## Group A 1st & 2nd Sem (SESSION 2024-2025)

## B.Tech (Civil Engineering)

### SEMESTER –I

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Spots/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 6. | 100105 | Engineering Mechanics | 3 | 1 | 0 | 4 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| | | | | | TOTAL | 20 |

### SEMESTER –II

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100210 | Building Material and Construction Techniques | 2 | 0 | 0 | 2 |
| 6. | 100211 | Environmental Science and Sanitation | 2 | 0 | 0 | 2 |
| 7. | 100212 | Elements of Civil Engineering | 2 | 0 | 0 | 2 |
| 8. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 9. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 10. | 100210P | Building Material and Construction Techniques Lab | 0 | 0 | 2 | 1 |
| | | | | | TOTAL | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

### B. Tech (Chemical Engineering)
### SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/Yoga/NCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics & Design | 1 | 0 | 0 | 1 |
| 6. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics & Design Lab | 0 | 0 | 4 | 2 |
| 10. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100206 | Workshop Practices | 2 | 0 | 0 | 2 |
| 6. | 100213 | Introduction to Chemical Engineering | 3 | 1 | 0 | 4 |
| 7. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 9. | 100206P | Workshop Practices Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

### B. Tech (Aeronautical Engineering)
### SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 10. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 11. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 12. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 13. | 100109P | Sports/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 14. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 15. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 16. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 17. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 18. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| 19. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 11. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 12. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 13. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 14. | 100214P | Swachha Bharat Mission (SBM) | 0 | 0 | 2 | 1 |
| 15. | 100206 | Workshop Practices | 2 | 0 | 0 | 2 |
| 16. | 100204 | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 17. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 18. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 19. | 100206P | Workshop Practices Lab | 0 | 0 | 2 | 1 |
| 20. | 100204P | Elements of Mechanical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

# Group A 1st & 2nd Sem (SESSION 2024-2025)

## B. Tech (Mining)

## SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/Yoga/NCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 6. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| 10. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100206 | Workshop Practices | 2 | 0 | 0 | 2 |
| 6. | 100204 | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 9. | 100206P | Workshop Practices Lab | 0 | 0 | 2 | 1 |
| 10. | 100204P | Elements of Mechanical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

## B. Tech (Civil Engineering with Computer Application)
## SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sport/Yoga/NCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 6. | 100105 | Engineering Mechanics | 3 | 1 | 0 | 4 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| | | TOTAL | | | | 20 |

## SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100210 | Building Material and Construction Techniques | 2 | 0 | 0 | 2 |
| 6. | 100211 | Environmental Science and Sanitation | 2 | 0 | 0 | 2 |
| 7. | 100212 | Elements of Civil Engineering | 2 | 0 | 0 | 2 |
| 8. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 9. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 10. | 100210P | Building Material and Construction Techniques Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## B. Tech (Mechanical Engineering)
### SEMESTER –I

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/Yoga/NCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 6. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| 10. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100206 | Workshop Practices | 2 | 0 | 0 | 2 |
| 6. | 100204 | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 9. | 100206P | Workshop Practices Lab | 0 | 0 | 2 | 1 |
| 10. | 100204P | Elements of Mechanical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## Group A 1ˢᵗ & 2ⁿᵈ Sem (SESSION 2024-2025)

## B. Tech (Biomedical and Robotics Engineering)

### SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 20. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 21. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 22. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 23. | 100109P | Sports/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 24. | 100104 | Engineering Graphics and Design | 2 | 0 | 0 | 2 |
| 25. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 26. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 27. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 28. | 100104P | Engineering Graphics and Design | 0 | 0 | 2 | 1 |
| 29. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 21. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 22. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 23. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 24. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 25. | 100206 | Workshop Practices | 1 | 0 | 0 | 1 |
| 26. | 100204 | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 27. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 28. | 100203P | Programming for Problem Solving  Lab | 0 | 0 | 2 | 1 |
| 29. | 100206P | Workshop Practices Lab Lab | 0 | 0 | 4 | 2 |
| 30. | 100204P | Elements of Mechanical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

# Group A 1st & 2nd Sem (SESSION 2024-2025)

## B. Tech (3D Animation and Graphics)

### SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1 | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100107 | Python Programming | 2 | 0 | 0 | 2 |
| 6. | 100108 | Introduction to Web Design | 3 | 0 | 0 | 3 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100107P | Python Programming Lab | 0 | 0 | 2 | 1 |
| 10. | 100108P | Introduction to Web Design Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100208 | IT Workshop | 2 | 0 | 0 | 2 |
| 6. | 100209 | Basic Electronics | 3 | 0 | 0 | 3 |
| 7. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 9. | 100208P | IT Workshop Lab | 0 | 0 | 2 | 1 |
| 10. | 100209P | Basic Electronics Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

### B. Tech (Fire Technology and Safety)
### SEMESTER –I

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 2. | 100102 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3. | 100103 | Communicative English | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | Engineering Graphics and Design | 1 | 0 | 0 | 1 |
| 6. | 100106 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100101P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 8. | 100103P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 9. | 100104P | Engineering Graphics and Design Lab | 0 | 0 | 4 | 2 |
| 10. | 100106P | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Hours Per Week | | | Total credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2. | 100202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| 3. | 100203 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4. | 100214P | Swachha Bharat Mission | 0 | 0 | 2 | 1 |
| 5. | 100206 | Workshop Practices | 2 | 0 | 0 | 2 |
| 6. | 100204 | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 7. | 100201P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | 100203P | Programming for Problem Solving Lab | 0 | 0 | 2 | 1 |
| 9. | 100206P | Workshop Practices Lab | 0 | 0 | 2 | 1 |
| 10. | 100204P | Elements of Mechanical Engineering Lab | 0 | 0 | 2 | 1 |
| | | TOTAL | | | | 20 |

# Group A 1ˢᵗ & 2ⁿᵈ Sem (SESSION 2024-2025)

## B. Tech (Food Processing and Preservation)
### SEMESTER –I

| Sl No. | Code No. | Course Title | Lecture | Tutorial | Practical | Total credits |
|---|---|---|---|---|---|---|
| 1. | 100101 | **Engineering Chemistry** | 3 | 0 | 0 | 3 |
| 2. | 100102 | **Engineering Mathematics-I** | 3 | 1 | 0 | 4 |
| 3. | 100103 | **Communicative English** | 3 | 0 | 0 | 3 |
| 4. | 100109P | Sports/YogaNCC/NSS | 0 | 0 | 2 | 1 |
| 5. | 100104 | **Engineering Graphics & Design** | 1 | 0 | 0 | 1 |
| 6. | 100106 | **Basic Electrical Engineering** | 3 | 0 | 0 | 3 |
| 7. | 100101P | **Engineering Chemistry Lab** | 0 | 0 | 2 | 1 |
| 8. | 100103P | **Communicative English Lab** | 0 | 0 | 2 | 1 |
| 9. | 100104P | **Engineering Graphics & Design Lab** | 0 | 0 | 4 | 2 |
| 10. | 100106P | **Basic Electrical Engineering Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

### SEMESTER –II

| Sl No. | Code No. | Course Title | Lecture | Tutorial | Practical | Total credits |
|---|---|---|---|---|---|---|
| 1. | 100201 | **Engineering Physics** | 3 | 0 | 0 | 3 |
| 2. | 100202 | **Engineering Mathematics-II** | 3 | 1 | 0 | 4 |
| 3. | 100203 | **Programming for Problem Solving** | 3 | 0 | 0 | 3 |
| 4. | 100214P | **Swachha Bharat Mission** | 0 | 0 | 2 | 1 |
| 5. | 100206 | **Workshop Practices** | 2 | 0 | 0 | 2 |
| 6. | 100207 | **Food Chemistry** | 3 | 0 | 0 | 3 |
| 7. | 100201P | **Engineering Physics Lab** | 0 | 0 | 2 | 1 |
| 8. | 100203P | **Programming for Problem Solving Lab** | 0 | 0 | 2 | 1 |
| 9. | 100206P | **Workshop Practices Lab** | 0 | 0 | 2 | 1 |
| 10. | 100207P | **Food Chemistry Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

## B.Tech(Chemical Technology(Leather Technology))

### SEMESTER –I

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | **Engineering Chemistry** | 3 | 0 | 0 | 3 |
| 2. | 100102 | **Engineering Mathematics-I** | 3 | 1 | 0 | 4 |
| 3. | 100103 | **Communicative English** | 3 | 0 | 0 | 3 |
| 4. | 100109P | **Sports/Yoga/NCC/NSS** | 0 | 0 | 2 | 1 |
| 5. | 100104 | **Engineering Graphics and Design** | 1 | 0 | 0 | 1 |
| 6. | 100106 | **Basic Electrical Engineering** | 3 | 0 | 0 | 3 |
| 7. | 100101P | **Engineering Chemistry Lab** | 0 | 0 | 2 | 1 |
| 8. | 100103P | **Communicative English Lab** | 0 | 0 | 2 | 1 |
| 9. | 100104P | **Engineering Graphics and Design Lab** | 0 | 0 | 4 | 2 |
| 10. | 1001016P | **Basic Electrical Engineering Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

### SEMESTER –II

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | **Engineering Physics** | 3 | 0 | 0 | 3 |
| 2. | 100202 | **Engineering Mathematics-II** | 3 | 1 | 0 | 4 |
| 3. | 100203 | **Programming for Problem Solving** | 3 | 0 | 0 | 3 |
| 4. | 100214P | **Swachha Bharat Mission** | 0 | 0 | 2 | 1 |
| 5. | 100206 | **Workshop Practices** | 2 | 0 | 0 | 2 |
| 6. | 100205 | **Introduction to Leather and Chemical Technology** | 3 | 1 | 0 | 4 |
| 7. | 100201P | **Engineering Physics Lab** | 0 | 0 | 2 | 1 |
| 8. | 100203P | **Programming for Problem Solving Lab** | 0 | 0 | 2 | 1 |
| 9. | 100206P | **Workshop Practices Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

## Group A 1st & 2nd Sem (SESSION 2024-2025)

### B.Tech (Mechatronics)

### SEMESTER –I

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100101 | **Engineering Chemistry** | 3 | 0 | 0 | 3 |
| 2. | 100102 | **Engineering Mathematics-I** | 3 | 1 | 0 | 4 |
| 3. | 100103 | **Communicative English** | 3 | 0 | 0 | 3 |
| 4. | 100109P | **Sports/Yoga/NCC/NSS** | 0 | 0 | 2 | 1 |
| 5. | 100104 | **Engineering Graphics and Design** | 1 | 0 | 0 | 1 |
| 6. | 100106 | **Basic Electrical Engineering** | 3 | 0 | 0 | 3 |
| 7. | 100101P | **Engineering Chemistry Lab** | 0 | 0 | 2 | 1 |
| 8. | 100103P | **Communicative English Lab** | 0 | 0 | 2 | 1 |
| 9. | 100104P | **Engineering Graphics and Design Lab** | 0 | 0 | 4 | 2 |
| 10. | 100106P | **Basic Electrical Engineering Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

### SEMESTER –II

| Sl No. | Course Code | Course Title | Hours Per Week | | | Total Credits |
|---|---|---|---|---|---|---|
| | | | Lecture | Tutorial | Practical | |
| 1. | 100201 | **Engineering Physics** | 3 | 0 | 0 | 3 |
| 2. | 100202 | **Engineering Mathematics-II** | 3 | 1 | 0 | 4 |
| 3. | 100203 | **Programming for Problem Solving** | 3 | 0 | 0 | 3 |
| 4. | 100214P | **Swachha Bharat Mission** | 0 | 0 | 2 | 1 |
| 5. | 100206 | **Workshop Practices** | 2 | 0 | 0 | 2 |
| 6. | 100204 | **Elements of Mechanical Engineering** | 3 | 0 | 0 | 3 |
| 7. | 100201P | **Engineering Physics Lab** | 0 | 0 | 2 | 1 |
| 8. | 100203P | **Programming for Problem Solving Lab** | 0 | 0 | 2 | 1 |
| 9. | 100206P | **Workshop Practices Lab** | 0 | 0 | 2 | 1 |
| 10. | 100204P | **Elements of Mechanical Engineering Lab** | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | | 20 |

## Course Code-100101    Engineering Chemistry           3 0 0 3

**UNIT 1.0- Atomic and Molecular Structure**                                    **8 hrs**
Electromagnetic radiations, Dual nature of electron and Heisenberg uncertainty Principle. Photoelectric effect, Planck's theory. Principles for the combination of atomic orbitals to form a molecular diagram of molecular orbitals. Bent's rule, VSEPR theory (typical example) co-ordination numbers and geometries. Isomerism in transition metal compounds. Metal Carbonyls; Synthesis and Structure.

**UNIT 2.0- Spectroscopy**                                                      **6 hrs**
Principle of rotational and vibrational spectroscopy, selection rule for application in diatomic molecules, elementary idea of electronic spectroscopy, UV-VIS spectroscopy with related to rules and its applications. Basic Principle of nuclear Magnetic resonance spectroscopy with applications.

**UNIT 3.0 -Electrochemistry and Fuels**                                        **6 hrs**
Nernst equation, EMF and electrochemical cell, the introduction of corrosion, corrosion mechanism, types of corrosion, water line corrosion, stress corrosion, pitting corrosion, Lead acid storage cell, leclanche cell. Calorific value of fuels, proximate and ultimate analysis of coals, fuel cells, Bio fuels.

**UNIT 4.0- Water Chemistry**                                                   **8 hrs**
Hardness of water, estimation of water hardness by EDTA and Alkalinity method. Removal of the hardness of water- soda lime process, zeolite process, Ion exchange process, Boiler problem, sludge, and scale formation, priming and foaming, Boiler corrosion, and Caustic embrittlement.

**UNIT 5.0 - Polymer and Plastics**                                            **8 hrs**
Polymerization techniques (free radical, ionic, and co-ordination mechanism)Preparation properties, and technical application of phenol-formaldehyde resins, elastomers, synthetic rubbers (Buna-S, Buna-N, neoprene). Inorganic polymers, Silicones, adhesives, epoxy resins. the structural difference between thermoplastic and thermosetting Plastics, the Importance of commercially important thermoplastics and thermosets; Poly ethylene, Polyvinyl chloride, Polystyrene.

**UNIT 6.0- Organic Reactions and Synthesis of A Drug Molecul**                **6 hrs**
Introduction to intermediate and reaction involving Substitution, addition, elimination, oxidation-reduction. Diels Elder cyclization and epoxide ring opening reactions, synthesis of commonly used drug molecules like aspirin.

**Test/ Reference:-**
1. University Chemistry, B.H. Mahan,Pearson
2. Chemistry, principles and application, M.J. Sienko and R.A. Plane, McGraw Hill International
3. Fundamentals of molecular Spectroscopy, C.N. Banwell    ,     McGraw      Hill International
4. Engineering Chemistry (NPTEL Web- Book), B.L. Tembe, Kamaluddin and M.S. Krishnan, NPTEL
5. Physical Chemistry, P.W. Atkins, Oxford University Press
6. A text book of engineering chemistry, S. Chawala, Dhanpat Rai Publication
7. General Chemistry Part 1, R. Sarkar, New Central Book agency

## Course Code-100101P    Engineering Chemistry Lab        0 0 2 1
### Perform any 10 Experiments

1. To estimate hardness of water by alkalinity method
2. To estimate hardness of water by EDTA method
3. To remove hardness of water by ion exchange method
4. Determination of pH of a given acid solution using a standard sodium hydroxide solution
5. Determination of surface tension and viscosity
6. Chemical analysis of salt (Acid radical and basic radical)
7. Adsorption of acetic acid by charcoal
8. Test of adulteration of fat butter, sugar, turmeric powder, chilli powder and pepper
9. Saponification/ acid value of an oil
10. Identification of organic substances and their functional groups
11. Potentiometric determination of redox potentials and emf
12. Synthesis of drug/ polymer like ASPRIN/ Urea- formaldehyde resin
13. Thin layer chromatography
14. Analysis of flue gas by orsatapparatus

## Course Code-100102     Engineering Mathematics–I          3 1 0 4

**Unit- 1.0: Linear Algebra-I                                        7 hrs**

Elementary Row operations, Gauss -Jordan Method for finding the inverse of Matrix, Complex Matrix : Hermitian , Skew Hermitian and Unitary Matrix, Vector space, Sub Spaces, Linear dependence and Independences of Vectors, Linear Span, Basis, Dimension, Extension of basis of subspace, The rank of a matrix, Row and column space, Solvability of system of linear equations.

**Unit- 2.0: Linear Algebra-II                                        7 hrs**

Linear Transformations, Kernel and Range of linear transformation, Matrix Representation of a linear transformation, Rank-Nullity Theorem, Eigen Value and Eigen Vectors, Properties of Eigen vectors, Eigen Bases, Orthogonal Transformation, Similarity Transformation, Matrix Diagonalization, Cayley- Hamilton Theorem.

**Unit- 3.0: Calculus for single variable                            7 hrs**

Inderminate form, L'Hospital Rule, Rolle's Theorem, Mean Value Theorem, Expansion of function (single variable), Taylor and  Maclaurin Series, Riemann Integration, Riemann Sum, Improper Integrals, Beta and Gamma function and their properties.

**Unit- 4.0 : Multivariable Calculus (Differentiation)               7 hrs**

Function with two or more variable, Limit, continuity and Partial differentiation, Total Differentiation

Taylor's series and Maclaurin's series for function with two variable, Jacobian, Maxima and Minima, Method of Lagrange's multiplier.

**Unit-5.0: Multivariable Calculus (Integration)                     7 hrs**

Double Integral, change of order of integration, Triple integral, Change of Variable in a Double and Triple Integrals, Change to polar coordinate, Change to cylindrical coordinate, Change to spherical polar coordinate, Application to area and volume using double and triple integral

**Unit- 6.0: Vector Calculus                                          7 hrs**

Scalar and vector fields, Gradient, Directional derivative, Divergence, Curl and their properties, Line integral, Green's theorem in plane (without proof), Surface integral, Stoke's theorem (without proof), Volume Integral, Gauss-Divergence' theorem (without proof).

**Test/ Reference:-**

1. AICTE's Prescribed Textbook: Mathematics-I (Calculus & Linear Algebra), Reena Garg, Khanna Book Publishing Co. ISBN-10 9391505171
2. Advanced Engineering Mathematics, Chandrika Prasad & Reena Garg, Khanna Book Publishing Co., 2021. ISBN 10: 9386173522 / ISBN 13: 9789386173522.
3. Higher Engineering Mathematics, B.V.  Ramana, Tata McGraw Hill New Delhi, 11th Reprint, 2010,ISBN-10 007063419X ISBN-13978- 0070634190.
4. Advanced Engineering Mathematics, SrkIyengar Rk Jain,Narosa,5thEdition,ISBN-10 8184875606I
     SBN-13978-8184875607

5. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.

## Course Code-100103    Communicative English              3 0 0 3

**Unit-1.0: Vocabulary Building**                                              **7 hrs**

Nature of Word Formation; Root Word and Morpheme; Prefix and Suffix; Foreign Expressions in English; Synonym and Antonym; Homophone and Homograph; Abbreviation and Acronym.

**Unit-2.0: Basic Writing Skills**                                              **7 hrs**

Parts of Speech: Types of Words; Structures of Sentence; Kind of Sentence; Phrase and Clause; Punctuation Marks; Capitalization; Tenses: Present, Past and Future; Voices: Active and Passive; Formation of Questions using Primary Auxiliaries, Modals and Wh-Words.

**Unit-3.0: Common Errors in English**                                         **7 hrs**

Articles; Prepositions; Modifiers; Subject-Verb Agreement; Noun-Pronoun agreement; Redundancies; Cliches; Spelling Error.

**Unit-4.0: Principles of Appropriate Writi**                                  **7 hrs**

Defining: Describing, Classifying and Exemplifying; Introduction, Body, and Conclusion; References, Quotations and Illustrations; Organizing the Paragraphs in a Document; 7Cs of the Professional Writing: Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous.

**Unit-5.0: Practices of Formal Writing**                                       **7 hrs**

Formal Letter: Cover-Letter and Application; Resume Writing; Report Writing; Minutes of Meeting; Memorandum; Notice; Essay Writing: Personal and Impersonal; Email Writing Etiquettes; Article Writing; Writing for Current Social Media.

**Unit-6.0: Comprehension of Written English**                                  **7 hrs**

*Of Studies* (Essay) by Sir Francis Bacon; *The Sun Rising* (Poem) by John Donne; *The Last Leaf* (Story) by O Henry; Unseen/Untaught Passage.

**Test/ Reference:-**

1. English language and communication skills for engineers, Sanjay Kumar,Pushp lata, Oxford university Press
2. Communicative English for Technical student, Dr. Bijay Bhadur Singh and Dr. Kalpana Sinha, Foundation publishing House (FPM)
3. Communication Skill (As per VRV syllabus 2018),Sanjay Kumar and Pushp lata, Oxford University Press
4.  A course in Listening & Speaking, V.  Sasi Kumar ,P. Kiranmai Dutt and Geetha Rajeevan, Foundation Books

**Course Code-100103P          Communicative English Lab          0 0 2 1**

### Perform any 10 Experiments

**Language Lab of English** includes Listening Comprehension, Reading Comprehension, Speaking Skills: Phonetics, International Phonetic Alphabet Symbols (IPAS), Sounds: Vowels and Consonants, Pronunciation, Intonation, Stress and Rhythm, Just A Minute Technique (JAM), Communication: Verbal and Non-Verbal; Ethical Usage of Artificial Intelligence, Self-Introduction: Social, Academic and Professional; Interview: Online and Offline; Oral Presentation, Debate, Group Discussion, Group-Activities, and Brainstorming Vocabulary Activities.

1. Listening Comprehension and Speed (Software)
2. Reading Comprehension and Speed (Software)
3. Pronunciation: Learning and Test (Software)
4. Self-Introduction: Social, Academic and Professional
5. English Typing: Microsoft Word Document (MS Word), and Microsoft Power Point Presentation (PPT)
6. Oral Presentation
7. Interview: Online and Offline
8. Just A Minute Technique (JAM) and Extempore
9. Debate
10. Group Discussion
11. Activities: Role Play, Peer Activities, and Group Activities
12. Anchoring and Addressing: an Assembly, a Meeting, a Seminar, a Party

**Course Code-100101P          Sports/Yoga/NCC/NSS          0 0 2 1**

Course Objectives:
(a) Encouraging creativity and innovation: The course could aim to foster a culture of creativity and innovation among engineering students. It could provide opportunities for students to generate and develop new ideas, think critically, and come up with innovative solutions to real-worldproblems. This objective could be achieved through brainstorming sessions, design thinking exercises, and hands-on projects.
(b) Enhancing problem-solving skills: The course could focus on enhancing the problem-solving skills of engineering students. It could provide training on various problem-solving techniques, such as root cause analysis, critical thinking, and decision-making. Students may learn how to identify and analyse complex problems, develop feasible solutions, and implement them effectively.
(c) Developing project management skills: The course could aim to develop project management skills among engineering students. It could cover topics such as project planning, scheduling, budgeting, and risk management. Students may learn how to manage resources, communicate effectively, and work collaboratively in a project-based environment.
(d) Promoting interdisciplinary collaboration: The course could encourage interdisciplinary collaboration among engineering students. It could provide opportunities for students from different engineering disciplines to work together on innovative projects. This could foster cross-disciplinary learning, encourage diverse perspectives, and promote teamwork and collaboration skills.
(e) Facilitating practical application of engineering concepts: The course could focus on the practical application of engineering concepts and principles. It could provide students with opportunities to apply their theoretical knowledge to real-world projects, prototypes, or simulations. Students may learn how to translate engineering theories into practical solutions and develop hands-on experience in implementing innovative projects.
**Pre-requisite: Nil**
**Course Outcome**:
1. Developed innovative projects: Students may have successfully developed innovative projects that demonstrate their creativity, problem-solving skills, and technical competence. These projects could be prototypes, models, simulations, or practical solutions to real-world problems, showcasing their ability to apply engineering concepts in a creative and innovative manner.
2. Improved critical thinking and problem-solving skills: Students may have honed their critical thinking and problem-solving skills through various course activities, such as brainstorming, design thinking, and project development. They may have learned to analyse complex problems, identify viable solutions, and make informed decisions based on technical, economic, and social considerations.
3. Enhanced project management and teamwork skills: Students may have gained practical experience in managing projects, including planning, scheduling, budgeting, and risk management. They may have learned how to work effectively in a team, collaborate with diverse team members, and communicate project progress and results professionally.
4. Increased interdisciplinary knowledge and collaboration: Students may have gained exposure to interdisciplinary concepts and collaborated with peers from different engineering disciplines. They may have learned to appreciate diverse perspectives, leverage interdisciplinary knowledge, and work collaboratively to develop innovative solutions that integrate multiple domains of engineering.
5. Cultivated a mindset of innovation and entrepreneurship: Students may have developed a mindset of innovation and entrepreneurship, recognizing the importance of creativity,

adaptability, and continuous improvement in engineering practice. They may have learned to identify opportunities, think critically, and take risks to develop and implement innovative projects with commercial or societal potential.

List of Reports:

Any topics related to innovative project.

## Course Code-100104    Engineering Graphics and Design        1 0 0 1

**Unit- 1.0: Introduction to Engineering Drawing**                                    **7hrs**
Principles of Engineering Graphics and Their Significance, Usage of Drawing Instruments, Lettering, Conic Sections including the Rectangular Hyperbola (General Method Only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales Plain, Diagonal and Vernier Scales

**Unit- 2.0 Orthographic Projections**                                              **7hrs**
Principles of Orthographic Projections - Conventions -Projections of Points and Lines Inclined to Both Planes; Projections of Planes Inclined Planes Auxiliary Planes.

**Unit- 3.0 Projections of Regular Solids**                                          **7hrs**
Types of Solids, Projects of Solids (Prism, pyramids, cone, and cylinder): Inclined to Both the Planes- Auxiliary Views; Draw Simple Annotation, Dimensioning and Scale.

**Unit- 4.0 Sections and Sectional Views of Right Angular Solids**            **7hrs**
Section of Solids (Prism, Cylinder, Pyramid, Cone), Auxiliary Views; Development of Surfaces Of Right Regular Solids- Prism, Pyramid, Cylinder And Cone; Draw The Sectional Orthographic Views of Geometrical Solids, Objects From Industry And Dwellings (Foundation To Slab Only).

**Unit- 5.0 Isometric Projections**                                                 **7hrs**
Isometric Views, Compound Solids; Principles of Isometric Projection Isometric Scale, Conventions; Isometric Views of Lines, Planes, Simple and Conversion of Isometric Views toOrthographic Views And Vice-Versa, Conventions.

**Unit- 6.0 Overview of Computer Graphics**                                          **7hrs**
Listing the Computer Technologies that Impact on Graphical Communication, Demonstrating Knowledge of the Theory of CAD Software [Such As: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify And Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog Boxes And Windows, Shortcut Menus (Button Bars), The Command Line (Where Applicable), The Status Bar, Different Methods of Zoom as Used in CAD, Select and Erase Objects.; Isometric Views of Lines, Planes, Simple And Compound Solids.

**Test/ Reference:-**
1. Engineering Drawing, N.D. Bhatt, Charotar Publishing House, 53rd Edition, ISBN: 978-9380358277
2. A Textbook of Engineering Drawing, R.K. Dhawan, S. Chand Publishing, Revised Edition, ISBN: 978-8121929571
3. Engineering Drawing and Graphics, K. Venugopal, V. Prabhu Raja, New Age International Publishers, 3rd Edition, ISBN: 978-8122430120
4. Engineering Graphics with AutoCAD, D.M. Kulkarni, A.P. Rastogi, A.K. Sarkar, PHI Learning Pvt. Ltd., 1ˢᵗEdition, ISBN: 978-8120337834

# Course Code-100104P   Engineering Graphics and Design Lab      0 0 4 2
## Perform any 10 Experiments

1. (Which includes dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil)
2. Construction of Plane, Diagonal & Vernier Scales.
3. Construction of Ellipses, Parabolas, and Hyperbolas using the general method.
4. Construction of cycloid, epicycloid, hypocycloid, and involute of a circle.
5. Projection of Points and Lines inclined to both planes.
6. Projections of Planes (e.g., rectangular, triangular) in inclined positions.
7. Projection of Solids (prisms,pyramids, cones, and cylinders)
8. Drawing of Sections of Prisms, Cylinders, Pyramids, and Cones.
9. Development of Surfaces for prisms, pyramids, cylinders, and cones.
10. Construction of Isometric views of lines, planes, and simple solids.
11. Introduction to CAD Software.
12. Use of CAD software to draw basic geometric shapes, apply dimensions, and modify objects.

**Course Code-100105         Engineering Mechanics         3 1 0 4**

**Unit- 1.0:**
**Fundamentals of Mechanics                                             7hrs**
Overview of engineering mechanics. Vector and scalar quantities. Units of physical quantities. Dimensions of physical quantities. Units and Dimensions. Dimensional analysis.

**Unit- 2.0:**
 **Force Systems and Equilibrium                                        7hrs**
Force Systems Basic Concepts, Particle Equilibrium in 2-D & 3-D, Rigid Body Equilibrium, System of Forces:  oplanar Concurrent Forces, Components in Space, Resultant and Moment of Forces and its Application, Couples and Resultant of Force System, Free Body Diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

**Unit- 3.0:**
**Friction and Structural Analysis                                       7hrs**
Types of Friction: Limiting, Static, and Dynamic, Laws of Friction, Motion of Bodies and Wedge Friction, Equilibrium in Three Dimensions, Method of Sections and Method of Joints, Tension and Compression in Members, Simple Trusses, Zero Force Members, Beams, Types of Beams, Frames and Machines.

**Unit- 4.0:**
**Centroid, Centre of Gravity, and Moment of Inertia                    7hrs**
Centroid of Simple Figures from First Principle, Centroid of Composite Sections, Centre of Gravity and Its Implications, Area Moment of Inertia: Definition and Theorems Moment of Inertia of Plane Sections, Standard Sections, and Composite Sections, Mass Moment Inertia of Circular Plate, Cylinder, Cone, Sphere, Hook.

**Unit- 5.0:**
**Virtual Work, Energy Method, and Particle Dynamics                    7hrs**
Virtual Displacements and Principle of Virtual Work, Degrees of Freedom and Active Force Diagram, Conservative Forces and Potential Energy, Energy Equation for Equilibrium, Applications of Energy Method for Equilibrium, Stability of Equilibrium, Review of Particle Dynamics: Rectilinear and Plane Curvilinear Motion, Relative and Constrained Motion, Newton's 2nd Law Work-Kinetic Energy, Power, Potential Energy Impulse-Momentum and Impact.

**Unit- 6.0: Kinetics of Rigid Bodies                                    7hrs**
Introduction to Kinetics of Rigid Bodies Basic Terms and General Principles in Dynamics Types of Motion and Instantaneous Centre of Rotation in Plane Motion Simple Problems D'Alembert's Principle and Its Applications in Plane Motion and Connected Bodies Work-Energy Principle and Its Application in Plane Motion of Connected Bodies Kinetics of Rigid Body Rotation.

**Test/ Reference:-**
1. Engineering Mechanics statics and dynamics R. C. Hibbeler Pearson Publication, 12ᵗʰ Edition. ISBN-10: 0-13-814929-1 ISBN-13:978-0-13-814929-1
2. Engineering Mechanics statics and dynamics, J. L. Meriam and L. G. Craige, John Willey and Son's publication. 9th Edition. ISBN: 978-1-119-39098-5
3. Engineering Mechanics, S. P. Timoshenko, D. H. Young, J. V. Rao & S.Pati, McGraw- Hill publication, 5th Edition ISBN-10:9781259062667
4. Engineering Mechanics statics and dynamics,A. K. Dhiman, P. Dhiman & D. Kulshreshtha, McGraw-Hill publication ISBN-10:9789339219178

## Course Code-100201    Engineering Physics              3 0 0 3

**Unit- 1.0**

**1. Frame of Reference:**                                                          **2 hrs**

Non-Inertial frame of reference, rotating coordinate system, centripetal and Coriolis acceleration and its application in weather system.

**2. Oscillations:**                                                                     **3 hrs**

Harmonic Oscillator, Damped Harmonic motion – overdamped, critically Damped and lightly damped oscillators, Force Oscillators and Resonance.

**Unit- 2.0**

**1. Optics:**                                                                             **4 hrs**

Huygens's Principle, Superposition of Waves and interference of Light by wave front-splitting and amplitude-splitting; Young's double slit experiment, Michelson interferometer, Fraunhofer diffraction from single slit and circular aperture, Diffraction Grating and their resolving power

**2. LASER:**                                                                            **4 hrs**

Einstein's theory of matter-radiations interaction, Einstein's Coefficients (A and B), Amplification by population inversion, Different types of lasers – Gas Laser, Helium-Neon Laser, Solid State Laser (Ruby, Neodymium), Semiconductor Laser.

**Unit- 3.0**

**1. Quantum Mechanics:**                                                       **5 hrs**

Compton Effect, Photoelectric Effect, Wave Particle duality, de Broglie's hypothesis, Heisenberg's Uncertainty Principle, Wave function and wave packets, phase and group velocities, Schrodinger's Wave Equation, Normalization, Expectation values, Eigenvalues and Eigenfunction.

**2. Applications in One dimensions:**                                       **2 hrs**

Application of Schrodinger Wave Equation for particle in one dimensional box – its wavefunction and eigenvalue of energy and momentum.

**Unit- 4.0**

**1. Vector Calculus:**                                                             **2 hrs**

Gradient, Divergence and Curl, Line, Surface and Volume integrals, Gauss's Divergence theorem and Stokes' theorem in Cartesian Coordinate.

**2. Electrostatics:**                                                                **4 hrs**

Gauss's Law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary Conditions, Poisson's and Laplace's equations, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary Conditions in dielectrics.

**Unit- 5.0**

**1. Magnetostatics:**                                                              **4 hrs**

Lorentz force, Biot-Savart and Ampere's circuital laws and their applications, Divergence and Curl of Magneto static fields, Magnetic vector potential, Force and torque on a magnetic dipole, Magnetic Materials, Magnetization, Bound currents, Boundary conditions.

**2. Electrodynamics and Electromagnetic Waves:**                    **4 hrs**

Ohm's law, Motional EMF, Faraday's Law, Lenz's law, Self and mutual inductance, Energy stored in magnetic field, Maxwell's equations in vacuum and nonconducting medium, Continuity Equation, Poynting Theorem, Wave Equations: plain electromagnetic wave in vacuum and their transverse nature and Polarization.

**Unit- 6.0**

**1. Introduction to Solids and Semi-Conductors:**                     **3 hrs**

Free electron theory of metal, fermi level, Bloch's theorem for particle in a periodic Potential, Kroning-Penney model and origin of energy band.

**2. Electronic Materials:**                                                       **3 hrs**

Metals, semiconductors and insulators, intrinsic and extrinsic semiconductors,Carrier transport, diffusion and drift, P-N junction.

# Group A 1ˢᵗ & 2ⁿᵈ Sem (SESSION 2024-2025)

**Test/ Reference:-**

1. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, R. Eisberg R. Resnick, Wiley India Pvt. Ltd ISBN 978-81-265-0818-1
2. Theory of Vibration with Application, W.T. Thomson M. D. Dahleh, Pearson India ISBN 978-81-317-0482-0
3. Introduction to Electrodynamics, D.J. Griffiths, Pearson India, ISBN 978-93-325-5044-5
4. Electromagnetism, I.S. Grant, W. R. Phillips, Wiley India Pvt. Ltd ISBN 978-04-719-2712-9
5. The Feynman Lectures on Physics, R.P. Feynman R. B. Leighton, Pearson India ISBN 978-00-710-7458-2
6. Optics, Ajay Ghatak ,McGraw Hill ISBN 978-93-901-1359-0
7. Physics of Vibration and Waves, H. J. Pain, Wiley India Pvt. Ltd, ISBN 978-04-700-1296-3
8. Concept of Modern Physics, Arthur Beiser, McGraw Hill ISBN 978-93-513-4185-7
9. Introduction to Solid State Physics, C. Kittle , Wiley India Pvt. Ltd, ISBN 978-81-265-7843-6

## Course Code-100201P   Engineering Physics Lab                    0 0 2 1
**Perform any 10 Experiments**

1. Determination of the capacitance and permittivity of the given material.
2. Determination of e/m of electron.
3. Determination of Planck's constant and Photoelectric Work Function using Photoelectric cell.
4. Verification of inverse square law using photocell.
5. Determination of Wavelength of (He-Ne) LASER using Diffraction Grating Method.
6. Calculation of Energy Band Gap of a semiconductor.
7. Determination of Dielectric constant using resonance method.
8. Determination of Wavelength of Sodium light by measuring the diameter of the Newton's Ring.
9. Determination of curvature of convex surface of a lens by Newton's ring.
10. Verification of existence of Bohr's Energy level with Frank-Hertz apparatus.
11. Determination of the Earth's horizontal magnetic field intensity and magnetic Moment of a magnet by                    employing magnetometer.
12. Verification of Faraday's Law and Lenz's Law of Electromagnetic Induction.

## Course Code-100202     Engineering Mathematics– II          3 1 0 4

**Unit- 1.0 Complex Analysis – I                                                    6 hrs**

Functions of complex variable, limit, Continuity, Differentiability, Analytic function, Cauchy-Riemann Equations in Cartesian and polar form, harmonic function and harmonic conjugate.

**Unit- 2.0 Complex Analysis – II                                                 8 hrs**

Line Integral, contour integrals, Cauchy theorem, Cauchy's Integral formula(without proof), Taylors series, zero of analytic functions, singularities, Laurent's series, residue, Cauchy residue theorem(without Proof) and its applications.

**Unit- 3.0 Ordinary Differential Equations                              8 hrs**

Linear differential equations of nth Order with constant coefficients, solution of Homogeneous and Non-Homogeneous Equations, Equations with variable coefficients, Cauchy- Euler Equations, Method of Variation of Parameters.

**Unit- 4.0   Sequence and Series                                                 6 hrs**

Introduction of Sequence and Series, Nature of series Tests of convergence of Series: Comparison test, D'Alembert ratio test, Cauchy's Root test, Raabe's test, Logarithmic test, Cauchy's condensation test.

**Unit- 5.0   Laplace Transform                                                  8 hrs**

Laplace Transform, Existence theorem, properties of Laplace Transform, Laplace Transform of Periodic functions, Inverse Laplace Transform, convolution theorem. Application of Laplace Transform to solve Ordinary differential equations.

**Unit- 6.0 Fourier Series                                                            6 hrs**

Fourier Series, Fourier Series for odd and even functions, Half range sine and cosine series, Parseval's theorem.

**Test/ Reference:-**

1. Advanced Engineering Mathematics, Kreyszig Erwin, John Wiley and Sons,10th Edition,2020 ISBN:978-0470-45836-5
2. Advanced Engineering Mathematics, Dass H.K., S Chand and Company pvt.Ltd.,22nd Edition,2018 ISBN:978-93-5283-718-2
3. Higher Engineering Mathematics, Grewal B.S., Khanna Publishers,44th Edition,2023 ISBN:9788174091154
4. Complex Variables (Theory and Applications), Kasana  H.S., PHI,2nd Edition.2015 ISBN:978-81-203-2641-5
5. A Text Book of Engineering Mathematics, Bali N.P., Goyal Manish Laxmi Publications,9th Edition,2014
6. Higher Engineering Mathematics, Ramana  B.V., Tata McGraw Hill New Delhi, 11th Reprint, 2010, ISBN-10 007063419X ISBN-13978- 0070634190
7. Differential Equations, Ross S.L.,Wiley Publications,3rd edition,2016 ISBN:978-81-265—1537-0
8. Advanced Differential Equations, Raisinghania M.D., S.Chand and Company PVT.LTD.,18th Edition,2015 ISBN:978-81-219-0893-1
9. Schaum's Outlines Complex Variables, Spiegel Murray R, Lipschutz Seymour, Schiller J John and Spellman Dennis, MC Graw Hill Education Private Ltd.2nd Edition,2010 ISBN:978-0-07-008538-1

## Course Code-100203   Programming for Problem Solving        3 0 0 3

**Unit- 1.0**

**Introduction to Programming**                                      **6 hrs**

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Unit- 2.0**

**Operators, Conditional Branching and Loops**                    **8 hrs**

Arithmetic expressions/arithmetic operators, relational operators, logical operators, bitwise operators and precedence. Writing and evaluation of conditionals and consequent branching, Iteration and loops.

**Unit- 3.0**

**Arrays and String**                                            **6 hrs**

Array declaration & initialization, bound checking arrays (1-d, 2-d), character arrays and strings.

**Unit- 4.0**

**Function, Recursion and Pointers**                              **9 hrs**

Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Idea of pointers, Defining pointers, Use of Pointers in self- referential structures, idea of call by reference.

**Unit- 5.0**

**User defined Data Types and File handling**                     **8 hrs**

Structure- defining, declaring, initializing; accessing structure members, processing of structure, array of structures, structures within structure, structure and function, type definition; Union— definition, declaration, accessing union members, initializing union. Introduction, file declaration, opening and closing a file, working with text and binary files, I/O operations on file, error handling, random access to files

**Unit- 6.0**

**Basic Algorithms**                                             **5 hrs**

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

**Test/ Reference:-**

1. Programming in ANSI C  4th Ed,E Balagurusamy, McGraw Hill Education India Private Limited, ISBN-978-9339219666, 7th Edition
2. The C Programming Language 2e,W. Kernighan / Dennis Ritchie,Pearson Education India, 978-9332549449, 2nd Edition
3. Computer Fundamentals and Programming in C,ReemaThareja,Oxford University Press, ISBN- 978-9354977893, 3rd Edition

## Course Code-100203P Programming for Problem Solving Lab    0 0 2 1
**Perform any 10 Experiments**

1.  Tutorial 1: Problem solving using computers:
    Lab1: Familiarization with programming environment
2.  Tutorial 2: Variable types and type conversions:
    Lab 2: Simple computational problems using arithmetic expressions
3.  Tutorial 3: Branching and logical expressions:
    Lab 3: Problems involving if-then-else structures
4.  Tutorial 4: Loops, while and for loops:
    Lab 4: Iterative problems e.g., sum of series
5.  Tutorial 5: 1D Arrays: searching, sorting:
    Lab 5: 1D Array manipulation
6.  Tutorial 6: 2D arrays and Strings
    Lab 6: Matrix problems, String operations
7.  Tutorial 7: Functions, call by value:
    Lab 7: Simple functions
8.  Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
    Lab 8 and 9: Programming for solving Numerical methods problems
9.  Tutorial 10: Recursion, structure of recursive calls
    Lab 10: Recursive functions
10. Tutorial 11: Pointers, structures and dynamic memory allocation
    Lab 11: Pointers and structures
11. Tutorial 12: File handling:
    Lab 12: File operations

**Course Code-100214P        Swatch Bharat Mission        0 02 1**

Objectives:
1. Understanding the importance of cleanliness and sanitation: The course could aim to create
awareness about the significance of cleanliness and sanitation in maintaining personal health,
environmental sustainability, and community well-being. It could cover topics such as waste
management, sanitation practices, and the impact of poor sanitation on public health.
2. Developing skills for effective waste management: The course could provide training on
various waste management techniques, such as waste segregation, composting, recycling,
and proper disposal of hazardous waste. It could also emphasize the importance of reducing
waste generation and promoting sustainable waste management practices.
3. Promoting behavioural change towards cleanliness: The course could focus on influencing
positive behavioural change among individuals and communities towards cleanliness. It
could include modules on promoting good hygiene practices, creating awareness about the
harmful effects of littering and open defecation, and encouraging responsible waste disposal
habits.
4. Creating awareness about Swachh Bharat Mission initiatives: The course could provide
information about the Swachh Bharat Mission initiatives and campaigns launched by the
Government of India to promote cleanliness and sanitation, such as Swachh Survekshan,
Swachh Bharat Abhiyan, and Clean India Campaign. It could also discuss the progress made,
challenges faced, and future prospects of the Swachh Bharat Mission.
5. Engaging in community participation and advocacy: The course could emphasize the
importance of community participation in the Swachh Bharat Mission and provide tools and
strategies for engaging with local communities to promote cleanliness and sanitation. It could
also encourage advocacy for policy changes and innovations to address sanitation-related
issues at the community, regional, and national levels.
6. Pre-requisite: Nil
7. Course Outcome:
8. Increased awareness and knowledge about cleanliness and sanitation: Participants of the
course may gain a deeper understanding of the importance of cleanliness and sanitation,
including the impact on personal health, environmental sustainability, and community well-
being. They may learn about various waste management techniques, hygiene practices, and
the initiatives of the Swachh Bharat Mission.
9. Enhanced skills for effective waste management: Participants may acquire practical skills
related to waste management, such as waste segregation, composting, recycling, and proper
disposal of hazardous waste. They may also develop skills in reducing waste generation and
promoting sustainable waste management practices in their communities or workplaces.
10. Positive behavioral change towards cleanliness: The course may influence participants to
adopt positive behavioral changes towards cleanliness, such as avoiding littering, practicing
good hygiene habits, and promoting responsible waste disposal. Participants may develop a
sense of responsibility towards maintaining cleanliness in their surroundings and actively
contribute towards creating a cleaner environment.
11. Increased community participation and advocacy: Participants may become actively
engaged in community participation and advocacy efforts related to cleanliness and

sanitation. They may collaborate with local communities, government bodies, and non-governmental organizations (NGOs) to raise awareness, implement cleanliness initiatives, and advocate for policy changes or innovations to address sanitation-related issues.

12. Contribution towards Swachh Bharat Mission objectives: Participants may contribute towards the objectives of the Swachh Bharat Mission, such as promoting cleanliness, ensuring proper waste management, and eliminating open defecation. They may actively participate in Swachh Bharat Mission campaigns, initiatives, and activities, and make a positive impact on their communities and society at large.

13. List of Reports:

14. Any topics related to Swatch Bharat Mission

**Course Code-100210 Building Material and Construction Techniques  2 0 0 2**

**Unit- 1.0**                                                                                                        **7hrs**
Stones and Bricks: Classification of Rocks. Requirement of good building stones. Quarrying and Dressing of Stones. 1 Components, properties and types of Bricks. Field and Laboratory tests of Bricks.

**Unit- 2.0**                                                                                                        **7hrs**
Cement: Introduction and manufacturing of cement. Composition of cement. Bouge's compound and their significance. Hydration of cement.  Physical properties of cement. Testing of Cement. Types of Cement and their field applications. Storage of cement and its effects on properties of cement.

**Unit- 3.0**                                                                                                        **7hrs**
Aggregate: Aggregate: Sources of aggregate, Classification according to source, size and shape.  Properties of fine and coarse aggregates. Bulking of fine aggregate, Parameters for good aggregate.  Grading and Zoning of fine and coarse aggregates as per IS code. Fineness Modulus of fine and coarse aggregate.  Testing of Aggregate.

**Unit- 4.0:**                                                                                                      **7hrs**
Miscellaneous Building Material: Metals: Steel: Important properties and uses of Iron (Cast iron, wroght iron and steel), Test on steel rebar.  Admixtures: Purpose, Types of chemical and mineral admixtures. Gypsum: source, properties and use. Paints: Types, distemper, varnish.

**Unit- 5.0:**                                                                                                      **7hrs**
Concrete: Introduction and Types of Concrete, Concreting Operations (Batching, mixing, transportation, placing, compaction, curing and finishing of concrete). Grades of concrete as per IS 456, Water cement ratio and its significance. Properties and  testing of fresh concrete. Properties and testing of hardened concrete. Non-Destructive Testing (NDT) of hardened concrete. Concrete Mix Design: objective, methods of mix design, the study of procedural steps of mix Design as per IS 10262:2019.

**Unit- 6.0:**                                                                                                      **7hrs**
Basic Building Constructions: Brick Masonry: types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Cavity Wall: Components and construction. Damp Proofing: causes, effects, prevention and treatments.  Fire resistant construction: Fire resistant properties of common building materials.

**Test/ Reference:-**

1. Concrete Technology, Gambhir, M.L., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th Edition, 2017, ISBN-13: 978-1- 259-06255-1

2. Concrete Technology, Shetty, M.S., S Chand and Co. Pvt. Ltd., Ram Nagar, New Delhi-110055, 8th Edition, 2019, ISBN, : 978-8-121- 90003-4

3. Concrete Technology, Santhakumar ,A. R., Oxford University Press, New Delhi, 2nd Edition, 2018, ISBN-13: 978-0-195-67153-7

4. Concrete Technology, Neville, A. M. and Brooks, J.J., Pearson Education Pvt. Ltd., New Delhi, 2nd Edition, 2010, ISBN 978- 0-273-73219-8

5. Properties of Concrete, Neville A. M., Pearson Education Pvt. Ltd., New Delhi, 5th Edition, 2012, ISBN 978- 8131791073

6. A Text-Book of Building Construction ,S.P.Bindra and S.P.Arora, Dhanpat Rai Publications

7. Building Construction, B. C. Punmia, Laxmi Publicaton

# Course Code-100210P
# Building Material and Construction Techniques Lab    0 0 2 1
### Perform any 10 Experiments

1. Determine the fineness of the given cement by Sieving as per IS: 4031 (Part 1)-1996 or Blaine's air permeability apparatus as per IS: 4031 (Part 2)- 1999
2. Determine the standard consistency of the given cement using Vicats apparatus as per IS: 4031 (Part 4)- 1988.
3. Determine the setting time of the given cement using Vicats apparatus as per IS: 4031 (Part 5)- 1988.
4. Determine the compressive strength of the given cement as per IS: 4031 (Part 6) - 1988.
5. Determine the soundness of the given cement by Lechatelier method as per IS: 4031 (Part 3)- 1988
6. Determine the size, grading and fineness modulus of the given fine and coarse aggregates as per IS: 2386 (Part I) – 1963.
7. Determine the flakiness index and elongation index of the given coarse aggregate as per IS: 2386 (Part I) - 1963.
8. Determine the silt content in given sand as per IS: 2386 (Part II) - 1963.
9. Determine the bulking of given sand as per IS: 2386 (Part III)- 1963.
10. Determine the bulk density of the given fine and coarse aggregates as per IS: 2386 (Part III) -1963.
11. Determine the water absorption of the given fine and coarse aggregates as per IS: 2386 (Part III) -1963.
12. Determine the impact value of the given coarse aggregate as per IS: 2386 (Part IV)- 1963.
13. Determine the crushing value of the given coarse aggregate as per IS: 2386 (Part IV)- 1963.
14. Determine the abrasion value of the given coarse aggregate as per IS: 2386 (Part IV)- 1963.
15. Determine workability of the given concrete mix by slump test/compaction factor test/flow table/VeeBee consistometer method as per IS: 1199-1959.
16. Determine the compressive strength of the given concrete mix at 7 days and 28 days of curing as per IS: 516-1959.
17. Asses the durability of the given concrete using Rapid Chloride Penetration test (RCPT) as per ASTM C 1202 /Permeability test as per IS: 3085-1965.

# Course Code-100211
## Environmental Science and Building Sanitation      2 0 0 2

**Unit- 1.0:**

**Introduction to Environmental Science**                                    **7hrs**

Definition, scope, and importance of Environmental Science, Environmental systems and their components, Interaction between Environmental systems, Natural Resources, Case study on key Environmental Issues..

**Unit- 2.0:**

**Ecosystems and Biodiversity**                                              **7hrs**

Structure and function of ecosystems, Energy flow and nutrient cycles (carbon, nitrogen, phosphorus), Biodiversity and its conservation, Case study on successful ecosystem conservation efforts.

**Unit- 3.0:**

**Environmental Pollution**                                                  **7hrs**

Air, water, soil, and noise pollution, Sources, effects, and control measures, Case studies on pollution management.

**Unit- 4.0:**

**Sustainable Development**                                                  **7hrs**

Principles of sustainable development, Environmental impact assessment (EIA), Sustainable practices in civil engineering, Case study on sustainable practices in civil engineering.

**Unit- 5.0:**

**Building Sanitation**                                                      **7hrs**

Importance of sanitation in buildings, Design and layout of sanitation systems, Waste management and disposal.

**Unit- 6.0:**

**Water Supply and Modern Sanitation Techniques**                           **7hrs**

Water Supply and Treatment: Sources of water and quality standards, Water supply systems for buildings, Water treatment processes. Modern Techniques in Sanitation: Modern tools and technologies in building sanitation, Smart sanitation systems and IoT, Case study on innovative sanitation solutions.

**Test/ Reference:-**
1. Environmental Science: Earth as a Living Planet Daniel B. Botkin, Edward A. Keller Wiley, 9th Edition ISBN: 978-1118427323
2. Environmental Engineering and Sanitation Joseph A. Salvato Wiley-Interscience, 4th Edition ISBN: 978-0471333055
3. Water Supply and Sanitation E. W. Steel, Terence J. McGhee McGraw-Hill, 5th Edition ISBN: 978-0070609384

## Course Code-100212  Elements of Civil Engineering                2 0 0 2
**Unit- 1.0**
**Overview of Civil Engineering.**                                                  **7hrs**
Basic understanding and History of Civil Engineering. Fundamental of Civil Architecture and Town Planning Basic Surveying Modern Surveying Equipment [ like TS, Theodolite ] Case study of National Infrastructure Projects, Professional Ethics in Engineering.
**Unit- 2.0**
**Structural Engineering.**                                                        **7hrs**
Introduction to Mechanics of Structure. Type of Structure. Fundamentals of Building Materials. Repair and Rehabilitation of Structures.
**Unit- 3.0**
**Geotechnical Engineering**.                                                      **7hrs**
Basic Terminology and properties of Soil Mechanics. Types of Foundations [ Shallow and Deep ] Solid Waste Management and Landfill. Basic of Engineering Geology.
**Unit- 4.0**
**Water Resources Engineering**                                                    **7hrs**
Fluid Properties and Type of Fluid Flow Wave and Current System Sediment Transport System Water Resources Structure Water Treatment and Supply.
**Unit- 5.0**
**Traffic and Transport Engineering**                                              **7hrs**
Introduction to different modes of Transportation. Major Transport Infrastructure in India. Introduction to Geometric Design. Pavement Materials, Design and Construction Basic of Traffic Engineering Road Safety Role of PPP model in transportation.
**Unit- 6.0**
**Miscellaneous**                                                                  **7hrs**
Sustainability in Construction. Construction Management. Contract Management Software used in Civil Engineering. Automation and Robotics in Civil Engineering.

**Test/ Reference:-**
1. Basic Civil Engineering, B. C. Punmia, Ashok Kumar, Jain, Arun Kumar Laxmi Publications
2. Basic Civil Engineering, Satheesh Gopi, Pearson Publishers ISBN 978-81-317-2988-5
3. Basic Civil Engineering, Palanichamy, McGraw Hill

## Course Code-100106    Basic Electrical Engineering    3 0 0 3

**Unit- 1.0**                                                                                   **8 hrs**

DC Circuit Analysis and Network Theorems: Concepts of Network, Active and Passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements. R L and C as linear elements. Source Transformation. Kirchhoff's Law, loop and nodal methods of analysis; star – delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem. (Simple Numerical Problems)

**Unit- 2.0**                                                                                   **5 hrs**

Magnetic Circuit: Magnetic circuit concepts, analogy between Electric & Magnetic circuits, Magnetic circuits with DC and AC excitation, Magnetic leakage. B-H curve, Hysteresis and Eddy Current losses, Magnetic circuit calculations.

**Unit- 3.0**                                                                                   **8 hrs**

Steady State Analysis of Single-Phase AC Circuits: Sinusoidal, Square and Triangular waveforms–average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel, and series – parallel RLC Circuits: Apparent, Active & Reactive Powers, Power factor, causes and problems of low power factor, power factor improvement. Resonance in Series and Parallel Circuits. (Simple Numerical Problems)

**Unit- 4.0**                                                                                   **5 hrs**

Three Phase AC Circuits: Three Phase System – its necessity and advantages, meaning of phase sequence and star and delta connections, balanced supply and balanced load, line and phase voltage/ current relations, three phase power and its measurement. (Simple Numerical Problems)

**Unit- 5.0**                                                                                   **10 hrs**

Introduction to DC Machines:Principal, Operation, Construction, and types of DC machines, e.m.f. equation of generator and torque equation of motor.

Single Phase Transformer: Principle of Operation, Construction, e.m.f. equation, losses in transformer, efficiency.

Three Phase Induction Motor:Principal, Operation, and Construction (Simple Numerical Problems)

**Unit- 6.0**                                                                                   **6 hrs**

Soldering- Soldering and desoldering techniques, breadboard wiring, general-purpose PCB soldering/wiring.

Wiring-Types of residential and commercial wiring systems, general rules and guidelines for installation, loadcalculation and sizing of wire, rating of main switch, distribution board.

**Test/ Reference:-**

1. Basic Electrical Engineering, D.P. Kothari et al,McGraw-Hill Education 4th Edition,2019
2. Electrical and Electronic TechnologyEdward Hughes, 12th edition, 2016
3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company 2nd edition, 2015
4. Basic Electrical Engineering, J. B. Gupta, Katson Publication
5. A textbook of Electrical Technology B. L. Thereja, A. K. Thereja  Vol. 1, 2, and 3 S Chand Publication

**Course Code-100106P   Basic Electrical Engineering Lab          0 0 2 1**
**Perform all 10 Experiments**

1.  Verification of Kirchhoff's laws.
2.  Verification of Superposition Theorem.
3.  Verification of Thevenin's Theorem.
4.  Verification of Norton's Theorem.
5.  Verification of Maximum Power Transfer Theorem.
6.  Measurement of power in 3 – Ø circuit by Two Watt meter method and determination of its power factor.
7.  Star to Delta and Delta to Star conversion of the three circuit.
8.  Determination of Efficiency by load test of a 1 – Ø Transformer.
9.  To study the typical BHK house wiring
10. Study of safety precautions while working on electrical installations and necessity of earthing

## Course Code-100206     Workshop Practices     2 0 0 2

**Unit-1**

**Sheet Metal Working:**                                                      **6 hrs**

Sheet material: GI sheets, aluminium, tin plate, copper, brass etc; Tools: steel rule, vernier callipers, micrometer, sheet metal gauge, scriber, divider, punches, chisels, hammers, snips, pliers, stakes etc.; operations: scribing, bending, shearing, punching etc; Product development: hexagonal box with cap, funnel etc.

**Unit-2**

**Joining:**                                                                      **6 hrs**

Classifications of joining processes; Brazing, Soldering, and Mechanical Joints, Arc welding, Gas welding etc.

**Unit-3**

**Pattern Making and Foundry Practice:**                                **6 hrs**

Pattern material: wood, cast iron, brass, aluminium, waxes etc.; Types of patterns: split, single piece, match plate etc; Tools: cope, drag, core, core prints, shovel, riddle, rammer, trowel, slick, lifter, sprue pin, bellow, mallet, vent rod, furnace etc. Moulding sands: green sand, dry sand, loam sand, facing sand etc., Sand casting: Sand preparation, mould making, melting, pouring, and cleaning

**Unit-4**

**Fitting Shop**                                                                **10 hrs**

Introduction to Fitting; Fitting Tools: Files and their classification, Holding Tools, Cutting Tools, Measuring and Marking Tools, Thread Making Tools, Various Fitting Power Tools; Methods Of Filing: Cross Filling and Draw Filing, Other associated operations Marking. Sawing and Chipping; Safety and Precautions in Fitting Shop.

**Unit-5**

**Carpentry Shop**                                                              **7 hrs**

Introduction to Carpentry Shop; Types of Wood; Seasoning of Wood: Ty[es of Seasoning Methods; Defects in wood; Structure of Wood; Car[entry Tools; Measuring Tools, Marking Tools, Cutting Tools, Planning Tools, Drilling and Boring Tools, Holding Tools, Striking Tools, Auxiliary tools and materials used in Carpentry; Wood working Processes; Carpentry joints; wood Working Machines: Wood Working Lathe, Circular Saw, Thickness Planer, Band  sawSafety and precautions in Carpentry Shop.

**Unit-6**

**Smithy Shop**                                                                 **5 hrs**

Introduction to Smithy Sho; Forging  Tools and Equipment; Forging Operations: Drawing, Upsetting, Swaging, Punching, Drifting, Fullering, Bending; Hot Working Processes: Rolling, Drop Forging, Press Forging, Hot  Extrusion, Hot Drawing, Cold Working Process, Safety and Precautions in Smithy Shop.

**Test/ Reference:-**

1.  Hajra Choudhury S.K., Hajra Choudhury A.K. And Nirjhar Roy S.K., "ElementsOf Workshop Technology", Vol. I 2008 And Vol. Ii 2010, Media PromotersAnd Publishers Private Limited, Mumbai.

2.  Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering AndTechnology", 4th Edition, Pearson Education India Edition, 2002.

3.  Gowri P. Hariharan And A. Suresh Babu,"Manufacturing Technology – I"Pearson Education, 2008.

4.  Roy A. Lindberg, "Processes And Materials Of Manufacture", 4th Edition,Prentice Hall India, 1998.

5.  Rao P.N., "Manufacturing Technology", Vol. I And Vol. Ii, Tata McgrawhillHouse, 2017.

**Course Code-100206P      Workshop Practices Lab      0 0 2 1**
**Perform all Experiments**

**List of Practical:**

1. Learn and apply of different fitting tools –like work holding, marking, measuring, cutting, finishing and miscellaneous. Student will also prepare the report with sketch, specifications and applications of fitting tools demonstrated.
2. Prepare one simple and another male-female type fitting jobs as per given drawings- 2 jobs
3. Learn and apply of different tin smithy tools. Student will also prepare the report with sketch, specifications and applications of tin smithy tools demonstrated.
4. Learn and apply of welding equipments and making minimum one model.
5. Learn and apply of foundry tools and making minimum one model.
6. Learn and apply of carpentry tools and making minimum one model.
7. Learn and apply of Sheet Metal tools and making minimum one model.
8. Learn and apply of Lathe Tools & operations for making a job.
9. Learn and apply the application of measuring tools.
10. Learn and apply any casting process for making a model

## Course Code-100209 Basic Electronics 3 0 0 3

**Unit- 1.0**

**Semiconductor diode** **9 hrs**

Intrinsic and extrinsic types, energy band in intrinsic and extrinsic Semiconductor, equilibrium carrier concentration Direct and indirect band-gap semiconductor. Ideal diode Construction, p-n junction under open circuit, drift, and diffusion current, built in potential, forward bias, and reverse bias condition. Effect of temperature, static and dynamic resistance, breakdown mechanism in diode, Junction capacitance. Zener diode Working, VI characteristics Light emitting Diode, Photodiode, Solar cell.

**Unit- 2.0**

**Diode Applications** **7 hrs**

Half wave rectifiers, Full wave rectifiers & Rectifier with filters, Zener diode application as voltage regulator, Clipping and Clamping circuits, Voltage doubler (includes numerical on rectifier, filter, and Zener regulator)

**Unit- 3.0**

**Bipolar Junction Transistor** **8 hrs**

BJT introduction: Construction, Symbol, and types (PNP and NPN), working of BJT, BJT configuration and characteristics, Load line analysis, Operating point, Need for Biasing, different Biasing circuits, Bias stability. BJT as a switch &Amplifier, low frequency small signal model of BJT, CE amplifier with and without feedback

**Unit- 4.0**

**Field Effect Transistor** **6hrs**

General characteristics of FET; Comparison between FET & BJT; JFET: Construction, Principle of Operation, Shockley equation. Outputand transfer characteristics; Depletion & Enhancement Type MOSFET: Construction, Principle of operation. Output and transfer characteristics;

**Unit- 5.0**

**Operational Amplifier** **6 hrs**

Block diagram of an Operational amplifier, schematic symbol, characteristics of an ideal and practical operational amplifier, concept of virtual ground, Inverting and non-inverting amplifier, voltage follower, adder, subtractor, integrator and differentiator.

**Unit- 6.0**

**Fundamental of Digital Electronics** **6 hrs**

Introduction to number system: octal, Hexadecimal, Binary numbers, Binary addition using 1's and 2's complement method. logic gates, Universal gates, Boolean Algebra, De Morgan's theorems, Simplification, and realization of Boolean expression using basic gates and NAND gates.

**Test/ Reference:-**
1. Electronic Device & Circuit theory Boylestad and Nashelsky Pearson
2. Electronic Principles Albert Malvino & Davis J. Bates TMH
3. Digital logic and computer design M. Morris Mano PHI
4. Electronic Devices and Circuit David A Bell Oxford
5. Microelectronic Circuit: Theory and Application Sedra and Smith Oxford

## Course Code-100209P    Basic Electronics Lab      0 0 2 1
### Perform any 10 Experiments

1. Study of Cathode Ray Oscilloscope (CRO) (a) Measurement of amplitude, time period and frequency of unknown continuous signals.
2. Identification of active and passive component.
3. Study the characteristics of P-N junction diode under (a) Forward bias, and (b) Reverse bias.
4. Study of clipping circuits and clamping circuits.
5. To recognize a half -wave rectifier and full-wave rectifier using sinusoidal voltage.
6. Study of Full wave rectifier using Capacitor filter.
7. To recognize voltage regulator using Zener diode.
8. Study of the input and output characterization of common base (CB) bipolar junction transistor.
9. Study the input and output characterization of common emitter (CE) bipolar junction transistor.
10. Study the output and transfer characteristics of JFET (Junction field effect transistor)
11. Study of operational amplifier as (i) Inverting (ii) Non-inverting amplifier.
12. Study of operational amplifier as (i) Integrator (ii) Differentiator.
13. Construction and verification of all other gate (AND, OR, NOT, XOR) using only a) NOR gate b) only NAND gate.

## Course Code-100208        IT Workshop                        2 0 0 2

**Unit- 1.0**

PC HARDWARE(6 lectures):

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. Installation of OS. Basic Linux commands.

**Unit- 2.0**

INTERNET(4 lectures)

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus types, Protection from various threats.

**Unit- 3.0**

MICROSOFT WORD(4 lectures)

Overview of MS word features. Usage of Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word. Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

**Unit- 4.0**

LaTeX(6 lectures)

Word Orientation: Overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX  and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX.

Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

**Unit- 5.0**

MICROSOFT EXCEL( 4 lectures)

Overview of Excel Features Excel formulae & Functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions. Creating a Scheduler (Features: - Gridlines, Format Cells, Summation, auto fill, Formatting) Calculating GPA (Features: - Cell Referencing, Formulae and functions in excel.

**Unit- 6.0**

MICROSOFT POWER POINT( 4 lectures)

Overview of PowerPoint features, Insertion of images, slide transition, Custom animation, Hyperlinks.

**Test/ Reference:-**

1. The Complete Computer upgrade and repair book, Cheryl A Schmidt, 3rd edition, WILEY Dream tech
2. Introduction to Information Technology,   ITL   Education   Solutions   limited, Pearson Education.
3. PC Hardware – A,   Handbook – Kate J., Chase PHI
4. LaTeX Beginner's Guide, Stefan Kottwitz, Packt Publishing

**Course Code-100208P          IT Workshop Lab          0 0 2 1**

Unit- 1: PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Different types of printer.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Unit 2:

Task 1: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 2: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Task 3: Different commands of DOS and Linux.

Unit- 3:Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Unit- 4.0: LaTeX

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX  and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Unit- 5.0 :

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel

files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Unit- 6.0 :

Powerpoint:

Task 1: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts. Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

## Course Code-100107    Python Programming                    2 0 0 2

**Unit 1.0: Input and Output                                         6 Hrs**

Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language

**Unit 2.0: Control Flow statements,  Function and Loops         6 Hrs**

Control Flow Statements, The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elseif…else Decision Control Statement, Nested if Statement, Built-InFunctions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, The while Loop, The for Loop, The continue and break Statements.

**Unit 3.0:Strings                                                     3 Hrs**

Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

**Unit 4.0: Lists                                                       3 Hrs**

Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

**Unit 5.0:Dictionaries, Tuples and Sets                           5 Hrs**

Creating Dictionary, Accessing and Modifying key value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, Tuples and Sets, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozen set.

**Unit 6.0: Files                                                       5Hrs**

Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

**Test/ Reference:-**

1. Introduction to Python Programming, Gowrishankar S, Veena A ,1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. Python Data Science Handbook: Essential Tools for Working with Data, Jake VanderPlas, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Core Python Applications Programming, Wesley J Chun, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Python Programming A Modular Approach, SheetalTaneja, Pearson Publications
5. Programming and Problem Solving with Python, Ashok NamdevKamathane and Amit Ashok Kamathane Tata McGraw Hill Education (India) Private Limited

## Course Code-100107P   Python Programming Lab

**L-T-P: 0-0-2**                                                                                       **Credit: 1**

**List of Experiments-**

| S.No. | Name of program |
|---|---|
| **Input and Output** | |
| 1 | Write a program to demonstrate different number data types in Python. |
| 2 | Write a program to perform different Arithmetic Operations on numbers in Python. |
| 3 | Write a program to create, concatenate and print a string and accessing sub-string from a given string. |
| 4 | Create a variable "number" and assign an Integer to the number. Check the assigned Integer is "Positive" or "Negative". |
| 5 | Write a program to find the largest element among three Numbers. |
| 6 | Write a program to print the sum of all the even numbers in the range 1 - 50 and print the even sum. |
| 7 | Write a Program to display all prime numbers within an interval of 20 and 50. |
| **Variables and Functions** | |
| 8 | Write a program to swap two numbers without using a temporary variable. |
| 9 | Write a program to define a function with multiple return values. |
| 10 | Write a python program to find factorial of a number using Recursion. |
| 11 | Write a python script to print the current date in the following format "WED 09 02:26:23   IST 2020". |
| 12 | Write a Python program to convert temperatures to and from Celsius, Fahrenheit [Formula: c/5 = f-32/9]. |
| 13 | Write a Python script that prints prime numbers less than 20. |
| **Loops and Conditionals** | |
| 14 | Write a program to print the following patterns using loop:<br>*<br>**<br>***<br>**** |
| 15 | Write a program to print multiplication tables of 8, 15, 69. |
| 16 | Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder). |
| 17 | Write a python Program to print the Fibonacci sequence using while loop. |
| **Strings** | |
| 18 | Write a program to find the length of the string without using any library functions. |
| 19 | Write a program to check if two strings are anagrams or not. |
| 20 | Write a program to check if the substring is present in a given string or not. (use regular expressions) |
| **Lists** | |
| 21 | Write a program to perform the given operations on a list:<br> i. add   ii. Insert iii. slicing |
| 22 | Write a program to perform any 5 built-in functions by taking any list. |
| 23 | Write a program to get a list of the even numbers from a given list of numbers.(use only comprehensions). |
| 24 | Write a program to implement round robin. |
|  | Note: This routine to take a variable number of sequences and return elements from them in round robin till each sequence is exhausted. If one of the input sequences is infinite, this is also infinite.  e.g. if input is [1,2,3], (4,5) -> yield 1,4,2,5,3 one after the other. Use exception control and comprehensions to write elegant code. Hint: |

| | This requires you to understand variable arguments, lists, list copy, comprehensions, iterators, generators, exception handling, control flow etc. |
|---|---|
| **Tuples** | |
| 25 | Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples. |
| 26 | Write a program to return the top 'n' most frequently occurring chars and their respective counts.<br>e.g. aaaaabbbbcccc, 2 should return [(a 5) (b 4)] |
| **Sets** | |
| 27 | Write a program to count the number of vowels in a string (No control flow allowed). |
| 28 | Write a program that displays which letters are present in both strings. |
| 29 | Write a program to sort given list of strings in the order of their vowel counts. |
| **Dictionaries** | |
| 30 | Write a program to generate a dictionary that contains numbers (between 1 and n) in the form of (x, x*x). |
| 31 | Write a program to check if a given key exists in a dictionary or not. |
| 32 | Write a program to add a new key-value pair to an existing dictionary. |
| 33 | Write a program to sum all the items in a given dictionary. |
| **Files** | |
| 34 | Write a program to sort words in a file and put them in another file. The output file should have only lower case words, so any upper case words from source must be lowered. (Handle exceptions) |
| 35 | Write a program to find the most frequent words in a text. (read from a text file). |

**Additional Programs:**
1. Write a program to check whether a given number has an even number of 1's in its binary representation (No control flow allowed).
2. Write a program to implement user defined map() function.
3. Write a program to return a list in which duplicates are removed and the items are sorted from a given input list of strings.
4. Write a program to implement left binary search.
5. Write a program to change days to hours, hours to minutes and minutes to seconds using currying of composition of functions.
6. Write a program to generate an infinite number of even numbers (Use generator)
7. Write a program to convert a given iterable into a list. (Using iterator)
8. Write a program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.

**TextBooks:**
1. Y. Daniel Liang, Introduction to programming using Python, 1st Edition,Pearson Publications, 2017.
2. Sheetal Taneja, Python Programming A Modular Approach ,1st Edition Pearson Publications, 2017.
3. Brett Slatkin (C), Effective Python: 59 Specific Ways to Write Better Python, I/C, 1st Edition Pearson Publications, 2015.

4.  Ashok Namdev Kamathane and Amit Ashok Kamathane, Programming and Problem Solving with Python , 1st Edition, McGraw Hill Education (India) Private Limited, 2017.

**REFERENCE BOOKS:**
1.  Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2.  Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3.  Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4.  Think Python, Allen Downey, Green Tea Press
5.  Core Python Programming, W. Chun, Pearson
6.  Introduction to Python, Kenneth A. Lambert, Cengage

## Course Code-100108     Introduction to Web Designing     3 0 0 3

**Unit- 1.0**

Fundamentals of Internet and Web Technologies Lecture [51 Web Basics and Overview: Introduction to Internet, World Wide Web, History of the web, Website, Homepage, Domain Narne, Web Brolvsers and Web server, Web Server Working, Client-Server Architecture, 3-Tier Web Architecture, Web hosting, URL, MIME, HTTP protocol, Web Programrners Toolbox.

**Unit- 2.0**

Introduction to HTML: Elements and Structure Lecture [7] lntroduction to html: Fundamentals of HTML elements, History of HTML, Document body, Different tags, sections, text, heading, paragraphs, hyperlink, lists, tables, color coding and images, Div and Span Tags for grouping, character entities, URL Encoding, frames, and frame sets.

**Unit - 3.0**

HTML Forms and Multimedia Integration Lecture [51 HTML form, Form Elements, Form Attributes, HTML canvas, embedding audio and video in a webpage, HTML Vs XHTML.

**Unit- 4.0**

Introduction to CSS: Styling and Layouts Lecture [8] Need for CSS, introduction to CSS, basic syntax and structure, External Style Sheets, Internal Style Sheets, lnline Style, CSS Selectors, div & span tag, CSS Color, CSS Backgrounds, Borders, Margins, Padding. Box Model, Heightiwidth, outline, Text, Font, Tables, CSS Buttons, CSS Display, CSS Float & Clear, CSS Overflow.

**Unit- 5.0**

JavaScript Basics: Scripting and Control Lecture [8] Java Script: [ntroduction to Client-side Scripting, w-hat can JavaScript Do, Need of JavaScript, Enhancing HTML Documents with JavaScript; the Building Blocks: Data types, variables, Types of Operators, Operator Precedetrce, Type conversion; Conditional statement irr .lavaScript: if else, and else il, Switch statement; Loops in JavaScript: for, while, do/while, break, continue.

**Unit- 6.0**

Advanced JavaScript: Objects and Events Lecture [9] Advanced JavaScript: Objects in JavaScript (array, number, string. Boolean); event handling (e.g., onclick, onsubniit); error liandling: JavaScript scope; responsive modal forrns; form validation.

**Test/ Reference:-**

1. Beginning Web Prograrnming with HTML, XHTML, and CSS., Jon Duckett, Publisher(s): WROX ISBN:9780470259313
2. JavaScript: The Definitive Guide, 6th Edition, David Flanagan, Publisher(s): O'Reilly Media, Inc. ISBN: 978059680552
3. lnternet & World Wide Web: How to Program, Fourth Edition, H. M. Deitel- Deitel& Associates, Inc., P. J. Deitel - Deitel & Associates, Inc, Publisher(s): Pearson ISBN: 9780 I 36085645
4. Internet and Web Technologies, Kamal Raj, Publisher: McGraw Hill Education India ISBN: 9780070472969, 9180070472969

## Course Code-100108P   Introduction to Web Designing Lab            0 0 2 1

1.  Design a home page which displays information about your college department using heading, HTML entities and paragraphs.  Implement diffbrent types of list tags in the college department home page.  Create a webpage for any clinic using marquee and HTML formatting ta-es.  Create an image(s) and iframe in a webpage.
2.  Create a Hyperlink in home page connecting it to 3 different pages. Design a webpage using HTML that includes an image map, and embeds audio and video. Design a time-table and display it in a tabular format. iv. Design an admission form for any course in your college with text, password fields, drop-down list, check-boxes, radio button, submit, and reset button.
3.  Design a static webpage using HTML to co-2, co-3 create a frameset with header, navigation, and content sections.  Create a webpage with a frameset divided into 3 frames: 20oh onthe left for page contents, 60% tt the center for the main body, and 20o/o on the right for remarks.  Create a web page multiple types of style sheet used in a single page
4.  Create a catalogue for an online shopping company that sells electronic items using CSS. Design a webpage of your hornetown with an attractive background color, text font, and an image using inline CSS formatting Create a student web form for enterning student information. Design a library webpage using different CSS border styles and the CSS box model.
5.  Write a JavaScript program: Find the largest among three numbers. Calculate the factorial of a number. Check whether a given number is an Armstrong number. Find the sum of natural numbers using recursion. v. Check whether a string is a palindrome. Convert a decimal number to binary.
6.  Write a JavaScript program: To design a scientific calculator with event handling for each button. To compute the squares and cubes of numbers ffom 0 to 10, and display the results in an HTML table format.
7.  Write JavaScript to validate the following fields of the registration page:  Name: Must contain only alphabets and be at least 6 characters long.  Password: Must be at least 6 characters long.  E-mail ID: Must follow the standard pattern name@domain.com and not contain inval id characters. Phone Number: Must contain exactly l0 digits

## Course Code-100204    Elements of Mechanical Engineering    3 0 0 3

**Unit- 1.0**                                                                                   **6hrs**

**Energy Resources:**

Renewable or non-conventional sources of energy, their origin and various forms-solar, wind. Biogas and biomass energy, their merits & demerits, major applications-brief description Non-renewable or non-renewable or conventional sources of energy: the fossil fuel. Coal, petroleum and natural gas.

**Unit- 2.0**                                                                                   **4hrs**

**Review of Basic Concepts Of Thermodynamics:**

Thermodynamics system, properties, state, processes and cycles. Heat, work and internal energy.

**Unit- 3.0**                                                                                   **4hrs**

**Steam Generators:**

Types of boilers, water-tube and fire-tube boilers-their merits and demerits, boiler mountings and accessories-simple description.

**Unit- 4.0**                                                                                   **8hrs**

**Basic Concept of Refrigeration And Air Conditioning:**

Principles of working or vapour compression, vapour absorption and air refrigeration; principles of air conditioning systems.

**Unit- 5.0**                                                                                   **10hrs**

**Prime Movers:**

Simple steam turbine, gas-turbine, IC engines (SI and CI), their brief description and principles of working.

**Power Plant:**

principles of working of thermal, hydel and nuclear power plants, work output and efficiency.

**Unit- 6.0**                                                                                   **6hrs**

**Engineering Materials and Their Properties:**

Ferrous and non-ferrous metals: Mechanical properties e.g. strength, hardness, resilience etc.

**Heat Treatment of Steel:**

Annealing, tempering, quenching, case-hardening etc.

**Test/ Reference:-**

1. Basic Mechanical Engineering, By T J Prabhu,
2. Element of Mechanical engineering, J.K .Kitlur, G.D.Gokak
3. Basic Mechanical Engineering, By Sadhu singh,
4. Element of Mechanical engineering, S. N. Lal

## Course Code-100204P Elements of Mechanical Engineering Lab    0 0 2 1
**Perform all Experiments**

1. Demonstrate & study of steam boilers and its mounting & accessories.
2. Demonstrate & study the working of SI internal combustion Engines &its components.
3. To learn the mechanical properties of engineering materials.
4. To learn the working of steam power plant.
5. To learnt the working of vapour compression refrigeration system.
6. To learn the working of impulse  steam turbines.
7. To study the working of gas turbines.
8. To learn the working of reaction steam turbines
9. To learnt the working of vapour absorption refrigeration system.
10. Demonstrate & study the working of CI internal combustion Engines &its components.

**Course Code-100207          Food Chemistry          3 0 0 3**

**Unit-1.0 Carbohydrate Metabolism                                    7 hrs**
1.1 General formula, Definition, Classification of carbohydrates – Monosaccharides, oligosaccharides and polysaccharide, Open and cyclic structure of glucose.
1.2 Structure of disaccharides- Maltose and Sucrose.
1.3 Polysaccharides- general introduction to their source and structure of starch, cellulose, and glycogen.
Metabolic pathways for breakdown of carbohydrates: Glycolytic pathway, Pentose phosphate pathway, Citric acid cycle, Electron transport chain, ATP balance, Gluconeogenesis.

**Unit-2.0 Protein Metabolism                                    7 hrs**
2.1 Amino acids, Classification of amino acids (acidic, basic and neutral).
2.2 Structure of protein (fibrous, globular, tertiary and quaternary structure of protein).
2.3 Properties of proteins- Amphoteric, Isoelectric point, hydrolysis, denaturation, Coagulation, introduction to Casein protein in milk.
2.4 Separation of amino acids by Chromatographic method (paper, thin layer chromatography).
2.5 Metabolism of proteins- digestion, absorption of dietary proteins and removal of nitrogen from amino acids.
2.6 Urea cycle.

**Unit-3.0 Lipid Metabolism                                    7 hrs**
3.1 Definition, structure, Classification of lipids, simple lipids -fats and oils.
3.2 Saponification, Iodine value, fatty acids, derived lipids -steroids-cholesterol, good cholesterol-high density cholesterol and bad cholesterol-low density cholesterol.
Metabolism of lipids- absorption, lipolysis, β-oxidation, ketogenesis and lipogenesis.

**Unit-4.0 Enzymes                                    7 hrs**
4.1 Concepts, Classification, Physico-   chemical nature.
4.2 Mechanism of enzyme action, Enzyme kinetics (MME and their transformations).
4.3 Factors affecting enzyme activity, Enzyme inhibition, Enzyme specificity, Co-factors.
4.4 Basic concepts on lysozymes & Isozymes, Enzyme unit, Turn over number.
Allosteric enzyme.

**Unit-5.0 Food Additives                                    7 hrs**
5.1 Introduction to uses, advantages and harmful effects of food additives with few examples: -
- Preservatives,
- flavoring agents,
- essence,
- sweetening agents,
- Antioxidants,
- thickeners and gelling agents,
- emulsifiers,
- colors (natural and synthetic),
- bleaching agents,
- anti-caking agents,
- acidity regulators-acid, bases, and buffers.

5.2 Food Adulteration and its prevention.

**Unit-6.0 Vitamins and Minerals**            **7hrs**

6.1 Vitamins: Fat soluble and water-soluble vitamins (A, B1, B6, B2, B12, C, D, E, K), sources and deficiency diseases.

6.2 Minerals: Types of minerals, importance of Minerals like Na, K, Fe, I, Zn, their functions, sources, effects of excessive mineral consumption.

Dietary supplements-definition and examples, harmful effects of high dose of dietary supplements.

**Course Code- 100207P**        **Food Chemistry Lab**               **0 0 2 1**
**Perform any 10 Experiments**

1.    Detection of reducing sugar and non-reducing sugars using Fehling's solution.
2.    Estimation of reducing sugar and total reducing sugar in given food sample by Lane and Eynon method.
3.    Estimation of lactose in milk sample by titrimetric method
4.    Identify amino acids in a mixture by thin layer chromatography.
5.    Detection of presence of proteins- Biuret test, Ninhydrin test and Xanthoproteic test.
6.    Detection of coagulation process of proteins using heating method and Chemical methods- using vinegar and Copper Sulphate in food (egg/milk).
7.    Estimation of saponification value of fats and oils.
8.    Estimation of iodine value of fats and oils.
9.    Detection of presence of fats in the given food sample- solubility test, spot test, Acrolein test and Baudouin Test.
10.    Detection the effect of pH and temperature on hydrolysis of starch by salivary amylase.
11.    Estimation of concentration of sodium benzoate in fruit juice.
12.    Determination of maximum use level of given food additives in particular food as per FSSAI.

# Course Code -100213    Introduction to Chemical Engineering 3 1 0 4

**Unit-1.0 Overview of Chemical Engineering**                    **7hrs.**
Definition, history, scope and features of Chemical Engineering, Role of chemical engineers, Major inventions, Greatest achievements and famous personalities of chemical engineering.

**Unit- 2.0 Components of Chemical Engineering**                 **7hrs.**
Role of Chemical Engineers in Food, Medical, Energy, Environmental, Biochemical, Electronics etc, Role of Physical, Mathematics & Biological Sciences, Thermodynamics, Transport Phenomenon, Chemical Kinetics, Process Dynamics, Design and control.

**Unit-3.0 Chemical Process Industries**                         **7hrs.**
Role of Computer in Chemical Engineering; Chemical Engineering Software; Relation between Chemical Engineering and other engineering disciplines, Evolution of chemical industries, Technological developments in major challenges; Chemical industries structure and segments of chemical industry, raw material and production pattern.

**Unit-4.0 Unit Operation**                                      **7hrs.**
Introduction, Mechanical Separations, Fluid flow operations, Heat transfer operations, Mass transfer operations, Simultaneous heat & mass transfer operations.

**Unit-5.0 Unit Processes in Chemical Industry**                 **7hrs.**
Introduction, Nitration process, Halogenations process, Alkylation's process, Sulfonation process, Amination process, Polymerization process, Oxidation process, Hydrogenation process.

**Unit- 6.0 Industrial Safety**                                  **7hrs.**
General aspects of industrial safety, Industrial accident, Direct & indirect losses due to accidents, Mechanical, electrical, and chemical accidents & preventions, Anatomy of fire, Various steps for controlling fire hazards, Various fire extinguishers used for firefighting, Storage handling & transportation of dangerous materials, Personal protective devices used for safety, Significance of color coding, Industrial safety act 1948, Material safety and data sheet.

**Text/Reference:-**
1. Introduction to Chemical Engineering, Anderson, L.B., Wenzel, L.A. McGraw-Hill Book Company, Inc., New York (1961).
2. Introduction to Chemical Engineering, Pushpavanam, S., PHI Learning Pvt. Ltd.(2012).
3. Introduction to Chemical Engineering, Ghosal, S.K., Sanyal, S.K., Datta, S. Tata McGraw-Hill Publishing Company Ltd., New Delhi(1997).

# Course Code -100205
## Introduction to the Leather and chemical technology 3 1 0 4

**Unit- 1.0**                                                  **8 hours**
### Statistical analysis of hide and leather industries
Livestock population, animal mortality and availability of hides and skins in India. Statistical analysis of leather Industries, Leather, Leather products (National &. International Scenario) .

**Unit- 2.0**                                                  **7 hours**
### Preservation process for Hides/skin
General principles involved in raw hide and skin preservation, assortment and their processing.

**Unit- 3.0**                                                  **5 hours**
### Analysis of Hide/skin
Chemical constituents of hides and skins, Structural analysis of hide and skin Defects in leather.

**Unit- 4.0**                                                  **8 hours**
### Leather processing
Introduction to Pre tanning, tanning and post tanning operations.

**Unit- 5.0**                                                  **7 hours**
### Role of a chemical Engineer
Introduction, Chemical Engineering in everyday life, Role of Chemical Engineer, Challenges in the leather and chemical sector, environmental engineering. Opportunities for Chemical Engineers.

**Unit- 6.0**                                                  **7 hours**
### Modern Chemical Engineering plants
Introduction, Idea of unit operation and unit processes, Description of different Unit Processes and Unit Operations, Introduction of Chemical process industries with reference to Indian resources, trade and export potential, Chemical Engineering related plants.

## Taxt/References:-
1. An introduction to the principles of leather manufacture, S.S. Dutta, ILTA.
2. Introduction to Chemical Engineering, S.PUSHPA VANAM, PHI.
3. Unit Operations of Chemical Engineering, McCabe Smith, McGraw Hill.
4. Dryden's Outlines of Chemical Technology for the 21st Century - III$^{rd}$ ED, Rao Gopala M., Affiliated East-West Press.
5. Introduction to Chemical Engineering, Badger & Banchero, McGraw Hiil.