**NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)**

**Affiliated to**

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW**

# Evaluation Scheme & Syllabus

For

## Minor Degree / Specialization

## in

## E-mobility

## School of Mechanical Engineering

**(Effective from the Session: 2023-24)**

**NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR**
**(AN AUTONOMOUS INSTITUTE)**

## Minor Degree / Specialization
## E-mobility

## EVALUATION SCHEME

| Sl. No. | Subject Codes | Subject Name | Period | | | Evaluation Scheme | | | | End Semester | | Total | Credit | Sem |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | AA | QZ | TOTAL | PS | TE | PE | | | |
| 1 | AMSEM0301 | Modern Automotive Technology | 3 | 0 | 0 | 25 | 25 | 50 | | 100 | | 150 | 3 | III |
| 2 | AMSEM0401 | Green Transportation Systems | 3 | 0 | 0 | 25 | 25 | 50 | | 100 | | 150 | 3 | IV |
| 3 | AMSEM0501 | Power drives and systems | 3 | 0 | 0 | 25 | 25 | 50 | | 100 | | 150 | 3 | V |
| 4 | AMSEM0601 | Smart Vehicles | 3 | 0 | 0 | 25 | 25 | 50 | | 100 | | 150 | 3 | VI |
| 5 | AMSEM0701 | Automotive Power Grids | 3 | 0 | 0 | 25 | 25 | 50 | | 100 | | 150 | 3 | VII |
| 6 | AMSEM0351 | Modern Automotive Technology Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 | III |
| 7 | AMSEM0451 | Green Transportation Systems Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 | IV |
| 8 | AMSEM0551 | Power drives and systems Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 | V |
| 9 | AMSEM0751 | Capstone Project | 0 | 0 | 2 | | | | 50 | | 50 | 100 | 2 | VII |
| | | GRAND TOTAL | | | | | | | | | | 1000 | 20 | |

**Abbreviation Used: -**

L: Lecture, T: Tutorial, P: Practical, AA: Assignment Assessment, QZ: Quiz, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

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# Branch wise Minor Degree / Specialization Details

| S.no. | Name of Minor Degree/Specialization | Streams/Branches of B.Tech. Programs whose students are eligible to opt for the Minor Degree | Streams/Branches of B.Tech. Programs whose students are eligible to opt for the Specialization |
|---|---|---|---|
| 1 | Artificial Intelligence and Machine Learning | All Branches except CSE and EC related Branches | CSE and EC related Branches |
| 2 | Data Science | All Branches except CSE and EC related Branches | CSE and EC related Branches |
| 3 | E-mobility | All Branches except ME related Branches | Only ME Branch |
| 4 | VLSI Design | All Branches except EC related Branches | Only EC Branch |

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# Guidelines for assessment of Minor Degree / Specialization Program

## For Theory Paper

| Internal (50) | | External (100) |
|---|---|---|
| **ASSIGNMENT (25)** | **QUIZ(25)** | |
| 5 Assignments of 5 marks each | 5 Quiz papers of 5 marks each | Theory Examination will be Conduct at the end of Semester |

## For Practical Paper

| Internal (25) | External (25) |
|---|---|
| On the basis of continuous Assessment | Practical Examination will be Conduct at the end of Semester |

| Course Code | AMSEM0301 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Modern Automotive Technology | 3 | 0 | 0 | 3 |

**Course objective:**

1. To understand Modern vehicles.
2. To know about basics of Modern vehicles Technologies.
3. To understand Energy Management.
4. To describe about Power Transmission & Control.
5. To elaborate various Safety & Emission Norms.

**Pre-requisites: Physics, Basic Electrical concepts, Basic Electronics**

**Course Contents / Syllabus**

| | | |
|---|---|---|
| **UNIT-I** | **Introduction** | **8 hours** |

Introduction and need of modern technologies; Components of mechanical module in modern vehicles; Engine management system**.**

| | | |
|---|---|---|
| **UNIT-II** | **Modern vehicles Technologies** | **8 hours** |

Working Principle of Hybrid Electrical Vehicles technologies, Fuel Cell technology, Full Electric vehicles and types, solar power vehicles.

| | | |
|---|---|---|
| **UNIT-III** | **Energy Management** | **8 hours** |

Batteries; Electric machines Electric motors; Components of electrical & electronics module; energy consumption & efficiency.

| | | |
|---|---|---|
| **UNIT-IV** | **Power Transmission & Control** | **8 hours** |

Vehicle system module; Braking system; ABS components and Operations, power steering, suspension systems, Clutch and differential gear box

| | | |
|---|---|---|
| **UNIT-V** | **Safety & Emission Norms** | **8 hours** |

Emissions control techniques, Indian emissions standards and regulations, Safety measures; Diagnostic system for modern vehicles.

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Understand the basic concepts of various systems used in automobile. | k2 |
| CO 2 | Understand the modern vehicle technologies and distinct types of vehicles. | k2 |
| CO 3 | Understand the principles and fundamentals of automotive electrical system and study their functions. | k2 |
| CO 4 | Understand the braking system and power transmission system- types & constructional features used in automobile. | k2 |
| CO 5 | Describe the principles and architecture of power and drive train and its components present in an automobile | k2 |

**Text books :**


1. "Modern Automotive Technology" by James E. Duffy
2. "Automobile Engineering", Dr. Kripal Singh.
3. "Automobile Engineering", R.B. Gupta, Satya Prakasan.
4. "Automobile Engineering", R.K. Rajput, Laxmi Publications (P) Ltd.


**Reference Books:**


1. Heldt P. M., "Automotive chassis", Chilton Co., New York.
2. Giles J.G., "Steering, Suspension and Tyres", Iliffe Book Co., London.
3. Heinz Heisler, "Advance vehicle Technology", Butterworth-Heinemann, 2002.
4. Newton and Steeds, "Motor vehicles", Life Publishers, 1985.
5. Crouse, W.H., Anglin, D.L.," Automotive Transmission and Power Trains construction", McGraw Hill,

| **Link:** NPTEL/ YouTube/ Faculty Video Link: | |
|---|---|
| **Unit 1** | https://www.youtube.com/watch?v=xCPINg7s1yY |
| **Unit 2** | https://www.youtube.com/watch?v=D-f0yVjYBRQ |
| **Unit 3** | https://www.youtube.com/watch?v=GeSY3oHHGAU |
| **Unit 4** | https://www.youtube.com/watch?v=uy9lZCdkQIM&list=PLD4ED2FAF3C155625 |
| **Unit 5** | https://www.youtube.com/watch?v=HBPtdm9lErI |

| Course Code | AMSEM0401 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Green Transportation Systems | 3 | 0 | 0 | 3 |

**Course objective:**

1. To understand Green Transportation Systems.
2. To know about basics of Modern Transport Planning
3. To understand Various Transportation Models
4. To describe about Transportation Strategies.
5. To elaborate various Green Transportation Infrastructures.

**Pre-requisites:**

**Course Contents / Syllabus**

| UNIT-I | Introduction | 8 hours |
|---|---|---|

Green Transportation: Introduction to Environmental Impact Assessment (EIA) and Transportation systems; Land-use plans, zoning schemes and provisions.

| UNIT-II | Modern Transport Planning | 8 hours |
|---|---|---|

Urban and regional transport planning Impacts on humans, flora and fauna, soil, water, air, climate and landscape, Airplanes, Railways, Metro, Ropeway, Tramways, Crane, Earth movers, Tractors, Commercial, Trucks & Buses.

| UNIT-III | Various Transportation Models | 8 hours |
|---|---|---|

Establishment of baseline conditions w.r.t soil, water and air quality; noise, air and water pollution modelling, Shipping, Bullet Trains, Magnetic Lavigation, Hyperloops.

| UNIT-IV | Transportation Strategies | 8 hours |
|---|---|---|

Modelling of impacts and scenario-based analysis; Assessment of potential project impacts including indirect, cumulative and synergistic impacts, Autonomous Vehicles, AI & ML applications, Fog security Systems.

| UNIT-V | Green Transportation Infrastructures | 8 hours |
|---|---|---|

Decision support systems for EIA of transport infrastructures; Abatement measures; Sustainable transportation systems, Hydrogen Fuel, Fuel Cells.

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Understand the current transport systems, their sustainability consequences, and how they can be transformed strategically to sustainability. | K2 |
| CO 2 | Describe in an overall way global sustainability challenges, policies and objectives that affect the development potential of the transport sector. | K2 |
| CO 3 | Describe current and possible future passenger and goods transport modes and their life cycles, and how they relate to strategic sustainable development | K2 |
| CO 4 | Describe current and possible future transport planning as a part of spatial planning for urban and rural development, transport management/governance, integration of different transport modes, and how they relate to strategic sustainable development. | K2 |
| CO 5 | Understand the various transportation strategies | K2 |

**Text books :**

1. Assessment & Decision Making for Sustainable Transport, European Conference of Ministers of Transport, OECD Publishing 2004.

2. Wood, C. and Wood, C., "Environmental Impact Assessment: A Comparative Review", Prentice Hall. 2002.

3. Petts, J., "Handbook of Environmental Impact Assessment", Blackwell Publishing. 1999

**Reference Books:**

1. Sucharov, L.J. and Baldasano, J.M., "Urban Transport and the Environment, Vol. II", Computational Mechanics Publications. 1996.

| | |
|---|---|
| 2. Zannetti P. (Ed.), "Environmental Modeling, Vol. I", Computational Mechanics Publication, Elsevier Applied Science. 1993. | |
| 3. Tumlin, Jeffrey (2012). Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy and Resilient Communities. Wiley, Hoboken, NJ. | |
| | |
| **Link:** NPTEL/ YouTube/ Faculty Video Link: | |
| **Unit 1** | https://www.youtube.com/watch?v=2M8FZiKQ798 |
| **Unit 2** | https://www.youtube.com/watch?v=OnjX0O9dPMc |
| **Unit 3** | https://www.youtube.com/watch?v=NwgjVFjmlws |
| **Unit 4** | https://www.youtube.com/watch?v=GJiaIcYuAlQ |
| **Unit 5** | https://www.youtube.com/watch?v=yDz5bRy7AgI |

| Course Code | AMSEM0601 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Smart Vehicles | 3 | 0 | 0 | 3 |

**Course objective:**

1. To understand Automated, Connected, and Intelligent Vehicles.
2. To know about basics of Remote Sensing and Wireless Technology.
3. To understand Wireless Networking and Connected Car Technology.
4. To describe about Vehicle Prognostics Technology and Autonomous Vehicles.
5. To elaborate various Troubleshooting and Maintenance of ADAS Systems.

**Pre-requisites: Physics, Basic Electrical concepts, Basic Electronics**

**Course Contents / Syllabus**

**UNIT-I** **Introduction to Automated, Connected, and Intelligent Vehicles** **8 hours**

Automotive Electronics, Infotainment, Body, Chassis, and Power Train Electronics, Advanced Driver Assisted Systems, Basic Control System Theory, Overview of ECU operation, Concept of Cyber-Physical Control Systems, Remote Sensing Technology, Wireless Networks and Autonomy.

**UNIT-II** **Remote Sensing and Wireless Technology** **10 hours**

Radar & Sonar, LIDAR – Multiple Beam, Cameras & Night Vision, Model Creation & Sensor Data Fusion, Wireless System Block Diagram, Transmission - Modulation/Encoding, Reception - Demodulation/ Decoding, Propagation, Transmission Lines, and Antennas, World-Wide Standards, Cellular and IEEE, Examples: DSRC, VANET, IEEE 802.11p.

**UNIT-III** **Wireless Networking and Connected Car Technology** **8 hours**

Basic Networking Concepts, Wireless Networking Fundamentals, IEEE802.11, 802.15, 802.16, and Cellular, Protocols and IP Addressing, Connection of On-Board Networks to Off Board, Review of On-Board Networks, Connectivity Fundamentals, Navigation and Other Applications, Vehicle-to-Vehicle (V2V), Vehicle-to-Roadside (V2R), Vehicle-to-Infrastructure (V2I), Wireless Security Issue.

**UNIT-IV** **Vehicle Prognostics Technology and Autonomous Vehicles** **8 hours**

Monitoring of Vehicle Systems – Advanced OBD, Basic Maintenance Functions, End-of-Life Predictions, ADAS Maintenance, Driverless Vehicle Technology, Artificial Intelligence and Deep Learning, Implementation Issues.

**UNIT-V** **Troubleshooting and Maintenance of ADAS Systems** **8 hours**

Failure Modes and Self Calibration, Sensor Testing and Calibration, Redundant Systems, Software Upgrades, Uber/Lyft Business Model, Trucking, Farming, Mining, Shipping and Rail, Military.

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Analyze the Automated, Connected, and Intelligent Vehicles. | K1, K2 |
| CO 2 | Evaluate Remote Sensing and Wireless Technology models. | K3, K4 |
| CO 3 | Explain the use of different Remote Sensing and Wireless Technologies. | K2, K3 |
| CO 4 | Analyze Vehicle Prognostics Technology and Autonomous Vehicles systems. | K3, K4 |

| | | |
|---|---|---|
| CO 5 | Relevant Troubleshooting and Maintenance of ADAS Systems. | K2, K3 |

**Text books :**

1. Ljubo Vlacic, Michel Parent, Fumio Harashima, "Intelligent Vehicle Technologies Theory and Applications" Boca Raton, CRC Press, 2001

2. Husain, I. "Electric and Hybrid Vehicles" Boca Raton, CRC Press, 2010.

3.Stuart Borlase 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.

**Reference Books:**

1. G. Mullett, Wireless Telecommunications Systems and Networks, Thomson – Delmar Learning, ISNB#1-4018-8659-0, 2006

**Link:** NPTEL/ YouTube/ Faculty Video Link:

| | |
|---|---|
| **Unit 1** | https://www.youtube.com/watch?v=HgF7E5q9sU4 |
| **Unit 2** | https://www.youtube.com/watch?v=N49PzLDUIFQ |
| **Unit 3** | https://www.youtube.com/watch?v=0FXHr1B8H7M |
| **Unit 4** | https://www.youtube.com/watch?v=gEy91PGGLR0 |
| **Unit 5** | https://www.youtube.com/watch?v=EiWl5PAtfYA |

| Course Code | AMSEM0501 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Power drives and systems | 3 | 0 | 0 | 3 |

**Course objective:**

1. To understand Automated, Connected, and Intelligent Vehicles.
2. To know about basics of Remote Sensing and Wireless Technology.
3. To understand Wireless Networking and Connected Car Technology.
4. To describe about Vehicle Prognostics Technology and Autonomous Vehicles.
5. To elaborate various Troubleshooting and Maintenance of ADAS Systems.

**Pre-requisites:** Physics, Basic Electrical concepts, Basic Electronics

**Course Contents / Syllabus**

| UNIT-I | Introduction | 8 hours |
|---|---|---|

Power Drives: Dynamics of Electric Drives: Fundamentals of torque equation, Speed torque convention and multi-quadrant operation, components of load torques

| UNIT-II | Power Drive Classifications | 8 hours |
|---|---|---|

Classification of load torques steady state stability. Load equation, Speed control and drive classification and close loop control of drives.

| UNIT-III | Various Power Drives | 8 hours |
|---|---|---|

DC motor Drives-Modelling of DC machines. Steady state characteristics with armature and speed control, Phase controlled DC motor drives, Chopper controlled DC motor drives.

| UNIT-IV | Various Power Drive Control Systems | 8 hours |
|---|---|---|

Poly-phase induction machines- Dynamic modelling of induction machines. Small signal equations, control characteristics of induction machines. Phase-controlled induction machines, Stator voltage control, Slip energy recovery scheme, frequency control and vector control of induction motor drives.

| UNIT-V | Power Machines | 8 hours |
|---|---|---|

Traction motor: Starting, Speed-Time characteristics, Braking, Traction motors used in practice. Industrial Drives-Digital Control of Electric Drives, Stepper motor, Servo motor, Solar drive, BLDC drive, PMSM drive, SRM drive and their specific applications.

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Model and simulate electric drive systems | K2 |
| CO 2 | Design modulation strategies of power electronics converters, for drives application | K2 |
| CO 3 | Design appropriate current/voltage regulators for electric drives | K2 |
| CO 4 | Select and implement the drives for Industrial Process | K2 |
| CO 5 | Implement various variable speed drives in Electrical Energy Conversion System | K2 |

**Text books :**


1. G.K, Dubey, "Power semiconductor controlled Drives", Prentice Hall international, New Jersey, 1989.
2. R.Krishanam, “Electric motor drives modeling, analysis and control”, PHI-India-2009
3. G. K. Dubey,“Fundamentals of electric Drives, Narosa Publishing House”, 2nd edition, 2011.


**Reference Books:**


1. W. Leonhard, “Control of Electrical drives”, Springer, 3rd edition, 2001.
2. P.C. Krause –, “Analysis of Electric Machine”, Wiley-IEEE press 3rdedition.
3. K. Bose,“Modern Power Electronics and AC Drives”, Prentice Hall publication, 1st edition, 2001.

| **Link:** NPTEL/ YouTube/ Faculty Video Link: | |
|---|---|
| **Unit 1** | https://www.youtube.com/watch?v=btNSMMednG0 |
| **Unit 2** | https://www.youtube.com/watch?v=E8f_h_6DIZc |
| **Unit 3** | https://www.youtube.com/watch?v=EaENkSSUK-k |
| **Unit 4** | https://www.youtube.com/watch?v=1AT1yuQ9awM&list=PLFW6lRTa1g83sIfVY1p1xGqPGYUmXyahx |
| **Unit 5** | https://www.youtube.com/watch?v=L6bq5U9tVt0 |

| Course Code | AMSEM0701 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Automotive Power Grids | 3 | 0 | 0 | 3 |

**Course objective:**

1. To understand hybrid electric vehicle
2. To know about basics of electric drives
3. To understand concept of energy storage
4. To describe about Energy management systems
5. To elaborate various Mobility and connectors

**Pre-requisites:** Physics, Basic Electrical concepts, Basic Electronics

**Course Contents / Syllabus**

| UNIT-I | Introduction to Hybrid Electric Vehicle | 8 hours |
|---|---|---|

Review of Conventional Vehicle: Introduction to Hybrid Electric Vehicles: Types of EVs, Hybrid Electric Drivetrain, Tractive effort in normal driving

| UNIT-II | Electric Drives | 10 hours |
|---|---|---|

Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor.

| UNIT-III | Energy Storage | 8 hours |
|---|---|---|

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles: - Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system, Design of Hybrid Electric Vehicle and Plug-in Electric Vehicle.

| UNIT-IV | Energy Management System | 8 hours |
|---|---|---|

Energy Management Strategies, Automotive networking and communication, EV charging standards, V2G, G2V, V2B, V2H. Business: E-mobility business, electrification challenges, Business- E-mobility business, electrification challenges.

| UNIT-V | Mobility and Connectors | 8 hours |
|---|---|---|

Connected Mobility and Autonomous Mobility- case study E-mobility Indian Roadmap Perspective. Policy: EVs in infrastructure system, integration of EVs in smart grid, social dimensions of EVs. Connectors- Types of EV charging connector, North American EV Plug Standards, DC Fast Charge EV Plug Standards in North America, CCS (Combined Charging System), CHAdeMO, Tesla, European EV Plug Standards,

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Analyze the grid system in hybrid electric Vehicles. | $K_1$, $K_2$ |
| CO 2 | Evaluate concept of electric drives | $K_3$, $K_4$ |
| CO 3 | Explain the use of different energy storages | $K_2$, $K_3$ |
| CO 4 | Analyze Vehicle energy management systems | $K_3$, $K_4$ |
| CO 5 | Relevant mobility and connectors. | $K_2$, $K_3$ |

**Text books :**

1. Emadi, A. (Ed.), Miller, J., Ehsani, M., "Vehicular Electric Power Systems" Boca Raton, CRC Press, 2003

2. Husain, I. "Electric and Hybrid Vehicles" Boca Raton, CRC Press, 2010.

3. Tariq Muneer and Irene IllescasGarcía, "The automobile, In Electric Vehicles: Prospects and Challenges", Elsevier, 2017

**Reference Books:**

| | |
|---|---|
| | |
| 1. Larminie, James, and John Lowry, “Electric Vehicle Technology Explained” John Wiley and Sons, 2012 | |
| 2. Sheldon S. Williamson, “Energy Management Strategies for Electric and Plug-in Hybrid | |
| 3. Electric Vehicles”, Springer, 2013 | |
| | |
| **Link:** NPTEL/ YouTube/ Faculty Video Link: | |
| **Unit 1** | https://www.youtube.com/watch?v=opvKyJ3DVJI |
| **Unit 2** | https://www.youtube.com/watch?v=1AT1yuQ9awM&list=PLFW6lRTa1g83sIfVY1p1xGqPGYUmXyahx |
| **Unit 3** | https://www.youtube.com/watch?v=9eAFEU7pMwU |
| **Unit 4** | https://www.youtube.com/watch?v=JABjhJHX8Tc |
| **Unit 5** | https://www.youtube.com/watch?v=ASU5nT3cTfs |

| Course Code | AMSEM0351 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Modern Automotive Technology Lab | 0 | 0 | 2 | 1 |

**Course objective:**

Students will be studying the experiments based on Modern Automotive Technology systems

**Pre-requisites: Student know the concept of Automobiles and systems.**

**Suggested list of Experiment Perform Ten experiment from the list of Experiment**

| S. No. | Name of Experiments |
|---|---|
| 1 | To Study Engine control units in modern Automobile systems |
| 2 | To Study Engine management techniques |
| 3 | To Study Engine cooling system of modern vehicles |
| 4 | To Study hybrid electric vehicle |
| 5 | To Study fuel cell technology |
| 6 | To Study solar power vehicles |
| 7 | To Study electric motors |
| 8 | To Study energy consumption and efficiency |
| 9 | Draw a flowchart of ABS components |
| 10 | To Study manual clutch and gear box |
| 11 | To Study power steering |
| 12 | To Study suspension systems |

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Understand the concept of Engine control | K2 |
| CO 2 | Understand the concept of Engine management | K2 |
| CO 3 | Understand the concept of Engine cooling system | K2 |
| CO 4 | Understand the concept of fuel cell technology | K2 |
| CO 5 | Understand the concept of electric motors | K2 |

**Link:** NPTEL/ YouTube/ Faculty Video Link:

| | |
|---|---|
| 1. | https://www.youtube.com/watch?v=dxv579W2G2c |
| 2. | https://www.youtube.com/watch?v=HgwhvfKcMMw |

| Course Code | AMSEM0451 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Green Transportation Systems Lab | 0 | 0 | 2 | 1 |

**Course objective:**

Students will be studying the experiments based on Green Transportation Systems.

**Pre-requisites: Student know the concept of Automobiles and systems**

**Suggested list of Experiment Perform Ten experiment from the list of Experiment**

| S. No. | Name of Experiments |
|---|---|
| 1 | To Study Environmental Impact Assessment (EIA) model for automobiles. |
| 2 | To Study Land-use plans, zoning schemes. |
| 3 | To Study Urban and regional transport planning Impacts on humans |
| 4 | To Study Urban and regional transport planning Impacts on Trucks & Buses |
| 5 | To Study Establishment of baseline conditions w.r.t soil, water and air quality. |
| 6 | To Study Magnetic Levitation. |
| 7 | To Study Bullet Trains model. |
| 8 | To Study Modelling of impacts and scenario-based analysis. |
| 9 | To Study Assessment of potential project impacts |
| 10 | To Study Fog security Systems |
| 11 | To Study Sustainable transportation systems |
| 12 | To Study Decision support systems for EIA of transport infrastructures. |

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Understand the concept of Land-use plans, zoning schemes | K2 |
| CO 2 | Understand the concept of Environmental Impact Assessment (EIA) model for automobiles | K2 |
| CO 3 | Understand the concept of Magnetic Levitation. | K2 |
| CO 4 | Understand the concept of Bullet Trains model. | K2 |
| CO 5 | Understand the concept of Fog security Systems | K2 |

**Link:** NPTEL/ YouTube/ Faculty Video Link:

| | |
|---|---|
| 1. | https://www.youtube.com/watch?v=yDz5bRy7AgI |
| 2. | https://www.youtube.com/watch?v=pBwemNvHVkY |

| Course Code | AMSEM0551 | L | T | P | Credit |
|---|---|---|---|---|---|
| Course Title | Power drives and systems Lab | 0 | 0 | 2 | 1 |

**Course objective:**

Students will be studying the experiments based on Power drives and systems

**Pre-requisites: Student know the concept of Automobiles and systems**

**Suggested list of Experiment Perform Ten experiment from the list of Experiment**

| S. No. | Name of Experiments |
|---|---|
| 1 | To Study 1-phase Half & Full Controlled Converter. |
| 2 | To study Characteristics of 1-phase Cycloconverter |
| 3 | To study the construction of a three-phase induction motor with the help of a model. |
| 4 | To study about the starters of three phase induction motors |
| 5 | To study about the power modulator & control unit. |
| 6 | To perform the Speed control of DC shunt Motor by Armature control. |
| 7 | To Start DC shunt motor by using three-point starter |
| 8 | To obtain the Speed control of DC shunt Motor by Field control. |
| 9 | To study about the detailed structure of wind power station |
| 10 | To study about Traction motor: Starting, Speed-Time characteristics |
| 11 | To study about Poly-phase induction machines |
| 12 | To study about Chopper controlled DC motor drives |

**Course outcome:**

| | | |
|---|---|---|
| CO 1 | Understand the concept of Full Controlled Converter | K2 |
| CO 2 | Understand the concept of Characteristics of 1-phase Cycloconverter | K2 |
| CO 3 | Understand the concept of Traction motor: Starting, Speed-Time characteristics | K2 |
| CO 4 | Understand the concept of Poly-phase induction machines | K2 |
| CO 5 | Understand the concept of Chopper controlled DC motor drives | K2 |

**Link:** NPTEL/ YouTube/ Faculty Video Link:

| | |
|---|---|
| 1. | https://www.youtube.com/watch?v=mPJxo_RnlFE |
| 2 | https://www.youtube.com/watch?v=DBvCP-LL-mE |