



UNIVERSITY OF CALICUT

Abstract

BVoc programme in Automobile Auto Electricals & Electronics- under Modified BVoc Regulations 2014 – Scheme and Syllabus - implemented w.e.f 2014 admission onwards - Orders issued

G & A - IV - J

U.O.No. 4516/2015/Admn

Dated, Calicut University.P.O, 04.05.2015

- Read:-*1) Minutes of the meeting of the Principals of the colleges who got permission to start BVoc programmes and Community College programme held on 19.06.14
- 2) Minutes of the combined meeting for the approval of BVoc Syllabus
- 3) BVoc Regulations implemented as per U.O.No. 9809/2014/Admn Dtd 23.10.2014
- 4) Minutes of the Faculty of Science 22.12.14
- 5) The minutes of the meeting of Academic Council held on 15.01.2015
- 6) Modified BVoc Regulaitons U.O.No. 2650/2015/Admn Dtd :17.03.2015
- 7) Corrected syllabus forwarded by the Chairman, BOS in Electronics.
- 8) Orders of Vice Chancellor in the File No: 141170/GA - IV -J1/2014/Admn on 16.02.15

ORDER

As per the paper read as (1) above the Draft Regulations for BVoc Programmes have been prepared. As per paper read as (2) the syllabus of BVoc in Software Development has been approved. As per paper read as (3) The BVoc Regulations have been implemented.

As per the paper read as (4) the Minutes of the Combined Meeting for the approval of BVoc Syllabi have been approved by the Faculty of Science. As per paper read as (5) the Academic council has approved the decisions of Faculty of Science. As per paper read as (6) the Bvoc Regulations have been finalised and implemented. Minor corrections have been made in the approved syllabus in tune with the modified regulations and as per paper read as (7) the Chairman, BOS in Electronics has forwarded the corrected Syllabus.

As per paper read as (8) the Vice Chancellor has approved to implement the decision of the Academic Council. Sanction has, therefore, been accorded for the implementation of the Scheme and Syllabus of BVoc programme in Automobile Auto Electricals and Electronics under BVoc Regulations 2014, in the University, w.e.f 2014 Admissions.

Orders are issued accordingly.

(The syllabus is available in the website: universityofcalicut.info)

Usha K
Deputy Registrar

To

Forwarded / By Order

Section Officer

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

Sem No	Course No	Code	Paper	Credits	Session
1	1.1	GEC1EG01	A01 The Four Skills for Communication	4	Theory
	1.2	GEC1ML02 GEC1AR02	MAL1A01 (2) Malayalam- Bhashayum Sahithyavum-I ARB1A07(1) Arabic- Communication Skills in Arabic(Muvasalath wa Murasarath; Dr. Mohammed Haneefa P)	4	“
	1.3	GEC1MT03	MM1C01 -Mathematics	4	“
	1.4	SDC1AE01	Electronics (Analog)	4	“
	1.5	SDC1AE02	Basic electrical engineering	5	“
	1.6	SDC1AE03(P)	Electronics	4	Lab
	1.7	SDC1AE04(P)	Electrical Engineering Practice	5	“
2	2.1	GEC2EG04	A02 Modern Prose & Drama	4	Theory
	2.2	GEC2ML05 GEC2AR05	MAL2A02 (2)Malayalam- Bhashayum Sahithyavum-II ARB2A08(1)-Literature in Arabic	4	“
	2.3	GECMT06	MM1C02 Mathematics	4	“
	2.4	SDC2AE05	PH3C03 Optics,Laser,Electronics&Communication	4	“
	2.5	SDC2AE06	Automotive Electrical and Electronic systems	5	“
	2.6	SDC2AE07(P)	Automotive Electrical Laboratory I	5	Lab
	2.7	SDC2AE08(Pr)	Mini Project	4	“
3	3.1	GEC3EG07	A03 Inspiring Expressions	4	Theory
	3.2	GEC3MT08	MM1C03 Mathematics	4	“
	3.3	GEC3ES09	Environmental Science EWM1B01 (Order No. GAI/J2/4884/08)	4	“
	3.4	SDC3AE09	Instrumentation for Automobile Engineers	4	“
	3.5	SDC3AE10	Circuit theory & Power systems	5	“
	3.6	SDC3AE11(P)	Automotive Electronics Laboratory	4	Lab
	3.7	SDC3AE12(P)	Automotive Electrical Laboratory- II	5	“
4	4.1	GEC4EG10	A04 Readings on Society	4	Theory
	4.2	GEC4MT11	MM1C04 Mathematics	4	“
	4.3	GEC4ED12	CA4A14 -Entrepreneurship Development	4	“
	4.4	SDC4AE13	Electronic Engine Management Systems	4	“
	4.5	SDC4AE14	Microprocessors and Applications	5	“
	4.6	SDC4AE15(P)	Industrial Workshop	4	Lab
	4.7	SDC4AE16(Pr)	Project	5	“
5	5.1	GEC5HR13	BC5B09Human Resource Management	4	Theory
	5.2	GEC5PP14	CPY5D01 Psychology and Personal Growth	4	“
	5.3	GEC5LS15	SO4 B.06 -Life Skill Development	4	“
	5.4	SDC5DF17	Digital Fundamentals	4	“
	5.5	SDC5AE18	Refrigeration and Air Conditioning	5	“
	5.6	SDC5AE19	Electrical System and Circuits	4	“
	2	5.7	SDC5AE20(P)	Microprocessor lab	5

6	6.1	SDC6AE21(Pr)	Internship and Project	30 (900 hrs)	Internship
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Course Outline

Semester 1

GEC1EG01 (A01) The Four Skills for Communication

Course No: 1.1

Course Code: GEC1EG01 - A01

Course Name: The Four Skills for Communication

Credits: 4

Hours: 60

GEC1ML/AR02 (Malayalam/Arabic)

GEC1ML02 Malayalam – MAL1A01 (2)Bhashayum Sahithyavum-I

Course No: 1.2

Course Code: GEC1ML03- MAL1A07(3)

Course Name: Malayalam – Bhashayum Sahithyavum-I

Credits: 4

Hours: 60

GEC1AR03 Arabic- ARB1A07(1) Arabic- Communication Skills in Arabic(Muvasalath wa Murasarath; Dr. Mohammed Haneefa P)

Course No: 1.2

Course Code: GEC1AR03- ARB1A07(1)

Course Name: Arabic- - Communication Skills in Arabic

Credits: 4

Hours: 60

GEC1MT03 – MM1C01 -Mathematics

Course No: 1.3

Course Code: GEC1MT02 - MM1C01

Course Name: Mathematics

Credits: 4

Hours: 60

SDCAE01 – ELECTRONICS

Course No: 1.4

Course Code: SDC1AE01

Course Name: ELECTRONICS (ANALOG)

Credits: 4

Hours: 60

COURSE OUTLINE

Unit I (8 Hours)

Preliminaries of rectification, Bridge rectifier, Efficiency, Nature of rectified output, Ripple factor, different types of filter circuits, voltage multipliers, Zener diode voltage stabilization

Unit II (15 Hours)

Different transistor amplifier configurations:- C-B, C-E, C-C, their characteristics, amplification factors, their relationships, Load line Analysis, Expressions for voltage gain, current gain and power gain of C.E amplifier, cut-off and saturation points, Transistor biasing, Different types of biasing - Base resistor, collector feedback resistor-voltage divider bias method, single stage transistor amplifier circuit, load line analysis, DC and AC equivalent circuits. R.C coupled amplifier- frequency response, and gain in decibels,

Unit III (13 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.

Unit IV (10Hours)

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

Unit V (14 Hours)

Basic ideas of UJT, FET, MOSFET, OP-amp-basic operations, Application, inverting, Non-inverting, summing amplifiers, Differentiator- integrator

TEXT BOOKS

1. Principles of electronics by VK Mehta - 2008 edition (S. Chand)
2. Digital Computer Fundamentals-Thomas c Bartee-McGraw Hill
3. Digital principles and applications by Leach and Malvino (Tata McGraw Hill)

REFERENCES

1. Introduction to Micro computers by Aditya P Mathur (Tata McGraw Hill)
2. Electronics principles by Malvino
3. Physics of Semiconductor Devices- Second Edition – Dilip K Roy – Universities Press
4. Digital computer electronics- Malvino, Brown TMH
5. Foundations of Electronics-D Chattopadhyay,P.C.Rakshit,B Saha,N.N.Purkait(New Age International Publishers)
6. Age International Publishers)

SDC1AE02 – BASIC ELECTRICAL ENGINEERING

Course No: 1.5

Course Code: SDC1AE02

Course Name: Basic electrical engineering

Credits: 5

Hours: 75

COURSE OUTLINE

Unit I – FUNDAMENTALS OF DC CIRCUITS (18 hours)

Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources – equivalent resistor, current division, voltage division.

Unit II – MAGNETIC CIRCUITS (18 hours)

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 III – AC CIRCUITS (18 hours)

Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator. Analysis of R-L, R-C, R-L-C circuits. Introduction to three phase systems - types of connections, relationship between line and phase values.

Unit IV – ELECTRICAL MACHINES & MEASURING INSTRUMENTS (21 hours)

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.

TEXT BOOK

1. Dash S.S, Subramani C, Vijayakumar K, “*Basic Electrical Engineering*”, First edition, Vijay Nicole Imprints Pvt.Ltd, 2013.

REFERENCES

1. Smarajt Ghosh, “*Fundamentals of Electrical & Electronics Engineering*”, Second edition, PHI Learning, 2007.
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.

SDC1AE03 (P) – ELECTRONICS (Lab)

Course No: 1.6

Course Code: SDC1AE03 (P)

Course Name: Electronics (Lab)

Credits: 4

Hours: 75

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)
12. Half adder using NAND gates and decade counter (7490 IC)

SDC1AE04 (P) – ELECTRICAL ENGINEERING PRACTICE

Course No: 1.7

Course Code: SDC1AE04 (P)

Course Name: Electrical Engineering Practice

Credits: 5

Hours: 75

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. Jeyapooan T, Saravanapandian M & Pranitha S, “*Engineering practices Laboratory manual*”, Vikas Publishing House Pvt., Ltd., 2006.

Semester 2

GEC2EG04 - A02 Modern Prose & Drama

Course No: 2.1

Course Code: GEC2EG04 - A02

Course Name: Modern Prose & Drama

Credits: 4

Hours: 60

GEC2ML/AR05 (Malayalam/Arabic)

GEC2ML05 (Malayalam)- MAL2A02 (2) – Bhashayum Sahithyavum-II

Course No: 2.2

Course Code: GEC2ML05

Course Name: Bhashayum Sahithyavum-II

Credits: 4

Hours: 60

GEC2AR05 (ARABIC)-ARB2A08(1)- Literature in Arabic

Course No: 2.2

Course Code: GEC2AR05

Course Name: Literature in Arabic

Credits: 4

Hours: 60

GEC2MT05 - MM1C02 Mathematics

Course No: 2.3
Course Code: GEC2MT06 –MM1C02
Course Name: Mathematics
Credits: 4
Hours: 60

SDC2AE05 - PH3C03 Physics-Optics, Laser, Electronics & Communication

Course No: 2.4
Course Code: SDC2AE05
Course Name: Physics -Optics, Laser, Electronics & Communication
Credits: 4
Hours: 60

SDC2AE06 - AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS(5C)

Course No: 2.5
Course Code: SDC2AE06
Course Name: Automotive Electrical and Electronic systems
Credits: 5
Hours: 75

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, behavior 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.
5. Norm Chapman, “*Principles of Electricity and electronics for the Automotive Technician*”, Delmar Cengage Learning, 2008.
6. Judge A.W, “*Modern Electrical Equipment of Automobiles*”, Chapman & Hall, London, 1992.

SDC2AE07 (P) - AUTOMOTIVE ELECTRICAL LABORATORY - I

Course No: 2.6

Course Code: SDC2AE04 (P)

Course Name: Automotive Electrical Laboratory I

Credits: 5

Hours: 75

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. Diagnosis of ignition system faults
5. 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: SDC4AE08 (Pr)

Course Name: Mini Project

Credits: 5

Hours: 75

COURSE OUTLINE

Mini Project

PURPOSE

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

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 - A03 Inspiring Expressions

Course No: 3.1
Course Code: GEC3EG07- A03
Course Name: Inspiring Expressions
Credits: 4
Hours: 60

GEC3MT08 - MM1C03 Mathematics

Course No: 3.2
Course Code: GEC3MT08 - MM1C03
Course Name: Mathematics
Credits: 4
Hours: 60

GEC3ES09- EWM1B01-ENVIRONMENTAL SCIENCE

Course No: 3.3
Course Code: GEC3ES09
Course Name: Environmental Science
Credits: 4
Hours: 60

SDC3AE09 - INSTRUMENTATION FOR AUTOMOBILE ENGINEERS

Course No: 3.4
Course Code: SDC3AE09
Course Name: Instrumentation for Automobile Engineers
Credits: 4
Hours: 60

COURSE OUTLINE

Unit I - TRANSISTOR & ITS BIASING (15 hours)

Transistor Symbols – Transistor as an Amplifier– Connections– CB, CE,&CC– Characteristics– Comparison of Transistor Connection. Transistor biasing: Methods of transistor Biasing– Base resistor method– Biasing with feedback resistor– Voltage divider bias method.

Unit II - JFET, MOSFET, SCR & UJT (10 hours)

JFET – JFET as an Amplifier and its Output Characteristics –JFET Applications– MOSFET Working Principles, SCR – Equivalent Circuit and V-I Characteristics. SCR as a Half wave and full wave rectifier– Application of SCR, UJT– Equivalent Circuit of a UJT and its Characteristics.

Unit III - MEASUREMENT SYSTEM (10 hours)

Methods of Measurements, Classification of Instruments and application, Static and Dynamic Characteristics of an Instruments, Errors in Measurement Systems– Units, System, Dimension and standards.

Unit IV - PRIMARY SENSING ELEMENTS AND SIGNAL CONDITIONING (15 hours)

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 - AUTOMOTIVE SENSORS AND ACTUATORS (10 hours)

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. Sawhney A. K, “A Course in Electrical and Electronic Measurement and Instrumentation”, Dhanpat Rai & Sons, New Delhi, 2001.
2. Millman and Halkias, “Electronic devices and Circuits”, Tata McGraw Hill International Edition, 1994.
3. Mithal G. K, “Electronic Devices and Circuits”, Khanna Publishers, New Delhi, 2008.

REFERENCES

1. “BOSCH Automotive Handbook”, 8th Edition, Bentley publishers, 2011.
2. Sze S. M, “Semiconductor Devices – Physics and Technology”, 2nd Edition, John Wiley & Sons, New York, 2002.
3. Ben G. “Streetman and Sanjay Banerjee, Solid State Electronic Devices”, 6th Edition, PHI Learning, 2009.

SDC3AE10 - CIRCUIT THEORY & POWER SYSTEMS

Course No: 3.5

Course Code: SDC3AE10

Course Name: Circuit theory & Power systems

Credits: 5

Hours: 75

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- ϕ balanced and unbalanced-N/W analysis, Resonance - Series and Parallel resonance - Selectivity - B.W- Q factors.

Unit II- CIRCUIT THEORY – II (16 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, Fourier Transforms and Fourier Series - Review of Fourier series and evaluation of Fourier coefficients, Amplitude and phase spectrums, Passive Filters and Attenuators - Classification and General relations in filters.

Unit III - POWER SYSTEMS - I (16 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 (16 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 (11 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.
5. Nassir H.Sabah: Electric Circuits and Signals, 4th Edition, CRC Press, 2008
6. C.L. Wadhwa, Electrical Power Systems, 33rd Edition, New Age International, 2004.
7. D.P. Kothari and I.J. Nagrath, Modern Power System Analysis, Fourth Edition, Tata McGraw Hill Pub.Co., New Delhi, 2011.
8. Hadi Sadat: Power System Analysis, Tata McGraw Hill Pub. Co. 2002

SDC3AE11 (P) - AUTOMOTIVE ELECTRONICS LABORATORY

Course No: 3.6

Course Code: SDC3AE11 (P)

Course Name: Automotive Electronics Laboratory

Credits: 4

Hours: 60

LIST OF EXPERIMENTS

1. Schematic capture
Introduction to ORCAD 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. Throttle Position Sensor
6. Lambda Sensor
7. Interfacing of analog sensors with micro-controller
8. Interfacing of frequency input from speed sensor to microcontroller
9. Study of Engine Management System
10. Study of Antilock Braking System

TEXT BOOKS

1. Orcad User manual.
2. Raghbir Singh Khandpur, “*Printed Circuit Boards: Design, Fabrication, and Assembly*”, Tata McGraw-Hill Education, 2005.

SDC3AE12 (P) - AUTOMOTIVE ELECTRICAL LABORATORY- II

Course No: 3.7

Course Code: SDC3AE12 (P)

Course Name: Automotive Electrical Laboratory- II

Credits: 5

Hours: 75

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 - A04 Readings on Society

Course No: 4.1
Course Code: GEC4EG10 –A04
Course Name: Readings on Society
Credits: 4
Hours: 60

GEC4MT11: MM1C04 Mathematics

Course No: 4.2
Course Code: GEC4MT11 –MM1C04
Course Name: Mathematic IV
Credits: 4
Hours: 60

GEC4ED12: ENTREPRENEURSHIP DEVELOPMENT

Course No: 4.3
Course Code: GEC4ED12
Course Name: ENTREPRENEURSHIP DEVELOPMENT
Credits: 4
Hours: 60

SDC4AE13 - ELECTRONIC ENGINE MANAGEMENT SYSTEMS

Course No: 4.4

Course Code: SDC4AE13

Course Name: Electronic Engine Management Systems

Credits: 4

Hours: 60

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 Arnold, 1995.

REFERENCES

1. Duffy Smith, “*Auto Fuel Systems*”, The Good Heart Willcox Company Inc., Publishers, 1987.
2. “*Gasoline Engine Management*”, Second Edition, Robert Bosch GmbH, 2004.

3. “*Engine Management*”, Second Edition, Robert Bosch GmbH, 1999.
4. Eric Chowaniety, “*Automobile Electronics*”, SAE Publications 1995.
5. William B. Ribbews, “*Understanding Automotive Electronics*”, Fifth Edition, SAE Publications 1998.

SDC4AE14 - MICROPROCESSORS AND APPLICATIONS

Course No: 4.5

Course Code: SDC4AE14

Course Name: Microprocessors and Applications

Credits: 5

Hours: 75

COURSE OUTLINE

Unit I (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 II (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 III (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 IV (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

Unit V (15 hours)

Intel 8086: Logical Pin diagram –Internal Architecture- pipelining- registers and flags - Operating modes: Minimum mode and Maximum mode. Physical address generation – memory segmentation –even and odd memory banks. Addressing modes- instruction set classification – writing simple programs : arithmetic operations.

TEXT BOOKS:

1. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, Penram Intl.
2. A.K. Ray and K.M. Burchand , Advanced Microprocessors and Peripherals, TMH

REFERENCE BOOKS:

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: 4

Hours: 60

COURSE OUTLINE

Purpose

To provide the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

INSTRUCTIONAL OBJECTIVES

1. To familiarize with the basics of tools and equipments used in fitting, Motors, batteries, charging systems, ignition system, lighting system, electronic controls etc
2. To familiarize with the production of simple models in the above trades.

SDC4AE16 (Pr) - PROJECT

Course No: 4.7

Course Code: SDC4AE16 (Pr)

Course Name: Project

Credits: 5

Hours: 75

COURSE OUTLINE

Project

PURPOSE

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

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 – BC5B09-HUMAN RESOURCE MANAGEMENT

Course No: 5.1

Course Code: GEC5IM13 (BC5B09)

Course Name: Human Resource Management

Credits: 4

Hours: 60

GEC5PP14- CCPY5DO1-PSYCHOLOGY AND PESONAL GROWTH

Course No: 5.2

Course Code: GEC5IP14

Course Name: PSYCHOLOGY AND PESONAL GROWTH

Credits: 4

Hours: 60

GEC5LS15 – SO4B06-LIFE SKILL DEVELOPMENT

Course No: 5.3

Course Code: GEC5LS15

Course Name: Life Skill Development

Credits: 4

Hours: 60

SDC5DF17 - Digitals Fundamentals

Course No: 5.4

Course Code: SDC5DF17

Course Name: Digitals Fundamentals

Credits: 4

Hours: 60

COURSE OUTLINE

Unit 1(12 Hours)

Number Systems - Binary, Octal, Decimal, and Hexadecimal-Number base conversions complements signed Binary numbers. Binary Arithmetic- Binary codes: Weighted BCD-2421-Gray code-Excess 3 code-ASCII Error detecting code conversion from one code to another-Boolean postulates and laws De-Morgans 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.

Unit 2(12 Hours)

Logic Gates - AND, OR, NOT, NAND, NOR, Exclusive OR and Exclusive NOR-Implementations of Logic Functions using gates, NAND, NOR implementations Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics, Tri-state gates. Combinational Circuits: Design procedure Adders-Subtractors Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder-BCD adder-Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder parity checker code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

Unit 3(12 Hours)

Sequential Circuits – Flip-flops SR, JK, T, D and Master slave Characteristic table and equation - Application table Edge triggering – Level Triggering Realization of one flip flop using other flip flops Asynchronous / Ripple counters Synchronous counters Modulo n counter - Classification of sequential circuits Moore and Mealy -Design of Synchronous, counters: state diagram - State table - State minimization - State assignment - ASM-Excitation table and maps - Circuit implementation Register shift registers- Universal shift register Shift counters Ring counters.

Unit 4(12 Hours)

Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits, primitive state / flow table Minimization of primitive state table state assignment Excitation table Excitation map- cycles Races Hazards: Static Dynamic Essential Hazards elimination.

Unit 5(12 Hours)

Memory Devices - Classification of memories-RAM organization – Write operation-Read operation - Memory cycle - Timing wave forms - Memory decoding - memory expansion - Static RAM Cell-Bipolar RAM cell - MOSFET RAM cell - Dynamic RAM cell - ROM organization – PROM, EPROM EEPROM EAPROM - Programmable Logic Devices - Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA).

TEXT BOOKS

1. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003.

REFERENCES

1. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. M. Morris Mano, Digital Design, 3.ed. Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd. New Delhi, 2003

SDC5AE18 - REFRIGERATION AND AIR CONDITIONING

Course No: 5.5

Course Code: SDC5AE18

Course Name: Refrigeration and Air Conditioning

Credits: 5

Hours: 75

COURSE OUTLINE

Unit 1 (11 hours)

Principles of refrigeration: Thermodynamics of refrigeration – Carnot, reversed carot cycle, heat pump, and refrigerating machine- coefficient of performance -unit of refrigeration-refrigeration methods - conventional refrigeration systems. Air refrigeration system –Bell Coleman cycle -C.O.P –capacity, work and refrigerant flow requirements in Bell Coleman cycle.

Unit II (18 hours)

Vapor compression system: simple cycle -comparison with Carnot cycle, theoretical and actual cycles- COP- effect of operating parameters on COP- wet, dry and superheated compression- sub cooling - actual cycle representation on TS and PH diagrams- simple problems. Advanced vapor compression systems – multistage vapor compression systems-flash chamber- multiple compression and evaporation systems- cascading -simple problems.

Unit III (18 hours)

Vapor absorption systems: simple cycles-actual cycle- ammonia water and lithium bromide water systems – COP -Electrolux system. Refrigerant and their properties: Nomenclature-suitability of refrigerants for various applications -unconventional refrigeration methods-

vortex tube, steam jet, magnetic (Cryogenics) refrigeration and thermoelectric refrigeration-applied refrigeration: house hold refrigerator –unit air conditioners and water coolers- ice plant -cold storage

Unit IV (10 hours)

Refrigeration system components (Theory Only): water and air cooled condensers- evaporative condensers- expansion devises -capillary tube -constant pressure expansion valve- thermostatic expansion valve- float valve and solenoid valve.Evaporators: natural convection coils -flooded evaporators -direct expansion coils. Reciprocating compressors: single stage and multistage compressors- work done -optimum pressure ratio -effect of intercooling- volumetric efficiency -effect of clearance- isothermal and adiabatic efficiency. Rotodynamic compressors: Screw and vane type compressors- principle of operation-hermetic, semi hermetic and open type refrigeration compressors.

Unit V (18 hours)

Principles of air conditioning: Psychrometry and psychrometric chart - human comfort-effective temperature- comfort chart. Applied psychrometry: sensible heat factor-psychrometric process – problems. Winter air conditioning- heating load calculations-humidifiers and humidistat. Summer air conditioning- cooling load calculations- year round air conditioning -unitary and central systems -principles of air distribution -design of air duct systems.

TEXT BOOKS

1. Stoecker W.F. and Jones J.W, Refrigeration and Air-Conditioning, McGraw- Hill
2. Jordan and Prister, Refrigeration and Air-Conditioning, Prentice Hall of India.

REFERENCE BOOKS

1. Dossat, Principles of Refrigeration, John Wiley and Sons
2. Robert H. Enerick, Basic Refrigeration and Air-Conditioning, Prentice Hall. Arora C.P., Refrigeration and Air-Conditioning, Tata McGraw- Hill

SDC5AE19 - ELECTRICAL SYSTEM AND CIRCUITS

Course No: 5.6

Course Code: SDC5AE19

Course Name: Electrical System and Circuits

Credits: 5

Hours: 75

COURSE OUTLINE

Unit I- ELECTRICAL SYSTEM, WIRING, TERMINALS AND SWITCHING

System, Vehicle system, open system, closed system, Cables, Colour codes and Terminal designation, Harness design, printed circuits, fuses and circuit breakers, terminations and switches

Unit II-MULTEPLEXING , MEDIA ORIENTED SYSTEM TRANSPORT

Limits of the conventional wiring system, multiplex data bus, controller area network(CAN), CAN data signal, Local Interconnect Network(LIN),flexray, MOST, network, protocol, MOST application, Consumer device gateway, Automotive Ethernet

Unit III - 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 IV- 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, Xenon lighting, LED & IR lighting, Mono colour signal lamps, Neon technology, Bending light, Intelligent front lighting, Advanced lighting technology.

Unit V- 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.

TEXT BOOK

Automobile electrical & electronic systems by Tom Denton (Fourth Edition)

SDC5AE20(P) - MICROPROCESSOR LAB

Course No: 5.7

Course Code: SDC5AE20(P)

Course Name: Microprocessor lab

Credits: 5

Hours: 75

COURSE OUTLINE

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.

Semester 6

SDCAE21 (Pr) - INTERNSHIP AND PROJECT

Course No: 6.1

Course Code: SDCAE20 (Pr)

Course Name: Internship and Project

Credits: 30

Hours: 900

COURSE OUTLINE

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.