**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA – 533 003, Andhra Pradesh, India**

# DEPARTMENT OFCIVIL ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

### For

## B. TECH CIVIL ENGINEERING

*(Applicable for batches admitted from 2019-2020)*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA - 533 003, Andhra Pradesh, India**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OFCIVIL ENGINEERING

### IV YEAR: I- SEMESTER

| Sl. No. | Course Code | Course Title | L | T | P | Credits |
|---------|-------------|--------------|---|---|---|---------|
| 1 | PC701 | Design & Drawing of Steel Structures | 3 | 0 | 0 | 3 |
| 2 | PC702 | Geotechnical Engineering - II | 3 | 0 | 0 | 3 |
| 3 | PC703 | Remote Sensing & GIS | 3 | 0 | 0 | 3 |
| 4 | PE701 | Program Elective – III | 3 | 0 | 0 | 3 |
| 5 | OE701 | Open Elective – III | 3 | 0 | 0 | 3 |
| 6 | PC704 | Remote Sensing & GIS Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC705 | Geotechnical Engineering Lab | 0 | 0 | 3 | 1.5 |
| 8 | PR701 | Industrial Training/ Internship or Seminar | 0 | 0 | 3 | 1 |
| 9 | PR702 | Project Work Phase-I | 0 | 0 | 4 | 2 |
| | | **Total Credits** | | | | **21** |

### IV YEAR: II- SEMESTER

| Sl. No. | Course Code | Course Title | L | T | P | Credits |
|---------|-------------|--------------|---|---|---|---------|
| 1 | PC801 | Estimation Specifications and Contract | 3 | 0 | 0 | 3 |
| 2 | PE801 | Program Elective - IV | 3 | 0 | 0 | 3 |
| 3 | PE802 | Program Elective – V | 3 | 0 | 0 | 3 |
| 4 | PR801 | Project Work Phase-II | 0 | 0 | 16 | 8 |
| | | **Total Credits** | | | | **17** |

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OFCIVIL ENGINEERING

| Open Electives | Professional Elective-I | Professional Elective-II | Professional Elective-III | Professional Elective-IV | Professional Elective-V |
|---|---|---|---|---|---|
| a) Disaster Management | a) Repair & Rehabilitation of Buildings | a) Pre-stressed Concrete | a) Bridge Engineering | a) Finite Element Methods | a) Advanced Structural Analysis |
| b) Environmental Pollution & Control | b) Environmental Impact Assessment | b) Watershed Management | b) Industrial Waste Water Treatment | b) Design & Drawing of Irrigation Structures | b) Urban Hydrology |
| c) Elements of Civil Engineering | c) Reinforced Soil Structures | c) Advanced Foundation Engineering | c) Earth & Rock-fill Dams | c) Soil Dynamics and Machine Foundations | c) Ground Improvement Techniques |
| d) Green Technology | d) Traffic Engineering | d) Urban Transportation Planning | d) Intelligent Transportation Systems | d) Road Safety Engineering | d) Pavement Management Systems |
| e) Smart Cities | e) Construction Technology & Management | e) Architecture Town Planning | e) Building Services | e) Disaster Management & Mitigation | e) Low-cost Housing |
| f) Project Management | | | | f)SWAYAM / NPTEL /MOOCS COURSES (12 weeks duration ) | f) SWAYAM / NPTEL /MOOCS COURSES (12 weeks duration ) |
| g) Traffic Safety | | | | | |
| h) Geo-Spatial Technologies | | | | | |
| i) Waste Water Treatment | | | | | |

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| IV Year – I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **PROGRAM ELECTIVE – IIIb) Industrial Wastewater Treatment** | | | | | |

## Course Learning Objectives:
The course will address the following:
1. Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
2. To impart knowledge on selection of treatment methods for industrial wastewater.
3. To know the common methods of treatment in different industries
4. To acquire knowledge on operational problems of effluent treatment plant.

## Course Outcomes:
Upon the successful completion of this course, the students will be able to:
a. Know the quality and quantity of water for various industries and Advanced water treatment methods
b. Learn the common methods of treatment of wastewaters and Biological treatment methods
c. Study of methods to reduce impacts of disposal of wasters into environment and CETPs.
d. Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
e. Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods

## UNIT – I
Industrial water Quantity and Quality requirements: Boiler, Cooling, Domestic/Canteen and Process waters for Textiles, Food processing, Dairy, Aqua industry, Sugar mills, Brewery and distillery Industries, Fertilizer industry, Power plants. Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Colour and Odour. Use of Municipal wastewater in Industries.

## UNIT – II
Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization- Toxicity of industrial effluents- Common methods of Treatment of wastewaters - Unit operations and processes- Volume and Strength reduction –Neutralization – Equalization and proportioning- recycling, reuse and resources recovery. Miscellaneous Treatment: Biological treatment of sewage- Primary, secondary and Tertiary treatment of sewage.

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### UNIT – III
Industrial wastewater disposal management: Discharges into Sewers, Streams- Oxygen sag curve, Lakes-eutrophication and oceans and associated problems, Land treatment – sewage sickness, Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastewaters- Effluent Disposal Method.

### UNIT – IV
Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants. Case studies.

### UNIT – V
Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Aqua industry, Pharmaceutical Plants. Case studies.

### Text books
1. Industrial Wastewater Treatment by KVSG Murali Krishna, Paramount Publishers, Visakhapatnam, 2019
2. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, NewDelhi.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning,Delhi
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala,

Shyam R Asolekar, Mc-Graw Hill, New Delhi; $3^{rd}$Edition

### References
1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc- GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and EddyInc, Tata McGrawhillCo., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L. Karia& R.A. Christian, Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

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## DEPARTMENT OFCIVIL ENGINEERING

### ALL OPEN ELECTIVES

| | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| a) DISASTER MANAGEMENT | | | | | |

**Course Learning Objectives:**
The objective of this course is:
1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

**Course Outcomes:**
Upon the successful completion of this course, the students will be able to:
a. Affirm the usefulness of integrating management principles in disaster mitigation work
b. Distinguish between the different approaches needed to manage pre- during and post- disaster periods
c. Explain the process of risk management
d. Relate to risk transfer

**SYLLABUS:**

**UNIT-I**

**Natural Hazards and Disaster Management:** Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

**UNIT-II**

**Man Made Disaster and Their Management Along With Case Study Methods Of The Following:** Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries -  Emerging infectious diseases and Aids and their management.

**UNIT-III**

**Risk and Vulnerability:** Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

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### UNIT-IV

**Role of Technology in Disaster Managements**: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes – flowchart, geospatial information in agriculture  drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

### UNIT-V

**Multi-sectional Issues, Education and Community Preparedness:** Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector  and disaster risk reduction- Education in disaster risk reduction-Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

### TEXT BOOKS:

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Punblishers& Distributors Pvt. Ltd.

2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications

3. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

4. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

### REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.
3. R. Nishith , Singh  AK, " Disaster Management in India : Perspectives, Issues and strategies" New Royal Book Company."

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## DEPARTMENT OFCIVIL ENGINEERING

| IV Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **PROGRAM ELECTIVE – V c). Ground Improvement Techniques** | | | | | |

**Course Learning Objectives:**
The objective of this course is:
1. To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
4. To make the student learn the concepts, purpose and effects of grouting.

**Course Outcomes:**
a. By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
b. The student should be in a position to design a reinforced earth embankment and check its stability.
c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
d. The student should be able to understand the concepts and applications of grouting.

## SYLLABUS:

### UNIT- I
In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

### UNIT -II
Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

### UNIT- III
Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests. Introduction to Liquifaction& its effects & applications.

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### UNIT- IV
Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

### UNIT- V
Geosynthetics – geotextiles – types – functions , properties and applications – geogrids , geomembranes and gabions - properties and applications.

### TEXT BOOKS:
1. 'Ground Improvement Techniques' by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by NiharRanjanPatro ,Vikas Publishing House (p) limited , New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

### REFERENCE BOOKS:
1. 'Ground Improvement' by MP Moseley , Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner , Prentice Hall

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| IV Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **PROGRAM ELECTIVE – IV  d). Road Safety Engineering** | | | | | |

### Course Objectives:
1. This module on the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.
2. The accident interrogations & risk involved with measures to identity the causes are dealt.
3. The role of road safety in planning the urban infrastructures design is discussed.
4. The various traffic management systems for safety & safety improvement strategies are dealt.

### Course Outcomes:
The student is able to
a) To understand fundamental of Traffic Engg.
b) To investigate & determine the collective factors & remedies of accident involved.
c) To design & planning various road geometrics.
d) To massage the traffic system from road safety point of view.

## SYLLABUS

### UNIT I
**Introduction to safety:**
Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India. Multi-causal dynamic systems approach to safety; Crash Vs Accident; Road safety improvement strategies; Elements of a road safety plan, Safety data Needs; Safe vehicle design.

### UNIT II
**Statistical Interpretation and Analysis of Crash Data:**
Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.

### UNIT III
**Road Safety Audits:**
Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.

### UNIT IV
**Crash Reconstruction:**
Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to crash reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.

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## DEPARTMENT OFCIVIL ENGINEERING

**UNIT V**

**Mitigation Measures:**

Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law.

**TEXT BOOKS:**

1. Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.
   Towards Safe Roads in Developing country, TRL – ODA, 2004.

**REFERENCES:**

1. Athelstan Popkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)
2. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
3. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## COURSE STRUCTURE-R19

# COURSE STRUCTURE AND SYLLABUS

## For

## B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

*(Applicable for batches admitted from 2019-2020)*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE-R19

### IV Year – I SEMESTER

| S. No | Course Code | Subjects | Category | L | T | P | Credits |
|-------|-------------|----------|----------|---|---|---|---------|
| 1 | | Switchgear & Protection | EE | 3 | -- | -- | 3 |
| 2 | | OOPs through JAVA | ES | 3 | -- | -- | 3 |
| 3 | | Renewable Energy Systems | EE | 3 | -- | -- | 3 |
| 4 | | **Elective – II** | EL | 3 | -- | -- | 3 |
| 5 | | **Elective - III** | EL | 3 | -- | -- | 3 |
| 6 | | Linear & Digital IC Applications Laboratory | ES | -- | -- | 2 | 1 |
| 7 | | Power Systems& Simulation Laboratory | EE | -- | -- | 2 | 1 |
| | | Industrial Training /Skill Development Programmes / Research Project | Project | -- | -- | 2 | 1 |
| 8 | | Project-I | Project | | | 4 | 2 |
| **Total Credits** | | | | **15** | **0** | **10** | **20** |

### IV Year – II SEMESTER

| S. No | Course Code | Subjects | Category | L | T | P | Credits |
|-------|-------------|----------|----------|---|---|---|---------|
| 1 | | Power System Operation & Control | EE | 3 | -- | -- | 3 |
| 2 | | **Open Elective - II** | OE | 3 | -- | -- | 3 |
| 3 | | **Elective - IV** | EL | 3 | -- | -- | 3 |
| 4 | | Project-II | Project | -- | -- | 16 | 8 |
| **Total Credits** | | | | **09** | | **16** | **17** |

**BS – Basic Sciences**          **EE – Electrical Engineering**
**HS – Humanity Sciences**       **OE – Open Elective          Proj- Project**
**ES – Engineering Sciences**    **EL – Elective          MC–Mandatory Course**

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## COURSE STRUCTURE-R19

### Elective – I:

1. Digital IC Applications
2. Communication Systems
3. Computer Networks
4. Internet of Things applications to Electrical Engineering
5. VLSI Design
6. Cloud Computing

### Elective – II:

1. Utilization of Electrical Energy
2. Data Base Management System
3. Advanced Control Systems
4. Electrical Machine Design
5. Hybrid Electric Vehicles
6. Swayam Course

### Elective – III:

1. Operating Systems
2. Neural Networks &Fuzzy Logic
3. High Voltage Engineering
4. Energy Auditing and Demand Side Management
5. Data Analytics with Python
6. Swayam Course

### Elective – IV:

1. Electrical Distribution Systems
2. HVAC & DC Transmission
3. Flexible Alternating Current Transmission Systems
4. Power Quality
5. Smart Grid
6. Special Electrical Machines

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## OPEN ELECTIVES FOR ECE:

### Open Elective 1:

1. DataMining
2. PowerElectronics
3. MEMS and itsapplications
4. Artificial NeuralNetworks

### Open Elective 2:

1. 3D Printing
2. Block chainTechnology
3. · Cyber Security &Cryptography

## OPEN ELECTIVES OFFERED BY ECE:

OE 1      Principles of communication
OE 2      Embedded Systems

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## COURSE STRUCTURE-R19

**Open Electives offered by EEE Department for Other Branches( Except for EEE Branch)**

### Open Elective-I:

1. Renewable Energy Sources
2. Essentials of Analog and Digital Electronics
3. Electrical Estimation and Costing
4. Power Electronic Devices & Circuits
5. Fundamentals of Electrical Machines

### Open Elective-II:

1. Measurements & Instrumentation
2. Fundamentals of Utilization of Electrical Energy
3. Concepts of Power System Engineering
4. Basics of Control Systems
5. Energy Audit

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## COURSE STRUCTURE-R19

| IV Year –I SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | UTILIZATION OF ELECTRICAL ENERGY (ELECTIVE-II) | | | | |

**Preamble:**

This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Energy Storage Systems concepts are also introduced as a part of this course.

**Course Educational Objectives:**

- To study the basic principles of illumination and its measurements and to design the different types lighting systems.
- To acquaint with the different types of heating and welding techniques.
- To understand the operating principles and characteristics of various motors with respect to speed, temperature and loading conditions.
- To understand the basic principles of electric traction including speed–time curves of different traction services and calculation of braking, acceleration and other related parameters.
- To Introduce the concept of various types of energy storage systems.

**UNIT – I:**

**Illumination fundamentals**

Introduction, terms used in illumination–Laws of illumination–Polar curves–Integrating sphere–Lux meter–Sources of light

**Various Illumination Methods**

Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting, Energy conservation.

**UNIT – II:**

**Electric Heating**

Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

**Electric Welding**

Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

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## COURSE STRUCTURE-R19

### UNIT – III:
**Selection of Motors**

Choice of motor, type of electric drives, starting and running characteristics–Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization, Introduction to energy efficient motors.

### UNIT – IV:
**Electric Traction – I**

System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

**Electric Traction – II**

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors.

### UNIT – V:
**Introduction to energy storage systems**

Need for energy storage, Types of energy storage-Thermal, electrical, magnetic and chemical storage systems, Comparison of energy storage technologies-Applications.

**Course Outcomes:**

After the completion of the course the student should be able to:
- understand various levels of illuminosity produced by different illuminating sources and able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- · identify most appropriate heating and welding techniques for suitable applications.
- identify a suitable motor for electric drives and industrial applications
- determine the speed/time characteristics of different types of traction systems and determination of various traction parameters.
- know the necessity and usage of different energy storage schemes for different applications.

**Text Books:**
1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai&Sons.
3. "Thermal energy storage systems and applications"-by Ibrahim Dincer and Mark A.Rosen. John Wiley and Sons 2002.

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## COURSE STRUCTURE-R19

**Reference Books:**
1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International(P)Limited,Publishers,1997.

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## COURSE STRUCTURE-R19

| IV Year – II SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **NEURAL NETWORKS AND FUZZY LOGIC**<br>(Elective-III) | | | | |

**Preamble:**
This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

**Learning Objectives:**
- To understand artificial neuron models & learning methods of ANN.
- To utilize different algorithms of ANN.
- To distinguish between classical and fuzzy sets.
- · To understand different modules of fuzzy controller.
- To understand applications of neural networks and fuzzy logic.

### Unit – I:
#### Introduction
Artificial Neural Networks (ANN) – Humans and computers – Biological neural networks – ANN Terminology – Models of Artificial neuron – activation functions – typical architectures – biases and thresholds – learning strategy(supervised, unsupervised and reinforced) – Neural networks learning rules. Single layer feed forward neural networks: concept of pattern and its types, perceptron training and classification using Discrete and Continuous perceptron algorithms– linear separability- XOR function.

### Unit- II:
#### ANN Paradigms
Multi-layer feed forward networks –Generalized delta rule– Back Propagation algorithm – Radial Basis Function (RBF) network. Kohonen's self organizing feature maps (KSOFM), Learning Vector Quantization (LVQ)– Functional Link Networks (FLN) – Bidirectional Associative Memory (BAM) – Hopfield Neural Network.

### Unit–III:
#### Classical and Fuzzy Sets
Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Cardinalities, Membership functions.

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## COURSE STRUCTURE-R19

**UNIT IV:**
**Fuzzy Logic Modules**
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

**UNIT V:**
**Applications**
**Neural network applications:** Load flow studies, load forecasting, reactive power control.
**Fuzzy logic applications:** Economic load dispatch, speed control of DC motors, single area and two area load frequency control.

**Learning Outcomes:**
After the completion of the course the student should be able to:
- know different models of artificial neuron & Use learning methods of ANN.
- use different paradigms of ANN.
- classify between classical and fuzzy sets.
- use different modules of Fuzzy logic controller.
- apply Neural Networks and fuzzy logic for real-time applications.

**Text Books:**
1. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
2. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by RajasekharanandPai – PHI Publication.

**Reference Books:**
1. Artificial Neural Network – B.Yegnanarayana, PHI, 2012.
2. Fuzzy logic with Fuzzy Applications – T.J Ross – Mc Graw Hill Inc, 1997.
3. Introduction to Neural Networks using MATLAB 6.0 – S N Sivanandam,SSumathi,S N Deepa TMGH
4. Introduction to Fuzzy Logic using MATLAB – S N Sivanandam,SSumathi,S N Deepa   Springer, 2007.

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## COURSE STRUCTURE-R19

| IV Year –II SEMESTER | | L | T | P |
|---|---|---|---|---|
| | | 3 | 0 | 0 |

## ELECTRICAL DISTRIBUTION SYSTEMS
### (ELECTIVE-IV)

**Preamble:**
This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

**Learning Objectives**
- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the concepts of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation for power factor improvement.
- To study the effect of voltage control on distribution system.

## UNIT – I:
**General Concepts**
Introduction to distribution systems - Distribution system losses – Coincidence factor – Contribution factor loss factor – Numerical Problems – Load Modeling and Characteristics – Relationship between the load factor and loss factor – Classification and charcteristics of loads (Residential, commercial, Agricultural and Industrial).

## UNIT – II:
**Substations**
Location of substations: Rating of distribution substation – Service area with 'n' primary feeders – Benefits and methods of optimal location of substations..
**Distribution Feeders**
Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

## UNIT – III:
**System Analysis**
Voltage drop and power–loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems - Three phase balanced primary lines.

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# COURSE STRUCTURE-R19

**UNIT – IV:**

**Protection, Coordination & Automation**

Objectives of distribution system protection –Time current characteristics – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers, Modulated case circuit breakers, Earth leakage circuit breakers – Protection schemes of parallel & Ringmain feeders.

Coordination of protective devices: General coordination procedure –Various types of co-ordinated operation of protective devices - Residual Current Circuit Breaker

Automation: Block diagram approach of SCADA.

**UNIT – V:**

**Compensation for Power Factor Improvement**

Capacitive compensation for power factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location – Numerical problems.

**Voltage Control**

Voltage Control: Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation – Numerical problems.

**Learning Outcomes:**

After the completion of the course the student should be able to:

- understand various factors of distribution system.
- design the substation and feeders.
- determine the voltage drop and power loss
- understand the protection and its coordination.
- understand the effect of compensation forp.f improvement.
- understand the effect of voltage control.

**Text Book:**

1. "Electric Power Distribution system, Engineering" – by TuranGonen, McGraw–hill Book Company.

**Reference Books:**

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

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| | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **EMBEDDED SYSTEMS**<br>**Open Elective (OE2)** | | | | | |

### Course Objectives:
The main objectives of this course are given below:

- The basic concepts of an embedded system areintroduced.
- The various elements of embedded hardware and their design principles areexplained.
- Different steps involved in the design and development of firmware for embedded systems iselaborated.
- Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design isdiscussed.
- Fundamental issues in hardware software co-design were presented andexplained.
- Familiarize with the different IDEs for firmware development for different family of processors/controllers and embedded operatingsystems.
- Embedded system implementation and testing tools are introduced anddiscussed.

### UNIT-I
**INTRODUCTION:** Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

### UNIT-II
**EMBEDDED HARDWARE DESIGN:** Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

### UNIT-III
**EMBEDDED FIRMWARE DESIGN:** Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versusCross-compiler.

### UNIT-IV
**REAL TIME OPERATING SYSTEM:** Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation.
**HARDWARE SOFTWARE CO-DESIGN:** Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware andFirmware.

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## UNIT-V:

**EMBEDDED SYSTEM DEVELOPMENT, IMPLEMENTATION AND TESTING:**The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

## Text Books:

1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications,2013.
2. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited,2013.

## References:

1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications,2013.
2. Embedded Systems-Lyla B.Das-Pearson Publications,2013.

## Course Outcomes:

At the end of this course the student can able to:

- Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specificfunction.
- The hardware components required for an embedded system and the design approach of an embeddedhardware.
- The various embedded firmware design approaches on embeddedenvironment.
- Understand how to integrate hardware and firmware of an embedded system using real time operatingsystem.

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## DEPARTMENT OF MECHANICAL ENGINEERING

# COURSE STRUCTURE AND SYLLABUS

### For

## B. TECH MECHANICAL ENGINEERING

*(Applicable for batches admitted from 2019-2020)*

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
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# DEPARTMENT OF MECHANICAL ENGINEERING

## IV YEAR I SEMESTER

| S. No. | Course Code | Course Title | L | T | P | Credits |
|--------|-------------|--------------|---|---|---|---------|
| 1 | HSIMS | Industrial Management | 3 | -- | -- | 3 |
| 2 | PCC-ME | Finite Element Methods | 3 | -- | -- | 3 |
| 3 | PEC-3 | 1.Mechanical Vibrations<br>2. Renewable Energy Sources<br>3.Production Planning & Control<br>4. Machine Tool Design<br>5. MOOCs (NPTEL/Swayam) | 3 | -- | -- | 3 |
| 4 | PEC-4 | 1.Industrial Automation and Robotics<br>2. Micro and Nano manufacturing<br>3. Power Plant Engineering<br>4.Optimization Techniques<br>5. MOOCs (NPTEL/Swayam) | 3 | -- | -- | 3 |
| 5 | OEC-1 | **OPEN ELECTIVE -I** | 3 | -- | -- | 3 |
| 6 | PCC-ME Lab | Finite Element Simulation Lab | -- | -- | 2 | 1 |
| 7 | PROJ-I | Project-I | -- | -- | 4 | 2 |
| | | **Total Credits** | **15** | **--** | **6** | **18** |

**OPEN ELECTIVE -I:**
1. MEMS
2. Optimization Methods
3. Operations Management
4. Nano Technology
5. Finite Element Analysis

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### IV YEAR II SEMESTER (VIII SEMESTER)

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | PEC-5 | 1. Additive Manufacturing<br>2. Gas Dynamics and Jet Propulsion<br>3. Product design and development<br>4. Reliability Engineering<br>5. MOOCs (NPTEL/Swayam) | 3 | -- | -- | 3 |
| 2 | PEC-6 | 1. Condition Monitoring<br>2. Computational Fluid Dynamics<br>3. Non Destructive Evaluation<br>4. Control Systems<br>5. Entrepreneurship Development | 3 | -- | -- | 3 |
| 3 | OEC-2 | OPEN ELECTIVE -II | 3 | -- | -- | 3 |
| 4 | OEC-3 | OPEN ELECTIVE -III | 3 | -- | -- | 3 |
| 5 | PROJ-II | Project-II | -- | -- | 16 | 8 |
| | | **Total Credits** | 12 | -- | 16 | 20 |

| OPEN ELECTIVE-II: | OPEN ELECTIVE-III: |
|---|---|
| 1. Green Energy Systems<br>2. Robotics<br>3. Energy Consumption and Management<br>4. 3D Printing Technologies<br>5. Mechatronics | 1. Total Quality Management<br>2. Supply Chain Management<br>3. Product Design & Development<br>4. Entrepreneurship<br>5. Advanced Materials |

**Note:**

1) Professional Elective course (PEC) /Open Elective course (OEC)  can also be completed via MOOCs (NPTEL/Swayam)  Course (12 Week duration)

2) The list of MOOCs courses shall be approved by the chairperson of BOS.

3) The tutorial class can be of one hour duration as per requirements of a particular subject.

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# DEPARTMENT OF MECHANICAL ENGINEERING

| IV Year - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **POWER PLANT ENGINEERING** | | | | |

**Course Objectives:**
The course is aimed at providing knowledge of power generation through different prime movers viz steam, ICGT, Hydro, nuclear and hybrid systems along with their economics and environmental considerations.

**UNIT – I**
Introduction to the sources of energy – resources and development of power in india.
**STEAM POWER PLANT:** Plant layout, working of different circuits, fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, ash handling systems. Combustion: properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection, corrosion and feed water treatment.

**UNIT – II**
**INTERNAL COMBUSTION AND GAS TURBINE POWER PLANTS:**
**DIESEL POWER PLANT:** Plant layout with auxiliaries – fuel supply system, air starting equipment, super charging.
**GAS TURBINE PLANT:** Introduction – classification - construction – layout with auxiliaries, combined cycle power plants and comparison.

**UNIT – III**
**HYDRO ELECTRIC POWER PLANT:** Water power – hydrological cycle / flow measurement – drainage area characteristics – hydrographs – storage and pondage – classification of dams and spill ways.
**HYDRO PROJECTS AND PLANT:** Classification – plant operation and pumped storage plants.
**NUCLEAR POWER STATION:** Nuclear fuel – breeding and fertile materials – nuclear reactor – reactor operation.
**TYPES OF REACTORS:** Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor, radiation hazards and shielding – radioactive waste disposal.

**UNIT – IV**
**COMBINED OPERATIONS OF DIFFERENT POWER PLANTS:** Introduction, advantages of combined working, load division between power stations, storage type hydro-electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydro-electric and gas turbine stations,
**POWER PLANT INSTRUMENTATION AND CONTROL:** Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, $O_2$ and $CO_2$ measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

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## DEPARTMENT OF MECHANICAL ENGINEERING

**UNIT – V**
**POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS**: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

**Text Books:**
1. A course in Power Plant Engineering - Arora and Domkundwar/Dhanpatrai & Co.
2. Power Plant Engineering - P.C.Sharma / S.K.Kataria Pub

**References:**
1. Power Plant Engineering - P.K.Nag/ II Edition /TMH.
2. Power station Engineering – ElWakil / McGrawHill.
3. An Introduction to Power Plant Technology - G.D. Rai/Khanna Publishers

**Course outcomes:**
After undergoing this course the student can
(1) Understand various conventional methods of power generation
(2) To understand the principle of operation and performance of respective prime movers along with their economics and their impact on environment.
(3) To understand the power plant instrumentation and control

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## DEPARTMENT OF MECHANICAL ENGINEERING

| IV Year  - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | NANO TECHNOLOGY | | | | |

## Course Objectives:
1. To make the students acquire an understanding the Nanoscience and Applications

## UNIT-I
**GENERAL INTRODUCTION:** Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

## UNIT-II
**SILICON CARBIDE:** Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,
**NANO PARTICLES OF ALUMINA AND ZIRCONIA**: Nano materials preparation, Characterization, Wear materials and nano composites,

## UNIT-III
**MECHANICAL PROPERTIES:** Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties,

## Unit -IV
**ELECTRICAL PROPERTIES:** Switching glasses with nanoparticles, Electronic conduction with nano particles
**OPTICAL PROPERTIES**: Optical properties, special properties and the coloured glasses

## UNIT-V
Process of synthesis of nano powders, Electro deposition, Important Nano materials
**INVESTIGAING AND MANIPULATING MATERIALS IN THE NANOSCALE:**
Electron microscopics, scanning probe microscopics, optical microscopics for nano science and technology, X-ray diffraction.

## TEXT BOOKS:
1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH
**Course Outcomes:** After completing this course students will be able to:
1.Learn the basic concepts of nanotechnology
2.Understand the synthesis of nanomaterials and their application
3.Apply their learned knowledge to develop Nanomaterial's.

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# DEPARTMENT OF MECHANICAL ENGINEERING

| IV Year - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **ADVANCED MATERIALS** | | | | |

## Course Objectives

The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behaviour, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

### UNIT-I

**INTRODUCTION TO COMPOSITE MATERIALS**: Introduction, classification: polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications

**REINFORCEMENTS:** Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.

### UNIT-II

Polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

**MANUFACTURING METHODS:** Autoclave, tape production, moulding methods, filament winding, hand layup, pultrusion, RTM.

### UNIT-III

**MACROMECHANICAL ANALYSIS OF A LAMINA**: Introduction, generalized Hooke's law, reduction of Hooke's law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

### UNIT-IV

**FUNCTIONALLY GRADED MATERIALS**: Types of functionally graded materials-classification-different systems-preparation-properties and applications of functionally graded materials.

**SHAPE MEMORY ALLOYS:** Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.

### UNIT-V

**NANO MATERIALS:** Introduction-properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (nano – structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.

## Text Books:

1. Nano material /A.K. Bandyopadyay/New age Publishers
2. Material science and Technology: A comprehensive treatment/Robert W.Cahn,/VCH
3. Engineering Mechanics of Composite Materials / Isaac and M Daniel/Oxford University Press

## References:

1. Mechanics of Composite Materials / R. M. Jones/ Mc Graw Hill Company, New York, 1975.
2. Analysis of Laminated Composite Structures / L. R. Calcote/Van Nostrand Rainfold,NY 1969
3. Analysis and performance of fibre Composites /B. D. Agarwal and L. J. Broutman /Wiley-Interscience, New York, 1980

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4. Mechanics of Composite Materials - Second Edition (Mechanical Engineering) /Autar K.Kaw / CRC Press

**Course Outcomes**

After learning the course the students should be able to

1. Explain various composite materials with their constituents, advantages, limitations and applications
2. Describe various manufacturing methods of polymer matrix composites materials.
3. Derive stress strain relationships for orthotropic materials and analyze orthotropic lamina.
4. Explain various functionally graded materials with their properties, preparation and applications
5. Explain different smart materials with their application.

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# DEPARTMENT OF MECHANICAL ENGINEERING

| IV Year  - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **ENERGY MANAGEMENT** | | | | |

**Course Objectives:** The course is intended to

- Demonstrate the importance and role of energy management in the functional areas like Manufacturing Industry, Process Industry, Commerce and Government.

- To know the different energy resources

- Understand thermodynamic power cycles and the associated processes and fuels.

- Understand the economics of energy conversion

- Enable the students to understand the basic energy conversion and management principles and to identify sources of energy loss and target savings

- Enable students in carrying out budgeting and risk analysis

**UNIT-I: INTRODUCTION:** Principles of energy management Managerial organization, Functional areas for i) manufacturing industry, ii) Process industry, iii) Commerce, iv) Government, Role of Energy manager in each of these organizations. Initiating, Organizing and managing energy management programs

**UNIT-II: ENERGY AUDIT:** Definition and concepts. Types of energy audits, Basic energy concepts, Resources for plant energy studies. Data gathering, Analytical techniques. Energy Conservation: Technologies for energy conservation, Design for conservation of energy materials, Energy flow networks. Critical assessment of energy usage. Formulation of objectives and constrains, Synthesis of alternative options and technical analysis of options. Process integration.

**UNIT-III: ECONOMIC ANALYSIS:** Scope, Characterization of an investment project. Types of depreciation, Time value of money. Budget considerations, Risk analysis.

**UNIT-IV: METHODS OF EVALUATION OF PROJECTS:** Payback, Annualized costs, Investor's rate of return, Present worth, Internal rate of return. Pros and cons of the common method of analysis. Replacement analysis.

**UNIT-V: ALTERNATIVE ENERGY SOURCES: SOLAR ENERGY:** Types of devices for solar energy collections, Thermal storage system, Control systems. Wind Energy. Availability, Wind Devices. Wind Characteristics, performance of turbines and systems.

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**TEXT BOOKS:**
- Energy Management by Murfy
- General Aspects of Energy Management and Audit, National Productivity Council of India, Chennai (Course Material- National Certification Examination for Energy Management)

**REFERENCE BOOKS**:
- Energy Management Handbook, W.C. Turner, 5th Edition, Marcel Dekker, Inc, New York, 2005.
- Guide to Energy Management, B. L. Capehart, W. C. Turner, W. J. Kennedy, CRC Press, New York, 2005.
- Energy Management by O.P. Collagan

**Course Outcomes:** At the end of the course, the student will be able to:

1. Explain the fundamentals of energy management and its influence on environment

2. Describe methods of energy production for improved utilization.

3. Apply the principles of thermal engineering and energy management to improve the performance of thermal systems. Analyze the methods of energy conservation and energy efficiency for buildings, airconditioning, heat recovery and thermal energy storage systems.

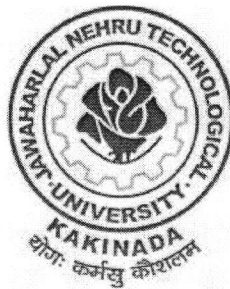4. Assess energy projects on the basis of economic and financial criteria.

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

## For

# B. TECH ELECTRONICS AND COMMUNICATION ENGINEERING

*(Applicable for batches admitted from 2019-2020)*

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

## IV Year – ISemester

| S. No. | Course | Category | L | T | P | Credits |
|--------|--------|----------|---|---|---|---------|
| 1 | Microwave and Optical Communication Engineering | PC | 3 | 0 | 0 | 3 |
| 2 | Data Communications & Computer networks | PC | 3 | 0 | 0 | 3 |
| 3 | Digital Image and Video Processing | PC | 3 | 0 | 0 | 3 |
| 4 | Professional Elective (PE3) | PE | 3 | 0 | 0 | 3 |
| 5 | Professional Elective (PE4) | PE | 3 | 0 | 0 | 3 |
| 6 | Internet of Things Lab | LC | 0 | 0 | 3 | 1.5 |
| 7 | Microwave and Optical Communication Engineering LAB | LC | 0 | 0 | 3 | 1.5 |
| 8 | Project - Part I | PR | 0 | 0 | 6 | 3 |
| | | | | | Sub-Total | **21** |

## IV Year – II Semester

| S. No. | Course | Category | L | T | P | Credits |
|--------|--------|----------|---|---|---|---------|
| 1 | Professional Elective (PE5) | PE | 3 | 0 | 0 | 3 |
| 2 | Open Elective (OE2) | OE | 3 | 0 | 0 | 3 |
| 3 | Project - Part II | PR | 0 | 0 | 18 | 9 |
| | | | | | Sub-Total | **15** |
| | | | | | **Total** | **160** |

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## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### PROFESSIONAL ELECTIVES 1:
1. Information Theory &Coding
2. Digital System Design usingHDL
3. Data structures andAlgorithms
4. Soft computing techniques and Pythonprogramming
5. Simulation& MathematicalModeling

### PROFESSIONAL ELECTIVES 2:
1. Cellular & Mobile Communication
2. Digital ICDesign
3. Business Intelligence &Analytics
4. PatternRecognition
5. Robotics andAutomation

### PROFESSIONAL ELECTIVES 3:
1. Communication Standards andProtocols
2. Analog ICDesign
3. SmartSensors
4. Advanced Digital SignalProcessing
5. AugmentedReality

### PROFESSIONAL ELECTIVES 4:
1. SoftwareRadio
2. Low power VLSIDesign
3. EmbeddedSystems
4. DSP processors andArchitectures
5. Multi MediaCommunication

### PROFESSIONAL ELECTIVES 5:
1. WirelessCommunication
2. VLSI Testing &Testability
3. Machine Learning & ArtificialIntelligence
4. SpeechProcessing
5. Industrial Internet ofThings

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## OPEN ELECTIVES FOR ECE:

### Open Elective 1:

1. • DataMining
2. PowerElectronics
3. MEMS and itsapplications
4. Artificial NeuralNetworks

### Open Elective 2:

1. 3D Printing
2. Block chainTechnology
3. Cyber Security &Cryptography

## OPEN ELECTIVES OFFERED BY ECE:

OE 1    Principles of communication
OE 2    Embedded Systems

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| IV Year - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **COMMUNICATION STANDARDS and PROTOCOLS**<br>**(Professional Elective 3)** | | | | | |

**Objective:**
- Acquire knowledge about transferring data into cloud using variousWired/Wireless communicationtechnologies.

**Prerequisites:**
Basic knowledge on Digital numbering system; Micro Controller Peripheral Programming, interfacing different types of sensors using I2C,SPI, UART ; wired and wireless communications.

**Unit-I:**
**Introduction to Communication and Networking :** Communications, Signal Types and its characteristics (Analog/Digital), Data Transmission Types (Serial/Parallel), Communication Techniques (Asynchronous, Synchronous),Data Transmission Modes (Simplex, Half/Full Duplex), Network Topologies (Star, Ring, Mesh, Point to Point, Tree, Bus, Daisy chain, Multi drop) and its applications, Modulation need and types.

**Unit-II:**
**OSI Layers:** Communication Layers and its applications, Communication media (Twisted Pair, Coaxial, Fiber Optics), Introduction to Errors (Error types, Detection, Correction) and Flow Control and its applications.

**Unit-III:**
**Wired Communication Protocols: Ethernet** (Types, Socket, MAC, IP, ARP, ICMP, TCP, UDP, DHCP), CAN, Mod-bus(RTU, ASCII), UART (RS485,RS232), OFC and Advantages, Disadvantages and its applications, Introduction to Dial up Modems, Leased line modems.

**Unit-IV:**
**Wireless Communication Protocols:** Zigbee, Bluetooth, Wi-Fi, GPRS, GSM , NFC , IR, Satellite Communication. Advantages, Disadvantages and its applications.

**Unit-V:**
**Network Types:** Introduction to LAN,WAN,PAN, Internet and Intranet, sensor networks (wired/wireless) and its applications.
**Network Security :**Introduction to NAT, PAT, DNS, Network Routing algorithms, Introduction to Switch, Hub, Bridges and its working, Network Security and Introduction to Firewall and its applications.

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### Text books:

1. Introduction to data communication and networking by Wayne Tomasi, PearsonPrentice Hall,2005
2. Introduction to data communication and networking by Behrouz Forouzan ,4<sup>th</sup>Edition McGraw HillEducation,2017.
3. Basics of data communications by WilliamStallings.

### Reference books:

1. . Basics of computer networking by Thomas Robertazzi Stony BrookUniversity,2011
2. Wireless Networking Absolute Beginner's Guide by MichaelMiller:
3. Designing and Deploying 802.11n Wireless Networks by Jim Geier 2nd Edition, Kindle Edition.
4. CAN System Engineering from Theory to Practical Applications,2nd Edition,Springer,2013

### Course Outcomes:

- Able to develop sensornetworks
- Able to communicate data via Wired/Wirelesscommunication
- Configure and test communicationtechnologies

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| | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **EMBEDDED SYSTEMS**<br>**Open Elective (OE2)** | | | | |

**Course Objectives:**
The main objectives of this course are given below:

- The basic concepts of an embedded system areintroduced.
- The various elements of embedded hardware and their design principles areexplained.
- Different steps involved in the design and development of firmware for embedded systems iselaborated.
- Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design isdiscussed.
- Fundamental issues in hardware software co-design were presented andexplained.
- ˙Familiarize with the different IDEs for firmware development for different family of processors/controllers and embedded operatingsystems.
- Embedded system implementation and testing tools are introduced anddiscussed.

**UNIT-I**
**INTRODUCTION:** Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

**UNIT-II**
**EMBEDDED HARDWARE DESIGN:** Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.
**UNIT-III**
**EMBEDDED FIRMWARE DESIGN:** Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versusCross-compiler.

**UNIT-IV**
**REAL TIME OPERATING SYSTEM:** Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation.
**HARDWARE SOFTWARE CO-DESIGN:** Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware andFirmware.

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### UNIT-V:

**EMBEDDED SYSTEM DEVELOPMENT, IMPLEMENTATION AND TESTING:** The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

### Text Books:

1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications,2013.
2. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited,2013.

### References:

1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications,2013.
2. Embedded Systems-Lyla B.Das-Pearson Publications,2013.

### Course Outcomes:

At the end of this course the student can able to:

- Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specificfunction.
- The hardware components required for an embedded system and the design approach of an embeddedhardware.
- The various embedded firmware design approaches on embeddedenvironment.
- Understand how to integrate hardware and firmware of an embedded system using real time operatingsystem.

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| IV Year - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**WIRELESS COMMUNICATION**
**(Professional Elective 5)**

**Course Objectives:**
The student will be introduced to:
- . The Aim of this course is to introduce the fundamental technologies forwireless Communication andnetworking
- Introducing the concepts of Multiple AccessSchemes
- Introducing the comprehensive exposure to the fast-evolving high-tech fields of Wirelesscommunications
- It introduces the latest technologies such as CDMA, OFDM, and MIMO, whichform The bedrock of 3G/4G wirelessnetworks

**UNIT I**
Introduction to 3G/4G Wireless Communications: Introduction, 2G Wireless Standards, 3GWireless Standards, 4G Wireless Standards, Overview of Cellular Service ProgressionPrinciples of Wireless Communications: The Wireless Communication Environment,Modeling of Wireless Systems, System Model for Narrowband Signals, Rayleigh FadingWireless Channel, BER Performance of Wireless Systems: SNR in a Wireless System, BER inWireless Communication System, Rayleigh BER at High SNR. Intuition for BER in a FadingChannel. Channel Estimation in Wireless Systems, Diversity in Wireless Communication.

**UNIT II**
Code Division for Multiple Access (CDMA): Introduction to CDMA, Basic CDMAMechanism, Fundamentals of CDMA Codes, Spreading Codes based on Pseudo-Noise (PN)Sequences, Correlation Properties of Random CDMA Spreading Sequences, Multi-UserCDMA, Advantages of CDMA.

**UNIT III**
Multiple-Input Multiple-Output Wireless Communications: Introduction to MIMOWireless Communications, MIMO System Model, MIMO Zero-forcing (ZF) Receiver, MIMOMMSE Receiver, Singular Value Decomposition (SVD) of the MIMO Channel,Singular Value Decomposition (SVD) and MIMO Capacity

**UNIT IV**
Orthogonal Frequency-Division Multiplexing: Introduction, Motivation and MulticarrierBasics, OFDM Example, Bit-Error Rate (BER) for OFDM, MIMO-OFDM, Effect ofFrequency Offset in OFDM, OFDM – Peak-to-Average Power Ratio (PAPR), SC-FDMA.

**UNIT V**
Satellite-Based Wireless Systems: Introduction, Satellite Orbits, Use of Satellites forCommunication, Satellites and Transponders, Signal and Noise Calculations,Systems

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UsingGeostationary Satellites, Systems Using Low-Earth-Orbit Satellites, Systems Using MediumEarth-Orbit Satellites.

**TEXTBOOKS:**
1. Principles of Modern Wireless Communication Systems – Aditya K Jagannathan,Mc Graw Hill publishers,2017
2. Wireless Communication Technology – Blake,Delmar/Cengage Learning India, first Edition,2012

**REFERENCES:**
1. Wireless Communications and Networking – Vijay K. Garg,MorganKaufmann,2007

**Course Outcomes:**
After going through this course, the student will be able to
- Know about the Wireless systems and Standards (1G/2G/3Gsystems).
- Concept and analysis of CDMA-based wirelessnetworks.
- Understand the concepts of Multiple-Input Multiple-Output(MIMO).
- Understand the modern wireless systems usingOFDM.
- Analysis of Satellite-Based Wirelesssystems.

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| IV Year - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**3D PRINITING**
Open Elective (OE2)

**Course Objectives:**
The main objectives of this course are:
- • The course aims at the importance of Additive Manufacturing, classifications, models, specifications of various Additive ManufacturingTechniques.
- Principles and operation of 3Dp, Various types of3DP
- Techniques of printingelectronics
- To learn the data formats and soft-waresrequired
- The applications ofRP

**UNIT-I**

**Introduction to Prototyping**, Traditional Prototyping Vs Rapid Prototyping (RP), Need for time compression in product development, Distinction between RP and CNC and other related technologies, Classification of RP, commonly used terms, advantages and limitations of rapid prototyping.

**UNIT-II**

**Three-Dimensional Printing (3DP)**

Overview of 3DP, 3D Printer, 3D Systems, and Z Corporation, ExOne - Metal and Molding Sand Printer, Metal Line: Direct Metal Printer, Molding Sand Line: Direct Core and Mold-Making Machine, Soligen - Direct Shell Production Casting (DSPC), Voxel jet- 3D Printing System, Optomec - Maskless Mesoscale Material Deposition (M3D),

**UNIT-III**

**Techniques for printing electronics**,printing electronics,2D-printing technologies- Flexographic, Offset, Gravure, screen printing, Processes in 3D-printing electronics - Improved building process for 3D devices, Fictionalization of 3D surfaces, Current trends in 3D-printed electronics- antennas, flexible electronics, batteries, The market for 3D-printed electronics And integrated machines

**UNIT – IV**

**RAPID PROTOTYPING DATA FORMATS:** STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, Newly Proposed Formats.

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**RAPID PROTOTYPING SOFTWARE'S:** Features of various RP software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, STL View 3 Data Expert and 3 D doctor.

**UNIT –V**

**RP APPLICATIONS:** Application in engineering, analysis and planning, aerospace industry, automotive industry, jewelry industry, coin industry, GIS application, arts and architecture. RP medical and bioengineering applications: planning and simulation of complex surgery, customized implants & prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bimolecular.

**TEXT BOOKS:**

1. Chua Chee Kai., Leong Kah Fai., Chu Sing Lim, Rapid Prototyping: Principles and Applications in Manufacturing, World Scientific,2010.
2. Andreas Gebhardt Jan-Steffen Hotter, Additive Manufacturing: 3D Printing for prototyping and Manufacturing, Hanser Publications, 6915 Valley Avenue, Cincinnati, Ohio.
3. Ian Gibson., David W Rosen., Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Springer,2010.

**REFERENCE BOOKS:**

1. Rapid Manufacturing / D.T. Pham and S.S.Dimov/Springer
2. Wohlers Report 2000 /Terry T Wohlers/WohlersAssociates
3. Rapid Prototyping & Manufacturing / Paul F.Jacobs/ASMEPress
4. Rapid Prototyping / Chua&Liou

**Course Outcomes:**

At the end of this course the student will be able to:

- Identify the importance of RP in presentscenario.
- Gain the knowledge on3DP
- Application of 3DP in electronics.
- Minimize various errors that are occurring during conversion of CADmodels.
- Applications ofRP.

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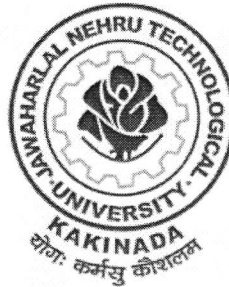
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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

## For

## B. Tech COMPUTER SCIENCE &ENGINEERING

*(Applicable for batches admitted from 2019-2020)*

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# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

## IV Year – I SEMESTER

| S.No | Course Code | Courses | L | T | P | Credits |
|------|-------------|---------|---|---|---|---------|
| 1 | CS4101 | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 2 | CS4102 | UML & Design Patterns | 3 | 0 | 0 | 3 |
| 3 | CS4103 | Machine Learning | 3 | 0 | 0 | 3 |
| 4 | OE4101 | **Open Elective -II** (Inter Disciplinary) | 3 | 0 | 0 | 3 |
| 5 | PE4101 | **Professional Elective- III**<br>1. Mobile Computing<br>2. Data Science<br>3. NoSQL Databases<br>4. Internet of Things<br>5. Software Project Management | 3 | 0 | 0 | 3 |
| 6 | PE4102 | **Professional Elective- IV**<br>1. Web Services<br>2. Cloud Computing<br>3. Mean Stack Technologies<br>4. Ad-hoc and Sensor Networks<br>5. Cyber Security & Forensics | 3 | 0 | 0 | 3 |
| 7 | CS4104 | UML Lab # | 0 | 0 | 2 | 1 |
| 8 | PR4101 | Project- I | 0 | 0 | 0 | 2 |
| 9 | MC4101 | IPR & Patents | 3 | 0 | 0 | 0 |
| | | **Total** | 21 | 0 | 2 | 21 |

# Relevant theory to be taught in the lab

## IV Year – II SEMESTER

| S.No | Course Code | Courses | L | T | P | Credits |
|------|-------------|---------|---|---|---|---------|
| 1 | HS4201 | Management and Organizational Behavior | 3 | 0 | 0 | 3 |
| 2 | OE4201 | **Open Elective- III** (Inter Disciplinary) | 3 | 0 | 0 | 3 |
| 3 | PE4201 | **Professional Elective-V**<br>1. Deep Learning<br>2. Quantum Computing<br>3. DevOps<br>4. Blockchain Technologies<br>5. Big Data Analytics | 3 | 0 | 0 | 3 |
| 4 | PR4201 | Project- II | 0 | 0 | 0 | 7 |
| | | **Total** | 9 | 0 | 0 | 16 |

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# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

## Open Electives to be offered by CSE for Other Branches:

| Open Elective I: | Open Elective II: |
|---|---|
| 1. Data Structures<br>2. Java Programming<br>3. Data Base Management Systems<br>4. C++ Programming<br>5. Operating Systems<br>6. Internet of Things | 1. Problem Solving using Python<br>2. Web Technologies<br>3. Machine Learning<br>4. Distributed Computing<br>5. AI Tools & Techniques<br>6. Data Science |
| **Open Elective III:**<br>1. Big Data<br>2. Image Processing<br>3. Mobile Application Development<br>4. Cyber Security<br>5. Deep Learning<br>6. Blockchain Technologies | |

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## DEPARTMENT OF MECHANICAL ENGINEERING

### IV YEAR II SEMESTER (VIII SEMESTER)

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | PEC-5 | 1.Additive Manufacturing<br>2.Gas Dynamics and Jet Propulsion<br>3. Product design and development<br>4. Reliability Engineering<br>5. MOOCs (NPTEL/Swayam) | 3 | -- | -- | 3 |
| 2 | PEC-6 | 1.Condition Monitoring<br>2.Computational Fluid Dynamics<br>3.Non Destructive Evaluation<br>4. Control Systems<br>5. Entrepreneurship Development | 3 | -- | -- | 3 |
| 3 | OEC-2 | OPEN ELECTIVE -II | 3 | -- | -- | 3 |
| 4 | OEC-3 | OPEN ELECTIVE -III | 3 | -- | -- | 3 |
| 5 | PROJ-II | Project-II | -- | -- | 16 | 8 |
| | | **Total Credits** | 12 | -- | 16 | 20 |

| OPEN ELECTIVE-II: | OPEN ELECTIVE-III: |
|---|---|
| 1.  Green Energy Systems | 1.  Total Quality Management |
| 2.  Robotics | 2.  Supply Chain Management |
| 3.  Energy Consumption and Management | 3.  Product Design & Development |
| 4.  3D Printing Technologies | 4.  Entrepreneurship |
| 5.  Mechatronics | 5.  Advanced Materials |

**Note:**

1) Professional Elective course (PEC) /Open Elective course (OEC)  can also be completed via MOOCs (NPTEL/Swayam)  Course (12 Week duration)

2) The list of MOOCs courses shall be approved by the chairperson of BOS.

3) The tutorial class can be of one hour duration as per requirements of a particular subject.

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| IV Year –I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | SOFTWARE PROJECT MANAGEMENT | | | | |

### Course Objectives:
At the end of the course, the student shall be able to:
- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

### Course Outcomes:
Upon the completion of the course students will be able to:-
- Apply the process to be followed in the software development life-cycle models.
- Apply the concepts of project management & planning.
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the Software projects
- Implement communication, modeling, and construction & deployment practices in software development.

### UNIT I
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

### UNIT II
The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.
Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

### UNIT III
Model Based Software Architectures: A Management perspective and technical perspective.
Work Flows of the Process: Software process workflows, Iteration workflows.
Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

### UNIT IV

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

### UNIT V

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

### Text Books:

1) Software Project Management, Walker Royce, Pearson Education, 2005.
2) Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

### Reference Books:

1) Software Project Management, Joel Henry, Pearson Education.
2) Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.
3) Effective Software Project Management, Robert K.Wysocki, Wiley,2006.

# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| IV Year –I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | CYBER SECURITY & FORENSICS | | | | |

## Course Objectives:
- Able to identify security risks and take preventive steps
- To understand the forensics fundamentals
- To understand the evidence capturing process
- To understand the preservation of digital evidence

## Course Outcomes:
At the end of the course, student will be able to
- Enumerate the computer forensics fundamentals
- Describe the types of computer forensics technology
- Analyze various computer forensics systems
- Illustrate the methods for data recovery, evidence collection and data seizure
- Identify the Role of CERT-In Security

## UNIT I
Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

## UNIT II
Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares,Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

## UNIT III
Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

## UNIT IV
Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

## UNIT V
Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital

Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario.

**Text Books:**
1) Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY, 2011.
2) Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

**Reference Books:**
1) Michael T. Simpson, Kent Backman and James E. Corley, "Hands on Ethical Hacking and Network Defence", Cengage, 2019.
2) Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3) Alfred Basta, Nadine Basta,Mary Brown and Ravinder Kumar "Cyber Security and Cyber Laws" , Cengage,2018.

**e-Resources:**
1) CERT-In Guidelines- http://www.cert-in.org.in/
2) https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks [ Online Course]
3) https://computersecurity.stanford.edu/free-online-videos [ Free Online Videos]
4) Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu. License: Creative Commons BY-NC-SA.

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| IV Year –II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **DEEP LEARNING** | | | | |

### Course Objectives:
- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

### Course Outcomes:
- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

### UNIT I
Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

### UNIT II
Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

### UNIT III
Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

### UNIT IV
Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

**UNIT V**

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

**Text Books:**

1) Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press,2016.
2) Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017.

**Reference Books:**

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

**e-Resources:**

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

# DEPARTMENT OF MECHANICAL ENGINEERING

| IV Year  - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | ENTREPRENEURSHIP | | | | |

## COURSE OBJECTIVE:
The aim of this course is to develop and strengthen entrepreneurial quality and motivation among students. This course will impart the basic entrepreneurial skills and understandings to run a business efficiently and effectively.

## UNIT I   ENTREPRENEURAL COMPETENCE
Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

## UNIT II   ENTREPRENEURAL ENVIRONMENT AND POLICIES
Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services –
Central and State Government Industrial Policies and Regulations - International Business.

## UNIT III BUSINESS PLAN PREPARATION
Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

## UNIT IV LAUNCHING OF SMALL BUSINESS
Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT startups.

## UNIT V  MANAGEMENT OF SMALL BUSINESS
Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

## Text Books:
1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.
2. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001.

## References
1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra ,2nd Edition 2005
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai -1997.

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# DEPARTMENT OF MECHANICAL ENGINEERING

**COURSE OUTCOME:**
- Up on completing this course, students are able to
- Gain the competency of preparing business plans
- Get the awareness on industrial policies
- Study the impact of launching small business
- Understand the recourse planning and market selection for start ups.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

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**DEPARTMENT OF AUTOMOBILE ENGINEERING**

## COURSE STRUCTURE-R19

# COURSE STRUCTURE AND SYLLABUS

## For

# B. TECH AUTOMOBILE ENGINEERING

*(Applicable for batches admitted from 2019-2020)*



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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
# DEPARTMENT OF AUTOMOBILE ENGINEERING

### IV Year - I Semester

| Course Code | Subjects | L | T | P | Credits |
|---|---|---|---|---|---|
| ME4117 | Industrial Engineering & Management | 3 | 0 | 0 | 0 |
| AU 4114 | Vehicle Dynamics | 3 | 0 | 0 | 3 |
| AU 4115 | Vehicle Body Engineering | 3 | 0 | 0 | 3 |
| AU 4116 | Alternative Energy sources for Automobiles | 3 | 0 | 0 | 3 |
| ME 4118<br>AU 4117<br>AU 4118<br>ME 4119<br>AU 4119 | **Elective I**<br>1. CAD/CAM<br>2. Two and Three Wheelers<br>3. Automotive Aerodynamics<br>4. Finite Element Methods<br>5. Vehicle Infotronics | 3 | 0 | 0 | 3 |
| ME 4120<br>ME 4121<br>ME 4122<br>ME 4123<br>CS 4101 | **Elective II**<br>1. Mechatronics<br>2. Computational Fluid Dynamics<br>3. Condition Monitoring<br>4. Managerial Economics and financial analysis<br>5. Internet of Things | 3 | 0 | 0 | 3 |
| AU 4120 | Vehicle Design and simulation Lab | | | | 2 |
| PROJ 4103 | Project I | 0 | 0 | 6 | 2 |
| | **Total Credits** | | | | 19 |

### IV Year - II Semester

| Course Code | Subjects | L | T | P | Credits |
|---|---|---|---|---|---|
| AU 4221 | Noise, Vibrations and Harshness | 3 | 0 | 0 | 3 |
| AU 4222 | Vehicle Maintenance | 3 | 0 | 0 | 3 |
| AU 4223 | Certification and Homologation | 3 | 0 | 0 | 3 |
| AU 4224<br>AU 4225<br>AU 4226 | **Elective III**<br>I. Automotive Safety<br>2. Automotive HVAC<br>3. Special Purpose Vehicles | 3 | 0 | 0 | 3 |
| PROJ 4204 | Project II | 0 | 0 | 12 | 8 |
| | **Total Credits** | | | | 20 |

## Total Course Credits— 40+41 + 40+ 39 = 160

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**DEPARTMENT OF AUTOMOBILE ENGINEERING**

| IV Year - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **CONDITION MONITORING**<br>**(ELECTIVE –II)** | | | | |

### UNIT – I

Introduction to maintenance and condition based maintenance, Definition, system approach, objectives, responsibilities of maintenance department, maintenance strategies, principles of maintenance, concepts of maintainability, availability and reliability, implementation of CBM, comparison of CBM with other maintenance techniques and case studies (overview). Introduction to condition monitoring,Basic concept, techniques - visual monitoring, temperature monitoring, vibration monitoring, lubricant monitoring, crack monitoring, thickness monitoring, noise and sound monitoring.

### UNIT – II

Basic signal processing techniques Probability distribution and density, Fourier analysis, Hilbert Transform, Cepstrum analysis, Digital filtering, Deterministic / random signal separation, Time-frequency analysis. WaveletTransform Introduction to Wavelets, Continuous Wavelet Transform (CWT), Discrete WaveletTransform (DWT), Wavelet Packet Transform (WPT),types of wavelets –Haarwavelets, Shannon wavelets, Meyer wavelets, Daubechies wavelets, Coifmann wavelets and applications of wavelets.

### UNIT - III

Vibration Monitoring,Introduction, vibration data collection, techniques, instruments, transducers, selection, measurement location, time domain analysis, frequency domain analysis, time-frequencydomain analysis and commonly witnessed machinery faults diagnosed by vibration analysis.
Rotating and reciprocating machines, Vibration signals from rotating and reciprocating machines – signal classification, signals,generated by rotating machines, signals generated by reciprocating machines.

### UNIT – IV

Mechanical fault diagnosis,Wear monitoring and lubricant analysis - sources of contamination, techniques, Spectrometric, Oil Analysis Procedure (SOAP) and ferrography. Nondestructive testing techniques,Measurement of surface and subsurface flaws – liquid penetrant inspection, eddy current inspection, radiographic inspection, ultrasonic inspection.

### UNIT – V

Condition monitoring of rolling element bearings and gear, Introduction, construction, types of faults, rolling element bearing diagnostics and gear diagnostics. Tool wear monitoring, Introduction, techniques and case studies.

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**KAKINADA – 533 003, Andhra Pradesh, India**
**DEPARTMENT OF AUTOMOBILE ENGINEERING**

## TEXT BOOKS:

1. Robert Bond Randall – Vibration-Based Condition Monitoring – Industrial, Aerospace and Automotive applications, John Wiley &amp; Sons Ltd., 2011
2. R.A.Collacot – Mechanical Fault Diagnosis – Chapman and Hall Ltd., 1977.
3. ISTE Course material on Condition Monitoring.
4. R.C.Mishra, K.Pathak – Maintenance Engineering and Management, Prentice Hall of India Pvt. Ltd., 2002.
5. K. P. Soman, K. I. Ramachandran, N. G. Resmi – Insight into wavelet from theory to practice, Third Edition, Prentice Hall of India,

## REFERENCES BOOKS:

1. John S.Mitchell, Introduction to Machinery Analysis and Monitoring, Penn Well Books,1993.
2. Elsevier-"Hand book of Condition Monitoring" ELSEVIER SCIENCE
3. R.A.Collacott, "Vibration monitoring and diagnosis", Wiley,1979.
4. RaoJ.S.,"VibratoryConditionMonitoringofMachines",CRCPress,2000.
5. "ConditionMonitoringmanual",NationalProductivityCouncil,NewDelhi.

## Course Outcomes:

At the end of this course the student shall be able to:

1. Understand the types of maintenance used and its significance, role of condition based maintenance in industries, familiarize with different condition monitoring techniques and its advantages in industries.
2. Implement the basic signal processing techniques.
3. Understand the role of vibration monitoring, its methodology and its use in condition monitoring of rotating and reciprocating machines.
4. Understand the significance of mechanical fault diagnosis and non-destructive testing techniques in monitoring and maintenance.
5. Study condition monitoring of rolling element bearing, gears and tool condition monitoring techniques in machining.

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**DEPARTMENT OF AUTOMOBILE ENGINEERING**

| IV Year - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**CAD/CAM**
**(ELECTIVE –I)**

**Course Objectives:**

The general objectives of the course are to enable the students to

1. Understand the basic fundamentals of computer aided design and manufacturing.
2. To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc
3. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication
4. To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control
5. To learn the overall configuration and elements of computer integrated manufacturing systems.

**UNIT – I**
Introduction to CAD/CAM, product cycle, CAD / CAM Hardware, basic structure.
**COMPUTER GRAPHICS:** Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 2D and 3D transformations, mathematics of projections, clipping, hidden surface removal.

**UNIT – II**
**GEOMETRIC MODELING:** Requirements, geometric models, geometric construction models, curve representation methods, parametric representation of various curves:cubic spline, bezier curves. surface representation methods, Solid modelling.

**UNIT – III**
**PART PROGRAMMING FOR NC MACHINES:** NC, NC modes, NC elements, CNC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming. Direct Numerical Control, Adaptive Control.

**UNIT – IV**
**GROUP TECHNOLOGY:** Part family, coding and classification, production flow analysis, types and advantages. Computer aided processes planning – importance, types. FMS-Introduction, Equipment, Tool management systems, Layouts, FMS Control

**UNIT – V**
**COMPUTER INTEGRATED MANUFACTURING SYSTEMS:** Types of manufacturing systems, machine tools and related equipment, material handling systems, material requirement planning, computer control systems, human labor in manufacturing systems, CIMS benefits.

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**COMPUTER AIDED QUALITY CONTROL:** Terminology used in quality control, use of computers in Quality control. Inspection methods- contact and noncontact types, computer aided testing, integration of CAQC with CAD/CAM.

**TEXT BOOKS:**
1. CAD / CAM Principles and Applications/PN Rao / McGraw-Hill
2. Automation, Production systems & Computer integrated Manufacturing/ M.P. Groover/Pearson Education

**REFERENCES:**
1. Mastering CAD / CAM / Ibrahim Zeid / McGraw-Hill
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
3. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson learning, Inc
4. Product manufacturing and cost estimation using CAD/CAE/ Kuang Hua Chang/Elsevier Publishers

**Course Outcomes:**
At the end of the course the students shall be able to:
1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix
2. Describe the use of GT and CAPP for the product development
3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.

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| | | 3 | 0 | 0 | 3 |
|---|---|---|---|---|---|
| | **AUTOMOTIVE SAFETY**<br>**(ELECTIVE – III)** | | | | |

**Course objective:** To impart the knowledge of the safety concepts, comfort and convenience system, driver assistance system and other requirements of automotive safety.

**UNIT-I**
**INTRODUTION:**
Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

**UNIT-II**
**SAFETY AND FATIGUE ASPECTS**
Design of body, forces in roll over, head on impact, plastics collapse and analysis, fatigue and vibration, test on box sections, structural vibration.

**UNIT-III**
**SAFETY CONCEPT**
Active safety: driving safety, conditional safety, perceptibility safety, operating safety- crash safety passive safety: exterior safety, interior, safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.
Safety equipment: Seat belt, regulations, automatic seat belt tightened system,Anti locking braking system(ABS), Speed limiting device(SLD),Fire detection and suppression system(FDSS), automatic traction control, automatic vehicle stability control, Collapsible steering system, tilt able steering system, air bags, electronic system for activating air bags, bumpers design for safety.

**UNIT-IV**
**COLLISION WARNING AND AVOIDANCE**
Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system object detection system with braking system interactions.

**UNIT-V**
**COMFORT AND CONVENIENCE SYSTEM**
Steering and mirror adjustment, central locking system, tyre pressure monitoring and control system, rain sensor system, automatic climate control systems, environment information system.

**TEXT BOOKS:**
1. Bosch /Automotive Handbook/5th edition /SAE publication
2. Junsz Pawlowski/Vehicle Body Engineering/Business book limited, 1989.
3. Ronald K Jurgen/Navigation and Intelligent Transportation Systems-Progress in Technology/ Automotive Electronics Series, SAE. USA,1998.

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**REFERENCE BOOKS:**

1. Rudolf Limpert/Brake Design and Safety/ SAE International, Second Edition, 1999.
2. Ronald. K. Jurgen / "Automotive Electronics Handbook" – Second edition / Mc Graw – Hill
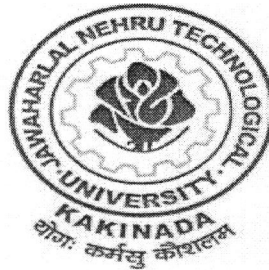
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**DEPARTMENT OF CIVIL ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

## For UG – R20

## B. TECH - CIVIL ENGINEERING

*(Applicable for batches admitted from 2020-2021)*

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
### DEPARTMENT OF CIVIL ENGINEERING

## III YEAR – I SEMESTER

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | PC501 | Professional Core courses (STRUCTURAL ANALYSIS) | 3 | 0 | 0 | 3 |
| 2 | PC502 | Professional Core courses (DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES) | 3 | 0 | 0 | 3 |
| 3 | PC503 | Professional Core courses (GEOTECHNICAL ENGINEERING-1) | 3 | 0 | 0 | 3 |
| 4 | OE501 | Open Elective Course/Job Oriented elective (OE-1) | 3 | 0 | 0 | 3 |
| 5 | PE501 | Professional Elective courses | 3 | 0 | 0 | 3 |
| 6 | PC504 | Professional Core courses Lab Survey Camp (Field work) | 0 | 0 | 3 | 1.5 |
| 7 | PC505 | Professional Core courses Lab (GEOTECHNICAL ENGINEERING LAB) | 0 | 0 | 3 | 1.5 |
| 8 | PC501 | Skill advanced course/ soft skill course* Design of Special Structure, Chimney, Hinge Tanks designs, spill ways etc., | 1 | 0 | 2 | 2 |
| 9 | MC501 | Mandatory Course (AICTE Suggested) Professional Ethics and Human Values | 2 | 0 | 0 | 0 |
| 10 | PR501 | Summer Internship 2Months (Mandatory) after second year (to be evaluated during V semester) | 0 | 0 | 3 | 1.5 |
| | | **Total Credits** | | | | **21.5** |
| | | **Honors/ Minor courses** (The hours distribution can be 3-0-2 or 3-1-0 also) | 3 | 1 | 0 | 4 |

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF CIVIL ENGINEERING

## III YEAR – II SEMESTER

| S. No. | Course Code | Course Title | L | T | P | Credits |
|--------|-------------|--------------|---|---|---|---------|
| 1 | PC601 | Professional Core courses (DESIGN AND DRAWING OF STEEL STRUCTURES) | 3 | 0 | 0 | 3 |
| 2 | PC602 | Professional Core courses (WATER RESOURCE ENGINEERING) | 3 | 0 | 0 | 3 |
| 3 | PC603 | Professional Core courses (GEOTECHNICAL ENGINEERING-II) | 3 | 0 | 0 | 3 |
| 4 | PE601 | Professional Elective courses | 3 | 0 | 0 | 3 |
| 5 | OE601 | Open Elective Course/Job oriented elective (OE-2) | 3 | 0 | 0 | 3 |
| 6 | PC604 | Professional Core courses Lab (ESTIMATION, COSTING AND CONTRACTS) | 0 | 0 | 3 | 1.5 |
| 7 | PC605 | Professional Core courses Lab (REMOTE SENSING & GIS LAB) | 0 | 0 | 3 | 1.5 |
| 8 | PC606 | Professional Core courses Lab CIVIL ENGINEERING PRACTICE | 0 | 0 | 3 | 1.5 |
| 9 | SC601 | Skill advanced course/ soft skill course* Computational Tools | 1 | 0 | 2 | 2 |
| 10 | MC601 | Mandatory course (AICTE) (EMPLOYABILITY SKILLS) | 2 | 0 | 0 | 0 |
| 11 | PR601 | Industrial/Research Internship (Mandatory) 2 Months | 0 | 0 | 3 | 1.5 |
| | | Total Credits | | | | 23 |
| **Honors/ Minor courses** (The hours distribution can be 3-0-2 or 3-1-0 also) | | | 3 | 1 | 0 | 4 |

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF CIVIL ENGINEERING

**Professional Electives R20 (5 PE x 3 = 15 Credits)**
**(Department can offer Maximum 2 Subjects from Each PE, elected by the students)**
**Note: Student must choose subjects which were not opted earlier**
**PE starts from III-I**

| rofessional Elective-I | Professional Elective-II | Professional Elective-III | Professional Elective-IV | Professional Elective-IV |
|---|---|---|---|---|
| a) Construction Technology &Management *(III-I)* | a) Advanced Structural Analysis | a) Advanced Structural Engineering | a) Ground Improvement Techniques | a) Design & Drawing of Irrigation Structures |
| b) Remote Sensing and GIS | b) Architecture and Town Planning | b) Bridge Engineering | b) Geo-Spatial Technologies | b) Earth & Rock fill Dams |
| c)Environmental Impact Assessment | c) Road Safety Engineering *(III-II)* | c) Structural Dynamics | c) Disaster Management & Mitigation | c) Urban Hydrology |
| d) Low Cost Housing | d) Traffic Engineering | d)Urban Transportation Planning | d) Soil dynamics & Machine Foundations | SWAYAM / NPTEL /MOOCS COURSES (12 weeks duration) |

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**OPEN ELECTIVES R20**
**(4 OE x 3 = 12 Credits)**
**Note: Student must choose subjects which were not opted earlier.**
**(OE Starts from III-I)**

| Open Elective-I/ Open Elective-III (Offered in Odd Semesters) | Open Elective-II/ Open Elective-IV (Offered in Even Semesters) |
|---|---|
| a) Strength of Materials | a) Elements of Civil Engineering |
| b) Fluid Mechanics | b) Environmental Engineering |
| c) Surveying and Geomatics | c) Disaster Management  [III-II] |
| d) Highway Engineering | d) Water Resource Engineering |
| e) Safety Engineering | e) Hydraulics and Hydraulic Machinery |
| f) Environmental Management  [III-I] | f) Green Technologies |
| g) Urban Planning | g) Remote Sensing & GIS |

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| PROFESSIONAL ELECTIVE | PE-501 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **I a) CONSTRUCTION TECHNOLOGY &MANAGEMENT** | | | | | |

**Course Learning Objectives:**

The objective of this course is:
1. To introduce to the student, the concept of project management including network drawing and monitoring
2. to introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. to introduce the importance of safety in construction projects

**Course Outcomes:**

Upon the successful completion of this course, the students will be able to:
1. appreciate the importance of construction planning
2. understand the functioning of various earth moving equipment
3. know the methods of production of aggregate products and concreting
4. apply the gained knowledge to project management and construction techniques

**Course Articulation Matrix:**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | - | - | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | 3 | - | - | 3 | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | 3 | 3 | - | 3 | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - |

**1 - Slightly    2 - Moderately      3 – Substantially**

**SYLLABUS:**

**UNIT- I**

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method

**UNIT -II**

Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

**UNIT- III**

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers
Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets

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### UNIT -IV
Concreting equipment — concrete mixers – Batching plants, mobile using plants like "Ajax" etc. mixing and placing of concrete – consolidating and finishing.

### UNIT -V
Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering.
BIM for Civil Engineers (Building Information Modelling)

### TEXT BOOKS:
1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar NeerajJha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Sarasvati, Oxford University press

### REFERENCES:
1. 'Construction Project Management - An Integrated Approach' by Peter Fewings , Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams , Cengage learning

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| OE- I/III | OPEN ELECTIVE | L | T | P | C |
|-----------|---------------|---|---|---|---|
|           |               | 3 | 0 | 0 | 3 |

| (f) ENVIRONMENTAL MANAGEMENT |
|---|

**Course Learning Objectives:**
The course will address the following:
1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of air pollution control with various methods
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems
5. Impart knowledge on Industrial Wastewater management
6. Visit at least one Water and Wastewater Treatment Plant and supply system.

**Course Outcomes:**
Upon the successful completion of this course, the students will be able to:
a. Plan and design the water and wastewater systems
b. Identify the source of emissions and select proper control systems
c. Design & estimation of water supply system for a city
d. to get knowledge about various environmental aspects
e. Selection of suitable treatment flow for raw water treatments

## SYLLABUS:
### UNIT I
**Energy and Environment:** Definition- Energy demand – Energy resources and generation of electricity – conservation and management of energy resources – Oil pollution – Impact of oil pollution on marine and costal ecosystems – Management of oil pollution - case study of oil pollution.

### UNIT II
**Agriculture and Environment:** Definition -Composition of soils – soils for plant growth – difference between sandy and clayey soils – macro and micro nutrients for plant growth – different types of agriculture – Impact of agriculture on environment and people – causes for soil erosion – management of soil erosion

### UNIT III
**Water Management:** Water cycle – global water distribution – fresh water supply system – water usage in different ways – water quality and availability - water pollution and its sources – impact of water pollution – managing pollution of fresh water – managing water related diseases.
### UNIT IV
**Atmospheric Pollution:** Definition – atmosphere – structure and composition of atmosphere – natural greenhouse effect – atmospheric pollution and its causes like smog, acid rain – ozone layer depletion – enhanced greenhouse effect – urban heat islands – impact of atmospheric pollution on humans, plants – managing of atmospheric pollution.

### UNIT V
**Management of natural hazards:** definition – hazard and disaster – Earth quake and volcanoes – Flooding – drought – impact of natural hazards – managing the impacts of natural hazards – opportunities presented by natural hazards.
**Text Books:**
1. KVSG Murali Krishna, "Environmental studies", VGS Publications, Vijayawada, 2016.
2. Jacobson, M.Z. "Atmospheric Pollution: History, Science and Regulation", Cambridge University Press.

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3. Masters, G.M. "Introduction to Environmental Engineering and Science", PHI.

.**References:**
1. Jacobson, M.Z. "Fundamental of Atmospheric Modeling", Cambridge University Press.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF CIVIL ENGINEERING

| III Year – II Semester | Professional Elective-II | L | T | P | C |
|---|---|---|---|---|---|
| . | | 3 | 0 | 0 | 3 |
| PE-601- II c). ROAD SAFETY ENGINEERING | | | | | |

## Course Objectives:
1. This module on the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.
2. The accident interrogations & risk involved with measures to identity the causes are dealt.
3. The role of road safety in planning the urban infrastructures design is discussed.
4. The various traffic management systems for safety & safety improvement strategies are dealt.

## Course Outcomes:
At the end of the course, students will be able to

a) To understand fundamental of Traffic Engineering
b) To investigate & determine the collective factors & remedies of accident involved.
c) To design & planning various road geometrics.
d) To massage the traffic system from road safety point of view.

## SYLLABUS:

### UNIT I
#### Introduction to Road Safety:
Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India. Multi-causal dynamic systems approach to safety; Crash Vs Accident; Road safety improvement strategies; Elements of a road safety plan, Safety data Needs; Safe vehicle design.

### UNIT II
#### Statistical Interpretation and Analysis of Crash Data:
Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.

### UNIT III
#### Road Safety Audits:
Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.

### UNIT IV
#### Crash Reconstruction:
Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to crash reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables

involved in pedestrian crashes, Case Studies.

## UNIT V
### Mitigation Measures:
Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law.

## TEXT BOOKS:

1. Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.
2. Towards Safe Roads in Developing country, TRL – ODA, 2004.

## REFERENCES:
1. Athelstan Popkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)
2. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
3. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.

**Date: 05ᵗʰ & 06ᵗʰ March 2022**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
### DEPARTMENT OF CIVIL ENGINEERING

| OE-II / IV | OPEN ELECTIVE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | (c) DISASTER MANAGEMENT | | | | |

**Course Learning Objectives:**

The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

**Course Outcomes:**

Upon the successful completion of this course, the students will be able to:

a. Affirm the usefulness of integrating management principles in disaster mitigation work
b. Distinguish between the different approaches needed to manage pre- during and post- disaster periods
c. Explain the process of risk management
d. Relate to risk transfer

**SYLLABUS:**

**UNIT-I**

**Natural Hazards and Disaster Management:** Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

**UNIT-II**

**Man Made Disaster and Their Management Along With Case Study Methods Of The Following:** Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

**UNIT-III**

**Risk and Vulnerability:** Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

**UNIT-IV**

**Role of Technology in Disaster Managements**: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

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**UNIT-V**
**Multi-sectional Issues, Education and Community Preparedness:** Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

**TEXT BOOKS:**

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Punblishers & Distributors Pvt. Ltd.

2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications

3. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

4. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

**REFERENCE BOOKS:**

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.
3. R. Nishith, Singh AK, "Disaster Management in India : Perspectives, Issues and strategies" New Royal Book Company."

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**
**GURAJADA VIZIANAGARAM**
Vizianagaram– 535 003, Andhra Pradesh, India
Established by Andhra Pradesh Act No.22 of 2021

# COURSE STRUCTURE AND SYLLABUS

## For

# B.TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

*(Applicableforbatchesadmittedfrom2020-2021)*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA**
**VIZIANAGARAM**
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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA**
**VIZIANAGARAM–535003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

### III B.Tech – I Semester

| Sl. No | Course Components | Subjects | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | PCC | Power Systems-II | 3 | 0 | 0 | 3 |
| 2 | PCC | Power Electronics | 3 | 0 | 0 | 3 |
| 3 | PCC | Control Systems | 3 | 0 | 0 | 3 |
| 4 | OEC | Open Elective- I/ Job Oriented Elective-I | 3 | 0 | 0 | 3 |
| 5 | PEC | Professional Elective - I | 3 | 0 | 0 | 3 |
| 6 | PCC | Control Systems Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC | Power Electronics Lab | 0 | 0 | 3 | 1.5 |
| 8 | SC | Soft Skill Course:Employability Skills | 2 | 0 | 0 | 2 |
| 9 | MC | Environmental Science | 2 | 0 | 0 | 0 |
| 10 | PROJ | Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester) | 0 | 0 | 0 | 1.5 |
| | | **TotalCredits** | | **21.5** | | |
| | | Minors Course* | 4 | 0 | 0 | 4 |
| | | Honors Course* | 4 | 0 | 0 | 4 |

### III B.Tech – II Semester

| Sl. No | Course Components | Subjects | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | PCC | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 2 | PCC | Electrical Measurements and Instrumentation | 3 | 0 | 0 | 3 |
| 3 | PCC | Power System Analysis | 3 | 0 | 0 | 3 |
| 4 | PEC | Professional Elective - II | 3 | 0 | 0 | 3 |
| 5 | OEC | Open Elective –II/ Job Oriented Elective-II | 3 | 0 | 0 | 3 |
| 6 | PCC | Electrical Measurements and Instrumentation Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC | Microprocessors and Microcontrollers Lab | 0 | 0 | 3 | 1.5 |
| 8 | PCC | Power Systems and Simulation Lab | 0 | 0 | 3 | 1.5 |
| 9 | SC | **Skill Advanced Course:** Machine Learning with Python | 2 | 0 | 0 | 2 |
| 10 | MC | Research Methodology | 2 | 0 | 0 | 0 |
| | | **Total Credits** | | **21.5** | | |
| | | Minors Course* | 4 | 0 | 0 | 4 |
| | | Honors Course* | 4 | 0 | 0 | 4 |

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## Professional Elective Subjects offered to EEE Branch Students:

### Professional Elective – I:
1. Linear IC Applications
2. Utilization of Electrical Energy
3. Computer Architecture and Organization
4. Optimization Techniques
5. Object Oriented Programming through Java (III-I)

### Professional Elective – II:
1. Signal and Systems
2. Electric Drives
3. Advanced Control Systems
4. Switchgear and Protection
5. Big Data Analytics

### Professional Elective –III:
1. Digital Signal Processing
2. Renewable and Distributed Energy Technologies
3. Flexible Alternating Current Transmission Systems
4. Power Systems Deregulation
5. Data Base Management Systems

### Professional Elective – IV:
1. Hybrid Electric Vehicles
2. High Voltage Engineering
3. Programmable Logic Controllers and Applications
4. Cloud Computing with AWS
5. Deep Learning Techniques

### Professional Elective – V:
1. Power System Operation and Control
2. Switched Mode Power Conversion
3. AI Applications toElectrical Engineering
4. Data Science
5. MEAN Stack Technologies

## Open Electives offered by EEE Department for Other Branches (Except EEE Branch)

### Open Elective-I:
1. Renewable Energy Sources
2. Concepts of Optimization Techniques
3. Concepts of Control Systems

### Open Elective-II:
1. Battery Management Systems and Charging Stations
2. Fundamentals of utilization of Electrical Energy
3. Indian Electricity Act

### Open Elective-III:
1. Concepts of Microprocessors and Microcontrollers
2. Fundamentals of Electric Vehicles
3. Concepts of Internet of Things

### Open Elective-IV:
1. Concepts of Power System Engineering
2. Concepts of  Smart Grid Technologies

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

| III Year – I SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| · | **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**<br>**(PROFESSIONAL ELECTIVE – I)** | | | | |

**Course Objective:** Implementing programs for user interface and application development using core java principles

**UNIT-I**
Focus on object oriented concepts and java program structure and its installation, Introduction to OOP Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features.

**UNIT-II**
Comprehension of java programming constructs, control structures in Java Programming Constructs Variables , Primitive Datatypes, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control Branching, Conditional, loops.,

**UNIT-III**
Classes and Objects- classes, Objects, Creating Objects, Methods, constructors, Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments **Interfaces and exception handling Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class Interfaces,

**UNIT-IV**
Understanding of Thread concepts and I/O in Java MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads.

**UNIT-V**
Being able to build dynamic user interfaces using applets and Event handling in java Swing: Introduction, javax.swing package , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box.

**Course Outcomes:** By the end of the course student will be able to
- Discuss and understand java programming constructs, Control structures
- Illustrate and experiment Object Oriented Concepts like classes, objects
- Apply Object Oriented Constructs such as Inheritance, interfaces, and exception handling
- Construct applications using multithreading and I/O
- Develop Dynamic User Interfaces using applets and Event Handling in java

**Text Books:**
1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
4. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.

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**VIZIANAGARAM–535003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Reference Books:**
1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java programming, 7th ed, Y Daniel Liang, Pearson Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
6. Object Oriented Programming through JAVA , P Radha Krishna , University Press

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

## GENERAL MINOR TRACKS

| S. No. | Subject | L-T-P | Credits |
|--------|---------|-------|---------|
| 1 | Electronics Devices and Basic Circuits | 3-1-0 | 4 |
| 2 | Digital Electronics | 3-1-0 | 4 |
| 3 | Principles of Communication | 3-1-0 | 4 |
| 4 | Signal Analysis | 3-1-0 | 4 |
| In addition to any of the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each) are compulsory in the domain of Electronics and Communication Engineering ||||

List of the **OPEN ELECTIVES** offered by **ECE** Department to **other Branches**:

1. Basics of Signals and Systems
2. Electronic Measurements and Instrumentation
3. Principles of Signal Processing
4. Industrial Electronics
5. Consumer Electronics
6. Fundamentals of Microprocessors and Microcontrollers
7. Transducers and Sensors
8. IOT and Applications
9. Soft Computing Techniques
10. IC Applications
11. Principles of Communications
12. Basic Electronics
13. Data Communications
14. Digital Logic design
15. Remote Sensing and GIS
16. Bio Medical Instrumentation

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

| | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| BASIC ELECTRONICS |
|---|
| (OE) |

**Unit I:** Semiconductor Basics: Atomic Structure, Semiconductors, Conductors, and Insulators, Covalent Bonds, Conduction in Semiconductors, N-Type and P-Type Semiconductors, Diode, Biasing a Diode, Voltage-Current Characteristic of a Diode, Diode Models.
Diode Applications: Half- Wave Rectifiers, Full-Wave Rectifiers, Power Supply Filters and Regulators.

**Unit II:** Special-Purpose Diodes: Zener Diodes, Zener Diode Applications, Varactor Diodes, Optical Diodes

**Unit III:** Bipolar junction Transistors: Transistor Structure, Basic Transistor Operation, Transistor Characteristics and Parameters, Transistor as an Amplifier and Switch

**Unit IV:** Field-Effect Transistors (FETs): JFET, Characteristics and Parameters, JFET Biasing, MOSFET Characteristics and Parameters

**Unit V:** Thyristors and Other Devices: Basic 4-Layer Device, The Silicon-Controlled Rectifier, SCR Applications, Unijunction Transistor , IGBT, Phototransistor, Light-Activated SCR, Optical Couplers

**Text Books:**
1. ˙ Electronic Devices conventional current version By Floyd, Seventh Edition, Pearson publications

**References:**
1. Electronics devices & circuit theory- Robert L.Boylestad and Loui Nashelsky, Pearson/Prentice hall, tenth edition, 2009
2. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2007

**Course Outcomes:**
At the end of this course the student will be able to
1. Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
2. Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
3. Understand the construction, principle of operation of transistors,

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

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## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

**UNIT – IV:**

**The Network Layer Design Issues** – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. Traffic Control Algorithm-Leaky bucket & Token bucket.

**Internet Working:** How networks differ- How networks can be connected- Tunnelling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, NAT-, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6- Internet control protocols- ICMP-ARP-DHCP

**UNIT –V:**

**The Transport Layer:** Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services-TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control, Congestion control in TCP.

**Application Layer** –- World Wide Web: HTTP, Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging-Domain Name System: Name Space, DNS in Internet ,-Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers, SNMP.

**Text Books:**
1. Computer Networks — Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan, Fifth Edition TMH.

**References Books:**
1. Data Communications and Networks- Achut S Godbole, Atul Kahate
2. Computer Networks, Mayank Dave, CENGAGE

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA
## VIZIANAGARAM–535003, Andhra Pradesh, India
### DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

| III Year – I SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **SWITCHGEAR AND PROTECTION**<br>(PROFESSIONAL ELECTIVE – II) | | | | |

**Preamble:**
In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

**Course Objectives:**
- To provide the basic principles and operation of various types of circuit breakers.
- To know the classification, operation and application of different types of electromagnetic protective relays.
- To explain protective schemes for generator and transformers.
- To gain the knowledge of various protective schemes used for feeders and bus bars.
- To explain the principle and operation of different types of static relays.
- To understand different types of over voltages in a power system and principles of different neutral grounding methods.

## UNIT–I
**Circuit Breakers**
Application oriented evolution of Switchgear - Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Concept of oil circuit breakers– Description and operation of Air Blast– Vacuum and $SF_6$ circuit breakers– Circuit Breaker ratings and specifications– Concept of Auto reclosing – Application Spectrum Numerical examples

## UNIT–II
**Electromagnetic Protection**
Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types– Applications of relays: Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

## UNIT–III
**Generator Protection**
Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.
**Transformer Protection**
Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

## UNIT–IV
**Feeder and Bus bar Protection & Static Relays:**
Over current Protection schemes – PSM - TMS – Numerical examples – Carrier current and three zone distance relay using impedance relays.
Protection of bus bars by using Differential protection.
Static relays: Introduction – Classification of Static Relays – Basic Components of Static Relays.

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## UNIT–V
### Protection against over voltage and grounding

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc oxide lighting arresters.

Grounded and ungrounded neutral systems – Effects of ungrounded neutral on system performance – Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

### Course Outcomes:
After the completion of the course the student should be able to:

- Illustrate the principles of arc interruption for application to high voltage circuit breakers of air - oil - vacuum - $SF_6$ gas type.
- Analyse the working principle and operation of different types of electromagnetic protective relays.
- Acquire knowledge of protective schemes for generator and transformers for different fault conditions.
- Classify various types of protective schemes used for feeders and bus bar protection and Types of static relays.
- Analyse the operation of different types of over voltages protective schemes required for insulation co–ordination and types of neutral grounding.

### Text Books:
1. Power System Protection and Switchgear by Badri Ram and D.N Viswakarma - Tata McGraw Hill Publications - 2nd edition - 2011.
2. Power system protection- Static Relays with microprocessor applications by T.S.Madhava Rao - Tata McGraw Hill - 2nd edition.

### Reference Books:
1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide. - PHI - 2003.
2. Art & Science of Protective Relaying – by C R Mason - Wiley Eastern Ltd.
3. Protection and SwitchGear by BhaveshBhalja - R.P. Maheshwari - Nilesh G.Chothani - Oxford University Press - 2013.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

**Open Electives to be offered by CSE for other Branches:**

| Open Elective-I: | Open Elective-II: |
|---|---|
| 1. Data Structures<br>2. Object Oriented Programming through JAVA<br>3. Data Base Management Systems<br>4. Computer Graphics<br>5. Advanced UNIX Programming<br>6. Computer Organization and Architecture<br>7. Operating Systems | 1. Python Programming<br>2. Web Technologies<br>3. Soft Computing<br>4. Distributed Computing<br>5. AI and ML for Robotics<br>6. Computer Networks<br>7. Big Data Analytics<br>8. Computational Tools |
| **Open Elective-III:** | **Open Elective-IV:** |
| 1. AI Tools & Techniques<br>2. Image Processing<br>3. Information Security<br>4. Mobile Application Development<br>5. Data Science<br>6. Cyber Security<br>7. Introduction to Internet of Things | 1. MEAN Stack Technologies<br>2. Deep Learning Techniques<br>3. Cloud computing with AWS<br>4. Block Chain Technologies<br>5. Cryptography & Network Security<br>6. Introduction to Machine Learning<br>7. Machine Learning with Python |

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III  Year – I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **COMPUTER NETWORKS** | | | | |

## Course Objectives:
- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

## Course Outcomes:
By the end of the course, the student will be able to
- Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
- Discuss different transmission media and different switching networks.
- Analyze data link layer services, functions and protocols like HDLC and PPP.
- Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
- Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.

## UNIT I:
**Introduction:** Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP, Lack of OSI models success, Internet History.
**Physical Layer** –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and unguided media: Wireless-Radio waves, microwaves, infrared.

## UNIT II:
**Data link layer:** Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.
**Sliding window protocol:** One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

## UNIT – III:
**Media Access Control: Random Access**: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
**Wired LANs:** Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet(100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

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## UNIT – IV:

**The Network Layer Design Issues** – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. Traffic Control Algorithm-Leaky bucket & Token bucket.

**Internet Working:** How networks differ- How networks can be connected- Tunnelling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, NAT-, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6-  Internet control protocols- ICMP-ARP-DHCP

## UNIT –V:

**The Transport Layer:** Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services-TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control, Congestion control in TCP.

**Application Layer** –- World Wide Web: HTTP, Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging-Domain Name System: Name Space, DNS in Internet ,-Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers, SNMP.

**Text Books:**
1. Computer Networks — Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan, Fifth Edition TMH.

**References Books:**
1. Data Communications and Networks- Achut S Godbole, Atul Kahate
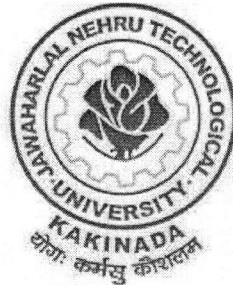2. Computer Networks, Mayank Dave, CENGAGE

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
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**DEPARTMENT OF MECHANICAL ENGINEERING**

# COURSE STRUCTURE

## For UG – R20

## B. TECH - MECHANICAL ENGINEERING

*(Applicable for batches admitted from 2020-2021)*



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF MECHANICAL ENGINEERING

## III B.TECH I SEMESTER

| S No | Code | Course Title | Hours | | | Credits |
|------|------|-------------|-------|-----|-----|---------|
| | | | L | T | P | |
| 1 | PCC-7 | Thermal Engineering-II | 3 | 0 | 0 | 3 |
| 2 | PCC-8 | Design of Machine Members-I | 3 | 0 | 0 | 3 |
| 3 | PCC-9 | Machining, Machine Tools & Metrology | 3 | 0 | 0 | 3 |
| 4 | OE-1 | 1. Sustainable Energy Technologies<br>2. Operations Research<br>3. Nano Technology<br>4. Thermal Management of Electronic systems | 3 | 0 | 0 | 3 |
| 5 | PE-1 | 1. Finite Element Methods<br>2. Industrial Robotics<br>3. Advanced Materials<br>4. Renewable Energy Sources<br>5. Mechanics of Composites<br>6. MOOCs (NPTEL/ Swayam) Course (12 Week duration) | 3 | 0 | 0 | 3 |
| 6 | PCC-L6 | Machine Tools Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC-L7 | Thermal Engineering Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC-3 | Advanced Communication Skills Lab | 1 | 0 | 2 | 2 |
| 9 | MC – 4 | Professional Ethics and Human Values | 2 | 0 | 0 | 0 |
| Evaluation of Summer Internship which is completed at the end of II B.Tech II Semester | | | | | | 1.5 |
| | | | | Total credits | | 21.5 |
| | | Honors/Minor courses | 4 | 0 | 0 | 4 |

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## DEPARTMENT OF MECHANICAL ENGINEERING

## III B.TECH II SEMESTER

| S.No | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | PCC-10 | Heat Transfer | 3 | 0 | 0 | 3 |
| 2 | PCC-11 | Design of Machine Members-II | 3 | 0 | 0 | 3 |
| 3 | PCC-12 | Introduction to Artificial Intelligence and Machine Learning | 3 | 0 | 0 | 3 |
| 4 | PE-2 | 1.Automobile Engineering<br>2.Smart Manufacturing<br>3.Advanced Mechanics of Solids<br>4.Statistical Quality Control<br>5.Industrial Hydraulics and Pneumatics<br>6.MOOCs (NPTEL/ Swayam) Course (12 Week duration) | 3 | 0 | 0 | 3 |
| 5 | OE-2 | 1.Industrial Robotics<br>2.Essentials of Mechanical Engineering<br>3.Advanced Materials<br>4.Introduction to Automobile Engineering | 3 | 0 | 0 | 3 |
| 6 | PCC-L8 | Heat Transfer Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC-L9 | CAE&CAM Lab | 0 | 0 | 3 | 1.5 |
| 8 | PCC-L10 | Measurements & Metrology Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC-4 | Artificial Intelligence and Machine Learning Lab | 0 | 0 | 4 | 2 |
| 10 | MC - 5 | Research Methodology and IPR | 2 | 0 | 0 | 0 |
| | | | | Total credits | | 21.5 |
| | | Honors/Minor courses | 4 | 0 | 0 | 4 |

* At the end of III Year II Semester, students shall complete summer internship spanning between 1 to 2 months at Industries/ Higher Learning Institutions/ APSSDC.

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| III Year - I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | ADVANCED MATERIALS (PE-1) | | | | |

**Course objectives:**
1) To gain knowledge about the metals and alloys and their utility in different environments.
2) To acquire knowledge about polymers and ceramics and their applications.
3) To analyze composite materials along with reinforcements and their applications.
4) To understand the basics of shape memory alloys and functionally graded materials.
5) To gain knowledge about the nanomaterials and their applications.

**UNIT– I:**
**METALS & ALLOYS:** Metallic materials- super alloys, Aluminium, Magnesium, titanium and Nickel based alloys and inter-metallics, Materials for cryogenic application, Materials for space environment, Evaluation of materials for extreme environment, Introduction to metallic foams.

**UNIT– II:**
**POLYMERS:** Natural Polymers-Synthetic polymers- Chemical & Physical structure, properties-glass-transition temperature-Thermosets-Thermoplastics- characteristics & applications of polymers-Elastomers- Processing of plastics.
**CERAMICS:** Applications-characteristics- classification-Processing of ceramics- Powder preparations- consolidation- hot compaction-drying- sintering-finishing of ceramics-Areas of application.

**UNIT– III:**
**COMPOSITE MATERIALS**: Introduction, classification: polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications
**REINFORCEMENTS:** Fibers- glass, silica, Kevlar, carbon, boron, silicon carbide, and boron carbide fibers.

**UNIT– IV:**
**SHAPE MEMORY ALLOYS:** Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.
**FUNCTIONALLY GRADED MATERIALS**: Types of functionally graded materials-classification different systems-preparation-properties and applications of functionally graded materials.

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## UNIT– V:

**NANO MATERIALS:** Introduction-properties at nano scales-advantages & disadvantages applications in comparison with bulk materials (nano–structure, wires, tubes, composites).

**TEXT BOOKS:**
1) Nanomaterial /A.K. Bandyopadyay/New age Publishers.
2) Material science and Technology: A comprehensive treatment/Robert W.Cahn, /VCH.
3) Engineering Mechanics of Composite Materials / Isaac and M Daniel/Oxford University Press.

**REFERENCES:**
1) Mechanics of Composite Materials / R. M. Jones/ Mc Graw Hill Company, New York, 1975.
2) Analysis of Laminated Composite Structures / L. R. Calcote/Van Nostrand Rainfold,NY 1969.
3) Analysis and performance of fibre Composites /B. D. Agarwal and L. J. Broutman /Wiley-Inter science, New York, 1980.
4) Mechanics of Composite Materials - Second Edition (Mechanical Engineering) /Autar K.Kaw /CRC Press.

**Course Outcomes: At the end of the course, student will be able to**
CO1: Justify the knowledge about metals and alloys and their utility in different environments.
CO2: Judge about polymers and ceramics and their applications.
CO3: Analyze composite materials along with reinforcements and their applications.
CO4: Utilize shape memory alloys and functionally graded materials for different applications.
CO5: Justify about the nanomaterials and their applications.

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| III Year-I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | SUSTAINABLE ENERGY TECHNOLOGIES (OE-1) | | | | |

### Course objectives:
1) To demonstrate the importance of solar energy collection and storage.
2) To understand the principles of wind energy and biomass energy.
3) To gain knowledge on geothermal and ocean energy.
4) To acquire knowledge about energy efficient systems.
5) To understand the concepts of green manufacturing systems.

### UNIT– I:
**SOLAR RADIATION**: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells.
**SOLAR ENERGY COLLECTION**: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.
**SOLAR ENERGY STORAGE AND APPLICATIONS**: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

### UNIT– II:
**WIND ENERGY**: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.
**BIO-MASS**: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

### UNIT– III:
**GEOTHERMAL ENERGY**: Resources, types of wells, methods of harnessing the energy.
**OCEAN ENERGY**: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques.

### UNIT– IV:
**ENERGY EFFICIENT SYSTEMS:**
(A) **ELECTRICAL SYSTEMS**: Energy efficient motors, energy efficient lighting and control, selection of luminaries, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) **MECHANICAL SYSTEMS**: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

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**UNIT– V:**

**GREEN MANUFACTURING SYSTEMS:** Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

**TEXT BOOKS:**
1) Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH.
2) Non-Conventional Energy Resources- Khan B.H/ Tata McGraw Hill, New Delhi, 2006.
3) Green Manufacturing Processes and Systems - J. Paulo Davim/Springer 2013.

**REFERENCES:**
1) Alternative Building Materials and Technologies - K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao/New Age International.
2) Principles of Solar Engineering - D.Yogi Goswami, Frank Krieth & John F Kreider /Taylor & Francis.
3) Non-Conventional Energy - Ashok V Desai /New Age International (P) Ltd.
4) Renewable Energy Technologies -Ramesh & Kumar /Narosa.
5) Non-conventional Energy Source- G.D Roy/Standard Publishers.
6) Renewable Energy Resources-2nd Edition/ J.Twidell and T. Weir/ BSP Books Pvt.Ltd.
7) Fuel Cell Technology -Hand Book / Gregor Hoogers / BSP Books Pvt. Ltd.

**Course Outcomes: At the end of the course, student will be able to**
CO1: Explain the importance of solar energy collection and storage.
CO2: Apply the principles of wind energy and biomass energy.
CO3: Analyze knowledge on geothermal and ocean energy.
CO4: Justify the knowledge about energy efficient systems.
CO5: Discuss the concepts of green manufacturing systems.

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| III Year - II Semester | . | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **AUTOMOBILE ENGINEERING (PE-2)** | | | | |

## Course objectives:
1) To understand various components of four wheeler automobile.
2) To gain knowledge of different parts of transmission system.
3) To understand the concepts of steering and suspension systems.
4) To gain knowledge about the braking system and electrical system used in automobiles.
5) To understand the concepts about engine specifications and service, safety and electronic system used in automobiles.

## UNIT– I:
**INTRODUCTION:** Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

## UNIT– II:
**TRANSMISSION SYSTEM:** Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres and their making.

## UNIT– III:
**STEERING SYSTEM:** Steering geometry – camber, castor, king pin rake, combined angle toein, centre point steering. types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.
**SUSPENSION SYSTEM:** Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

## UNIT– IV:
**BRAKING SYSTEM:** Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
**ELECTRICAL SYSTEM:** Charging circuit, generator, current – voltage regulator – starting system, Bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

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**UNIT– V:**
**ENGINE SPECIFICATION AND SAFETY SYSTEMS:** Introduction- engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.
**SAFETY:** Introduction, safety systems - seat belt, air bags, bumper, anti-lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.
**ENGINE SERVICE:** Introduction, service details of engine cylinder head, valves and valve mechanism, piston-connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.
**AUTOMOBILE ELECTRONIC SYSTEMS:**
Concept of CPU and computer memory used in automobiles, sensors- Pressure sensor, Throttle position sensor, fuel flow sensor, thermistor sensor, oxygen sensor, speed sensors, knock detecting sensor, actuators solenoids and stepper motor, Electronic dash board instruments - Onboard diagnosis system, security and warning system.

**TEXT BOOKS:**
1) Automotive Mechanics – Vol. 1 & Vol. 2 / Kirpal Singh/standard publishers
2) Automobile Engineering / William Crouse/TMH Distributors
3) Automobile Engineering/P.S Gill/S.K. Kataria& Sons/New Delhi.

**REFERENCES:**
1) Automotive Engines Theory and Servicing/James D. Halderman and Chase D. Mitchell Jr.,/ Pearson education inc.
2) Automotive Engineering / K Newton, W.Steeds& TK Garrett/SAE
3) Automotive Mechanics: Principles and Practices/ Joseph Heitner/Van Nostrand Reinhold
   4. Automobile Engineering / C Srinivasan/McGraw-Hill.

**Course Outcomes: At the end of the course, student will be able to**
CO1: Discuss various components of four wheeler automobile.
CO2: Apply the knowledge of different parts of transmission system.
CO3: Judge about steering and suspension systems.
CO4: Justify the braking system and electrical system used in automobiles.
CO5: Analyze the concepts about engine specifications and service, safety and electronic system used in automobiles.

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## DEPARTMENT OF MECHANICAL ENGINEERING

| III Year - II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **INDUSTRIAL ROBOTICS (OE-2)** | | | | |

### Course objectives:
1) To understand the basic concepts and components of industrial robotics and automation.
2) To acquire knowledge about robot actuators and feedback components.
3) To analyze the motion of robot and manipulator kinematics.
4) To know the general considerations of path description and generation.
5) To gain knowledge about the image processing, machine vision and robotic applications.

### UNIT– I:
**INTRODUCTION:** Automation and Robotics, CAD/CAM and Robotics – An overview of Robotics –present and future applications – classification by coordinate system and control system.
**COMPONENTS OF THE INDUSTRIAL ROBOTICS:** Robot anatomy, work volume, components, number of degrees of freedom - robot drive systems, functions, line diagram representation of robot arms,common types of arms —requirements and challenges of end effectors, determination of the end effectors.

### UNIT– II:
**ROBOT ACTUATORS AND FEEDBACK COMPONENTS:** Actuators: Pneumatic, Hydraulic actuators, electric& stepper motors. Comparison of Electric, Hydraulic and Pneumatic types of actuation devices.
Feedback components: position sensors–potentiometers, resolvers, encoders–Velocity sensors.

### UNIT– III:
**MOTION ANALYSIS:** Homogeneous transformations as applicable to rotation and translation – problems.
**MANIPULATOR KINEMATICS:** Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics–problems.

### UNIT– IV:
**GENERAL CONSIDERATIONS IN PATH DESCRIPTION AND GENERATION:** Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion–straight line motion–Robot programming, languages and software packages-description of paths with a robot programming language.

### UNIT– V:
**IMAGE PROCESSING AND MACHINE VISION:** Introduction to Machine Vision, Sensing and Digitizing function in Machine Vision, Training and Vision System, Robotic Applications.

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### TEXTBOOKS:
1) Industrial Robotics/GrooverMP/Pearson Edu.
2) Robotics and Control /MittalR K & Nagrathi J /TMH.

### REFERENCES:
1) Robotics/Fu KS/ McGrawHill.
2) Robotic Engineering /Richard D. Klafter, PrenticeHal.l
3) Robot Analysis and Control/ H. Asada and J.J.E. Slotine/BSP Books Pvt.Ltd.
4) Introduction to Robotics/John JCraig/PearsonEdu.

### Course outcomes: At the end of the course, student will be able to
CO1: Explain the basic concepts and components of industrial robotics and automation.

CO2: Judge the knowledge about robot actuators and feedback components.

CO3: Analyze the motion of robot and manipulator kinematics.

CO4: Analyze the general considerations of path description and generation.

CO5: Utilize knowledge about the image processing, machine vision and robotic applications.

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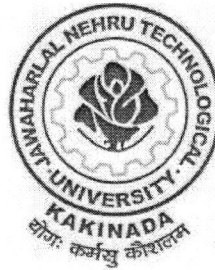**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

# For UG – R20

## B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

*(Applicable for batches admitted from 2020-2021)*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

### III Year - I Semester

| S. No | Category | Name of the subject | L | T | P | Credits |
|-------|----------|---------------------|---|---|---|---------|
| 1 | PC | Analog ICs and Applications | 3 | 0 | 0 | 3 |
| 2 | PC | Electromagnetic Waves and Transmission Lines | 3 | 0 | 0 | 3 |
| 3 | PC | Digital Communications | 3 | 0 | 0 | 3 |
| 4 | OE1 | Open Elective Course/Job oriented elective-1 | 2 | 0 | 2 | 3 |
| 5 | PE1 | Professional Elective courses -1 | 3 | 0 | 0 | 3 |
| 6 | LC | Analog ICs and Applications LAB | 0 | 0 | 3 | 1.5 |
| 7 | LC | Digital Communications Lab | 0 | 0 | 3 | 1.5 |
| 8 | SC | Data Structures using Java Lab | 0 | 0 | 4 | 2 |
| 9 | MC | Indian Traditional Knowledge | 2 | 0 | 0 | 0 |
| | | **Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester** | 0 | 0 | 0 | 1.5 |
| | | | | | **Total credits** | **21.5** |
| | | **Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)** | | | | **4** |

| PE1: | OE1: |
|------|------|
| 1. Antenna and Wave Propagation<br>2.Electronic Measurements and Instrumentation<br>3.Computer Architecture & Organization | Candidate should select the subject from list of subjects offered by other departments |

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### III Year –II Semester

| S. No | Category | Name of the subject | L | T | P | Credits |
|-------|----------|---------------------|---|---|---|---------|
| 1 | PC | Microprocessor and Microcontrollers | 3 | 1 | 0 | 3 |
| 2 | PC | VLSI Design | 3 | 0 | 0 | 3 |
| 3 | PC | Digital Signal Processing | 3 | 0 | 0 | 3 |
| 4 | PE2 | Professional Elective courses - 2 | 3 | 0 | 0 | 3 |
| 5 | OE 2 | Open Elective Course/Job oriented elective -2 | 2 | 0 | 2 | 3 |
| 6 | LC | Microprocessor and Microcontrollers - Lab | 0 | 0 | 3 | 1.5 |
| 7 | LC | VLSI Design Lab | 0 | 0 | 3 | 1.5 |
| 8 | LC | Digital Signal Processing Lab | 0 | 0 | 3 | 1.5 |
| 9 | SC | ARM based/ Aurdino based Programming | 1 | 0 | 2 | 2 |
| 10 | MC | Research Methodology | 2 | 0 | 0 | 0 |
| | | | | | Total credits | 21.5 |
| | Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | | 4 |

**Industrial/Research Internship (Mandatory) 2 Months during summer vacation**

| PE2: | OE2: |
|------|------|
| 1. Microwave Engineering<br>2. Mobile & Cellular Communication<br>3. Embedded Systems<br>4. CMOS Analog IC Design | Candidate should select the subject from list of subjects offered by other departments |

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| III Year – I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION** **(PE1)** | | | | | |

**UNIT I:**
**Performance characteristics of instruments, Static characteristics:** Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Dynamic Characteristics; speed of response, Fidelity, Lag and Dynamic error, Types of errors in measurements and their analysis, Design of multi-range AC, DC meters (voltmeter &ammeter) and ohmmeter(series &shunt type) using D'arsonval movement. True rms meter.

**UNIT II:**
**Specifications and designing aspects of Signal Generators** –AF sine and square wave signal generators, Function Generators, Random noise generators, Arbitrary waveform generators.WaveAnalyzers,HarmonicDistortionAnalyzers,SpectrumAnalyzers,DigitalFourier Analyzers.

**UNIT III:**
**Oscilloscopes**-general purpose CROs, block diagram, functions and implementation of various blocks, specifications, various controls and their functions , types of probes used in CROs, Measurement of frequency and phase difference using Lissajous patterns
Special purpose CROs; sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope

**UNIT IV:**
**Bridge circuits**- Wheat stone bridge, measurement of very low resistance, Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance-Schearing Bridge, Wien Bridge, Errors and precautions in using bridges
Q-meter, principle of operation, measurement methods and sources of errors Counters : principle of operation -modes of operation- totalizing mode, frequency mode and time period mode-sources of errors.

**UNIT V:**
**Transducers**-active & passive transducers: Resistance, Capacitance, inductance, Strain gauges, LVDT, Piezo Electric transducers.
Measurement of physical parameters temperature, force, pressure, velocity, acceleration and displacement

**TEXT BOOKS:**
1. Electronic instrumentation, second edition-H.S.Kalsi,TataMcGrawHill,2004.
2. Modern Electronic Instrumentation and Measurement Techniques–A.D.Helfrickand W.D. Cooper, PHI,5th Edition, 2002.

**REFERENCES:**
1. Electronic Instrumentation & Measurements -DavidA.Bell,PHI,3rdEdition,2013.

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**Course Outcomes:**
After going through this course the student will be able to
1. Select the instrument to be used based on the requirements.
2. Understand and analyze different signal generators and analyzers.
3. Understand the design of oscilloscopes for different applications.
4. Design different transducers for measurement of different parameters.

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## Professional Elective Subjects offered to EEE Branch Students:

### Professional Elective – I:
1. Linear IC Applications
2. Utilization of Electrical Energy
3. Computer Architecture and Organization
4. Optimization Techniques
5. Object Oriented Programming through Java

### Professional Elective – II:
1. Signal and Systems
2. Electric Drives
3. Advanced Control Systems
4. Switchgear and Protection
5. Big Data Analytics

### Professional Elective –III:
1. Digital Signal Processing
2. Renewable and Distributed Energy Technologies
3. Flexible Alternating Current Transmission Systems
4. Power Systems Deregulation
5. Data Base Management Systems

### Professional Elective – IV:
1. Hybrid Electric Vehicles
2. High Voltage Engineering
3. Programmable Logic Controllers and Applications
4. Cloud Computing with AWS
5. Deep Learning Techniques

### Professional Elective – V:
1. Power System Operation and Control
2. Switched Mode Power Conversion
3. AI Applications toElectrical Engineering
4. Data Science
5. MEAN Stack Technologies

## Open Electives offered by EEE Department for Other Branches (Except EEE Branch)

### Open Elective-I:
1. Renewable Energy Sources
2. Concepts of Optimization Techniques
3. Concepts of Control Systems

### Open Elective-II:
1. Battery Management Systems and Charging Stations
2. Fundamentals of utilization of Electrical Energy
3. Indian Electricity Act

### Open Elective-III:
1. Concepts of Microprocessors and Microcontrollers
2. Fundamentals of Electric Vehicles
3. Concepts of Internet of Things

### Open Elective-IV:
1. Concepts of Power System Engineering
2. Concepts of  Smart Grid Technologies

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA**
**VIZIANAGARAM–535003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

| III Year –I SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **RENEWABLE ENERGY SOURCES**<br>**(OPEN ELECTIVE-I)** | | | | |

**Preamble:**
This course presents the various sources of renewable energy such as solar, wind, geothermal energy, biomass & other potential energy and contribution towards energy profile of the nation.

**Course Objectives:**
- To study the solar radiation data, equivalent circuit of PV cell and its I-V & P-V characteristics.
- To understand the concept of Wind Energy Conversion & its applications.
- To study the principles of biomass and geothermal energy.
- To understand the principles of Ocean Thermal Energy Conversion (OTEC), motion of waves and power associated with it.
- To study the various chemical energy sources such as fuell cell and hydrogen energy along with their operation and equivalent circuit.

**UNIT–I**
**Solar Energy:** Introduction - Renewable Sources - prospects, Solar radiation at the Earth Surface - Equivalent circuit of a Photovoltaic (PV) Cell - I-V & P-V Characteristics - Solar Energy Collectors: Flat plate Collectors, concentrating collectors - Solar Energy storage systems and Applications: Solar Pond - Solar water heating - Solar Green house.

**UNIT–II**
**Wind Energy:** Introduction - basic Principles of Wind Energy Conversion, the nature of Wind - the power in the wind - Wind Energy Conversion - Site selection considerations - basic components of Wind Energy Conversion Systems (WECS) - Classification - Applications.

**UNIT–III**
**Biomass and Geothermal Energy:**
**Biomass:** Introduction - Biomass conversion technologies - Photosynthesis, factors affecting Bio digestion - classification of biogas plants - Types of biogas plants - selection of site for a biogas plant
**Geothermal Energy:** Introduction, Geothermal Sources – Applications - operational and Environmental problems.

**UNIT–IV**
**Energy From oceans, Waves & Tides:**
**Oceans:** Introduction - Ocean Thermal Electric Conversion (OTEC) – methods - prospects of OTEC in India.
**Waves:** Introduction - Energy and Power from the waves - Wave Energy conversion devices.
**Tides:** Basic principle of Tide Energy -Components of Tidal Energy.

**UNIT–V**
**Chemical Energy Sources:**
**Fuel Cells:** Introduction - Fuel Cell Equivalent Circuit - operation of Fuel cell - types of Fuel Cells - Applications.
**Hydrogen Energy:** Introduction - Methods of Hydrogen production - Storage and Applications
**Magneto Hydro Dynamic (MHD) Power generation:** Principle of Operation - Types.

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**Course Outcomes:**
After the completion of the course the student should be able to:
- Analyze solar radiation data, extra-terrestrial radiation, radiation on earth's surface and solar Energy Storage.
- Illustrate the components of wind energy systems.
- Illustrate the working of biomass, digesters and Geothermal plants.
- Demonstrate the principle of Energy production from OTEC, Tidal and Waves.
- Evaluate the concept and working of Fuel cells & MHD power generation.

**Text Books:**
1. G.D.Rai, Non-Conventional Energy Sources, Khanna Publications, 2011.
2. John Twidell & Tony Weir, Renewable Energy Sources, Taylor & Francis, 2013.

**Reference Books:**
1. S.P.Sukhatme & J.K.Nayak, Solar Energy-Principles of Thermal Collection and Storage, TMH, 2011.
2. John Andrews & Nick Jelly, Energy Science- principles, Technologies and Impacts, Oxford, 2nd edition, 2013.
3. Shoba Nath Singh, Non- Conventional Energy Resources, Pearson Publications, 2015.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

| III Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| MOBILE & CELLULAR COMMUNICATION |
|---|
| (PE2) |

## UNIT I
**CELLULAR MOBILE RADIO SYSTEMS:** Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.
**CELLULAR CONCEPTS:** Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

## UNIT II
**INTERFERENCE:** Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni-directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

## UNIT III
**FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:** Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. **CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, general formula for mobile propagation over water and flat open
area, near and long distance propagation, antenna height gain, form of a point to point model.

## UNIT IV
**HANDOFF STRATEGIES:**
Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, soft and hard hand offs, vehicle locating methods, dropped call rates and their evaluation.

## UNIT V
**DIGITAL CELLULAR NETWORKS:** GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, OFDMA.3G and 4G Wireless Standards GSM , GPRS , WCDMA , LTE , Wi-MAX, Introduction to 5G standards.

## TEXT BOOKS:
1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.
3. Advanced Wireless Communications-4G By. Savo G Glisic, John Wiley & Sons Publication 2nd Edition

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
**KAKINADA – 533 003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**REFERENCES:**
1. Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn.,2002.
2. Fundamentals of Wireless Communication By. David Tse and Pramod Viswanath, Cambridge University Press

**Course Outcomes:**
At the end of this course the student can able to:
1. Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
2. Understand the frequency management, channel assignment strategies and antennas in cellular systems.
3. Understand the concepts of handoff and architectures of various cellular systems.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA**
**VIZIANAGARAM–535003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

| III Year – II SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**FUNDAMENTALS OF UTILIZATION OF ELECTRICAL ENERGY**
**(OPEN ELECTIVE – II)**

**Preamble:**
In the modern society, every engineer is using electrical energy irrespective of their branch of specialization. To provide knowledge about the various electrical energy utilization technologies to non-electrical engineering students this course is developed. In this course, a detailed description about the illumination requirements and energy storage, various techniques used for heating & welding applications, and brief description about the electric traction are presented. At the end of the course, an insight in to the important techniques of various energy storage systems is also presented.

**Course Objectives:**
- To study the various types of Illumination equipment, measurement of Illumination, Illumination techniques.
- To know the various technologies used for heating applications using electrical energy.
- To understand the various welding techniques and operations of welding equipment and comparison.
- To know the various systems of traction, equipment used for traction.
- To understand the importance and operation of various Energy storage systems and comparison & applications.

**UNIT - I**
**Illumination fundamentals**
Introduction - terms used in illumination–Laws of illumination–Lux meter–Sources of light.
**Various Illumination Methods**
Tungsten filament lamps and fluorescent lamps - Comparison –Basic principles of light control– Types and design of lighting and flood lighting–LED lighting - Energy conservation.

**UNIT - II**
**Electric Heating**
Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

**UNIT - III**
**Electric Welding**
Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

**UNIT - IV**
**Electric Traction**
System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves. Calculations of tractive effort– power – Specific energy consumption for given run–Effect of varying acceleration and braking retardation– Adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

**UNIT - V**
**Introduction to Energy Storage Systems**
Need for energy storage - Types of energy storage-Thermal - electrical - magnetic and chemical storage systems - Comparison of energy storage technologies-Applications.

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**Course Outcomes:**
After the completion of the course the student should be able to:
- Know the concepts of illumination and various illumination methods.
- Know about the resistance - induction and dielectric heating.
- Learn about the resistance and arc welding and welding equipment
- Know about the mechanisms - equipment and technology used in the electric traction.
- Differentiatethe importance of various energy storage systems

**Text Books:**
1. Electrical Power Systems(Generation, Transmission, Distribution, Protecection and Utilization of Electrical Energy) – Dr. S.L.Uppal and Prof. Sunil S.Rao – Khanna Publisher, 15$^{th}$ edition, 1987.
2. Electric Power Distribution – A S Pabla – McGrawHill.

**Reference Books:**
1. Generation Distribution and Utilization of Electrical Energy – C.L.Wadhwa- New Age International Publishers- revised third edition.

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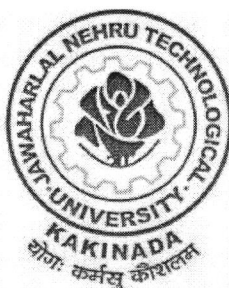
**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

## For UG –R20

### B. TECH - COMPUTER SCIENCE & ENGINEERING

*(Applicable for batches admitted from 2020-2021)*



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| S.No | Course Code | Courses | Hours per week | | | Credits |
|---|---|---|---|---|---|---|
| | | | L | T | P | C |
| | | **III B. Tech – I Semester** | | | | |
| 1 | PC | Computer Networks | 3 | 0 | 0 | 3 |
| 2 | PC | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 |
| 3 | PC | Data Warehousing and Data Mining | 3 | 0 | 0 | 3 |
| 4 | Open Elective / Job Oriented | **Open Elective-I** Open Electives offered by other departments/ Optimization in Operations Research (Job oriented course) | 3 | 0 | 0 | 3 |
| 5 | PE | **Professional Elective-I** Artificial Intelligence Software Project Management Distributed Systems Advanced Unix Programming | 3 | 0 | 0 | 3 |
| 6 | PC | Data Warehousing and Data Mining Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | Computer Networks Lab | 0 | 0 | 3 | 1.5 |
| 8 | SO | **Skill Oriented Course – III** 1. Animation course: Animation Design **OR** 2.Continuous Integration and Continuous Delivery using DevOps | 0 | 0 | 4 | 2 |
| 9 | MC | Employability Skills-I | 2 | 0 | 0 | 0 |
| 10 | PR | **Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester** | 0 | 0 | 0 | 1.5 |
| | | **Total credits** | | | | 21.5 |
| 11 | Minor | Database Management Systems$ | 3 | 0 | 2 | 3+1 |
| 12 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |

$- Integrated Course

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| S.No | Course Code | Courses | Hours per week | | | Credits |
|---|---|---|---|---|---|---|
| | | | L | T | P | C |
| 1 | PC | Machine Learning | 3 | 0 | 0 | 3 |
| 2 | PC | Compiler Design | 3 | 0 | 0 | 3 |
| 3 | PC | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 4 | PE | **Professional Elective-II** 1.Mobile Computing 2.Big Data Analytics 3.Object Oriented Analysis and Design 4.Network Programming | 3 | 0 | 0 | 3 |
| 5 | Open Elective /Job Oriented | **Open Elective-II** Open Electives offered by other departments/ MEAN Stack Development *(Job Oriented)* | 3 | 0 | 0 | 3 |
| 6 | PC | Machine Learning using Python Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | Compiler Design Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | Cryptography and Network Security Lab | 0 | 0 | 3 | 1.5 |
| 9 | SO | **Skill Oriented Course - IV** 1.Big Data:Spark **OR** 2.MEAN Stack Technologies-Module I (HTML 5, JavaScript, Node.js, Express.js and TypeScript) | 0 | 0 | 4 | 2 |
| 10 | MC | Employability skills-II | 2 | 0 | 0 | 0 |
| | | **Total credits** | | | | **21.5** |
| | | **Industrial/Research Internship(Mandatory) 2 Months during summer vacation** | | | | |
| 11 | Minor | Data Structures and Algorithms$ | 3 | 0 | 2 | 3+1 |
| 12 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |
| | | **Minor course through SWAYAM** | - | - | - | **2** |

Table title: III B. Tech – II Semester

$- Integrated Course

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III  Year – I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **SOFTWARE PROJECT MANAGEMENT**<br>(Professional Elective –I) | | | | |

## Course Objectives:
At the end of the course, the student shall be able to:
- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

## Course outcomes:
Upon the completion of the course students will be able to:-
- Apply the process to be followed in the software development life-cycle models
- Apply the concepts of project management & planning
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the Software projects
- Implement communication, modeling, and construction & deployment practices in software development

## UNIT-I:
**Conventional Software Management:** The waterfall model, conventional software Management performance.
**Evolution of Software Economics:** Software Economics, pragmatic software cost estimation.
**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

## UNIT-II:
**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.
**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

## UNIT- III:
**Model based software architectures:** A Management perspective and technical perspective.
**Work Flows of the process:** Software process workflows, Iteration workflows.
**Checkpoints of the process: Major** mile stones, Minor Milestones, Periodic status assessments.
**Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

## UNIT- IV:
**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.
**Process Automation:** Automation Building blocks, The Project Environment.
**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**UNIT-V:**
Agile Methodology, ADAPTing to Scrum, Patterns for Adopting Scrum, Iterating towards Agility.
**Fundamentals of DevOps**: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

**Text Books:**
1. Software Project Management, Walker Royce, PEA, 2005.
2. Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.
3. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.

**Reference Books:**
1. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki, Wiley,2006
5. Project Management in IT, Kathy Schwalbe, Cengage

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA
## VIZIANAGARAM–535003, Andhra Pradesh, India
## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### Professional Elective Subjects offered to EEE Branch Students:

**Professional Elective – I:**
1. Linear IC Applications
2. Utilization of Electrical Energy
3. Computer Architecture and Organization
4. Optimization Techniques
5. Object Oriented Programming through Java

**Professional Elective – II:**
1. Signal and Systems
2. Electric Drives
3. Advanced Control Systems
4. Switchgear and Protection
5. Big Data Analytics

**Professional Elective –III:**
1. Digital Signal Processing
2. Renewable and Distributed Energy Technologies
3. Flexible Alternating Current Transmission Systems
4. Power Systems Deregulation
5. Data Base Management Systems

**Professional Elective – IV:**
1. Hybrid Electric Vehicles
2. High Voltage Engineering
3. Programmable Logic Controllers and Applications
4. Cloud Computing with AWS
5. Deep Learning Techniques

**Professional Elective – V:**
1. Power System Operation and Control
2. Switched Mode Power Conversion
3. AI Applications toElectrical Engineering
4. Data Science
5. MEAN Stack Technologies

### Open Electives offered by EEE Department for Other Branches (Except EEE Branch)

**Open Elective-I:**
1. Renewable Energy Sources
2. Concepts of Optimization Techniques
3. Concepts of Control Systems

**Open Elective-II:**
1. Battery Management Systems and Charging Stations
2. Fundamentals of utilization of Electrical Energy
3. Indian Electricity Act

**Open Elective-III:**
1. Concepts of Microprocessors and Microcontrollers
2. Fundamentals of Electric Vehicles
3. Concepts of Internet of Things

**Open Elective-IV:**
1. Concepts of Power System Engineering
2. Concepts of  Smart Grid Technologies

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA
## VIZIANAGARAM–535003, Andhra Pradesh, India
### DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

| III Year –I SEMESTER | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| - | RENEWABLE ENERGY SOURCES (OPEN ELECTIVE-I) | | | | |

## Preamble:
This course presents the various sources of renewable energy such as solar, wind, geothermal energy, biomass & other potential energy and contribution towards energy profile of the nation.

## Course Objectives:
- To study the solar radiation data, equivalent circuit of PV cell and its I-V & P-V characteristics.
- To understand the concept of Wind Energy Conversion & its applications.
- To study the principles of biomass and geothermal energy.
- To understand the principles of Ocean Thermal Energy Conversion (OTEC), motion of waves and power associated with it.
- To study the various chemical energy sources such as fuell cell and hydrogen energy along with their operation and equivalent circuit.

## UNIT–I
**Solar Energy:** Introduction - Renewable Sources - prospects, Solar radiation at the Earth Surface - Equivalent circuit of a Photovoltaic (PV) Cell - I-V & P-V Characteristics - Solar Energy Collectors: Flat plate Collectors, concentrating collectors - Solar Energy storage systems and Applications: Solar Pond - Solar water heating - Solar Green house.

## UNIT–II
**Wind Energy:** Introduction - basic Principles of Wind Energy Conversion, the nature of Wind - the power in the wind - Wind Energy Conversion - Site selection considerations - basic components of Wind Energy Conversion Systems (WECS) - Classification - Applications.

## UNIT–III
**Biomass and Geothermal Energy:**
**Biomass:** Introduction - Biomass conversion technologies - Photosynthesis, factors affecting Bio digestion - classification of biogas plants - Types of biogas plants - selection of site for a biogas plant
**Geothermal Energy:** Introduction, Geothermal Sources – Applications - operational and Environmental problems.

## UNIT–IV
**Energy From oceans, Waves & Tides:**
**Oceans:** Introduction - Ocean Thermal Electric Conversion (OTEC) – methods - prospects of OTEC in India.
**Waves:** Introduction - Energy and Power from the waves - Wave Energy conversion devices.
**Tides:** Basic principle of Tide Energy -Components of Tidal Energy.

## UNIT–V
**Chemical Energy Sources:**
**Fuel Cells:** Introduction - Fuel Cell Equivalent Circuit - operation of Fuel cell - types of Fuel Cells - Applications.
**Hydrogen Energy:** Introduction - Methods of Hydrogen production - Storage and Applications
**Magneto Hydro Dynamic (MHD) Power generation:** Principle of Operation - Types.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA**
**VIZIANAGARAM–535003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## Course Outcomes:

After the completion of the course the student should be able to:

- Analyze solar radiation data, extra-terrestrial radiation, radiation on earth's surface and solar Energy Storage.
- Illustrate the components of wind energy systems.
- Illustrate the working of biomass, digesters and Geothermal plants.
- Demonstrate the principle of Energy production from OTEC, Tidal and Waves.
- Evaluate the concept and working of Fuel cells & MHD power generation.

## Text Books:

1. G.D.Rai, Non-Conventional Energy Sources, Khanna Publications, 2011.
2. John Twidell & Tony Weir, Renewable Energy Sources, Taylor & Francis, 2013.

## Reference Books:

1. S.P.Sukhatme & J.K.Nayak, Solar Energy-Principles of Thermal Collection and Storage, TMH, 2011.
2. John Andrews & Nick Jelly, Energy Science- principles, Technologies and Impacts, Oxford, 2nd edition, 2013.
3. Shoba Nath Singh, Non- Conventional Energy Resources, Pearson Publications, 2015.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III  Year – II Semester | . | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **OBJECT ORIENTED ANALYSIS AND DESIGN** <br> **(Professional Elective II)** | | | | | |

**Course Objectives:** The main objective is the students to
- Become familiar with all phases of OOAD.
- Master the main features of the UML.
- Master the main concepts of Object Technologies and how to apply them at work   and develop the ability to analyze and solve challenging problem in various domains.
- Learn the Object design Principles and understand how to apply them towards Implementation.

**Course Outcomes:** After finishing this course student will be able to:
- 'Analyze the nature of complex system and its solutions.
- Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships
- Analyze &Design Class and Object Diagrams that represent Static Aspects of a Software System and apply basic and Advanced Structural Modeling Concepts for designing real time applications.
- Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
- Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.

## UNIT I:
**Introduction:** The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems. **Case Study:** System Architecture: Satellite-Based Navigation

## UNIT II:
**Introduction to UML:** Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle. **Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams. **Case Study:** Control System: Traffic Management.

## UNIT III:
**Class & Object Diagrams:** Terms, concepts, modeling techniques for Class & Object Diagrams. **Advanced Structural Modeling:** Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. **Case Study:** AI: Cryptanalysis.

## UNIT IV:
**Basic Behavioral Modeling-I:** Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams. **Case Study:** Web Application: Vacation Tracking System

## UNIT V:
**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams. **Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams
**Case Study:** Weather Forecasting

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**KAKINADA – 533 003, Andhra Pradesh, India**

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

**Text Books:**
1. Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston , "Object- Oriented Analysis and Design with Applications", 3rd edition, 2013, PEARSON.
2. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.

**Reference Books:**
1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
**KAKINADA – 533 003, Andhra Pradesh, India**

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **MEAN STACK DEVELOPMENT**<br>**(Job Oriented Course)** | | | | |

**Course Outcomes:**
At the end of the Course, Student will be able to:
- Build static web pages using HTML 5 elements.
- Apply JavaScript to embed programming interface for web pages and also to perform Client side validations.
- Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.
- Develop JavaScript applications using typescript and work with document database using MongoDB.
- Utilize Angular JS to design dynamic and responsive web pages.

**UNIT-I:**
**HTML 5:** Introduction to Web, Overview of Web Technologies, HTML - Introduction, HTML - Need, Case-insensitivity, Platform-independency, DOCTYPE Declaration, Types of Elements, HTML Elements - Attributes, Metadata Element, Sectioning Elements, Paragraph Element, Division and Span Elements, List Element, Link Element, Character Entities, HTML5 Global Attributes, Creating Table Elements, Table Elements : Colspan/ Rowspan Attributes, border, cellspacing and cellpadding attributes, Creating Form Elements, Input Elements - Attributes, Color and Date Pickers, Select and Datalist Elements, Editing Elements, Media, Iframe, Why HTML Security, HTML Injection, Clickjacking, HTML5 Attributes & Events Vulnerabilities, Local Storage Vulnerabilities, HTML5 - Cross-browser support, Best Practices For HTML Web Pages.

**UNIT-II:**
**JavaScript:** Why we need JavaScript, What is JavaScript, Environment Setup, Working with Identifiers, Type of Identifiers, Primitive and Non Primitive Data Types, Operators and Types of Operators, Types of Statements, Non - Conditional Statements, Types of Conditional Statements, If and Switch Statements, Types of Loops, Types of Functions, Declaring and Invoking Function, Arrow Function, Function Parameters, Nested Function, Built-in Functions, Variable Scope in Functions, Working With Classes, Creating and Inheriting Classes, In-built Events and Handlers, Working with Objects, Types of Objects, Creating Objects, Combining and cloning Objects using Spread operator, Destructuring Objects, Browser and Document Object Model, Creating Arrays, Destructuring Arrays, Accessing Arrays, Array Methods, Introduction to Asynchronous Programming, Callbacks, Promises, Async and Await, Executing Network Requests using Fetch API, Creating and consuming Modules.

**UNIT-III:**
**Node.js:** Why and What Node.js, How to use Node.js, Create a web server in Node.js, Node Package Manager, Modular programming in Node.js, Restarting Node Application, File Operations.
**Express.js:** Express Development Environment, Defining a route, Handling Routes, Route and Query Parameters, How Middleware works, Chaining of Middlewares, Types of Middlewares, Connecting to MongoDB with Mongoose, Validation Types and Defaults, Models, CRUD Operations, API Development, Why Session management, Cookies, Sessions, Why and What Security, Helmet Middleware, Using a Template Engine Middleware, Stylus CSS Preprocessor.

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## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

**UNIT-IV:**
**Typescript:** Installing TypeScript, Basics of TypeScript, Function, Parameter Types and Return Types, Arrow Function, Function Types, Optional and Default Parameters, Rest Parameter, Creating an Interface, Duck Typing, Function Types, Extending Interfaces, Classes, Constructor, Access Modifiers, Properties and Methods, Creating and using Namespaces, Creating and using Modules, Module Formats and Loaders, Module Vs Namespace, What is Generics, What are Type Parameters, Generic Functions, Generic Constraints.

**MongoDB:** Introduction Module Overview, Document Database Overview, Understanding JSON, MongoDB Structure and Architecture, MongoDB Remote Management, Installing MongoDB on the local computer (Mac or Windows), Introduction to MongoDB Cloud, Create MongoDB Atlas Cluster, GUI tools Overview, Install and Configure .MongoDB Compass, Introduction to the MongoDB Shell, MongoDB Shell JavaScript Engine, MongoDB Shell JavaScript Syntax, Introduction to the MongoDB Data Types, Introduction to the CRUD Operations on documents, Create and Delete Databases and Collections, Introduction to MongoDB Queries.

**UNIT-V:**
What is Angular, Features of Angular, Angular Application Setup, Components and Modules, Executing Angular Application, Elements of Template, Change Detection, Structural Directives - ngIf, ngFor, ngSwitch, Custom Structural Directive, Attribute Directives - ngStyle, ngClass, Custom Attribute Directive, Property Binding, Attribute Binding, Style and Event Binding, Built in Pipes, Passing Parameters to Pipes, Nested Components Basics, Passing data from Container Component to Child Component, Passing data from Child Component to ContainerComponent, Shadow DOM, Component Life Cycle, Template Driven Forms, Model Driven Forms or Reactive Forms, Custom Validators in Reactive Forms, Custom Validators in Template Driven forms, Dependency Injection, Services Basics, RxJS Observables, Server Communication using HttpClient, Communicating with different backend services using Angular HttpClient, Routing Basics, Router Links, Route Guards, Asynchronous Routing, Nested Routes.

**Text Books:**
1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson.
2. Pro Mean Stack Development, 1st Edition, ELadElrom, Apress O'Reilly.
3. Full Stack JavaScript Development with MEAN, Colin J Ihrig, Adam Bretz, 1st edition, SitePoint, SitePoint Pty. Ltd., O'Reilly Media.
4. MongoDB – The Definitive Guide, 2nd Edition, Kristina Chodorow,O'Reilly.

**Reference Books:**
1. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book,1st Edition, Dream Tech.
2. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda SKatila, Cengage Learning.

**Web Links:**
1. https://infyspringboard.onwingspan.com/en/app/toc/lex_17739732834840810000_shared/overview (HTML5)
2. https://infyspringboard.onwingspan.com/en/app/toc/lex_18109698366332810000_shared/overview (Javascript)
3. https://infyspringboard.onwingspan.com/en/app/toc/lex_32407835671946760000_shared/overview (Node.js & Express.js)
4. https://infyspringboard.onwingspan.com/en/app/toc/lex_9436233116512678000_shared/overview (Typescript)
5. https://infyspringboard.onwingspan.com/en/app/toc/lex_20858515543254600000_shared/overview (Angular JS)
6. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_013177169294712832113_shared/overview (MongoDB)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**KAKINADA – 533 003**, Andhra Pradesh, India

**DEPARTMENT OF AUTOMOBILE ENGINEERING**

# COURSE STRUCTURE AND SYLLABUS

# For UG – R20

## B. TECH - AUTOMOBILE ENGINEERING

*(Applicable for batches admitted from 2020-2021)*

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
## KAKINADA – 533 003, Andhra Pradesh, India

# DEPARTMENT OF AUTOMOBILE ENGINEERING

### III YEAR I SEMESTER

| S. No. | Course Code | Course Title | L | T | P | Credits |
|--------|-------------|--------------|---|---|---|---------|
| 1 | PCC-7 | Theory of Machines | 3 | 0 | 0 | 3 |
| 2 | PCC-8 | Production Technology | 3 | 0 | 0 | 3 |
| 3 | PCC-9 | Vehicle Dynamics | 3 | 0 | 0 | 3 |
| 4 | OE-1 | **OPEN ELECTIVE** | 3 | 0 | 0 | 3 |
| 5 | PEC-1 | 1.Alternative Fuels for engines<br>2. Two and Three Wheelers<br>3. Microprocessor and Micro Controllers<br>4. Heat Transfer<br>5. Industrial Hydraulics and Pneumatics<br>6. MOOC's/NPTEL | 3 | 0 | 0 | 3 |
| 6 | PCC-L6 | Production Technology Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC-L7 | Theory of Machines Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC-3 | Vehicle Design & Analysis Lab | 0 | 0 | 4 | 2 |
| 9 | MC-4 | Professional Ethics And Human Values | 2 | 0 | 0 | 0 |
| 10 | | Evaluation of Summer Internship, completed after II B. Tech II Semester | | | | 1.5 |
| | | **Total Credits** | 17 | -- | 10 | 21.5 |
| | | Honors/Minor courses | 4 | 0 | 0 | 4 |

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# DEPARTMENT OF AUTOMOBILE ENGINEERING

## III YEAR II SEMESTER

| S. No | Course Code | Course Title | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---------|
| 1 | PCC-10 | Automobile Components and Chassis Design | 3 | 0 | 0 | 3 |
| 2 | PCC-11 | Automobile Transmission systems | 3 | 0 | 0 | 3 |
| 3 | PCC-12 | Vehicle Body Engineering | 3 | 0 | 0 | 3 |
| 4 | OE-2 | **OPEN ELECTIVE** | 3 | 0 | 0 | 3 |
| 5 | PEC-2 | 1. CFD for Automobile Applications<br>2. Condition Monitoring<br>3. Noise Vibrations and Harshness<br>4. Mechatronics<br>5. Measurements and Control systems<br>6. MOOC's/NPTEL | 3 | 0 | 0 | 3 |
| 6 | PCC-L8 | Auto Scanning & Vehicle Testing Lab | 0 | 0 | 3 | 1.5 |
| 7 | PCC-L9 | Vehicle Maintenance Lab | 0 | 0 | 3 | 1.5 |
| 8 | PCC-L10 | Vehicle Evaluation Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC-4 | Soft Skills | 0 | 0 | 4 | 2 |
| 10 | MC-5 | Research Methodologies & IPR | 2 | -- | | 0 |
| | | **Total Credits** | 17 | -- | 13 | 21.5 |
| | | Honors/Minor courses | **4** | **0** | **0** | **4** |

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

**OPEN ELECTIVES:**

| | |
|---|---|
| **OPEN ELECTIVE-I:** | 1. Basic Automobile Engineering<br>2. Automobile Maintenance and Safety<br>3. Automobile Emissions and Effects |
| **OPEN ELECTIVE-II:** | 1. Alternative Fuels for Automobiles<br>2. Vehicle Stability and Control<br>3. Electric Vehicles and Hybrid Technology |
| **OPEN ELECTIVE-III:** | 1. Automobile Safety<br>2. Automobile Power train<br>3. IC Engines |
| **OPEN ELECTIVE-IV:** | 1. Automobile Materials and Manufacturing Techniques<br>2. Engine Management Systems<br>3. Automobile Electrical and Electronics |

## MINOR in AUTOMOBILE ENGINEERING:

| S. No | Subject | Prerequisites |
|---|---|---|
| 1 | Basic Automobile Engineering | NIL |
| 2 | IC Engines | NIL |
| 3 | Vehicle Body Engineering | Basic AE |
| 4 | Vehicle Dynamics | Basic AE, VBE |
| 5 | Automobile Electrical and Electronics | Basic AE |
| 6 | Electric Vehicles and Hybrid Technology | Basic AE ,AEE |
| 7 | Automobile Materials and Manufacturing | Basic AE |
| 8 | Automobile Pollution and its Effects | Basic AE, ICE |

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

| III Year-I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **ALTERNATIVE FUELS FOR ENGINES (PROGRAM ELECTIVE-I)** | | | | |

**Course Objectives:** To impart the necessity of finding alternative energy sources for automobiles and to understand merits and demerits, performance characteristics of various sources of fuels and their comparison.

## UNIT I
## CONVENTIONAL FUELS FOR I.C. ENGINES
Petroleum based conventional fuels for SI and CI engine, Demand and Availability of crude oil – vehicle population increase – national and international standards for conventional and alternative fuels.
Desirable characteristics of SI Engine fuels – Petrol – Properties, Specification, chemical structure, Volatility characteristics, knock rating and additives. Desirable characteristics of CI Engine fuels – Diesel – Properties, Specification, chemical structure, Ignition quality, Cetane rating and additives.

## UNIT II
## ALCOHOLS AS FUELS
Availability of different alternative fuels for engines. Alcohols – Properties, Production methods and usage in engines. Blending, dual fuel operation, surface ignition, spark ignition and oxygenated additives. Performance, combustion and emission characteristics in engines. Advantages and disadvantages of alcohol fuels

## UNIT III
## VEGETABLE OILS AND BIODIESEL AS FUELS
Properties of Vegetable oils and biodiesel- Methods of using vegetable oils – Blending, preheating, and emulsification – Preparation of biodiesel from non-edible, edible oil and Algae - Performance, combustion and emission Characteristics in diesel engines. Advantages and disadvantages of Vegetable oils and biodiesel

## UNIT IV
## HYDROGEN AS FUEL
Hydrogen – Properties, Production methods, storage and safety aspects. Issues & limitation in Hydrogen. Methods of using hydrogen in engines. Performance, combustion and emission Characteristics in engines. Advantages and disadvantages of Hydrogen fuel.

## UNIT V
## BIOGAS, CNG AND LPG AS FUELS
Biogas, Compressed Natural gas (CNG) and LPG – Properties and production methods. $CO_2$ and $H_2S$ scrubbing in Biogas, Modifications required for use in Engines- Performance, combustion and emission Characteristics in engines. Advantages and disadvantages of Gaseous fuels. Working of LPG and CNG kits used in automotive engines.

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

### REFERENCES

1. Arumugam S. Ramadhas, "Alternative Fuels for Transportation" CRC Press, 2011.
2. Ayhan Demirbas and M. Fatih Demirbas, "Algae Energy-Algae as a New Source of Biodiesel", Springer-Verlag London Limited 2010.
3. Ayhan Demirbas, 'Biodiesel A Realistic Fuel Alternative for Diesel Engines', Springer-Verlag London Limited 2008
4. David M. Mousdale, "Introduction to Biofuels", CRC Press, 2015.
5. Ganesan.V., "Internal Combustion Engineering", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
6. Gerhard Knothe, Jon Van Gerpen, Jargon Krahl, The Biodiesel Handbook, AOCS Press Champaign, Illinois 2005.
7. M. K. Gajendra Babu and K. A. Subramanian, "Alternative Transportation Fuels-Utilisation in Combustion Engines", CRC Press, 2013.
8. M.L. Mathur, R.P.Sharma "A course in internal combustion engines", Dhanpatrai publication, 2003.
9. Richard L Bechtold P.E., Alternative Fuels Guide book, Society of Automotive Engineers, 1997 ISBN 0-76-80-0052-1.

**Course Outcomes:**

By the end of this course, students will be able to

- Possess a comprehensive understanding of available alternative fuels for IC engines. They will possess complete knowledge on producing different biofuels, modifying them and using them in IC engines
- Acquire the skills in developing new technologies for alternative fuels efficiently in IC engines.
- Demonstrate the importance of using alternative fuels for sustainable energy supply and for emission control in IC engines.

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

| III Year-I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **AUTOMOBILE MAINTENANCE AND SAFETY (OPEN ELECTIVE-I)** | | | | |

**Course objective:** To impart the knowledge of the safety concepts, and electrical and chassis maintenance. To learn about different comfort and safety systems used in automobiles.

### UNIT I
### INSPECTION SCHEDULE AND MAINTENANCE OF RECORDS
Need for maintenance, types of maintenance: preventive and breakdown maintenance, requirements of maintenance, preparation of check lists. Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance: general safety, tool safety.

### UNIT II
### ENGINE MAINTENANCE
Tools used for engine disassembly, dismantling of engine components: cylinder head, valve train, cylinder block, connecting rod, piston and crankshaft assembly; cleaning and inspection of engine components, reconditioning of components, servicing and maintenance of fuel system, engine tune-up, cooling system: water pump, radiator, thermostat. Lubrication system maintenance, anticorrosion and anti-freeze additives

### UNIT III
### CHASSIS MAINTENANCE
Servicing and maintenance of clutch, gear box, universal joints, propeller shaft, differential system. Service and maintenance of brake – disc and drum brakes, steering wheel and suspension systems, wheel alignment, and vehicle body maintenance

### UNIT IV
### ELECTRICAL SYSTEM MAINTENANCE
Servicing and maintenance of battery, starter motor, alternator and generator, ignition system lighting system, electric horn, and wiper motor.

### UNIT-V
### COMFORT AND SAFETY SYSTEMS
Steering and mirror adjustment system, central locking system, tyre pressure monitoring and control system, rain sensor system, automatic climate control systems, environment information system, air bag system, collapsible steering column, anti-lock braking system, electronic brake force distribution.

### Text Books:
1. Knott and Phil Knott, "An Introductory Guide to Motor Vehicle Maintenance: Light
2. Vehicles", EMS publishing, 2010
3. Vehicle Maintenance and Garage Practice by Jigar A Doshi, PHI Pub, 2014.
4. Prasad, Priya and Belwafa Jamel, "Vehicles Crashworthiness and Occupant Protection", American Iron and Steel Institute, USA
5. JullianHappian-Smith "An Introduction to Modern Vehicle Design" SAE, 2002

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

**Reference Books:**
1. William H. Crouse and Donald L. Anglin, "Automotive Mechanics", 10th edition, 2007
2. Tim Giles, "Automotive service: Inspection, maintenance and repair", 3rd edition, 2007
3. Jack Erjavec, "Automotive technology: A systems approach", 5th edition, 2009
4. Recent development in Automotive Safety Technology", SAE International Publication. Editor: Daniel J Helt,2013

**Course outcomes:** After the completion of the course, the student should be able to acquire knowledge of the safety concepts, understand engine maintenance and electrical and chassis maintenance.

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

| III Year-II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **NOISE, VIBRATIONS AND HARSHNESS (PROGRAM ELECTIVE-II)** | | | | | |

**Course Objectives:**
- To acquire the knowledge in basic of vibration and noise
- To understand the effect of noise an human comfort and environment
- To know the methods of vibration and noise measurement.

## UNIT I
## FUNDAMENTALS OF ACOUSTICS AND NOISE, VIBRATION
Theory of Sound—Predictions and Measurement, Sound Sources, Sound Propagation in the Atmosphere, Sound Radiation from Structures and Their Response to Sound, General Introduction to Vibration, Vibration of Simple Discrete and Continuous Systems, Random Vibration, Response of Systems to Shock, Passive Damping

## UNIT II
## EFFECTS OF NOISE, BLAST, VIBRATION, AND SHOCK
General Introduction to Noise and Vibration Effects on People and Hearing Conservation, Sleep Disturbance due to Transportation Noise Exposure, Noise-Induced Annoyance, Effects of Infrasound, Low-Frequency Noise, and Ultrasound on People, Auditory Hazards of Impulse and Impact Noise, Effects of Intense Noise on People and Hearing Loss, Effects of Vibration on People, Effects of Mechanical Shock on People, Rating Measures, Descriptors, Criteria, and Procedures for Determining Human Response to Noise.

## UNIT III
## VEHICLE NOISE AND VIBRATION—SOURCES, PREDICTION, AND CONTROL
Introduction to Vehicle Noise and Vibration Sources, Internal Combustion Engine Noise Prediction and Control—Diesel, Exhaust and Intake Noise and Acoustical Design of Mufflers, Tire/Road Noise—Generation, Measurement, and Abatement, Aerodynamic Sound Sources in Vehicles—Prediction and Control, Transmission and Gearbox Noise and Vibration Prediction and Control, Brake Noise Prediction and Control.

## UNIT IV
## VEHICLE INTERIOR NOISE AND VIBRATION SOURCES - PREDICTION AND CONTROL
Introduction to Vehicle Interior Noise and Vibration Sources, Automobile, Bus, and Truck Interior Noise and Vibration Prediction and Control, Noise and Vibration in Off-Road Vehicle Interiors-Prediction and Control,

## UNIT V
## NOISE AND VIBRATION TRANSDUCERS, SIGNAL PROCESSING, AND MEASURING TECHNIQUES
Introduction to Noise and Vibration Transducers, Measuring Equipment, Measurements, Signal Acquisition, and Processing, Acoustical Transducer Principles and Types of Microphones, Vibration Transducer Principles and Types of Vibration Transducers, Sound Level Meters, Noise Dosimeters, Analyzers and Signal Generators, System for Data Acquisition, Noise and Vibration Measurements, Noise and Vibration Data Analysis, Calibration of Measurement Microphones, Calibration of Shock and Vibration Transducers, Metrology and Traceability of Vibration and Shock Measurements.

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

**TEXT BOOKS:**
1. Clarence W. de Silva , "Vibration Monitoring, Testing, and Instrumentation ",CRC Press, 2007
2. David A.Bies and Colin H.Hansen "Engineering Noise Control: Theory and Practice "Spon Press, London, 2009

**REFERENCES:**
1. Allan G. Piersol ,Thomas L. Paez "Harris' Shock and Vibration Handbook", McGraw-Hill , New Delhi, 2010
2. Colin H Hansen "Understanding Active Noise Cancellation" , Spon Press , London 2003
3. Matthew Harrison "Vehicle Refinement: Controlling Noise and Vibration in Road Vehicles ", Elsevier Butterworth-Heinemann, Burlington, 2004

**Course Outcome:**
At the end of the course, the student will understand the sources, effects, prediction, control techniques, measurement techniques of noise, vibration pertaining to an automobile.

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## DEPARTMENT OF AUTOMOBILE ENGINEERING

| III Year-II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ALTERNATIVE FUELS FOR AUTOMOBILES (OPEN ELECTIVE-II)** | | | | | |

**Course Objectives:** To impart the necessity of finding alternative energy sources for automobiles. To understand merits and demerits, performance characteristics of various sources of fuels and their comparison.

## UNIT I
## CONVENTIONAL FUELS FOR I.C. ENGINES

Petroleum based conventional fuels for SI and CI engine, Demand and Availability of crude oil – vehicle population increase – national and international standards for conventional and alternative fuels.
Desirable characteristics of SI Engine fuels – Petrol – Properties, Specification, chemical structure, Volatility characteristics, knock rating and additives. Desirable characteristics of CI Engine fuels – Diesel – Properties, Specification, chemical structure, Ignition quality, Cetane rating and additives.

## UNIT II
## ALCOHOLS AS FUELS

Availability of different alternative fuels for engines. Alcohols – Properties, Production methods and usage in engines. Blending, dual fuel operation, surface ignition, spark ignition and oxygenated additives. Performance, combustion and emission Characteristics in engines. Advantages and disadvantages of alcohol fuels

## UNIT III
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Properties of Vegetable oils and biodiesel- Methods of using vegetable oils – Blending, preheating, and emulsification – Preparation of biodiesel from non-edible, edible oil and Algae - Performance, combustion and emission Characteristics in diesel engines. Advantages and disadvantages of Vegetable oils and biodiesel

## UNIT IV
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Hydrogen – Properties, Production methods, storage and safety aspects. Issues & limitation in Hydrogen. Methods of using hydrogen in engines. Performance, combustion and emission Characteristics in engines. Advantages and disadvantages of Hydrogen fuel.

## UNIT V
## BIOGAS, CNG AND LPG AS FUELS

Biogas, Compressed Natural gas (CNG) and LPG – Properties and production methods. $CO_2$ and $H_2S$ scrubbing in Biogas, Modifications required for use in Engines- Performance, combustion and emission Characteristics in engines. Advantages and disadvantages of Gaseous fuels. Working of LPG and CNG kits used in automotive engines.

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1. Arumugam S. Ramadhas, "Alternative Fuels for Transportation" CRC Press, 2011.
2. Ayhan Demirbas and M. Fatih Demirbas, "Algae Energy-Algae as a New Source of Biodiesel", Springer-Verlag London Limited 2010.
3. Ayhan Demirbas, 'Biodiesel A Realistic Fuel Alternative for Diesel Engines', Springer-Verlag London Limited 2008
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6. Gerhard Knothe, Jon Van Gerpen, Jargon Krahl, The Biodiesel Handbook, AOCS Press Champaign, Illinois 2005.
7. M. K. Gajendra Babu and K. A. Subramanian, "Alternative Transportation Fuels-Utilisation in Combustion Engines", CRC Press, 2013.
8. M.L. Mathur, R.P.Sharma "Internal combustion engines", Dhanpatrai publication, 2003.
9. Richard L Bechtold P.E., Alternative Fuels Guide book, Society of Automotive Engineers, 1997 ISBN 0-76-80-0052-1.

**Course Outcomes**:

By the end of this course, students will be able to

- Possess a comprehensive understanding of available alternative fuels for IC engines. They will possess complete knowledge on producing different biofuels, modifying them and using them in IC engines
- Acquire the skills in developing new technologies for alternative fuels efficiently in IC engines.
- Demonstrate the importance of using alternative fuels for sustainable energy supply and for emission control in IC engines.