Hours/Week |   |   |       | Credit Points |
|   |                |                            |            |   | L                  | T | P | Total |               |
| <b>A. THEORY</b>                              |                |                            |            |   |                    |   |   |       |               |
| 1   | ENGG           | Major                      | EC301      | Digital Electronics                               | 3                  | 0 | 0 | 3     | 3             |
| 2   | ENGG           | Major                      | EC302      | Solid State Devices                               | 3                  | 0 | 0 | 3     | 3             |
| 3   | ENGG           | Major                      | EC303      | Signals & Systems                                 | 3                  | 0 | 0 | 3     | 3             |
| 4   | ENGG           | Minor                      | CS(EC)301  | Data Structure                                    | 3                  | 0 | 0 | 3     | 3             |
| 5   | SCI            | Minor                      | M(EC)301   | Numerical Methods                                 | 2                  | 0 | 0 | 2     | 2             |
| <b>B.PRACTICAL</b>                            |                |                            |            |   |                    |   |   |       |               |
| 1   | ENGG           | Major                      | EC391      | Digital Electronics Lab                           | 0                  | 0 | 3 | 3     | 1.5           |
| 2   | ENGG           | Minor                      | CS(EC)391  | Data Structure Lab                                | 0                  | 0 | 3 | 3     | 1.5           |
| 3   | HUM            | Ability Enhancement Course | HU(EC)391  | Technical Seminar Presentation & Group Discussion | 0                  | 0 | 2 | 2     | 1             |
| <b>Total of Theory, Practical</b>             |                |                            |            |   |                    |   |   | 22    | 16            |

| 2nd Year 4th Semester      |                |          |            |                                    |                    |   |   |       |               |
|----------------------------|----------------|----------|------------|------------------------------------|--------------------|---|---|-------|---------------|
| Sl. No.                    | Broad Category | Category | Paper Code | Subject                            | Contact Hours/Week |   |   |       | Credit Points |
|                            |                |          |            |                                    | L                  | T | P | Total |               |
| <b>A.THEORY</b>            |                |          |            |                                    |                    |   |   |       |               |
| 1                          | ENGG           | Major    | EC401      | EM Theory & Antenna                | 3                  | 0 | 0 | 3     | 3             |
| 2                          | ENGG           | Major    | EC402      | Analog Circuits                    | 3                  | 0 | 0 | 3     | 3             |
| 3                          | ENGG           | Major    | EC403      | Analog & Digital Communication     | 3                  | 1 | 0 | 4     | 4             |
| 4                          | ENGG           | Minor    | IT(EC)401  | Database Management System         | 3                  | 0 | 0 | 3     | 3             |
| 5                          | ENGG           | Minor    | M(EC)401   | Probability and Statistics         | 3                  | 0 | 0 | 3     | 3             |
| <b>B.PRACTICAL</b>         |                |          |            |                                    |                    |   |   |       |               |
| 1                          | ENGG           | Major    | EC491      | EM Theory & Antenna Lab            | 0                  | 0 | 3 | 3     | 1.5           |
| 2                          | ENGG           | Major    | EC492      | Analog Circuits Lab                | 0                  | 0 | 3 | 3     | 1.5           |
| 3                          | ENGG           | Major    | EC493      | Analog & Digital Communication Lab | 0                  | 0 | 3 | 3     | 1.5           |
| 4                          | ENGG           | Minor    | IT(EC)491  | Database Management System Lab     | 0                  | 0 | 3 | 3     | 1.5           |
| Total of Theory, Practical |                |          |            |                                    |                    |   |   | 28    | 24            |

| 3 <sup>rd</sup> Year 5 <sup>th</sup> Semester |                |                            |            |  |                    |   |   |       |               |
|---|----------------|----------------------------|------------|--|--------------------|---|---|-------|---------------|
| Sl. No.                                       | Broad Category | Category                   | Paper Code | Subject                                    | Contact Hours/Week |   |   |       | Credit Points |
|   |                |                            |            |  | L                  | T | P | Total |               |
| <b>A.THEORY</b>                               |                |                            |            |  |                    |   |   |       |               |
| 1   | ENGG           | Major                      | EC501      | Digital Signal Processing                  | 3                  | 0 | 0 | 3     | 3             |
| 2   | ENGG           | Major                      | EC502      | Microprocessor & Microcontroller           | 3                  | 0 | 0 | 3     | 3             |
| 3   | ENGG           | Major                      | EC503      | Computer Network                           | 3                  | 0 | 0 | 3     | 3             |
| 4   | ENGG           | Major                      | EC504A     | Mobile Communication & Network             | 3                  | 0 | 0 | 3     | 3             |
|   |                |                            | EC504B     | Embedded Systems                           |                    |   |   |       |               |
|   |                |                            | EC504C     | RF & Microwave Engineering                 |                    |   |   |       |               |
| 5   | ENGG           | Minor                      | CS(EC)501A | Object Oriented Programming using JAVA     | 3                  | 0 | 0 | 3     | 3             |
|   |                |                            | CS(EC)501B | Introduction to Quantum Computing          |                    |   |   |       |               |
|   |                |                            | CS(EC)501C | Cloud Computing                            |                    |   |   |       |               |
| 6   | HUM            | Ability Enhancement Course | HU(EC)501  | Business Communication                     | 1                  | 0 | 0 | 1     | 1             |
| <b>B.PRACTICAL</b>                            |                |                            |            |  |                    |   |   |       |               |
| 1   | ENGG           | Major                      | EC591      | Digital Signal Processing Lab              | 0                  | 0 | 3 | 3     | 1.5           |
| 2   | ENGG           | Major                      | EC592      | Microprocessor & Microcontroller Lab       | 0                  | 0 | 3 | 3     | 1.5           |
| 3   | ENGG           | Major                      | EC594A     | Mobile Communication & Network Lab         | 0                  | 0 | 3 | 3     | 1.5           |
|   |                |                            | EC594B     | Embedded Systems Lab                       |                    |   |   |       |               |
|   |                |                            | EC594C     | RF & Microwave Engineering Lab             |                    |   |   |       |               |
| 4   | ENGG           | Minor                      | CS(EC)591A | Object Oriented Programming using JAVA Lab | 0                  | 0 | 3 | 3     | 1.5           |
|   |                |                            | CS(EC)591B | Introduction to Quantum Computing Lab      |                    |   |   |       |               |
|   |                |                            | CS(EC)591C | Cloud Computing Lab                        |                    |   |   |       |               |
| 5   | ENGG           | Skill Enhancement Course   | IT(EC)591  | IT Workshop Lab (SciLab/MATLAB/C++)        | 0                  | 0 | 2 | 2     | 1             |
| Total of Theory, Practical                    |                |                            |            |  |                    |   |   | 30    | 23            |

| 3 <sup>rd</sup> Year 6 <sup>th</sup> Semester |                |            |            |                                    |                    |   |   |       |               |
|---|----------------|------------|------------|------------------------------------|--------------------|---|---|-------|---------------|
| Sl. No.                                       | Broad Category | Category   | Paper Code | Subject                            | Contact Hours/Week |   |   |       | Credit Points |
|   |                |            |            |                                    | L                  | T | P | Total |               |
| <b>A.THEORY</b>                               |                |            |            |                                    |                    |   |   |       |               |
| 1   | ENGG           | Major      | EC601      | VLSI Design                        | 3                  | 0 | 0 | 3     | 3             |
| 2   | ENGG           | Major      | EC602      | Control System                     | 3                  | 0 | 0 | 3     | 3             |
| 3   | ENGG           | Major      | EC603A     | IoT for Communication              | 3                  | 0 | 0 | 3     | 3             |
|   |                |            | EC603B     | Digital Image Processing           |                    |   |   |       |               |
|   |                |            | EC603C     | Soft Computing                     |                    |   |   |       |               |
| 4   | ENGG           | Minor      | CS(EC)601A | Artificial Intelligence            | 3                  | 0 | 0 | 3     | 3             |
|   |                |            | CS(EC)601B | Web Intelligence & Big Data        |                    |   |   |       |               |
|   |                |            | CS(EC)601C | Software Engineering               |                    |   |   |       |               |
| <b>B.PRACTICAL</b>                            |                |            |            |                                    |                    |   |   |       |               |
| 1   | ENGG           | Major      | EC691      | VLSI Design Lab                    | 0                  | 0 | 3 | 3     | 1.5           |
| 2   | ENGG           | Major      | EC692      | Control System Lab                 | 0                  | 0 | 3 | 3     | 1.5           |
| 3   | ENGG           | Major      | EC693A     | IoT for Communication Lab          | 0                  | 0 | 3 | 3     | 1.5           |
|   |                |            | EC693B     | Digital Image Processing Lab       |                    |   |   |       |               |
|   |                |            | EC693C     | Soft Computing Lab                 |                    |   |   |       |               |
| 4   | ENGG           | Minor      | CS(EC)691A | Introduction to AI Lab             | 3                  | 0 | 0 | 3     | 1.5           |
|   |                |            | CS(EC)691B | Web Intelligence & Big Data Lab    |                    |   |   |       |               |
|   |                |            | CS(EC)691C | Software Engineering Lab           |                    |   |   |       |               |
| 5   | ENGG           | Internship | EC681      | Industrial Training (Min. 2 Weeks) | 0                  | 0 | 0 | 0     | 1             |
| Total of Theory, Practical                    |                |            |            |                                    |                    |   |   | 24    | 19            |

| 4 <sup>th</sup> Year 7 <sup>th</sup> Semester |                |                          |                |                               |                    |   |   |       |               |
|---|----------------|--------------------------|----------------|-------------------------------|--------------------|---|---|-------|---------------|
| Sl. No.                                       | Broad Category | Category                 | Paper Code     | Subject                       | Contact Hours/Week |   |   |       | Credit Points |
|   |                |                          |                |                               | L                  | T | P | Total |               |
| <b>A.THEORY</b>                               |                |                          |                |                               |                    |   |   |       |               |
| 1   | ENGG           | Major                    | EC701          | Satellite Communication       | 3                  | 0 | 0 | 3     | 3             |
| 2   | ENGG           | Major                    | EC702A         | Information Theory & Coding   | 3                  | 0 | 0 | 3     | 3             |
|   |                |                          | EC702B         | Fiber Optic Communication     |                    |   |   |       |               |
|   |                |                          | EC702C         | Remote Sensing & GIS          |                    |   |   |       |               |
| 3   | ENGG           | Major                    | EC703A         | Computer Architecture         | 3                  | 0 | 0 | 3     | 3             |
|   |                |                          | EC703B         | Machine Learning              |                    |   |   |       |               |
|   |                |                          | EC703C         | IC Technology                 |                    |   |   |       |               |
| 4   | ENGG           | Minor                    | CS(EC)701<br>A | Data Analytics                | 3                  | 0 | 0 | 3     | 3             |
|   |                |                          | CS(EC)701<br>B | Deep Learning                 |                    |   |   |       |               |
|   |                |                          | CS(EC)701<br>C | Cyber Security & Cryptography |                    |   |   |       |               |
| 5   | HUM            | Skill Enhancement Course | HU(EC)701      | Economics for Engineers       | 2                  | 0 | 0 | 2     | 2             |
| <b>B.PRACTICAL</b>                            |                |                          |                |                               |                    |   |   |       |               |
| 1   | ENGG           | Major                    | EC791          | Satellite Communication Lab   | 0                  | 0 | 2 | 2     | 1             |
| 2   | ENGG           | Internship               | EC781          | Internship (Min. 1 Month)     | 0                  | 0 | 0 | 0     | 1             |
| 3   | PRJ            | Project                  | EC782          | Project-I                     | 0                  | 0 | 0 | 6     | 6             |
| Total of Theory, Practical                    |                |                          |                |                               |                    |   |   | 22    | 22            |

| 4 <sup>th</sup> Year 8 <sup>th</sup> Semester |                |                            |            |                                     |                    |   |   |       |               |
|---|----------------|----------------------------|------------|-------------------------------------|--------------------|---|---|-------|---------------|
| Sl. No.                                       | Broad Category | Category                   | Paper Code | Subject                             | Contact Hours/Week |   |   |       | Credit Points |
|   |                |                            |            |                                     | L                  | T | P | Total |               |
| <b>A.THEORY</b>                               |                |                            |            |                                     |                    |   |   |       |               |
| 1   | ENGG           | Major                      | EC801 A    | Ad-Hoc and Wireless Sensor Networks | 3                  | 0 | 0 | 3     | 3             |
|   |                |                            | EC801B     | Introduction to EDA                 |                    |   |   |       |               |
|   |                |                            | EC801C     | Speech and Audio Signal Processing  |                    |   |   |       |               |
| 2   | ENGG           | Major                      | EC802A     | Adaptive Signal Processing          | 3                  | 0 | 0 | 3     | 3             |
|   |                |                            | EC802B     | Electronic System Design            |                    |   |   |       |               |
|   |                |                            | EC802C     | Industrial Automation & Robotics    |                    |   |   |       |               |
| 3   | ENGG           | Minor                      | CS(EC)801A | Data Mining and Data Warehouse      | 3                  | 0 | 0 | 3     | 3             |
|   |                |                            | BM(EC)801B | Biomedical Electronics              |                    |   |   |       |               |
|   |                |                            | CS(EC)801C | Block Chain                         |                    |   |   |       |               |
| 4   | HUM            | Ability Enhancement Course | HU(EC)801  | Principles of Management            | 2                  | 0 | 0 | 2     | 2             |
| <b>B.PRACTICAL</b>                            |                |                            |            |                                     |                    |   |   |       |               |
| 1   | ENGG           | Internship                 | EC881      | Grand Viva                          | 0                  | 0 | 0 | 0     | 1             |
| 2   | PRJ            | Project                    | EC882      | Project-II                          | 0                  | 0 | 0 | 12    | 6             |
| Total of Theory, Practical                    |                |                            |            |                                     |                    |   |   | 23    | 18            |

**Total Credit = 162**

**Course Name: BASICS ELECTRICAL AND ELECTRONICS ENGINEERING**

**Course Code: EC101**

**Contact: 3:0:0**

**Total Contact Hours: 36**

**Credit: 3**

**Pre-requisite:** Basic 12<sup>th</sup> standard Physics and Mathematics, Concept of components of electric circuit.

**Course objective:** The objective of this course is to understand the laws of electrical engineering and to apply it in simple electronics circuit analysis.

**Course outcomes:**

The Graduates of the ECE program will be able to:

CO1: Apply fundamental concepts and circuit laws to solve simple DC electric circuits

CO2: Solve simple ac circuits in steady state

CO3: Impart the knowledge of Basic Electronics Devices

CO4: Analyze the simple electronics circuits

**MODULE 1: Elementary Concepts of Electric Circuits**

6L

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

**MODULE 2: Electrical machine**

6L

Transformer: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.

DC Machines: Brief idea on constructional features, classifications, working principle of both motor and generator. Simple problems on Voltage equation.

**MODULE 3: Fundamentals of Semiconductor Devices:**

6L

Introduction to Semiconductor: Concept of energy band diagram; Comparison among metal, insulator, semiconductor; Semiconductors-classifications and Fermi energy level; Charge neutrality and Mass-Action law in semiconductor; Current flow in semiconductor due to drift & diffusion process; Einstein relation.

**MODULE 4: PN Junction Diode and its applications:**

8L

Principle of operation; V-I characteristics; principle of avalanche & Zener breakdown; V-I characteristics of Zener diode.

Working principle of half wave and full wave rectifier; Rectifiers-Average output current

and voltage, ripple factor, power conversion efficiency; LC filters; working principle of Zener voltage regulator; Block diagram description of DC power supply; Clipper and Clamper circuit.

**MODULE 5:** Bipolar Junction Transistors: 4L

PNP and NPN structures; Principle of operation; Current gains in CE, CB and CC mode; input and output characteristics; Biasing & Stability Analysis-Concept of Fixed Bias, Collector to base Bias & voltage divider bias.

**MODULE 6:** Field Effect Transistors: 6L

JFET and MOSFET- P Channel & N Channel structures; Principle of operation; CS, CD and CG configurations; Transfer Characteristics and Drain characteristics; FET parameters.

Textbooks:

1. A Textbook of Electrical Technology - Volume I (Basic Electrical Engineering) & Volume II (Ac & DC Machines)-B. L Theraja & A.K. Teraja, S. Chad,23rd Edition, 1959
2. D. Chattopadhyay, P.C Rakshit, “Electronics Fundamentals and Applications”, New Age International (P) Limited Publishers, Seventh Edition,2006
3. Basic Electrical & Electronics Engineering by J.B. Gupta , S.K. Kataria& Sons,2013

Reference Books:

1. DC Kulshreshtha,“Basic Electrical Engineering”,TataMcGrawHill,2010.
2. Hughes,“Electrical and ElectronicTechnology”,Pearson Education”, 12<sup>th</sup> edition, 2016
3. Parker and Smith,“Problems in Electrical Engineering”,CBS Publishers and Distributors, 9<sup>th</sup> edition ,2018.

### CO-PO Mapping:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO 7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-------|-------|-------|
| CO1 | 3   | 3   | 2   | 1   | 1   | -   | -    | 2   | 1   | 1     | 2     | 2     |
| CO2 | 3   | 3   | 2   | 1   | 2   | -   | -    | 2   | 1   | -     | 2     | 2     |
| CO3 | 3   | 2   | 2   | 1   | -   | -   | -    | 2   | 3   | 2     | 1     | 2     |
| CO4 | 2   | 3   | 2   | 1   | 4   | -   | -    | 2   | 1   | -     | 2     | 1     |

**Course Name: PROGRAMMING FOR PROBLEM SOLVING**

**Course Code: CS(EC)101**

**Contact: 3:0:0**

**Total Contact Hours: 36**

**Credits: 3**

**Pre-requisite:** None

**Course objective:** The objective of this course is to:

1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.

2. Choose a suitable C-construct to develop C code for a given problem.
3. Apply the C-language syntax rules to correct the bugs in the C program.
4. Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.

**Course Outcome:**

The Graduates of the ECE program will be able to:

CO1: Identify the working principle of input and output devices of Computers memorize the basic terminology used in computer programming.

CO2: Express programs in C language and use different data types for writing the programs.

CO3: Implement programs using the dynamic behaviour of memory by the use of pointers.

CO4: Explain the difference between call by value and call by address.

CO5: Write programs using basic data files and developing applications for real world problems.

**CO-PO Mapping:**

| CO  | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO1 | 3    | 3    | 3    | 2    | 2    | -    |      |      |      |       | 2     | 3     |
| CO2 | 2    | 2    | 3    | 3    | 3    | -    |      |      |      |       |       | 3     |
| CO3 | 2    | 3    | 2    | 2    | 2    | -    |      |      |      |       |       | 3     |
| CO4 | 3    | 2    | 2    | 3    | 3    | -    |      |      |      |       |       | 2     |
| CO5 | 2    | 2    | 2    | 1    | 1    | -    |      |      |      |       | 2     | 3     |

**Course Content:**

**Module-1:** Fundamentals of Computer [9L]

History of Computer, Generation of Computer, Classification of Computers, Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices.

Number System: basic of Binary, Octal, Decimal and Hexadecimal number systems; Representation and interchanging of number in different number systems. Introduction to complements system, Representation of signed and unsigned numbers in signed magnitude signed 1's complement system and signed 2's complement system.

Arithmetic–Addition and Subtraction (using 1's complement and 2's complement). Representation of Characters-ASCII Code, Basics of Compiler, Interpreter and Assembler

Problem solving–Basic concept of Algorithm. Representation of algorithm using flowchart and pseudocode, Some basic examples.

**Module-2:** Introduction to C Programming [5L]

Overview of Procedural vs Structural language; History of C Programming Language.  
Variable and Data Types: The C characters identifiers and keywords, data type & sizes, variable names, declaration, statements.

Operators & Expressions: Arithmetic operators, relational operators, Logical operators, increment and decrement operators, bitwise operators, Assignment operators, conditional operators, special operators-type conversion, C expressions, precedence and associativity.

Input and Output: Standard input and output, formatted output–printf, formatted input scanf.

### **Module-3: Branch and Loop [5L]**

Branching: Concept of Statement and Blocks in C, Simple if, if -else, nested if-else and if-else ladder. Switch Case: breakandcontinue;switch-case,conceptofgotoandlabels

Loops- while, for, dowhile

### **Module-4: Program Structures [4L]**

Function: Basics of Functions, function types, function prototypes, formal and actual parameter, function calling, functions returning values, functions not returning values. Recursion and Recursive Function.

Storage Class in C: Storage Class-auto, external, static and register storage class, scope rules and lifetime of variables.

C pre-processor: Pre-processing directive and macro, parameterized macro.

### **Module-5: Array and Pointer [7L]**

Arrays: One dimensional arrays, Two-dimensional arrays

Passing an array to a function Pointers: Pointers, Pointer and Array, Pointer and functions.

Strings: Character array and string, array of strings, Passing a string to a function, String related functions, Pointer and String.

Dynamic memory allocation: Malloc, calloc, realloc and free with example.

### **Module-6: Structures, Unions and Enum [3L]**

Basic of structures, arrays of structures, structures and pointers, bitfields. Basics of union and enum, difference between structure and union.

### **Module-7: File in C [3L]**

Files handling-opening and closing a file in different mode, formatted and unformatted files, Command line arguments, fopen, fclose, fgetc, fputc, fprintf, fscanf function.

Textbook:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Kanetkar Y.-LetusC, BPBPublication,15<sup>th</sup>Edition

Reference Books:

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



## **Course Content:**

### **Module 1 (12L)**

#### Modern Optics

1.01- Laser: Concepts of various emission and absorption processes, Einstein A and B coefficients and

equations, working principle of laser, metastable state, population inversion, condition necessary for active laser action, optical resonator, illustrations of Ruby laser, He-Ne laser, Semiconductor laser, applications of laser, related numerical problems. 6L

1.02-Fibre optics-Principle and propagation of light in optical fibers (Step index, Graded index, single and multiple modes) - Numerical aperture and Acceptance angle, Basic concept of losses in optical fiber, related numerical problems. 3L

1.03-Holography-Theory of holography, viewing of holography, applications 3L

### **Module 2 (6L)**

#### Solid State Physics

2.01 Crystal Structure: Structure of solids, amorphous and crystalline solids (definition and examples), lattice, basis, unit cell, Fundamental types of lattices –Bravais lattice, simple cubic, fcc and bcc lattices, Miller indices and miller planes, co-ordination number and atomic packing factor, Bragg's equation, applications, numerical problems. 3L

2.02 Semiconductor: Physics of semiconductors, electrons and holes, metal, insulator and semiconductor, intrinsic and extrinsic semiconductor, p-n junction. 3L

### **Module 3 (8L)**

#### Quantum Mechanics

3.01 Quantum Theory: Inadequacy of classical physics-concept of quantization of energy, particle concept of electromagnetic wave (example: photoelectric and Compton Effect; no derivation required, origin of modified and unmodified lines), wave particle duality; phase velocity and group velocity; de Broglie hypothesis; Davisson and Germer experiment, related numerical problems. 4L

3.02 Quantum Mechanics 1: Concept of wave function, physical significance of wave function, probability interpretation; normalization of wave functions-Qualitative discussion; uncertainty principle, relevant numerical problems, Introduction of Schrödinger wave equation (only statement). 4L

### **Module 4 (4L)**

#### Physics of Nanomaterials

Reduction of dimensionality, properties of nanomaterials, Quantum wells (two dimensional), Quantum wires (one dimensional), Quantum dots (zero dimensional); Quantum size effect and Quantum confinement. Carbon allotropes. Application of nanomaterials (CNT, graphene, electronic, environment, medical).

## **Module 5 (6L)**

### Statistical Mechanics

Concept of energy levels and energy states, phasespace, microstates, macrostates and thermodynamic probability, MB, BE, FD, statistics (Qualitative discussions)-physical significance, conception of bosons, fermions, classical limits of quantum statistics, Fermi distribution at zero & non-zero temperature, Concept of Fermi level, relevant problems, Position of Fermi level for a semiconductor (intrinsic & extrinsic) - Qualitative discussion.

### **Recommended Text Books for Engineering Physics:**

#### Modern Optics:

1. A text book of Light- K.G. Mazumder&B.Ghoshs (Book & Allied Publisher)
2. A text book of Light-Brijlal & Subhramanium, ( S. Chand publishers)
3. Modern Optics-A. B. Gupta ( Book& Allied Publisher)
4. Optics-Ajay Ghatak (TMH)
5. Optics-Hecht
6. Optics-R. Kar, Books Applied Publishers
7. Physical Optics Möler
8. Concepts of Modern Physics-Arthur Beiser, McGraw Hill

#### Solid State Physics:

1. Solid state physics-Puri&Babbar( S. Chand publishers)
2. Materials Science & Engineering-KakaniKakani
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics and Electronics-A. B. Gupta and Nurul Islam (Book & Allied Publisher)
6. Problem in Solid state physics -S.O. Pillai (a. b.)

#### Quantum Mechanics:

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde and Singh (S. Chand Publishers)
3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
4. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
5. Quantum Mechanics-Bransden (Pearson Education Ltd.)
6. Perspective of Modern Physics-A. Beiser (TMH)

**Course Name: Engineering Mathematics - I**

**Paper Code: M(EC)101**

**Contact: 3:0:0**

**Total Contact Hours: 36**

**Credit: 3**

#### **Prerequisites:**

The students to whom this course will be offered must have the concept of (10+2) standard matrix algebra, and calculus.

#### **Course Objectives:**

The objective of this course is to familiarize the prospective engineers with techniques in matrix algebra and calculus. 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.

**Course Outcomes:**

The Graduates of the ECE program will be able to:

CO1: Recall the properties related to matrix algebra and calculus.

CO2: Determine the solutions of the problems related to matrix algebra and calculus.

CO3: Apply the appropriate mathematical tools of matrix algebra and calculus for the solutions of the problems.

CO4: Analyze different engineering problems linked with matrix algebra and calculus.

**CO-PO Mapping:**

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1      | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | -   | 2   |
| CO2      | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | -   | 1   |
| CO3      | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | 1   |
| CO4      | 2   | 3   | 1   | 2   | -   | -   | -   | -   | -   | -   | -   | 1   |

**Course Content:**

**Module I:** Liner Algebra (11L)

Echelon form and normal (canonical) form of a matrix; Inverse and rank of a matrix; Consistency and inconsistency of system of linear equations, Solution of system of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrix, Cayley-Hamilton theorem.

**Module II:** Single Variable Calculus (5L)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Concept of sequence and series, Power series; Taylor's series.

**Module III:** Multivariable Calculus (Differentiation) (13L)

Function of several variables; Concept of limit, continuity and differentiability; Partial derivatives, Total derivative and its application; chain rules, Derivatives of implicit functions Euler's theorem on homogeneous function; Jacobian; Maxima and minima of functions of two variables.

**Module IV:** Multivariable Calculus (Integration) (7L)

Double Integral, Triple Integral; Change of order in multiple integrals; Line Integral, Surface Integral, Volume Integral. Change of variables in multiple integrals.

**Text Books:**

1. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
2. Kreyszig, E., Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.

**Reference Books:**

1. Guruprasad, S. A text book of Engineering Mathematics-I, New age International Publishers.
2. Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
3. Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. Apostol, M., Calculus, Volumes 1 and 2 (2<sup>nd</sup> Edition), Wiley Eastern, 1980.
6. Kumaresan, S., Linear Algebra - A Geometric approach, Prentice Hall of India, 2000.

**Course Name: ENVIRONMENTAL SCIENCE****Course Code: HU104****Contact hours: 2:0:0****Total contact hours: 24****Credit: 2****Prerequisites:** None**Course Objective:**

- Realize the importance of environment and its resources.
- Apply the fundamental knowledge of science and engineering to assess environmental and health risk.
- Know about environmental laws and regulations to develop guidelines and procedures for health and safety issues.
- Solve scientific problem-solving related to air, water, land and noise pollution.

**Course Outcomes:**

Graduates of ECE program will be able to:

CO1: Understand the natural environment and its relationships with human activities.

CO2: Apply the fundamental knowledge of science and engineering to assess environmental and health risk.

CO3: Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.

CO4: Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

### CO-PO Mapping:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | 2   | -   | -   | -   | 3   | 3   | -   | -   | -    | -    | -    |
| CO2 | 1   | 2   | -   | -   | -   | 3   | 3   | -   | -   | -    | -    | 1    |
| CO3 | 2   | 2   | 3   | 1   | -   | 3   | 3   | -   | -   | -    | -    | -    |
| CO4 | 3   | 1   | 3   | 1   | 3   | 3   | 3   | -   | -   | -    | -    | -    |

#### Module 1 - Resources and Ecosystem (6L)

1. Resources (2L)
2. Types of resources, resistance to resources, Human resource, Population Growth models: Exponential Growth, logistic growth
3. Ecosystem (3L)
4. Components of ecosystem, types of ecosystem, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Food chain, Food web.
5. Energy and Environment(1L)
6. Conventional energy sources, coal and petroleum, Green energy sources, solar energy, tidal energy, geothermal energy, biomass

#### Module 2 – Environmental Degradation (9L)

- a) Air Pollution and its impact on Environment (3L)  
Air Pollutants, primary & secondary pollutants, Criteria pollutants, Smog, Photochemical smog and London smog, Greenhouse effect, Global Warming, Acid rain, Ozone Layer Depletion.
- b) Water Pollution and its impact on Environment (3L)  
Water Pollutants, Oxygen demanding wastes, heavy metals, BOD, COD, Eutrophication, Hardness, Alkalinity, TDS and Chloride, Heavy metal poisoning and toxicity.
- c) Land Pollution and its impact on Environment (2L)  
Solid wastes, types of Solid Waste, Municipal Solid wastes, hazardous wastes, bio-medical wastes, E-wastes
- d) Noise Pollution and its impact on Environment (1L)  
Types of noise, Noise frequency, Noise pressure, Noise intensity, Noise Threshold limit, Effect of noise pollution on human health.

#### Module 3 – Environmental Management (6L)

- a) Environmental Impact Assessment (1L)  
Objectives of Environmental management, Components of Environmental Management, Environmental Auditing, Environmental laws and Protection Acts of India
- b) Pollution Control and Treatment (2L)  
Air Pollution controlling devices, Catalytic Converter, Electrostatic Precipitator, etc., Waste Water Treatment, Noise pollution control.

c) Waste Management (3L)

Solid waste management, Open dumping, Land filling, incineration, composting, E-waste management, Biomedical Waste management.

**Module 4 – Disaster Management (3L)**

a) Study of some important disasters (2L)

Natural and Man-made disasters, earthquakes, floods drought, landside, cyclones, volcanic eruptions, tsunami, Global climate change. Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

b) Disaster management Techniques (1L)

Basic principles of disasters management, Disaster Management cycle, Disaster management policy, Awareness generation program

**Text Books:**

1. A Textbook of Environmental Studies, Shashi Chawla. Tata McGraw Hill Education Private Limited, 2<sup>nd</sup> edition, 2017

**References Books:**

1. Environmental Studies, Dr. J P Sharma, University Science Press, 3<sup>rd</sup> edition, 2009
2. Environmental Engineering, J K Das Mohapatra, Vikas Publication, 2<sup>nd</sup> edition, 2018

**Paper Name: Indian knowledge System**

**Paper Code: HU 105**

**Contact: 1:0:0**

**No. of lectures: 12**

**Credit: 1**

**Prerequisite: Nil**

**Course outcomes:**

CO1: To recall & state thought process of social setting in ancient India to identify the roots and details of some contemporary issues faced by Indians

CO 2: The students are able to identify & inspect the importance of our surroundings & culture to design & formulate sustainable developmental solutions

CO 3: To develop the ability to understanding the issues related to ‘Indian’ culture, tradition and its composite character to apply the same in the socio-technological developments in present scenario

CO 4: The students are able to relate & assess Indian Knowledge System in the health care, architecture, agriculture & other systems .

**Module-1**

3L

An overview of Indian Knowledge System (IKS): Importance of Ancient Knowledge - Definition of IKS - Classification framework of IKS - Unique aspects of IKS.  
The Vedic corpus: Vedas and Vedangas - Distinctive features of Vedic life.  
Indian philosophical systems: Different schools of philosophy.

**Module-2**

3L

Salient features of the Indian numeral system: Importance of decimal representation - The discovery of zero and its importance - Unique approaches to represent numbers.

Highlights of Indian Astronomy: Historical development of astronomy in India

**Module-3**

3L

Indian science and technology heritage : Metals and metalworking - Mining and ore extraction –Physical structures in India - Irrigation and water management - Dyes and painting technology - Surgical Techniques - Shipbuilding

**Module-4**

3L

Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, Traditional Knowledge in agriculture, Traditional societies depend on it for their food and healthcare needs.

**Text Book:**

- 1) Introduction to Indian knowledge system: concepts and applications-[Mahadevan B.Bhat](#), [Vinayak Rajat](#), [Nagendra Pavana R.N.](#), PHI

**Reference Books:**

1. Traditional Knowledge system in India, Amit Jha, Atlantic Publishers
2. S. N. Sen and K. S. Shukla, History of Astronomy in India, Indian National Science Academy, 2nd edition, New Delhi, 2000

**CO and PO mapping:**

| PO \ CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1     | -   | -   | 2   | 3   | -   | 3   | -   | 2   | 3   | 1   | -   | 2   |
| CO2     | -   | -   | 2   | -   | -   | 3   | 3   | 2   | 3   | 3   | -   |     |
| CO3     | -   | -   | 2   | -   | -   | 3   | 3   | 1   | 3   | 1   | -   | 2   |
| CO4     |     |     | 2   |     |     | 3   | 3   | 2   | 3   |     |     |     |

**Paper Name: BASICS ELECTRICAL AND ELECTRONICS ENGINEERING  
LABORATORY****Paper Code:EC191****Credit:1.5****Total Lecture: 36****Course Outcomes:**

The Graduates of the ECE program will be able to:

CO1: Analyze a given network by applying KVL and KCL.

CO2: Examine the Operation of DC Motor.

CO3: Examine the Operation of Basic Electronics Devices

CO4: Design simple electronics circuits.

**List of Experiments: -**

1. Familiarization with different passive and active electrical & electronic components.
2. Familiarization with different Electrical & Electronics Instruments.
3. Verification of KVL and KCL.
4. Forward and reversal of DC shunt motor.
5. Speed control of DC shunt motor.
6. Study of the P-N junction diode V-I characteristics (Forward & Reverse
7. Bias).
8. Study of the Characteristics of Zener diode (Forward & Reverse
9. Bias).
10. Study of half wave and full wave rectifier.
11. Study of clipper and clamper circuit.

12. Study of the Input and Output characteristics of BJT in CE mode.
13. Study of transfer and drain characteristics of JFET.
14. Extramural Experiment.

**Textbooks:**

1. Handbook of Laboratory Experiments in Electronics Engineering Vol. 1, Author Name: A.M. Zungeru, J.M. Chuma, H.U. Ezea, and M. Mangwala, Publisher -Notion Press Electronic Devices and Circuit Theory by Robert Boylestad Louis Nashelsky,7th Edition, Prentice Hall
2. Experiments Manual for use with Grob's Basic Electronics 12th Edition by Wes Ponick, Publisher-McGraw Hill,2015
3. Laboratory Manual for 'Fundamentals of Electrical & Electronics Engineering': A handbook for Electrical & Electronics Engineering Students by ManojPatil (Author), Jyoti Kharade (Author), 2020

**Reference Books**

1. Basic Electrical and Electronics Engineering, Author:S. K. Bhattacharya, Publisher: Pearson Education India,2011
2. Practical Electrical Engineering
3. Electronics Lab Manual (Volume 2) By Navas, K. A. Publisher: PHI Learning Pvt. Ltd. 2018

CO-PO Course Articulation Matrix Mapping:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO 7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-------|-------|-------|
| CO1 | 3   | 2   | 3   | 2   | -   | 2   | -    | -   | 2   | -     | 2     | 3     |
| CO2 | 3   | 3   | 2   | 3   | -   | 2   | -    | -   | 3   | -     | 2     | 2     |
| CO3 | 3   | 2   | 2   | 3   | -   | 2   | -    | -   | 2   | -     | 3     | 3     |
| CO4 | 3   | 3   | 2   | 2   | -   | 2   | -    | -   | 3   | -     | 2     | 3     |

**Course Name: Engineering Physics Lab**

**Code: PH(ECE)191**

**Contact Hours: 0:0:3**

**Credit: 1.5**

**Prerequisites:** Knowledge of Physics up to 12th standard.

**Course Objectives:**

The aim of course is to provide adequate exposure and develop insight about the basic principles of physical sciences and its practical aspects which would help engineers to learn underlying principles of various tools and techniques they use in core engineering and related industrial applications. The course would also inculcate innovative mindsets of the students and can create awareness of the vital role played by science and engineering in the development of new technologies.

**Course Outcomes:**

The Graduates of the ECE program will be able to:

CO1 : demonstrate experiments allied to their theoretical concepts

CO2 : conduct experiments using LASER, Optical fiber.

CO3 : participate as an individual, and as a member or leader in groups in laboratory sessions actively

CO4 : analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiment.

CO5: Design solutions for real life challenges.

### CO-PO Mapping:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | 3   | 2   | 3   | 3   | --  | --  | --  | --  | --   | --   | --   |
| CO2 | 2   | 3   | 2   | 3   | 3   | --  | --  | --  | --  | --   | --   | --   |
| CO3 | 2   | 3   | 2   | 3   | 3   | --  | --  | --  | --  | --   | --   | --   |
| CO4 | 2   | 2   | 3   | 2   | 3   | --  | --  | --  | --  | --   | --   | --   |
| CO5 | 2   | 2   | 3   | 2   | 3   | --  | --  | --  | --  | --   | --   | --   |

### Course Content:

General idea about Measurements and Errors (One Mandatory):

i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.

Experiments on Classical Physics (Any 4 to be performed from the following experiments ):

1. Study of Torsional oscillation of Torsional pendulum & determination of time using various load of the oscillator.

2. Determination of Young's moduli of different materials.

3. Determination of Rigidity moduli of different materials.

4. Determination of wavelength of light by Newton's ring method.

5. Determination of wavelength of light by Laser diffraction method.

6. Optical Fibre-numerical aperture, power loss.

Experiments on Quantum Physics (Any 2 to be performed from the following experiments):

7. Determination of Planck's constant using photoelectric cell.

8. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.

9. Determination of Stefan's Constant.

10. Study of characteristics of solar cell.

Perform at least one of the following experiments:

11. Determination of Q factor using LCR Circuit.

12. Study of I-V characteristics of a LED/LDR

**\*\*In addition it is recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.**

**Innovative experiments:**

1. Study of dispersive power of material of a prism.
2. Study of viscosity using Poiseuille's capillary flow method/using Stoke's law.
3. Determination of thermal conductivity of a bad/good conductor using Lees-Charlton / Searle apparatus.
4. Determination of the angle of optical rotation of a polar solution using polarimeter.
5. Any other experiment related to the theory.

**Recommended Text Books for Engineering Physics Lab:**

**Waves & Oscillations:**

1. Vibration, Waves and Acoustics- Chattopadhyay and Rakshit Classical & Modern Optics:

2. A text book of Light- K.G. Mazumder&B.Ghosh (Book & Allied Publisher)  
Quantum Mechanics-I

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)  
Solid State Physics:

1. Solid State Physics and Electronics-A. B. Gupta and Nurul Islam (Book & Allied Publisher)

**Text Books:**

1. Practical Physics by Chatterjee &Rakshit (Book & Allied Publisher)
2. Practical Physics by K.G. Mazumder (New Central Publishing)
3. Practical Physics by R. K. Kar (Book & Allied Publisher)

**Course Name: PROGRAMMING FOR PROBLEM SOLVING LAB**

**Course Code: CS191**

**Contact Hours: 3L/Week**

**Total Contact Hours: 36**

**Credits: 1.5**

**Prerequisites:** None

**Course Outcomes:**

The Graduates of the ECE program will be able to:

CO1: Identify the working of different operating systems like DOS, Windows, Linux

CO2: Express programs in C language

CO3: Implement programs connecting decision structures, loops

CO4: Experiment with user defined functions to solve real time problems

CO5: Write C programs using Pointers to access arrays, strings, functions, structures and files

### CO-PO Mapping:

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | 3   | 2   | 2   | -   | -   | -   | -   | -    | 2    | 3    |
| CO2 | 2   | 2   | 3   | 3   | 3   | -   | -   | -   | -   | -    | -    | 3    |
| CO3 | 2   | 3   | 2   | 2   | 2   | -   | -   | -   | -   | -    | -    | 3    |
| CO4 | 3   | 2   | 2   | 3   | 3   | -   | -   | -   | -   | -    | -    | 2    |
| CO5 | 2   | 2   | 2   | 1   | 1   | -   | -   | -   | -   | -    | 2    | 3    |

### CourseContent:

**Module-1:** Familiarization with some basic commands of DOS and Linux. File handling and Directory structures, file permissions, creating and editing simple C program in different editor and IDE, compilation and execution of C program. Introduction to Codeblock.

**Module-2:** Problem based on

- Basic data types
- Different arithmetic operators.
- Printf() and scanf() functions.

**Module-3:** Problem based on conditional statements using

- if-else statements
- different relational operators
- different logical operators

**Module-4:** Problem based on

- for loop
- while loop
- do-while loop

**Module-5:** Problem based on

- How to write a menu driven program using switch-case statement
- How to write a function and passing values to a function
- How to write a recursive function.

**Module-6:** Problem based on

- How to use array (both 1-D and 2-D).
- How to pass an array to a function.

**Module-7:** Problem based on manipulation of strings in different way.

**Module-8:** Problem based on

- How to handle compound variables in C

- b) HowtohandlefileinC
- c) HowtousecommandlineargumentinC

**Textbook:**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. KanetkarY.-LetusC,BPBPBpublication,15<sup>th</sup>Edition

**Reference Books:**

1. BrianW.Kernighan and Dennis M.Ritchie, The C Programming Language, PrenticeHall of India, KRVenugopal&SRPrasad–MASTERINGC,TMH,2ndEdition

**COURSE NAME: ENGINEERING GRAPHICS & DESIGN LAB**

**COURSE CODE: ME(EC) 191**

**CONTACT: 0:0:3**

**CREDITS: 1.5**

**Prerequisites:** Basic knowledge of geometry

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

CO1: Learn the basics of drafting

CO2: Understand the use of drafting tools which develops the fundamental skills of industrial drawings.

CO3: Apply the concept of engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

CO4: Analyse the concept of projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

CO5: Evaluate the design model to different sections of industries as well as for research & development.

**Course Contents:**

Basic Engineering Graphics: 3P

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.

**Module 1:** Introduction to Engineering Drawing 6P

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

**Module 2:** Orthographic & Isometric Projections 6P

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes on inclined Planes - Auxiliary Planes; Projection of Solids inclined to both the Planes- Auxiliary Views; Isometric Scale, Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic

Views and Vice-versa.

**Module 3:** Sections and Sectional Views of Right Angular Solids 6P

Drawing sectional views of solids for Prism, Cylinder, Pyramid, Cone and project the true shape of the sectioned surface, Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw sectional orthographic views of objects from industry and dwellings (foundation to slab only).

Computer Graphics: 3P

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling.

**Module 4:** Overview of Computer Graphics 3P

Demonstration of CAD software [The Menu System, Toolbars (Standard, Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Zooming methods, Select and erase objects].

**Module 5:** CAD Drawing, Customization, Annotations, layering 6P

Set up of drawing page including scale settings, ISO and ANSI standards for dimensioning and tolerance; Using various methods to draw straight lines, circles, applying dimensions and annotations to drawings; Setting up and use of Layers, changing line lengths (extend/lengthen); Drawing sectional views of solids; Drawing annotation, CAD modeling of parts and assemblies with animation, Parametric and nonparametric solid, surface and wireframe modeling, Part editing and printing documents.

**Module 6:** Demonstration of a simple team design project 3P

Illustrating 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, use of solid-modeling software for creating associative models at the component and assembly levels.

**Text Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R, (2014), Engineering Drawing, Charotar Publishing House
2. K. Venugopal, Engineering Drawing + AutoCAD, New Age International publishers

**Reference Books:**

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
3. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

Narayana, K.L. & P Kanniah (2008), Text book on Engineering Drawing, Scitech Publ

**CO-PO Mapping:**

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO1 | 2    |      |      | 2    |      |      |      |      |      |       |       |       |
| CO2 | 2    |      |      | 2    |      |      |      |      |      |       |       |       |
| CO3 | 3    |      |      | 2    |      |      |      |      |      |       |       |       |
| CO4 | 3    |      |      | 3    |      |      |      |      |      |       |       |       |
| CO5 | 3    | 2    |      | 3    | 2    |      |      |      |      |       |       |       |

**Paper Name: Soft Skill and Aptitude Training**

**Paper Code: HU(EC)191**

**Contact: 0:0:2**

**Total Contact Hours: 12**

**Credit: 1**

**Prerequisites:** None

**Course Objective:** To train the students in acquiring workplace-specific interpersonal communication skills.

**Course Outcomes:**

The Graduates of the ECE program will be able to:

CO1: identify, define, apply workplace interpersonal communication modalities in an effective manner.

CO2: employ, infer, relate group behavioral and personal interview skills.

CO3: organize, differentiate, employ reading proficiency skills.

CO4: identify, classify, organize and relate question types and aptitude test patterns in placement tests.

**Course Content:**

**Module 1 – Introduction to Soft Skills**

1.The Skills of Interpersonal Communication. 2. Team Behavior. 3. Time Management Skills

**Module 2- Verbal Ability: Reading**

Enhancing reading speed and vocabulary enhancement through intensive practice of placement test-based reading passages.

**Module 3 – Verbal Ability Test Patterns**

Introducing Verbal Ability tests—Test Question Types: Synonyms and Antonyms, Error Spotting/Sentence Improvement, Analogies and Para Jumbles.

**Module 4 – Group Discussion and Personal Interview**

Basics of Group Discussion—Intensive practice on answering interview-based questions common in placement interviews.

**CO-PO Mapping:**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | -   | -   | 2   | 2   | 1   | 3   | 2   | 3    | -    | 3    |
| CO2 | 3   | 2   | 2   | -   | 2   | 1   | -   | 3   | 3   | 3    | -    | 3    |
| CO3 | 3   | -   | -   | -   | 2   | -   | -   | -   | -   | 3    | 2    | 3    |
| CO4 | 3   | 3   | 1   | 1   | 3   | -   | -   | -   | 3   | 3    | 3    | 3    |
| CO5 | 3   | 3   | -   | -   | 3   | 2   | -   | 2   | 3   | 3    | -    | 3    |

**Course Name: Circuit Theory & Network**

**Course Code: EC 201**

**Contact: 3:0:0**

**Total Contact Hours: 36**

**Credits: 3**

**Prerequisites:** Properties of series and parallel connections, concept of KCL, KVL, complex number, current- voltage phasor diagram, DC and AC, Charging and discharging of capacitor, Energizing and decaying of inductor.

**Course Objective:** Objective of this course is to Understand basic concepts of DC and AC circuit behavior. Develop and solve mathematical representations for simple RLC circuits. Understand the use of circuit analysis theorems and methods.

**Course Outcomes:** Graduates of the ECE program will be to:

CO1: Analyze series and parallel resonance circuit based on parameters: resonance frequency, band-width, upper & lower cut-off frequency, quality factor and impedance for the designing of single tuned circuit

CO2: Determine current, voltage and power at different branch for DC and AC circuit using networks theorems.

CO3: Solve branch current and branch voltage with the help of planner graph of a circuit using cut-set and tie set matrix.

CO4: Apply Laplace Transform technique for the determination of current, voltage and power in magnetically coupled and transient circuits.

CO5: Estimate parameters of two port network through open circuit & short circuit test for the development of the model of the circuit.

**CO-PO mapping:**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 2   | 2   | 2   | -   | -   | -   | -   | 2   | -    | -    | 2    |
| CO2 | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -   | -    | -    | 3    |
| CO3 | 3   | 3   | 3   | 2   | -   | -   | -   | -   | -   | -    | -    | 3    |
| CO4 | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -   | -    | -    | 3    |
| CO5 | 3   | 3   | 3   | 3   | -   | -   | -   | -   | 2   | -    | -    | 2    |

**Course Content:**

**Module I:** Methods of Analysis and Network Theorems.

[10L]

Node and Mesh analysis in DC and AC circuits with independent and dependent sources, super node & super mesh; Star-Delta transformation technique in DC & AC circuits; Solving problems using network theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem in DC & AC Circuits with independent and dependent sources; Sinusoidal steady state analysis, complex power.

**Module II:** Application of Laplace Transform in Circuit Analysis

[4L]

Laplace transform: Step function, GATE function, Impulse function, Delta function, Periodic functions - Rectangular & Triangular wave, strain of pulses; initial & final value theorem; Circuit analysis & solution of numerical problems in S-domain.

**Module III: Transient Analysis in RC, RL and RLC Circuit** [5L]

Transient analysis in RC, RL, RLC circuit with DC excitations – determination of circuit parameters at time ( $t=0$ ,  $t=0^+$ ,  $t=0^-$ ,  $t > 0$ ) with numerical examples; RC, RL, RLC circuit with sinusoidal excitation (concept only).

**Module IV: Resonance in RLC Circuit** [4L]

RLC series and parallel resonance circuit - condition of resonance, resonance frequency, impedance & admittance characteristics, quality factor, half power points, bandwidth, phasor diagrams, properties of series and parallel resonance; Solution of problems.

**Module V: Two Port Network** [5L]

Two port network analysis – Z, Y, h and ABCD parameters; conditions of reciprocity and symmetry in terms of two port parameters; equivalent circuit in terms of Z, Y and h parameters; Interrelation between different two port parameters (concept only); Solutions of circuit problems using two port parameters.

**Module VI: Magnetically Coupled Circuit** [4L]

Self & Mutual inductance; Polarity of induced voltage in magnetically coupled circuit; Determination of equivalent inductance in series and parallel magnetically coupled network; Numerical examples for the determination current, voltage and power of a magnetically coupled network.

**Module VII: Graph of a Network** [4L]

Development of graph of a network -planner and non-planner graph, branch, tree, twigs; Incidence Matrix, Cut Set Matrix, Tie Set Matrix for a graph of circuit; Application of graph to solve problems in circuit.

**Textbooks:**

1. A.Chakrabarti - Circuit Theory: Analysis and Synthesis , Dhanpat Rai & Co. 7<sup>th</sup> edition 2018
2. Valkenburg M. E. Van, “Network Analysis”, Prentice Hall. /Pearson Education , 3<sup>rd</sup> edition 2019
3. D. Roy Chowdhury -Networks and Systems, New Age International, 4<sup>th</sup> edition 2017
4. Reference Books:
5. B.L. Thereja and A.K. Thereja - A Textbook of Electrical Technology: Basic Electrical Engineering in S. Units (Volume - 1), S-Chand , 2<sup>nd</sup> edition 2005
6. Sudhakar: Circuits & Networks: Analysis & Synthesis” 2/e TMH, 5<sup>th</sup> edition 2017  
D.A.Bell- Electrical Circuits- Oxford, 7<sup>th</sup> edition 2009

**Course Name: ENGINEERING CHEMISTRY**

**Course Code: CH (ECS) 201**

**Total Contact Hours: 24**

**Credit: 2**

**Prerequisites:** 10+2 knowledge of Chemistry

### **COURSE OBJECTIVE**

- To understand the basic principles of elements, organic reactions, drug synthesis and computational chemistry
- To apply the knowledge of different engineering materials, advanced polymers, and nanomaterials to solve complex engineering problems
- To analyse and evaluate quality parameters of water and its treatment
- Apply the knowledge of free energy, energy storage device, semiconductors and corrosion to design environment friendly & sustainable devices
- Apply the knowledge of different instrumental techniques to analyse unknown engineering materials.

### **COURSE OUTCOME**

CO1. Able to understand the basic principles of elements, organic reactions drug synthesis and computational chemistry

CO2. Able to apply the knowledge of different engineering materials, advanced polymers, and nanomaterials to solve complex engineering problems

CO3. Able to analyse and evaluate water quality parameters and its treatment

CO4. Able to the knowledge of free energy, energy storage device and corrosion to design environment friendly & sustainable devices

CO5. Able to apply the knowledge of different instrumental techniques to analyse unknown engineering materials

### **CO-PO MAPPING**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | 2   | 2   | 2   | -   | -   | -   | -   | -    | 2    | 2    |
| CO2 | 3   | 3   | 3   | 3   | -   | -   | 2   | -   | -   | -    | 2    | 2    |
| CO3 | 3   | 3   | -   | -   | -   | -   | 3   | -   | -   | -    | 3    | 2    |
| CO4 | 3   | 3   | 3   | 2   | -   | -   | 3   | -   | -   | -    | 3    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | -   | -    | 2    | 2    |

### **COURSE CONTENT:**

### **Module 1 - Elements and their properties (6L)**

#### 1. Elements and their properties (3L)

Bohr's theory for one electron system, Hydrogen spectrum, Quantum numbers, Atomic orbitals, Pauli's exclusion principle, Hund's rule, exchange energy, Aufbau principle, Electronic configuration and Magnetic properties.

#### 2. Periodic Table for Engineers (3L)

Modern Periodic table, Periodic properties, study of advanced functional materials like Silicones, Silicates, Zeolite and alloys like steel, mischmetall, Neodymium alloy and their applications

### **Module 2 - Energy devices and Semiconductors (6L)**

#### 1. Use of free energy in chemical equilibria (3L)

Laws of Thermodynamics, Enthalpy, Entropy, Spontaneity, Electrochemical Cell, Dry Cell, Mercury Cell, Lead Storage batteries, Ni-Cd Cells, Fuel Cells, Solar Cells, Nernst equation and applications, Electrochemical sensors

#### 2. Crystals and Semiconductors (3L)

Crystals and their defects, Stoichiometric and Non-stoichiometric defects, Band theory and Doping, n-type and p-type semiconductors, Superconductors

### **Module 3 – Industrial Applications of Chemistry (8L)**

#### 1. Advanced Polymeric materials (3L)

Classification, Engineering Plastics, conducting polymers, bio polymers, polymer composites

#### 2. Industrial corrosion (2L)

Classification, Effects of corrosion, Preventive measures

#### 3. Analysis of Water Quality (1L)

Water quality parameters and treatment

#### 4. Nano materials (1L)

Synthesis of Nano materials, Applications in modern devices

#### 5. Basic Computational Chemistry (1L)

Introduction of computational chemistry and their applications

### **Module 4 – Organic Reaction Products and their spectroscopic analysis (4L)**

#### 1. Organic Reactions (2L)

Substitution, Elimination and Addition reactions

#### 2. Drug designing and synthesis (1L)

Paracetamol, Aspirin

#### 3. Spectroscopic Analysis (1L)

UV – Visible Spectra, IR spectra

### **Text Books**

1. Fundamentals of Engineering Chemistry, Dr. Sudip Bandopadhyay & Dr. Nirmal Hazra, latest edition, Chhaya Prakashani Pvt. Ltd.
2. Chemistry –I, Gourkrishna Das Mohapatro, 3rd Edition, Vikas Publications, 2016
3. A text book of Engineering Chemistry, 2nd Edition, Dr. Rajshree Khare, S.K. Kataria & Sons, 2022
4. Engineering Chemistry, N Acharjee & P. Dhar, Latest Edition, U. N. Dhar & Sons Pvt. Ltd., 2020
5. Physical Chemistry, P.C. Rakshit, 7th edition, Sarat Book House, 2018

### **Reference Books**

1. Engineering Chemistry, Jain & Jain, 16th Edition, Dhanpat rai Publishing Company, 2016
2. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.Krishna, 2019
3. Text book of Engineering Chemistry, Jaya Shree Anireddy, 1st Edition, Wiley, 2018

**Course Name: Engineering Mathematics - II**

**Paper Code: M(EC)201**

**Contact : 3 : 0 : 0**

**Total Contact Hours: 36**

**Credit: 3**

### **Prerequisites:**

The students to whom this course will be offered must have the concept of (10+2) standard calculus.

### **Course Objectives:**

The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations, Laplace transform and numerical methods. 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.

### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the properties related to ordinary differential equations, Laplace transform and numerical techniques.

CO2: Determine the solutions of the problems related to ordinary differential equations, Laplace transform and numerical techniques.

CO3: Apply appropriate mathematical tools of ordinary differential equations, Laplace transform and numerical techniques for the solutions of the problems.

CO4: Analyze engineering problems by using ordinary differential equation, Laplace transform and numerical Methods.

**CO-PO Mapping:**

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1      | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | -   | 2   |
| CO2      | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | -   | 1   |
| CO3      | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -   | -   | 1   |
| CO4      | 2   | 3   | 1   | 2   | -   | -   | -   | -   | -   | -   | -   | 1   |

**Course Content:****Module I: First Order Ordinary Differential Equations (ODE) (9L)**

Solution of first order and first degree ODE: Exact ODE, Rules for finding Integrating factors, Linear ODE, Bernoulli's equation.

Solution of first order and higher degree ODE: solvable for  $p$ , solvable for  $y$  and solvable for  $x$  and Clairaut's equation.

**Module II: Second Order Ordinary Differential Equations (ODE) (8L)**

Solution of second order ODE with constant coefficients: C.F. & P.I., Method of variation of parameters, Cauchy-Euler equations.

**Module III: Laplace Transform (LT)**

(12L)

Concept of improper integrals; Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property, LT of  $tf(t)$ , LT of  $\frac{f(t)}{t}$ , LT of derivatives of  $f(t)$ , LT of integral of  $f(t)$ , Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties, Convolution theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.

**Module IV: Numerical Methods (7L)**

Introduction to error analysis, Calculus of finite difference. Interpolation: Newton forward and backward interpolation, Lagrange's interpolation. Numerical integration: Trapezoidal rule, Simpson's 1/3 rule. Numerical solution of ordinary differential equation: Euler method, Fourth order Runge-Kutta method.

**Text Books:**

1. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
2. Kreyszig, E., Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.

**Reference Books:**

1. Guruprasad, S. A text book of Engineering Mathematics-I, New age International Publishers.

2. Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
3. Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. Apostol, M., Calculus, Volumes 1 and 2 (2<sup>nd</sup> Edition), Wiley Eastern, 1980.
6. Kumaresan, S., Linear Algebra - A Geometric approach, Prentice Hall of India, 2000.

**Course Name: Professional Communication**

**Paper Code: HU 201**

**Contact : 2:0:0**

**Total Contact Hours: 24**

**Credit: 2**

Pre-requisites: Basic(10+2)levelof knowledgeofEnglishgrammar,vocabularyreading andwriting skills.

Course Objectives: The course aims to impart domain and industry-specific communication skillsinaglobalizedcontextandto promote the understandingofbusiness communicationpracticesandcross cultural dynamics.

Course Outcomes:

CO1: Define, describe and classifythemodalitiesandnuancesofcommunicationin aworkplacecontext.

CO2: Review, appraise and understand the modes, contexts and appropriacy ofcommunicatingacrosscultures and societies.

CO3: Identify, interpret and demonstratethebasicformats,templatesof business and officialcommunication.

CO4: Identify, compare and illustrate reading strategies and basic writing strategies.

CO5: Interpret, analyze and evaluate semantic-structural,interpersonaland multicultural dynamics in businesscommunication.

CO-PO Mapping:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | -   | -   | -   | -   | 2   | 1   | 1   | 2   | 3    | -    | 2    |
| CO2 | -   | -   | -   | -   | -   | 1   | 1   | 2   | 2   | 3    | -    | 3    |
| CO3 | -   | -   | -   | -   | -   | 3   | 3   | 1   | 1   | 3    | 2    | 3    |
| CO4 | -   | -   | -   | -   | 1   | 3   | 3   | 1   | -   | 3    | -    | 3    |
| CO5 |     |     |     |     | 1   | 2   | 2   | 2   | 2   | 3    | -    | 3    |

**Module 1:** Verbal and Non verbal communication 4L

Definition, Relevance and Effective Usage Components of Verbal Communication: Written and Oral Communication Components of Non-verbal Communication: Kinesics, Proxemics, Chronemics, Haptics Paralanguage Barriers to Effective Communication

**Module 2:** Workplace Communication Essentials and Cross Cultural Communication 4L

Communication at the Workplace—Formal and Informal Situations  
Language in Use—Jargon, Speech Acts/Language Functions, Syntactical and Grammatical Appropriacy Cultural Contexts in Global Business: High Context and Low Context Cultures Understanding Cultural Nuances and Stereotyping Achieving Culturally Neutral Communication in Speech and Writing

**Module 3:** Reading Strategies and Basic Writing Skills 4L

Reading: Purposes and Nature of Reading  
Reading Sub-Skills—Skimming, Scanning, Intensive Reading  
Reading General and Business Texts(Reading for Comprehension and Detailed Understanding)  
Basic Writing Skills—Paragraph and Essay writing, writing technical document  
Writing Technicalities—Paragraphing, Sentence Structure and Punctuation

**Module 4:** 4L

Report Writing

Nature and Function of Reports  
Types of Reports  
Researching for a Business Report  
Format, Language and Style  
Report Documentation

**Module 5:** Employment Communication 8L

- a. Writing Business Letters—(Enquiry, Order, Sales, Complaint, Adjustment, Job Application, Offer)
- b. Creating an Employee Profile-- Preparing a CV or Résumé.  
Creating a Digital/Online Profile – LinkedIn (Résumé/Video Profile)
- c. Writing Other Interoffice Correspondence--E-mails: types, convention, and etiquette, Memo, Notices and Circulars
- d. Preparing Meeting Documentation—Drafting Notice and Agenda of Meetings, Preparing Minutes of Meetings.

**Text Books:-**

1. Meenakshi Raman and Sangeetha Sharma. Technical Communication. 3<sup>rd</sup> edition. New Delhi: Oxford University Press, 2015.
2. Mark Ibbotson. Cambridge English for Engineering. Cambridge: Cambridge University Press, 2008.
3. Mark Ibbotson. Professional English in Use: Engineering. Cambridge: Cambridge UP, 2009.

**Reference Books:**

1. Lesikar. Business Communication: Connecting in a Digital World. New Delhi: Tata McGraw-Hill, 2014.
2. John Seeley. Writing Reports. Oxford: Oxford University Press, 2002.
3. Diana Booher. E-writing: 21<sup>st</sup> Century Tools for Effective Communication. Macmillan, 2007.
4. Michael Swan. Practical English Usage. Oxford: OUP, 1980.

**Course Name: Value & Ethics****Course Code: HU 202****Contact: 2:0:0****Credit: 2****No. of lectures: 24****Prerequisite: Nil****Course outcome:**

CO1: Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.

CO2: understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories

CO3: understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field

CO4: Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer

CO5: Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

**Module 1:**

Value: Definition- Importance and application of Value in life- Formation of Value- Process of Socialization- self and integrated personality.

Types of values-Social, Psychological, Aesthetic, Spiritual, and Organizational-Value crisis in contemporary society: individual, societal cultural and management level. (4)

**Module-2 :**

Effects of Technological Growth- Rapid Technological growth and depletion of resources, Reports of the Club of Rome.

Problems of Technology transfer- Technology assessment impact analysis.

Human Operator in Engineering projects and industries- Problems of man, machine- interaction- Impact of assembly line and automation-Human centred Technology. (4)

**Module-3**

Impact of Ethics on Business Policies and Strategies – Utilitarianism – Principles of Utilitarianism - Criticism of Utilitarianism - Impact on Business Culture - Role of CEO in shaping Business Culture – Ethical Leadership – Characteristics (4)

**Module-4**

Types of Ethical issues - Internal Ethics of Business – Hiring Employees – Promotion - Wages – Job discrimination - its nature and extent- Exploitation of Employees – Discipline and Whistle Blowing (2)

**Module-5**

Markets and consumer Protection – Consumer rights – Unethical Practices in Marketing – Ethics of Competition and Fair Prices – Ethics in Advertising and False Claims - Environmental Protection and Ethics –Pollution Control – Ecological ethics (4)

**Module-6**

Social Responsibilities of Business – Definition and case study of Corporate Compliance; Responsibilities towards Customers, shareholders, employees – Social Audit – Objectives and Need for Social Audit – Methods of Social Audit – Benefits – Obstacles – Social Audit in India. (6)

**Text Books:**

- 1) A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996
- 2) . S. K. Chakraborty: Values and Ethics in Organization, OUP

**Reference Books:**

- 1) U.C.Mathur, Corporate Governance & Business Ethics, Macmillan, 2005
2. Fernando. A. C., Business Ethics – An Indian Perspective, Pearson Publication, 2009.
- 3) Prem Vir Kapoor, Professional Ethics & Human Values, Khanna Publishing House, New Delhi

## CO and PO Mapping

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1     | -   | -   | -   | -   | -   | 2   | -   | 3   |     | 1   | 2   | 1   |
| CO2     | -   | 2   | -   | -   | -   | 1   | -   | 2   | 3   | 3   | 3   | 2   |
| CO3     | -   | -   | -   | -   | -   | 3   | 3   | 2   | 3   | 1   | 3   | 2   |
| CO4     |     | 2   |     |     |     | 3   | 3   |     | 3   |     | 3   | 2   |
| CO5     |     |     |     |     |     | 3   |     |     |     |     | 2   |     |

**Course Name: Constitution of India**

**Course Code: HU 203**

**Contact: 1:0:0**

**Credit: 1**

**No. of lectures: 12**

**Prerequisite: Nil**

**Course Outcome:** On Completion of this course student will be able to

CO1: To Identify and explore the basic features and modalities of Indian constitution.

CO2: To Differentiate and relate the functioning of Indian parliamentary system at the centre and state level.

CO3: To Differentiate the various aspects of Indian Legal System and its related bodies.

**Module 1:** History of Making of the Indian Constitution: History. Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution: Preamble Salient Features

3L

**Module 2:** Fundamental Rights, Fundamental Duties, Directive Principles of State Policy:

6L

The Right to Equality

The Right to Freedom: I (Article 19)

The Right to Freedom: II (Articles 20, 21 and 22)

The Right against Exploitation  
 The Right to freedom of Religion  
 Cultural and Educational rights  
 The Right to Property  
 The Right to Constitutional Remedies

Fundamental Duties

**Module-3:** Organs of Governance:

3L

Parliament - Composition - Qualifications and Disqualifications -Powers and Functions – Executive- President -Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions

**Text Book:**

- 1) Indian Constitution by D.D.Basu, The Publisher, LexisNexis
- 2) PM Bhakshi, The constitution of India, Universal Law, 14e, 2017

**Reference Books:**

- 1) Constitution of India by Subhas C Kasyap, Vitasta Publishing
- 2) The Constitution of India, P.M Bakshi, Universal Law Publishing Co.Ltd, New Delhi, 2003.
- 3) Indian Constitution Text Book - Avasthi, Avasthi, Publisher: LAKSHMI NARAIN AGARWAL
- 4) Introduction to the Constitution of India, Brij Kishore Sharma, PHI

**CO-PO mapping:**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1     | -   | -   | -   | -   | -   | 2   | -   | 3   |     | 1   | -   |     |
| CO2     | -   | -   | -   | -   | -   | 1   | -   | 2   |     | 3   | -   |     |
| CO3     | -   | -   | -   | -   | -   | 3   | -   | 2   |     | 1   | -   |     |

**Course Name: ENGINEERING CHEMISTRY LAB**

**Paper Code: CH (ECS)291**

**Total Contact Hours: 24**

**Credit: 1**

**Prerequisites: 10+2**

**Course Objective**

- Study the basic principles of pH meter and conductivity meter for different applications
- Analysis of water for its various parameters & its significance in industries
- Learn to synthesis Polymeric materials and drugs
- Study the various reactions in homogeneous and heterogeneous medium

**Course Outcome**

CO1: operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CO2: analyse and determine the composition and physical property of liquid and solid samples when working as an individual and also as a team member

CO3: analyse different parameters of water considering environmental issues

CO4: synthesize drug and sustainable polymer materials.

CO5: design innovative experiments applying the fundamentals of modern chemistry.

CO-PO Mapping:

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 1   | 3   | 1   | -   | 2   | 3   | -   | -   | -    | -    | 1    |
| CO2 | 2   | 2   | 1   | 1   | -   | 1   | -   | -   | -   | 1    | -    | 1    |
| CO3 | -   | -   | -   | -   | -   | -   | -   | -   | 3   | 3    | 2    | 2    |
| CO4 | 2   | 1   | 2   | 2   | -   | -   | 1   | -   | -   | -    | -    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 1   | 1   | 1   | 1   | -   | -    | 2    | 2    |

**Course Content:**

1. Synthesis of Silver Nanoparticles doped organic thin film for organic transistors.
2. Preparation of Si-nano crystals for future memory devices.
3. Determination of the concentration of the electrolyte through conductance measurement.
4. Green Synthesis of ZnO based Polymer Nano composites.
5. Determination of the concentration of the electrolyte through pH measurement.
6. Determination of water quality measurement techniques.

7. Isolation of graphene from dead dry batteries and their use for temporary soldering.
8. Synthesis of polymers for electrical devices and PCBs.
9. Determination of Partition Coefficient of acetic acid between two immiscible liquids.
10. Computational optimization of molecular geometry
11. Drug design and synthesis
12. Rheological properties of the Newtonian fluids
13. Innovative Experiments

**Course Name: Workshop and Manufacturing Practices Lab**

**Course Code: ME(EC) 291**

**Contact: 0:0:3**

**Credits: 1.5**

**Prerequisite:** Physics & Mathematics(10+2Level)

Course Objective: The objective of this course is to impart knowledge and skill to use tools, machines, equipment, and measuring instruments.

Course Outcome:

CO1: Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

CO2: Understand the use of Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc.

CO3: Apply and performing operations like such as Marking, Cutting etc used in manufacturing processes.

CO4: Analyse the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.

CO5: Get hands on practice of in Welding and apply various machining processes which give alot of confidence to manufacture physical prototypes in project works.

**Course Content:**

3P

(i) Theoretical discussions:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Carpentry
4. Welding (arc welding & gas welding), brazing
5. Electrical & Electronics
6. Metal casting
7. CNC machining, Additive manufacturing, 3D Printing
8. Plastic moulding & Glass Cutting

(ii) Workshop Practice:

At least 6 modules should be covered

**Module 1 - Machine shop** 6P

Typical jobs that may be made in this practice module:

- i. To make a pin from a mild steel rod in a lathe.
- ii. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.

**Module 2 - Fitting shop** 6P

Typical jobs that may be made in this practice module: To make a Gauge from MS plate.

**Module 3 – Carpentry Shop** 6P

Typical jobs that may be made in this practice module: To make wooden joints and/or a pattern or like.

**Module 4 - Welding & Soldering shop** 6P

Typical jobs that may be made in this practice module:

- i. Arc Welding: To join two thick (approx 5mm) MS plates by manual metal arc welding.
- ii. Gas Welding: To join two thin mild steel plates or sheets by gas welding.
- iii. House wiring, soft Soldering

**Module 5 – Smithy & Casting** 6P

Typical jobs that may be made in this practice module:

- i. A simple job of making a square rod from a round bar or similar.
- ii. One/ two green sand moulds to prepare, and a casting be demonstrated.

**Module 6 – CNC Machining & Laser Cutting** 6P

Typical jobs that may be made in this practice module:

- i. At least one sample shape on mild steel plate should be made using CNC Milling / CNC Lathe Machine
- ii. At least one sample shape on glass should be made using laser cutting machine.

**Module 7 – 3D Printing** 6P

- i) Exposure to a 3D printing machine,
- ii) 3D printing of at least one sample model using available materials.

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

**Text 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. Rao P.N., –Manufacturing Technology, Vol. I and Vol. II, Tata McGrawHill House, 2017.

**Reference Books:**

1. Gowri P., Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2. Roy A. Lindberg, –Processes and Materials of Manufacture, 4th edition, Prentice Hall India, 1998.
3. Kalpakjian S. and Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
4. Manufacturing Science by A. Ghosh and A.K. Mallick, Wiley Eastern.
5. Principles of Metal Cutting/Principles of Machine Tools by G.C. Sen and A. Bhattacharya, New Central Book Agency, Kolkata.

**CO-PO Mapping:**

| CO Codes | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|----------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO1      | 3    | -    | -    | -    | -    |      | 2    |      | 2    | 2     |       |       |
| CO2      | 3    | -    | -    | -    | -    |      | 2    |      | 2    | 2     |       |       |
| CO3      | 3    | -    | -    | -    | -    |      | 2    |      | 2    | 2     |       |       |
| CO4      | 3    | -    | -    | -    | -    |      | 2    |      | 2    | 2     |       |       |
| CO5      | 3    | 2    | 2    |      |      |      | 2    |      | 2    | 2     |       |       |

**Course Name: Circuit Theory and Networks Lab****Course code: EC 291****Contact: 0-0-3****Credit: 1.5**

**Prerequisites:** Concept of series and parallel connections, concept of KCL, KVL, circuit with electrical components, DC, and AC source

**Course Objective:** The objective of this course is to understand current and electric circuits is critical to understanding how electricity works.

**Course Outcomes:** The Graduates of the ECE program will be able to:

CO1: Determine current, voltage and power in a DC and AC circuit with the help of network Theorems, Superposition theorem, Thevenin's & Norton's theorem, Maximum power transfer theorem, Compensation theorem and Millman's theorem.

CO2: Measure Z, Y, h & ABCD parameters of a two-port network following open circuit and short circuit test and conclude whether the network is symmetrical or reciprocal or both.

CO3: Construct RLC series & parallel resonance circuit and analyze its performance through the determination of resonance frequency, bandwidth, upper & lower cut-off frequency, quality factor and impedance at audio frequency range.

CO4: Estimate transient & steady state value of current & voltage in RC, RL & RLC circuit with DC excitations range up to 25 V from the transient response curve.

**CO-PO Mapping:**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | 3   | 2   | 3   | -   | -   | 2   | 3   | 3    | 2    | 3    |
| CO2 | 3   | 3   | 3   | 2   | 3   | -   | -   | 2   | 3   | 3    | 2    | 3    |
| CO3 | 3   | 3   | 3   | 2   | 3   | -   | -   | 2   | 3   | 3    | 2    | 3    |
| CO4 | 3   | 3   | 3   | 2   | 3   | -   | 1   | 2   | 3   | 3    | 2    | 3    |

List of Experiments:

1. Verification of Superposition theorem, Thevenin's Theorem, Norton's Theorem.
2. Study of maximum power transfer theorem
3. Study of reciprocity theorem.
4. Determination of Z & Y parameters of a two-port network.
5. Determination of h & ABCD parameters of two port networks.
6. Study of series RLC resonance circuit.
7. Study of Parallel RLC resonance circuit.
8. Transient response in RC circuit.
9. Transient response in RL circuit.
10. Transient response in RLC circuit.
11. Innovative experiment.

**Paper Name: Professional Communication Lab**

**Paper Code: HU191/291**

**Contact: (0:0:2)**

**Total Contact Hours: 26**

**Credit: 1**

**Pre requisites:** Basic knowledge of LSRW skills.

**Course Objectives:** To train the students in acquiring interpersonal communication skills by focussing on language skill acquisition techniques and error feedback.

**Course Outcome:**

By pursuing this course the students will be able to:

CO1: Recognize, identify and express advanced skills of Technical Communication in English through Language Laboratory.

CO2: Understand, categorize, differentiate and infer listening, speaking, reading and writing skills in societal and professional life.

CO3: Articulate and present the skills necessary to be a competent Interpersonal communicator.

CO4: Deconstruct, appraise and critique communication behaviours.

CO5: Adapt, negotiate and facilitate with multifarious socio-economical and professional arenas with effective communication and interpersonal skills.

## CO-PO Mapping

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | -   | 2   | -   | -   | 1   | 1   | -   | 2   | 3    | -    | 2    |
| CO2 | -   | -   | 2   | 2   | -   | 3   | 3   | -   | 2   | 3    | -    | 3    |
| CO3 | -   | -   | 2   | 2   | -   | 3   | 3   | 2   | 2   | 3    | -    | 3    |
| CO4 | -   | -   | -   | -   | -   | 3   | 3   | 2   | 2   | 3    | -    | 3    |
| CO5 | -   | -   | 2   | 2   | -   | 3   | 3   | 2   | 2   | 3    | -    | 3    |

### Course Contents:

#### Module 1: Introduction to the Language Lab

- a. The Need for a Language Laboratory
- b. Tasks in the Lab
- c. Writing a Laboratory Note Book

#### Module 2: Active Listening

- a. What is Active Listening?
- b. Listening Sub-Skills—Predicting, Clarifying, Inferencing, Evaluating, Note-taking
- c. Listening in Business Telephony

#### Module 3: Speaking

- a. Speaking—Accuracy and Fluency Parameters
- b. Pronunciation Guide—Basics of Sound Scripting, Stress and Intonation
- c. Fluency-focussed activities—JAM, Conversational Role Plays, Speaking using Picture/Audio Visual inputs
- d. Accuracy-focussed activities—Identifying Minimal Pairs, Sound Mazes, Open and Closed Pair Drilling, Student Recordings (using software)
- e. Group Discussion: Principles and Practice
- f. Giving a Presentation—Learning Presentation Basics and Giving Micro Presentations

#### Module 4: Lab Project Work

- a. Writing a Book Review
- b. Writing a Film Review
- c. Scripting a Short Presentation (2 minutes)
- d. Making a short video CV (1-2 minutes)

### Reference Books:

1. Sasikumar et al. A Course in Listening and Speaking. New Delhi: Foundation Books, 2005.
2. Tony Lynch, Study Listening. Cambridge: Cambridge UP, 2004.
3. Ann Baker, Ship or Sheep. Cambridge: Cambridge UP, 1998.