UNIVERSITY OF CALICUT

Abstract

General and Academic - Faculty of Science - Syllabus of B.Voc. in Automobile-Auto Electrical & Electronics - with effect from 2020 Admission - Revised - Approved - Orders Issued.

G & A - IV - J

U.O.No. 12640/2022/Admn Dated, Calicut University.P.O, 27.06.2022

Read:-1. U.O.No. 4256/2015/Admn dated, 27.04.2015
2. Item No.2 in the minutes of the meeting of the Board of Studies in Electronics (SB) held on 21.12.2021
3. Item No.I.2 in the meeting of Faculty of Science held on 03.02.2022
4. Item No.II.H.2 in the minutes of the LXXXIII meeting of Academic Council held on 30.03.2022
5. Orders of the Vice-chancellor in file no. 120153/GA - IV -J1/2018/Admn, dated 07.04.2022

ORDER

1. The scheme and syllabus of B.Voc in Automobile-Auto Electrical & Electronics Programme under B.Voc Regulations 2014, with effect from 2014 Admission , was implemented, vide paper read (1) above.
2. The meeting of Board of Studies in Electronics (SB) held on 21.12.2021, vide paper read (2) above, resolved to approve scheme and syllabus of B.Voc in Automobile-Auto Electrical & Electronics Programme under B.Voc Regulations 2014, with effect from 2020 Admission.
3. The Faculty of Science at its meeting held on 03.02.2022 approved the minutes of the meeting of the Board of Studies in Electronics (SB), vide paper read (3) above.
4. The LXXXIII meeting of academic Council, vide paper read (4)above, resolved to approve the scheme and syllabus of B.Voc in Automobile-Auto Electrical & Electronics Programme under B.Voc Regulations 2014, with effect from 2020 Admission and the Vice Chancellor has accorded sanction to implement the Academic Council decision, vide paper read (5) above.
5. The revised scheme and syllabus of B.Voc in Automobile-Auto Electrical & Electronics Programme under B.Voc Regulations 2014, with effect from 2020 Admission, is therefore implemented.
6. Orders are issued accordingly. (syllabus appended)

Ajitha P.P

Joint Registrar

To

The Principals of all Affiliated Colleges offering B.Voc in Automobile-Auto Electrical & Electronics Programme
Copy to: PS to VC/PA to PVC/ PA to Registrar/PA to CE/JCE I/JCE IV/DoA/EX and EG Sections/GA I F/CHMK Library/Information Centres/SF/DF/FC

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Section Officer

Bachelor of Vocation (B.Voc)
IN
AUTOMOBILE- AUTO ELECTRICALS & ELECTRONICS

(With Effect from the Academic Year 2020-2021)

SYLLABUS

As per General & Academic- Regulations for B.Voc. Programme under University of Calicut w.e.f 2014

Prepared by:

BOARD OF STUDIES IN ELECTRONICS (UG)

Course Structure

Sem No	Course No	Code	Paper	Credits	Session
1	**1.1**	GEC1EG01	BEN1A01 Transactions: Essential English Language Skills	**4**	**Theory**
	1.2	GEC1ML02 GEC1AR02 GEC1HD02	BML1A07(3) Bhashayum Sahithyavum-1 BAR1A03 Communicative skill in Arabic BHN1A07(3) Prose and one act plays	**4**	**”**
	1.3	GEC1MT03	BMT1C01 Mathematics-1	**4**	**”**
	1.4	SDC1AE01	Basics of Electrical & Electronic Engineering	**5**	**”**
	1.5	SDC1AE02	Basic Mechanical engineering	**4**	**”**
	1.6	SDC1AE03(P)	Electronic Engineering Practice	**5**	**Lab**
	1.7	SDC1AE04(P)	Electrical Engineering Practice	**4**	**”**
2	**2.1**	GEC2EG04	BEN1A02 Ways with Words: Literatures in English	**4**	**Theory**
	2.2	GEC2ML05 GEC2AR05 GEC2HD05	BML2A08(3) Bhashayum Sahithyavum-2 BAR2A06 Literature in Arabic BHN2A08(3) Poetry and Short Stories	**4**	**”**
	2.3	GECMT06	BCS3A11 Numerical Skills	**4**	**”**
	2.4	SDC2AE05	Introduction to Automobile Engineering	**4**	**”**
	2.5	SDC2AE06	Instrumentation for Automobile Engineers	**5**	**”**
	2.6	SDC2AE07(P)	Automotive Electrical Laboratory I	**5**	**Lab**
	2.7	SDC2AE08(Pr)	Mini Project	**4**	**”**

Sem No	Course No	Code	Paper	Credits	Session
3	**3.1**	GEC3EG07	BEN2A03 Writing for Academic and Professional Success	**4**	**Theory**
	3.2	GEC3FM08	BCA2C03 Financial and Management Accounting	**4**	**”**
	3.3	GEC3ED09	BCM4A13 Entrepreneurship Development	**4**	**”**
	3.4	SDC3AE09	Circuit theory and Power systems	**4**	**”**
	3.5	SDC3AE10	Automotive Electrical and Electronic systems	**5**	**”**
	3.6	SDC3AE11(P)	Automotive Electronics Laboratory	**4**	**Lab**
	3.7	SDC3AE12(P)	Automotive Electrical Laboratory- II	**5**	**”**
4	**4.1**	GEC4EG10	BEN2A04 Zeitgeist: Readings on Contemporary Culture	**4**	**Theory**
	4.2	GEC4IT11	SDC4IT13 Internet of Things (IoT)	**4**	**”**
	4.3	GEC4IT12(P)	Office Automation Tools Lab	**4**	**Lab**
	4.4	SDC4AE13	Electronic Engine Management Systems	**4**	**Theory**
	4.5	SDC4AE14	Digital Fundamentals and Microprocessors	**5**	**”**
	4.6	SDC4AE15(P)	Industrial Workshop	**5**	**Lab**
	4.7	SDC4AE16(Pr)	Project	**4**	**„**

Sem No	Course No	Code	Paper	Credits	Session
5	**5.1**	GEC5HR13	BCM3C03 Human Resources Management	**4**	**Theory**
	5.2	GEC5LS14	BPS5D02 Life Skill Application	**4**	**”**
	5.3	GEC5BS15	BCM3A12 Professional Business Skills	**4**	**”**
	5.4	SDC5AE17	Automotive Electrical System and Hybrid Vehicles	**5**	**”**
	5.5	SDC5AE18	Automobile HVAC	**4**	**”**
	5.6	SDC5AE19	Vehicle Body Engineering	**4**	**”**
	5.7	SDC5AE20(P)	Microprocessor and IoT Lab	**5**	**Lab**
6	**6.1**	SDC6AE21(Pr)	Internship and Project	**30**	**Internship**

Semester 1

GEC1EG01 BEN1A01 Transactions: Essential English Language Skills

Course No: 1.1
Course Code: GEC1EG01- BEN1A01
Course Name: Transactions: Essential English Language Skills
Credits: 4
Hours: 60

GEC1ML02/AR02/HD02 (Malayalam/Arabic/Hindi)

Course No: 1.2
Course Code: GEC1ML02- BML1A07(3)
Course Name: Bhashayum Sahithyavum-1
Credits: 4
Hours: 60

Course No: 1.2
Course Code: GEC1AR02- BAR1A03
Course Name: Communicative skill in Arabic
Credits: 4
Hours: 60

Course No: 1.2
Course Code: GEC1HD02- BHN1A07(3)
Course Name: Prose and one act plays
Credits: 4
Hours: 60

GEC1MT03- BMT1C01 Mathematics-1

Course No: 1.3
Course Code: GEC1MT03- BMT1C01
Course Name: Mathematics-1
Credits: 4
Hours: 60

SDC1AE01 Basics of Electrical & Electronic Engineering

Course No. 1. 4
Course Code: SDC1AE01
Course Name: Basics of Electrical & Electronic Engineering
Credits: 5
Hours: 75

Objectives of the Course

To provide the students with an overview of the most important concepts in Electrical and Electronics Engineering.

Course Outcome

The students will be able to

1. Solve basic electrical circuit problems using various laws and theorems.
2. Analyze AC power circuits and networks, its measurement and safety concerns.
3. Analyze DC, magnetic circuits.
4. Classify and compare various types of electrical machines.
5. Understand the working of rectifiers, amplifiers and oscillators.
6. Familiarize the working of diodes, transistors, MOSFETS and integrated circuits.

Course Outline

UNIT I (18 Hours)

DC circuits: Basic circuit elements and sources, Ohms law, Kirchhoff's laws, series and parallel connection of circuit elements, Node voltage analysis, Mesh analysis.
Magnetic Circuits: Introduction to magnetic circuits, Problems involving simple magnetic circuits.Faraday's laws induced emfs and inductances, Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship and eddy currents.

UNIT II (18 Hours)

AC circuits: Alternating voltages and currents, AC values, Single Phase RL, RC, RLC Series circuits, Power in AC circuits-Power Factor- Three Phase Systems – Star and Delta Connection- Three Phase Power Measurement – Electrical Safety –Fuses and Earthing, Residential wiring.
Electrical machines & measuring instruments: Working principle, construction and applications of DC machines and AC machines (1- phase transformers, 3-phase induction motors, single phase induction motors: split phase, capacitor start and capacitor start & run motors, DC shunt generator). Basic principles and classification of instruments -Moving coil and moving iron instruments, 3-phase squirrel cage induction motor, DC series motor, slip ring induction motor.

UNIT III (18 Hours)

Conduction in Semiconductor materials Preliminaries of rectification, Bridge rectifier, Efficiency, Nature of rectified output, Ripple factor, different types of filter circuits, voltage multipliers, Zener diode voltage stabilization.
Different transistor amplifier configurations:- C-B, C-E, C-C, their characteristics, amplification factors, their relationships, Load line Analysis, Transistor biasing, Different types of biasing - Base resistor, Emitter feedback - resistor-voltage divider bias method and R.C coupled amplifier.

UNIT IV (15 Hours)

Basic principles of feedback, negative feedback and its advantages, positive feedback circuits Oscillatory Circuits-LC, RC oscillators, tuned collector oscillator, Hartley, Colpitt's, phase shift oscillators - Expressions for their frequency.
Basic ideas of UJT, FET, MOSFET, OP-amp-basic operations, Application, inverting, Noninverting, summing amplifiers, Differentiator- integrator.

UNIT V (6 Hours)

Communication Systems: Transmission and reception of radio waves, types of modulation, AM, FM their comparison advantages, demodulation, straight receiver-pulse code modulation (qualitative idea only).

Text Books:

1. Dash S.S, Subramani C, Vijayakumar K, "Basic Electrical Engineering", First edition, Vijay Nicole Imprints Pvt.Ltd, 2013.
2. 1. John Bird, 'Electrical circuit theory and technology ', Newnes publications, 4 t h Edition, 2010.
3. Principles of electronics by VK Mehta - 2008 edition (S. Chand).

References:

1. Allan R. Hambley, 'Electrical Engineering -Principles & Applications' Pearson Education, First Impression, 6/e, 2013.
2. Metha V.K, Rohit Metha, "Basic Electrical Engineering", Fifth edition, S.Chand & Co, 2012.
3. Kothari D P and Nagrath I J, "Basic Electrical Engineering", Second edition, Tata McGraw - Hill, 2009.
4. Bhattacharya S. K, "Basic Electrical and Electronics Engineering", First edition, Pearson Education, 2011.
5. Introduction to Micro computers by Aditya P Mathur (Tata McGarw Hill)
6. Electronics principles by Malvino.
7. Physics of Semiconductor Devices- Second Edition – Dilip K Roy – Universities Press.

SDC1AE02 Basic Mechanical Engineering

Course No. 1.5
Course Code: SDC1AE02
Course Name: Basic Mechanical Engineering
Credits: 4
Hours: 60

Objectives of the Course

To familiarize the students with the basic of Mechanical Engineering.

Course Outcome

The students will be able

1. To introduce different disciplines of Mechanical Engineering.
3. To impart basic knowledge in Thermodynamics and IC engine.
4. To understand the basics of Refrigeration and air conditioning.
5. To able to make elementary idea about different manufacturing process.
6. To understand various energy conversion systems.
7. To understand power transmission elements.

Course Outline

UNIT I (10 Hours)

Thermodynamics: Basic concepts and definitions of Zeroth law, First law, Second law of thermodynamics- concept of reversibility and entropy. p-v and T-s diagrams Air cycles: Carnot, Otto and Diesel cycles-Air standard efficiency (simple problems).

UNIT II (10 Hours)

IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system, ignition system and governing system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles.

UNIT III (10 Hours)

Principles and fields of application of - compressors - reciprocating and centrifugal, blower, pumps- reciprocating, centrifugal and jet pumps, steam and hydraulic turbines- impulse and reaction, gas turbine cycles- open and closed Elementary ideas of hydro electric, thermal and nuclear power plants.

UNIT IV (10 Hours)

Refrigeration & Air Conditioning: Refrigerants, CFC free refrigerants. Vapour compression refrigeration system, Comfort and Industrial air conditioning-typical window air conditioning unit.

UNIT V (20 Hours)

Mechanical Power transmission systems: Belt, rope and gear drives-types, comparison and fields of application-velocity ratio-slip (simple problems) friction disc, single plate clutch, gear trains (no derivations).

Manufacturing processes: Elementary ideas of casting, forging, rolling, welding, soldering and brazing Machining processes- turning, taper turning, thread cutting, shaping, drilling, grinding, milling (simple sketches and short notes). Non conventional machining - Electro discharge machining (EDM) and Electro chemical machining (ECM) Principle, application and advantages of C N C machine.

Text Books:

1. Dr. D.S Kumar, Basics of Mechanical Engineering, Kataria, S. K., & Sons.
2. Kumar Pravin, Basics of Mechanical Engineering, Pearson.

References:

1. Dossat, R. J., Principles of Refrigeration, PHI.
2. Heywood, J., Internal Combustion Engine Fundamentals, McGraw Hill Publishers.
3. Holman, J. P., Thermodynamics, McGraw Hill Co.
4. Jain, K. K. and Asthana, R. B., Automobile Engineering, TTTI Bhopal.
5. Jonathan Wickert, Introduction to Mechanical Engineering, Cengage Learning.
6. Kalpakjian, S. and Schmid, S. R., Manufacturing Processes for Engineering.
7. Materials, Pearson education.
8. Maines, R., Landmarks in Mechanical Engineering, ASME.

SDC1AE03 (P) Electronic Engineering Practice

Course No. 1.6
Course Code: SDC1AE03 (P)
Course Name: Electronic Engineering Practice
Credits: 5

Objectives of the Course

To provide exposure to the students with hands on experience on various Electrical Engineering practices.

Course Outcome

At the end of the course students will be able to

1. Familiarize the electronic components and basic electronic instruments.
2. Learn the characteristics of various types of Diodes, design half and full wave Rectifiers.
3. Compare the different configurations of BJT.
4. Design Amplifier circuits and draw frequency response characteristics.
5. Develop the parameters of feedback amplifier circuit, describe different types of oscillator circuits.

List of Experiments

1. Construction of full wave, Centre tapped and Bridge rectifiers.
2. Characteristics of Zener diode and construction of Voltage regulator.
3.Transistor characteristics and transfer characteristics in CB&CE Configuration-current gain.
4. CE Transistor Amplifier-Frequency response.
5. Clipping & Clamping circuits.
6. Negative feedback amplifier.
7. LC Oscillator (Hartley or Colpitt's).
8. Phase shift oscillator.
9. Operational Amplifier –inverting, non inverting, Voltage follower.
10. Realization of gates using diodes(AND, OR) & transistors (NOT), verification using IC's.
11. Voltage multiplier (doubler, tripler).

SDC1AE04 (P) Electrical Engineering Practice

Course No. 1.7
Course Code: SDC1AE04 (P)
Course Name: Electrical Engineering Practice
Credits: 4

Objectives of the Course

To provide exposure to the students with hands on experience on various Electrical Engineering practices.

Course Outcome

At the end of the course students will be able

1. To learn the residential wiring and various types of wiring.
2. To measure the various electrical quantities.
3. To gain knowledge about the fundamentals of various electrical gadgets and their working and trouble shooting of them.
4. To design a prototype of a transformer.
5. To know the necessity and types of earthing and measurement of earth resistance.

List of Experiments

1. Residential wiring (using Energy meter, fuses, switches, indicator, lamps, etc).
2. Types of wiring (fluorescent lamp wiring, staircase wiring, godown wiring, etc).
3. Measurement of electrical quantities (like voltage, current, power, power factor in RLC circuits).
4. Measurement of energy (using single phase and three phase energy meter).
5. Study of Earthing and Measurement of Earth resistance.
6. Study of trouble shooting of electrical equipments (fan, iron box, mixergrinder, etc).
7. Study of various electrical gadgets (Induction motor, transformer, CFL, LED, PV cell, etc).
8. Assembly of choke or small transformer.
9. Load test on DC shunt generator.
10. Load test on DC series motor.

References:

1. Subhransu Sekhar Dash & K.Vijayakumar, “Electrical Engineering Practice Laboratory Manual”. Vijay Nicole Imprints Private Ltd., First Edition, 2013.
2. Jeyachandran K, Natarajan S & Balasubramanian S, “A Primer on engineering practices Laboratory”, Anuradha Publications, 2007.
3. Jeyapoovan T, Saravanapandian M & Pranitha S, “Engineering practices Laboratory manual”, Vikas Publishing House Pvt., Ltd., 2006.

Semester 2

GEC2EG04- BEN1A02 Ways with Words: Literatures in English

Course No. 2.1
Course Code: GEC2EG04- BEN1A02
Course Name: Ways with Words: Literatures in English
Credits: 4
Hours: 60

GEC2ML05/ AR05/ HD05 (Malayalam/Arabic/Hindi)

Course No. 2.2
Course Code: GEC2ML05- BML2A08(3)
Course Name: Bhashayum Sahithyavum-2
Credits: 4
Hours: 60

Course No. 2.2
Course Code: GEC2AR05- BAR2A06
Course Name: Literature in Arabic
Credits: 4
Hours: 60

Course No. 2.2
Course Code: GEC2HD05- BHN2A08(3)
Course Name: Poetry and Short Stories
Credits: 4
Hours: 60

GECMT06- BCS3A11 Numerical Skills

Course No. 2.3
Course Code: BCS3A11
Course Name: Numerical Skills
Credits: 4
Hours: 60

SDC2AE05 Introduction to Automobile Engineering

Course No. 2.4
Course Code: SDC2AE05

Course Name: Introduction to Automobile Engineering

Credits: 4

Hours: 60

Objectives of the Course

The course provides an in depth knowledge on the various dimensions of automobile engineering.

Course Outcome

At the end of the course students will be able

1. To understand basics of automobile drive train.
2. To make the student conversant with Axles, Steering system and tyre assembly.
3. To understand the construction and working principle of various parts of an automobile.
4. Understand basics of suspension and brake system.
5. To obtain an outline of engine parts and transmission system.

Course Outline

UNIT I (10 Hours)

VEHICLE STRUCTURE AND ENGINES: Types of automobiles, vehicle construction and different layouts, chassis, frame and body, resistances to vehicle motion and need for a gearbox, components of engine-their forms, functions and materials.

UNIT II (15 Hours)

ENGINE AUXILIARY SYSTEMS: Electronically controlled gasoline injection system for SI engines. Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system ,Turbo chargers, Engine emission control by three way catalytic converter system.

UNIT III (10 Hours)

TRANSMISSION SYSYTEMS: Clutch-types and construction ,gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel –torque converter , propeller shaft, slip joints, universal joints, Differential, and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT IV (12 Hours)

STEERING,BRAKES AND SUSPENSION SYSTEMS: Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System and Traction Control.

UNIT V (13 Hours)

ALTERNATIVE ENERGY SOURCES: Use of Natural Gas, Liquefied Petroleum Gas. Bio-diesel, Bio-ethanol , Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance ,Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell.

Text Books:

1. 1. Kirpal Singh, " Automobile Engineering Vol 1 & 2 ", Standard Publishers, Seventh Edition , 1997, New Delhi.
2. 2. Jain,K.K.,and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi.1999.

References:

1. Heldt.P.M.,Automotive Chassis, Chilton Co., New York,1990.
2. Steed.W.,Mechanics of Road Vehicles,IIliffe Books Ltd.,London,1960.
3. Newton. Steeds & Garrot.Motor Vehicles, Butterworths, London, 1983.
4. Powloski. J. Vehicle Body Engineering, Business Books Ltd., 1989.
5. Giles. J.C. Body construction and design, IIliffe Books Butterworth & Co., 1971.
6. John Fenton, Vehicle Body layout and analysis, Mechanical Engg Publication Ltd., London, 1982.

SDC2AE06 Instrumentation for Automobile Engineers

Course No. 2.5
Course Code: SDC2AE06

Course Name: Instrumentation for Automobile Engineers

Credits: 5

Hours: 75

Objectives of the Course

To familiarize students with basics of Automobile instrumentation.

Course Outcome

At the end of the course students will be able to

1. Illustrate the different methods for the measurement.
2. Explicate the construction and working of various industrial devices used to measure Physical quantities.
3. Analyze, formulate and select suitable sensor for the given Automobile applications.
4. Understand Automotive Sensory Systems.
5. Analyze Primary sensing elements and signal conditioning elements.

Course Outline

UNIT I (15 Hours)

BASICS OF MEASUREMENT: Classification of Instrument, Characteristics of Instruments – Static and dynamic, experimental error analysis, Systematic and random errors, Statistical analysis, Uncertainty, Experimental planning and selection of measuring instruments, Reliability of instruments.

UNIT II (15 Hours)

AUTOMOTIVE INSTRUMENTATION: Modern automotive instrumentation – computerized instrumentation system, multiplexing, sampling and advantages – Measurements – fuel quality, coolant temperature, oil pressure vehicles speed, Display devices – LED, LCD, VFD, CRT and types, CAN network, the glass cockpit and information system.

UNIT III (15 Hours)

MEASUREMENT ANALYSIS: Chemical, thermal, magnetic and optical gas analyzers, measurement of smoke, dust and moisture, gas chromatography, spectrometry, measurement of pH, Review of basic measurement techniques.

UNIT IV (10 Hours)

PRIMARY SENSING ELEMENTS AND SIGNAL CONDITIONING: Transducers and inverse transducers. Characteristics and Choice of transducers, Input, Transfer and output Characteristics and its application. Operational Amplifier, Characteristics of Operational Amplifier, Attenuator, Amplitude Modulation and Demodulation, Basic Filters, A/D Converters.

UNIT V (20Hours)

AUTOMOTIVE SENSORS AND ACTUATORS: Introduction, basic sensor arrangement, Types of sensors such as – oxygen sensors, coolant temperature, exhaust temperature, Crank angle position sensors -Fuel metering, vehicle speed sensor and detonation sensor -Altitude sensor, flow sensor. Throttle position sensors,solenoids, stepper motors, relays.

Text Books:

1.William B.Riddens - Understanding Automotive Electronics, 5th edition- Butter worth Heinemann, Woburn- 1998.
2. Holman, J.P., Experimental methods for engineers, McGraw-Hill, 1988.
3. Raman, C.S., Sharma, G.R., Mani, V.S.V., Instrumentation Devices and Systems, Tata McGraw Hill, New Delhi, 1983.

References:

1. Bechhold- Understanding Automotive Electronics- SAE- 1998.

SDC2AE07(P) Automotive Electrical Laboratory I

Course No. 2.6
Course Code: SDC2AE07(P)

Course Name: Automotive Electrical Laboratory I

Credits: 5

Objectives of the Course

1. To introduce the testing procedure for electronics system in automobile.

2. The student should be able to perform servicing, trouble shooting and testing of various automobile electrical and electronics systems and components.

Course Outcome

At the end of the course students will be able

1. To familiarize the students with different type of errors and compensations in measuring instruments.

2. To familiarize the students with the extension of range of transducers.
3. To familiarize the students with different type of error compensations in measuring instruments.

4. To Explain the calibration procedure.

5. To familiarize the students with battery, motor and alternator inspection procedure.

List of Experiments

PART- I

1. Testing of batteries and battery maintenance.
2. Testing of starting motors and Alternators.
3. Testing of regulators and cut – outs relay.
4. Study of automobile electrical wiring.

PART- II

1. Kelvin's double bridge.
2. Maxwell's inductance-capacitance bridge.
3. Anderson's bridge, Schering's bridge.
4.Ratio error and phase error of a P.T & C.T.
5.Characteristics of a given RTD,
6.Characteristics of a given Thermistor.
7. Characteristics of a given Pressure transducer,
8.Characteristics of a given Weight transducer.

SDC2AE08(Pr) Mini Project

Course No. 2.7
Course Code: SDC2AE08(Pr)

Course Name: Mini Project

Credits: 4

Objectives of the Course

To obtain a chance to utilize and implement the knowledge and skill acquired over the past academic period.

Course Outcome

At the end of the course students will be able

1. To foster innovation in design of products, processes or systems.
2. To develop design that add value to products and solve technical problems
3. Provide a solution for a real life situation.
4. To carry out budget and time planning for the project.
5. To develop effective communication skill by delivering a Presentaion based on mini project.
6. To Extend or use the idea in mini project for major project.

Instructional Objective

To guide the students in such a way so that they carry out a work on a topic as a forerunner to the full fledged industrial training & project to be taken subsequently in II semester. The project work shall consist of substantial multidisciplinary component The students will carry out a project one of the specializations of program under study with substantial multidisciplinary component. Student groups will be formed and a faculty member will be allocated to guide them. Assessment will be based on internal reviews.

The main aim of mini project is to implement the theoretical knowledge gained from various areas to develop effective solutions to various real life problems in auto electrical & electronics. The course Mini Project is one that involves practical work for understanding and solving problems in the field of auto electrical & electronics. Students will select individually Commercial/Technical/Research Project based on Application. The project work will be presented by students using Power Point Presentation Tool to the panel of Examiners, along with a live demonstration of the project.

Semester 3

GEC3EG07- BEN2A03 Writing for Academic and Professional Success

Course No. 3.1
Course Code: GEC3EG07- BEN2A03

Course Name: Writing for Academic and Professional Success

Credits: 4

Hours: 60

GEC3FM08- BCA2C03 Financial and Management Accounting

Course No. 3.2
Course Code: GEC3FM08- BCA2C03

Course Name: Financial and Management Accounting

Credits: 4

Hours: 60

GEC3ED09- BCM4A13 Entrepreneurship Development

Course No. 3.3
Course Code: GEC3ED09- BCM4A13

Course Name: Entrepreneurship Development

Credits: 4

Hours: 60

SDC3AE09 Circuit theory and Power systems

Course No. 3.4
Course Code: SDC3AE09

Course Name: Circuit theory and Power systems

Credits: 4

Hours: 60

Objectives of the Course

1. To learn about various techniques available to solve various types of circuits and networks.
2. To give the students basic concepts in transmission systems.

Course Outcome

At the end of the course students will be able to

1. Analyse electrical circuits.
2. Apply circuit theorems.
3. Solve any DC and AC circuits.
4. Apply knowledge in transmission systems.
5. Extend or use the idea in electrical safety.

Course Outline

UNIT I CIRCUIT THEORY - I (16 hours)

Circuit Elements & Relations, Dot convention and formation of loop and node equations,Graphs,Bus incidence Matrix, Dual networks, Time Domain Analysis, classical differential equations approach, Applications of L.T's in circuit Theory, Laplace transformed N/W's, Steady State Analysis of circuits for Sinusoidal Excitations-1- Ø Series, Parallel, Series - Parallel circuits, 3-Ø balanced and unbalanced-N/W analysis, Resonance - Series and Parallel resonance - Selectivity - B.W- Q factors.

UNIT II CIRCUIT THEORY – II (8 hours)

Network Theorems and Applications- Superposition, Thevenin's, Norton's ,Substitution and Compensation, Reciprocity, Millman's, Maximum power transfer, Tellegen's theorem, and their application in analysis of N/W's, N/W Functions and 2-Port N/W's - Natural frequencies of a N/W, poles and zeros.

UNIT III POWER SYSTEMS - I (12 hours)

Introduction - Typical Layout of an Electrical Power System - Present Power Scenario in India, Generation of Electric Power - Conventional Sources (Qualitative),Non Conventional Sources (Qualitative), Economics Of Generation, A.C.Distribution, bus bar arrangement, Overhead Line Insulators, Insulated Cables, grading of cables, overhead lines versus underground cables, L and C Calculations of Transmission Lines, composite conductors transposition, bundled conductors, Corona.

UNIT IV POWER SYSTEMS - II (12 hours)

Performance of Lines- Ferranti Effect, Power flow, receiving end power circle diagram. Voltage Control - Compensation In Power Systems-. Per Unit Representation - impedance and reactance diagrams, Travelling Waves On Transmission Lines-. Overvoltage Protection and Insulation Coordination- Peterson coil, lightning, rod gaps, lightning arrester, volt-time curves. Symmetrical Components and Fault Calculations- faults with fault impedance, reactors and their location.

UNIT V ELECTRICAL SAFETY, WIRING (12 hours)

Safety measures in electrical system- types of wiring- wiring accessories staircase, fluorescent lamps & corridor wiring- Basic principles of earthing-Types of earthing- Simple layout of generation, transmission & distribution of power.

Text Books:

1. M.E. Van Valken Burg: Network Analysis, 3rd Edition, Pearson Education, 2006.
2. G.K. Mithal and Ravi Mittal: Network Analysis,14th Edition, Khanna Publications, 2003
3. N.C. Jagan, C. Lakshminarayana: Network Theory, BS Pub. 2003.
4. De Carlo and Lin: Linear Circuit Analysis, 2nd Edition, Oxford University Press, 2010.

References:

1. Nassir H.Sabah: Electric Circuits and Signals, 4th Edition, CRC Press, 2008
2. C.L. Wadhwa, Electrical Power Systems, 33rd Edition, New Age International, 2004.
3. D.P. Kothari and I.J. Nagrath, Modern Power System Analysis, Fourth Edition, Tata McGraw Hill Pub.Co., New Delhi, 2011.
4. Hadi Sadat: Power System Analysis, Tata McGraw Hill Pub. Co. 2002

SDC3AE10 Automotive Electrical and Electronic systems

Course No. 3.5
Course Code: SDC3AE10

Course Name: Automotive Electrical and Electronic systems

Credits: 5

Hours: 75

Objectives of the Course

This course makes the students to know the functions, working principles of various Automotive electrical & electronics components.

Course Outcome

At the end of the course students will be able to

1. Enumerate the construction, characteristics and maintenance of battery, lighting system and different accessories in a typical automobile after careful inspection.
2. Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.
3. List out the principles and characteristics of charging system components and demonstrate their working with suitable tools.

4. Describe the principles and architecture of electronics systems and its components present in an automobile related to instrumentation, control, security and warning systems.

5. Know the concepts and develop basic skills necessary to diagnose automotive electrical problems.

Course Outline

Unit I BATTERIES AND ACCESSORIES (15 hours)

Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging.

Unit II STARTING SYSTEM (15 hours)

Condition at starting, behaviour of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.

Unit III CHARGING SYSTEM AND LIGHTING (15 hours)

Generation of direct current , shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.

Unit IV FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS (15 hours)

Current trends in automotive electronic engine management system, electromagnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system.

Unit V ELECTRICAL SYSTEM MAINTENANCE – SERVICING AND REPAIRS (15 hours)

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

Text Books:

1. Allan Bonnick, “Automotive Computer Controlled Systems”, 2011.
2. Tom Weather Jr and Cland C.Hunter, “Automotive Computers and Control system”, Prentice Hall Inc., New Jersey.
3. Young A. P & Griffiths L, “Automobile Electrical and Electronic Equipments”, English Languages Book Society & New Press, 1990. 4. John Doke, “Fleet Management”, McGraw Hill Co. 1984.

References:

1. Santini Al, “Automotive Electricity and Electronics”, Cengage Learning, 2012.
2. Tom Denton, “Automotive Electrical and Electronic System”, SAE International, 2004.

3. William B. Ribbens, “Understanding Automotive Electronics”, 6th Edition, Newnes, 2003.
4. BOSCH, “Automotive Handbook”, 8th Edition, BENTLEY ROBERT Incorporated, 2011.

SDC3AE11(P) Automotive Electronics Laboratory

Course No. 3.6
Course Code: SDC3AE11(P)

Course Name: Automotive Electronics Laboratory

Credits: 4

Objectives of the Course

1. To equip the students with the knowledge of PCB design and fabrication processes.
2. To equip the students with basic idea of automotive sensor working.

Course Outcome

At the end of the course students will be able

1. To familiarize the electronic components and basic electronic instruments.
2. To make familiar with PCB design and various processes involved.
3. To provide in-depth core knowledge in fabrication of Printed Circuit Boards.
4. To provide the knowledge in assembling and testing of the PCB based electronic circuits.
5. To know the concepts and develop basic skills necessary to diagnose automotive sensor problems.

Instructional Objective

1. Schematic capture.
Introduction to ORCAD/ Express PCB Plus schematic capture tool, Simulation of simple electronic circuit, Schematic to layout transfer, Layout Printing.
2. PCB design process.
Conception Level Introduction: Specifying Parts, Packages and Pin Names, Libraries and Checking foot prints of the components, Partlist, Netlist, Making Netlist Files, Placing Parts, Routing Traces, Modifying Traces, Mounting Holes, Adding Text, PCB Layout, DRC, Pattern Transfer.
3. PCB fabrication process.
Etching, cleaning, drying and drilling.
4. Assembling and testing Identifying the components and its location on the PCB, soldering of active and passive components, Testing the assembled circuit for correct functionality.
5. Lambda Sensor.
6. Interfacing of analog sensors with micro-controller.
7. Study of Engine Management System.

SDC3AE12(P) Automotive Electrical Laboratory- II

Course No. 3.7
Course Code: SDC3AE12(P)
Course Name: Automotive Electrical Laboratory- II
Credits: 5

Objectives of the Course

To give students a fair knowledge of testing different types of DC machines and transformers.

Course Outcome

At the end of the course students will be able to

1. Test and validate different types of dc motors and generators.
2. Validate and to do different test in transformer.
3. Measure power in single phase and three phase system.
4. Test and validate different types of three phase induction motors.
4. Measure regulation of a given alternator.
6. Be familiar with constructional features of 3-phase and 1-phase AC machines.
7. Starting, Speed control of 3-phase and 1-phase motors.
8. Determine efficiency, regulations of different machines.

List of Experiments

1. Calibration of single phase energy meter (Induction and Static type) by direct loading
   a. Plot external characteristics. b. Deduce internal characteristics.
2. Load test on 3-phase squirrel cage induction motor.
3. Measurement of 3-phase power by using two-wattmeter method.
4. Determination of V-I characteristics of linear resistance and incandescent lamp.
5. No-load and blocked rotor tests on slip ring induction motor
a. Determine equivalent circuit parameters.
b. Predetermine the torque, line current and efficiency from equivalent circuit corresponding to a specified slip.
6. Measurement of L,M & K of i) transformer windings and ii) air core coil.
7. OC & SC tests on 3-phase alternator
a. Predetermine the voltage regulation at various loads and different power factors by EMF method.
8. Load test on single phase transformer.
   a. Determine efficiency and regulation at various loads and unity power factor.
9. OC & SC tests on single phase transformer.
a. Determine equivalent circuit parameters.
b. Predetermine efficiency and regulation at various loads and different power factors.
10. Open circuit characteristics of dc shunt generator.
a. Plot OCC of rated speed. b. Predetermine OCC for other speeds.
c. Determine critical field resistance for a specified speed.

d. Determine critical speed for a specified shunt field resistance.

Semester 4

GEC4EG10- BEN2A04 Zeitgeist: Readings on Contemporary Culture

Course No. 4.1
Course Code: GEC4EG10- BEN2A04
Course Name: Zeitgeist: Readings on Contemporary Culture
Credits: 4
Hours: 60

GEC4IT11- SDC4IT13 Internet of Things (IoT)

Course No. 4.2
Course Code: GEC4IT11- SDC4IT13
Course Name: Internet of things (IoT)
Credits: 4
Hours: 60

GEC4IT12(P) Office Automation Tools Lab

Course No. 4.3
Course Code: GEC4IT12(P)
Course Name: Office automation tools lab
Credits: 4

Objectives of the Course

To acquire knowledge on word editor, spread sheet and presentation softwares.

Course Outcome

At the end of the course students will be able to

1. Use file mangers, word processors, spreadsheets and presentation softwares.
2. Describe the features and functions of the categories of application software.
3. Present effectively using software tools.
4. Understand the dynamics of an office environment.
5. Demonstrate the ability to apply application software in an office environment.

List of Experiments

1. Write a paragraph about yourself and Change the font size and type, Spell check, Aligning and justification of Text.
2. Write two or three pages about your college - Use Numbering Bullets, page numbering, Footer and Headers.
3. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows).
4. Mail Merge:
5. Prepare your personal resume.
6. Sorting: Sort a set of data in Ascending and Descending (both numbers and alphabets).
7. Prepare a Mark list for a B. Voc student.
8. Prepare a Bill for electricity consumption.
9. Prepare a sales Invoice Report.
10. Drawing Graphs and charts.
11. Create a slide show presentation about hybrid vehicles.
12. Prepare a presentation with various slide transitions.
13. Prepare an Organization Charts of your college.
14. Prepare a presentation and include audio, videos.
15. Prepare a presentation and include animations.
16. Prepare a presentation and include links to external websites.
17. Selecting car sales data to compare sales for men and women, using various different chart types.
18. Calculate road tax using an IF function.
19. Using lookup formulae to calculate staff bonuses.
20. Complete a vehicle shopping workbook to compare the purchase of several vehicle of sales showroom.

SDC4AE13 Electronic Engine Management Systems

Course No. 4.4
Course Code: SDC4AE13

Course Name: Electronic Engine Management Systems

Credits: 4

Hours: 60

Objectives of the Course

1. Gain knowledge about the construction and working of electronic components in an engine management system.

2. Gain knowledge about how the combustion and pollution can be varied by sensors.

Course Outcome

At the end of the course students will be able to

1. Describe the fuel injection systems in a SI engine, diesel engine and the emission control systems.

2. Explain the different types of sensors used in an automobile engine management system.

3. Describe the ignition and injection methods used in an SI engine.

4. Explain the electronic systems used in the fuel control system and the dash board unit.

Course Outline

Unit I - ELECTRONIC FUEL INJECTION AND IGNITION SYSTEMS (15 hours)
Introduction, Feed back carburetor systems (FBC), Throttle body injection and multi point fuel injection, Fuel injection systems, injection system controls.

Unit II - GASOLINE INJECTION SYSTEM (15 hours)
Open loop and closed loop systems, Mono point, Multi point, Direct injection systems and Air assisted systems – Principles and Features, examples of Bosch injection systems. Idle speed, lambda, knock and spark timing control. Three way catalytic converters, Lean NOx converters.

Unit III - DIESEL INJECTION SYSTEM (15 hours)
Heat release in the diesel engine and need for control of fuel injection. Inline injection pump - Rotary Pump and injector– Construction and principle of operation, Electronic control of these pumps. Common rail and unit injector system – Construction and principle of operation.

Unit IV - IGNITION SYSTEMS (15 hours)
Ignition fundamentals, Advantages of electronic ignition system. Types of solid-state ignition systems and their principle of operation, Contact less electronic ignition system , high energy ignition distributors, Electronic spark timing and control. Combined ignition and fuel management systems. Dwell angle calculation, Ignition timing calculation.

Text Books:

1. Robert N. Brady, “Automotive Computers and Digital Instrumentation”, Prentice Hall, 1988.
2. Bosch Technical Instruction Booklets.
3. Tom Denton, “Automotive Electrical and Electronic Systems”, Edward Amold, 1995.

References:

1. Duffy Smith, “Auto Fuel Systems”, The Good Heart Willcox Company Inc., Publishers, 1987

SDC4AE14 Digital Fundamentals and Microprocessors

Course No. 4.5
Course Code: SDC4AE14

Course Name: Digital Fundamentals and Microprocessors

Credits: 5

Hours: 75

Objectives of the Course

To gain knowledge in microprocessor architecture, programming and its various applications.

Course Outcome

At the end of the course students will be able

1. To Realize logic expressions using gates.
2. To Learn importance of Microprocessors in designing real time applications.
3. To Learn need of Microprocessors in computer system.
4. To Gain describe the architecture of INTEL 8085, instruction sets, programming and interrupt structures.
5. To Gain describe the architecture & different instructions of 8255, 8257, 8279 and 8275 microprocessor.
6. To develop microprocessor based systems along with I/O interfacing.

Course Outline

Unit I (15 Hours)

Logic Gates - AND, OR, NOT, Exclusive OR and Exclusive NOR, Universal gates - NAND, NOR. Boolean postulates and laws De-Morgan's Theorem- Principle of Duality- Boolean expression Boolean function- Minimization of Boolean expressions Sum of Products (SOP) Product of Sums (POS)-Minterm- Maxterm- Canonical forms Conversion between canonical forms Karnaugh map Minimization Don't care conditions. Combinational Circuits: Design procedure Adders-Subtractors

Unit II (15 Hours)

Evolution of Processors – single chip microcomputer – Intel 8085 Microprocessor – signals architecture of 8085 – ALU – register organization – timing and control unit – microprocessor operations – instruction cycle – fetch, decode and execute operation – T-state, machine cycle and instruction cycle – timing diagram of opcode fetch, memory read, I/O read, memory write and I/O write cycles – wait state.

Unit III (15 Hours)

Instruction set of 8085: Classification of instructions – different addressing modes – writing assembly language programs – typical examples like 8 bit and 16 bit arithmetic operations, finding the sum of a data array, finding the largest and

smallest number in a data array, arranging a data array in ascending and descending order, finding square from look-up table.

Unit IV(15 Hours)

Stack and Subroutines: Stack pointer – stack operations – call-return sequence – examples - Counters and time delays Interrupts of 8085: Software and hardware interrupts-restart instructions – interrupt structure of 8085 – interrupt procedure-vectored and non-vectored interrupts – SIM and RIM instructions.

Unit V (15 Hours)

Interfacing: Memory interfacing-ROM and RAM – interfacing I/O devices – address space partitioning – memory mapped I/O and I/O mapped I/O schemes – interfacing I/Os using decoders –programmable peripheral devices –8255 block diagram, programming simple input and output ports- DMA controller 8257-– interfacing of 8279 keyboard /display controller- 8275 CRT controller.

Text Books:

1. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with8085, Penram Intl.

2. A.K. Ray and K.M. Burchand , Advanced Microprocessors and Peripherals, TMH

References:

1. B.Ram, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai and Sons

2. A.Nagoor Kani , Microprocessor(8085) and its Applications, RBA Publications

3. Douglas V. Hall, Microprocessors and Digital Systems, McGraw Hill

4. A.P Mathur, Introduction to Microprocessors, TMH

5. Douglas V. Hall , Microprocessors and Interfacing: Programming and Hardware, TMH

6. A. Nagoor Kani , Microprocessor 8086 Programming and Interfacing, RBA Publication

SDC4AE15(P) Industrial Workshop

Course No. 4.6
Course Code: SDC4AE15(P)

Course Name: Industrial Workshop

Credits: 5

Objectives of the Course

1. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.

2. Introduction to manufacturing processes and application. Familiarization of various tools, measuring devices, practices and machines used in various workshop.

Course Outcome

At the end of the course students will be able to

1. Develop a right attitude, team working, precision and safety at work place.
2. Develop a right attitude, team working, precision and safety at work place.

3. Have practical exposure to various welding and joining processes.
4. Practice on manufacturing of components using workshop trades including wiring and welding.
5. Apply basic electrical engineering knowledge for house wiring practice.
6. Practice Soldering and De-soldering of various types of IC Packages.
7. Prepare wires for soldering select the correct grades of solder.

Instructional Objective

Introduction to workshop practice, Safety precautions, Shop floor ethics, Basic First Aid knowledge. Study of mechanical tools, components and their applications:
(a) Tools: screw drivers, spanners, Allen keys, cutting pliers etc and accessories
(b) bearings, seals, O-rings, circlips, keys etc.
To familiarize with the basics of tools and equipments used in Motors, batteries, charging systems, ignition system, lighting system, electronic controls etc.
Understanding of welding equipments, Making Joints using electric arc welding. Bead formation in horizontal, vertical and overhead positions.
Practice soldering of different electronic active and passive components and IC bases on lug boards and PCBs.

SDC4AE16(Pr) Project

Course No. 4.7
Course Code: SDC4AE16(Pr)

Course Name: Project

Credits: 4

Objectives of the Course

To carry out a design project in one of the specializations of the program with substantial multidisciplinary component.

Course Outcome

At the end of the course students will be able.

1. To foster innovation in design of products, processes or systems.
2. To develop design that add value to products and solve technical problems
3. Provide a solution for a real life situation.
4. To carry out budget and time planning for the project.
5. To develop effective communication skill by delivering a Presentaion based on mini project.
6. To Extend or use the idea in mini project for major project.

Instructional Objective

To guide the students in such a way so that they carry out a work on a topic as a forerunner to the full-fledged industrial training & project to be taken subsequently in VI semester. The project work shall consist of substantial multidisciplinary component the students will carry out a project one of the specializations of program under study with substantial multidisciplinary component. Student groups will be formed and a faculty member will be allocated to guide them. Assessment will be based on internal reviews.

The main aim of project is to implement the theoretical knowledge gained from various areas to develop effective solutions to various real life problems in auto electrical & electronics. The course Project is one that involves practical work for understanding and solving problems in the field of auto electrical & electronics. Students will select individually Commercial/Technical/Research Project based on Application. The project work will be presented by students using Power Point Presentation Tool to the panel of Examiners, along with a live demonstration of the project.

Semester 5

GEC5HR13- BCM3C03 Human Resource Management

Course No. 5.1
Course Code: GEC5HR13- BCM3C03

Course Name: Human Resource Management

Credits: 4

Hours: 60

GEC5LS14- BPS5D02 Life Skill Application

Course No. 5.2
Course Code: GEC5LS14- BPS5D02

Course Name: Life Skill Application

Credits: 4

Hours: 60

GEC5BS15- BCM3A12 Professional Business Skills

Course No. 5.3
Course Code: GEC5BS15- BCM3A12

Course Name: Professional Business Skills

Credits: 4

Hours: 60

SDC5AE17 Automotive Electrical System and Hybrid Vehicles

Course No. 5.4
Course Code: SDC5AE17

Course Name: Electrical System And Hybrid Vehicles

Credits: 5

Hours: 75

Objectives of the Course

1. The course aims to impart basic skills and understanding of automotive electrical systems, equipments and their working details.
2. To present a comprehensive overview of Electric and Hybrid Electric Vehicles.

Course Outcome

The students will be able to

1. Understand the basic auto electrical systems.
2. Understand the layout of wiring and connections of electrical systems in automobiles.
3. Understand the working of different electrical components and Auxiliaries used in automobiles.
4. Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources.
5. Design and develop basic schemes of electric vehicles and hybrid electric vehicles.
6. Choose proper energy storage systems for vehicle applications.
7. Identify various communication protocols and technologies used in vehicle networks.

Course Outline

UNIT I (15 Hours)

CIRCUIT DIAGRAMS AND ELECTROMAGNETIC COMPATIBILTY (EMC), CENTRAL ELECTRICAL CONTROLE, CONNECTED CARS

Symbols, Conventional Circuits diagrams, layout or wiring diagrams, Terminal diagram, Current flow diagram, EMC, problems, GEM (generic electronic module),communication between modules, Smart Cars and Traffic system, Wi-Fi cars ,blue Tooth ,Applications, Vision Enhancement.

UNIT II (15 Hours)

LIGHTING

Bulbs, External lights, Head light reflectors, Complex shape reflectors, Head light lenses,Head light leveling, Beam setting. Different light circuits (Dim- Dip, General lighting, Flow diagram, central lighting control, Gas discharge lamp, U V headlights, IR lighting, Xenonlighting, LED & IR lighting, Mono colour signal lamps, Neon technology, Bending light, Intelligent front lighting, Advanced lighting technology.

UNIT III (15 Hours)

AUXILIARIES

Wind screen washers & wipers. Signaling circuits (Flasher, Indicator, Brake & Hazard circuits). Electric horns, Engine cooling fan motors, Headlight wipers & washers. Diagnosing auxiliary system fault. Wiper motor torque calculations, P M motor – electronic speed control.

UNIT IV (15 Hours)

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

UNIT V (15 Hours)

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Text Books:

1. Automobile electrical & electronic systems by Tom Denton (Fourth Edition).
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

References:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

SDC5AE18 Automobile HVAC

Course No. 5.5
Course Code: SDC5AE18

Course Name: Automobile HVAC

Credits: 4

Hours: 60

Objectives of the Course

At the end of the course, the students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

Course Outcome

The students will be able to

1. Understand working of Automotive Air conditioning & Refrigeration system and its components.
2. Working of Automotive heater system and its components.
2. Understand various types of refrigerants and their properties.
3. Distinguish manually controller and automatic controlled air conditioner.
4. Understand the maintenance and service procedure of Air conditioner.

Course Outline

UNIT I: Introduction to Air conditioning & Refrigeration (15 Hours)

Methods of refrigeration. Vapour compression refrigeration system, vapour absorption refrigeration system, applications of refrigeration & air conditioning, Automobile air conditioning, air conditioning for passengers, isolated vehicles, Refrigerated transport vehicles, applications related with very low temperatures.
Refrigerants: Classification, properties, selection criteria, commonly used refrigerants, alternative refrigerants, eco-friendly refrigerants, applications of refrigerants, refrigerants used in automobile air conditioning.

UNIT II: AUTOMOTIVE AIRCONDITIONING FUNDAMENTALS (15 Hours)

Purposes of Heating, Ventilation and Air Conditioning- Environmental Concerns- Ozone layer depletion- Location of air conditioning components in a car – Schematic layout of a vehicle refrigeration system. Psychrometry – Basic terminology and Psychrometric mixtures- Psychrometric Chart- Related problems.

UNIT III: AUTOMOTIVE COOLING AND HEATING SYSTEM (15 Hours)

Vehicle Refrigeration System and related problems- Fixed thermostatic and Orifice tube system- Variable displacement thermostatic and Orifice tube system- Vehicle air conditioning operation Types of compressor- Compressor Clutches- Compressor

Clutch electrical circuit- Compressor lubrication- Condensers- Evaporators- Expansion devices- Evaporator temperature and pressure controls- receiver-drier- Accumulators- refrigerant hoses, Connections and other assemblies- Heating system.

UNIT IV: AIR-CONDITIOING CONTROLS, DELIVERY SYSTEM AND REFRIGERANTS (15 Hours)

Types of Control devices- Preventing Compressor damage- Preventing damage to other systems- Maintaining driveability- Preventing Overheating Ram air ventilation- Air delivery Components- Control devices- Vacuum Controls Containers – Handling refrigerants – Discharging, Charging & Leak detection – Refrigeration system diagnosis – Diagnostic procedure – Ambient conditions affecting system pressures.

Text Books:

1. Boyce Dwiggins, “Automotive Air Conditioning”, Delmar Cengage Learning, 2001.
2. Steven Daly, “Automotive Air Conditioning and Climate Control Systems”, Butterworth Heinemann, 2006.

References:

1. John Haynes, “Automotive Heating and Air Conditioning Systems Manual”, Haynes Publications, 2000.
2. ASHRAE Handbooks.

SDC5AE19 Vehicle Body Engineering

Course No. 5.6
Course Code: SDC5AE19

Course Name: Vehicle Body Engineering

Credits: 4

Hours: 60

Objectives of the Course

At the end of the course, the students will be able to Categorize types of body styles and explain the construction of different types of vehicle body and understand the basics of safety and ergonomics.

Course Outcome

The students will be able to

1. Illustrate the different types and components of car body.
2. Explain the concept, importance and testing of aerodynamics in car body design.
3. Illustrate the different types and components of bus and commercial body.
4. Explain different vehicle body materials with their merits and demerits.
5. Explain different vehicle body materials with their merits and demerits.
6. Describe the concept and importance of Air conditioning in Automobiles.

Course Outline

Unit I (10 Hours)

CAR BODY DETAILS: Types: compact, hatch-back, saloon, convertibles, limousine, estate car, racing and sports car. Car body construction; design criteria, prototype making, Body In white, creating the inner panels, underfloor panels, detailing of class A surfaces (Flanges, seatings, hemming) from manufacturing point of view.

Unit II (15 Hours)

BUS BODY DETAILS: Types: mini bus, single decker, double-decker, two level and articulated bus. Bus body layout; floor height, engine location, entrance and exit location, seating dimensions. Constructional details: frame construction, double skin construction, types of metal sections used, Conventional and integral type construction, Bus Body Code and Regulations

Unit III (10 Hours)

COMMERCIAL VEHICLE DETAILS: Types of body; flat platform, drop side, fixed side, tipper body, tanker body, Light commercial vehicle body types. Dimensions of driver's seat relation to controls. Driver's cab design

Unit IV(12 Hours)

Statistics of accidents - Accident investigation and analysis. Active and passive safety. Characteristics of vehicle structures, Optimization of vehicle structures for crash worthiness. Types of crash / roll over, Regulatory requirements for crash testing - Instrumentation, high speed photography, Image Analysis – Crash analysis using appropriate software.

Unit V (13 Hours)

Pedestrian Safety and Ergonomics - Anthropometry - Locations of controls. Human impact tolerance- Determination of Injury thresholds, Severity Index, Study of comparative tolerance. Study of crash dummies using appropriate software. Vehicle Safety systems - Survival space requirements, Restraint systems used in automobiles -safety belts, Head restraints, Air bags - Use of energy absorbing systems - Impact protection from steering controls.

Text Books:

1. Automobile electrical & electronic systems by Tom Denton (Fourth Edition)
2. Johnson W and Mamalis A.G., "Crashworthiness of Vehicles", Mechanical Engineering Publications, 2002.

References:

1. Olson L. P., "Forensic Aspects of Driver Perception and Response", Lawyers and Judges, 1996.

SDC5AE20(P) Microprocessor and IoT Lab

Course No. 5.7
Course Code: SDC5AE20(P)

Course Name: Microprocessor lab

Credits: 5

Objectives of the Course

1. To practice assembly language programming
2. To practice fundamentals of interfacing/programming various peripheral devices with microprocessor/microcontroller.
3. The outcomes of this course include a practical understanding of how Arduino Uno and thorough clarity on the Internet of Things.

Course Outcome

1. The students will be able to Develop assembly language programs for problem solving using software interrupts and various assembler directives.
1. Interface different I/Os with Microprocessors.
2. Implement interfacing of various I/O devices to the microprocessor/microcontroller through assembly language programming.
3. Design projects based of Arduino.
4. Identify and use different types of sensors which are compatible with Arduino.

List of Experiments

PART- I
Microprocessor

1. I) Introduction to Microprocessor Trainer Kit.
   II) Addition of two 8-bit numbers.
2. Addition of ten 8-bit numbers stored in memory.
3. Find no. of negative elements in a block of data.
4. Observing T-States on CRO.
5. Sorting of numbers (Ascending/Descending).
6. Code Conversion: Binary to BCD.
7. Working of RST 7.5 interrupt.
8. To Transfer data serially between two kits. It will cover Study of 8253/8251/USART

9. Study of 8279 Programmable Keyboard/Display Controller.
10. Study of ADC/DAC.
i) Reading analog voltage through ADC 0809.
ii) Generating different waveforms on DAC800 output.
11. Design a kit that can be used as software digital clock.
12. Design a kit that can be used as voltmeter to measure voltmeter to measure 0 to 5 volt.

PART- II
IoT Experiments Using Arduino Uno

1. Blinking LED
2. Temperature Monitoring
3. Water Level Indicator
4. Motion Detection
5. Reverse parking sensor
6. Wireless Remote Control Switch System
7. Implementation of RFID

Semester 6

SDC6AE21(Pr) Internship and Project

Course No: 6.1
Course Code: SDCAE21 (Pr)
Course Name: Internship and Project
Credits: 30

Objectives of the Course

1. Utilize the theoretical knowledge and practical experiences to solve a real life problem with high standard and accuracy.
2. Get a feel of organizational atmosphere and their practices.
3. Induce confidence to manage large engineering projects and make him work ready.

Course Outcome

The students will be able to

1. Gain practical experience within the business environment.
2. Acquire knowledge of the industry in which the internship is done.
3. Apply knowledge and skills learned in the classroom in a work setting.
4. Develop a greater understanding about career options while more clearly defining personal career goals.
5. Develop and refine oral and written communication skills.
6. Identify areas for future knowledge and skill development.

7. Think innovatively on the development of components, products, processes or technologies in the engineering field.
8. Apply knowledge gained in solving real life engineering problems.

Instructional Objective

This course is mandatory and the student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made.

The student shall undergo Industrial training and a project of six month duration. Industrial training should be carried out in an industry / company approved by the institution and under the guidance of a staff member in the concerned field.

The project is designed to develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the automobile industry. The project should strictly stick to the auto electrical and electronics engineering principle. Students can take up any application level/system level project pertaining to a relevant domain. Projects can be chosen either from the list provided by the faculty or in the field of interest of the student. For external projects, students should obtain prior permission after submitting the details of the external guide, institution and synopsis of the work. The project guide should have a minimum qualification of ME/M.Tech/M.Sc in concerned fields.

At the end of each phase, presentation and demonstration of the project should be conducted, which will be evaluated by a panel of examiners. A detailed project report duly approved by the guide in the prescribed format should be submitted for end semester assessment. Marks will be awarded based on the report and their performance during presentations and demonstrations. Publishing the work in Conference Proceedings/ Journals with National/ International status with the consent of the guide will carry an additional weightage in the review process.