

**13. Courses of Study and Scheme of Assessment
ME CONTROL SYSTEMS**

**(2021 REGULATIONS)
(Minimum No. of credits to be earned: 70*)**

| Course Code | Course Title | Hours / Week | | | Credits | Maximum Marks | | | CAT |
|---------------------------------------------------------|----------------------------------------|--------------|----------|-----------|-----------|---------------|------------|------------|-----|
| | | Lecture | Tutorial | Practical | | CA | FE | Total | |
| I SEMESTER | | | | | | | | | |
| 21UC01 | Mathematics of Systems Engineering | 2 | 1 | 0 | 3 | 50 | 50 | 100 | PC |
| 21UC02 | Smart Sensors and Data Networks | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 21UC03 | Dynamical Systems and Control | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 21UC04 | Process Control and Automation | 4 | 0 | 0 | 4 | 50 | 50 | 100 | PC |
| 21UC05 | Applied Digital Signal Processing | 4 | 0 | 0 | 4 | 50 | 50 | 100 | PC |
| 21UC61 | Research Methodology and IPR | 2 | 0 | 0 | 2 | 50 | 50 | 100 | RMC |
| 21UC72 | Audit Course – I | 2 | 0 | 0 | Grade | 100 | 0 | 100 | MC |
| 21UC51 | Systems and Control Laboratory | 0 | 0 | 4 | 2 | 50 | 50 | 100 | PC |
| 21UC52 | Process Automation Laboratory | 0 | 0 | 4 | 2 | 50 | 50 | 100 | PC |
| Total 30 hrs | | 20 | 2 | 8 | 24 | 500 | 400 | 900 | |
| II SEMESTER | | | | | | | | | |
| 21UC06 | System Identification | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 21UC07 | Embedded Control Systems | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 21UC__ | Professional Elective – I | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC__ | Professional Elective – II | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC__ | Professional Elective – III | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC82 | Audit Course – II | 2 | 0 | 0 | Grade | 100 | 0 | 100 | MC |
| 21UC53 | Embedded Control Systems Laboratory | 0 | 0 | 4 | 2 | 50 | 50 | 100 | PC |
| 21UC54 | Advanced Control Laboratory | 0 | 0 | 4 | 2 | 50 | 50 | 100 | PC |
| 21UC55 | Industrial Visit and Technical Seminar | 0 | 0 | 4 | 2 | 50 | 50 | 100 | EEC |
| Total 30 hrs | | 17 | 1 | 12 | 22 | 500 | 400 | 900 | |
| III SEMESTER | | | | | | | | | |
| 21UC__ | Professional Elective – IV | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21____ | Open Elective | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE |
| 21UC71 | Project Work I | 0 | 0 | 12 | 6 | 50 | 50 | 100 | EEC |
| Total 18 hrs | | 6 | 0 | 12 | 12 | 150 | 150 | 300 | |
| IV SEMESTER | | | | | | | | | |
| 21UC81 | Project Work II | 0 | 0 | 24 | 12 | 50 | 50 | 100 | EEC |
| Total 24 hrs | | 0 | 0 | 24 | 12 | 50 | 50 | 100 | |
| PROFESSIONAL ELECTIVE COURSES (Four to be opted) | | | | | | | | | |
| 21UC21 | Nonlinear Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC22 | Optimal Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC23 | Adaptive Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC24 | Robust Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |

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|------------------------------------------------|-------------------------------------------------|---|---|---|---|----|----|-----|----|
| 21UC25 | Industrial Drives and Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC26 | Sliding Mode Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC27 | Fault Diagnosis and Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC28 | Multivariable Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC29 | Model Predictive Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC30 | Advanced PID Controllers | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC31 | State Estimation | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC32 | Optimization Techniques | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC33 | Applied Machine Learning for Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC34 | Mathematical Methods for Process Data Analytics | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC35 | Automotive Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC36 | Flight Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC37 | Control of Unmanned Aerial Vehicle | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC38 | Electric Vehicle Control | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC39 | Robotic Systems | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC40 | Machine Vision | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC41 | Industrial Cyber Physical Systems | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 21UC42 | Industrial Cyber security | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| OPEN ELECTIVE COURSES (One to be opted) | | | | | | | | | |
| 21UC91 | Energy Management Systems | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE |
| 21UC92 | Mathematics for Signal Analysis | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE |

* Indicated is the minimum number of credits to be earned by a student.

CAT – Category; PC – Professional Core; PE - Professional Elective; RMC - Research Methodology and IPR; EEC – Employability Enhancement Course; MC - Mandatory Course; Grade – Completed / Not Completed; OE – Open Elective.