SYLLABUS

Core & Elective Courses

UG PROGRAMME IN Automobile- Auto Electricals & Electronics

Under Choice Based Credit Semester System

FAROOK COLLEGE

(AUTONOMOUS)

www.farookcollege.ac.in

CERTIFICATE

I hereby certify that the documents attached are the bonafide copies of the syllabus of Core Courses offered to B.Voc Automobile- Auto Electricals & Electronics programme and Elective Courses offered by the Department of Automobile- Auto Electricals & Electronics to be effective from 2021 admission onwards.

Principal

Date:
Place: Farook College

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PROGRAMME SPECIFIC OUTCOMES (PSO)

Upon completion of B.Voc Automobile- Auto Electricals & Electronics program, the students will be able to:

PSO 01 Demonstrate comprehensive skills relating to chosen B.Voc Programme and knowledge content of General Education and make them industry ready.

PSO 02 To enhance employability of the graduates through the National Skills Qualification Framework and meet industry requirements in the country and abroad to become part of the global workforce.

PSO 03 Exhibit the skill of critical design thinking and use them to predict a range of creative solutions towards a design problem, evaluate them and choose the most appropriate options.

PSO 04 Identify opportunities of Industry-Institute interactions by doing internships in industries.

PSO 05 Equip the graduates to go for higher studies after the completion of B.Voc.

PSO 06 To develop the knowledge, skills and attitude of the students which help them to support & enhance their entrepreneurial ability.

PSO 07 Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological change

PSO 08 Understand the impact of the technological solution in the societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PSO 09 Exhibit thoughts and ideas effectively in writing and orally; communicate with others using appropriate media, build effective interaction and presentation skills to meet global competencies and connect with people individually or in group settings.

PSO 10 Create new conceptual, theoretical, methodological innovations that integrate and transcend beyond discipline-specific approaches to address a common problem.

SCHEME OF THE PROGRAMME

Credit and Weightage Distribution in Each Semester Total Credits:

Semester	Course	Credit	Internal	External	Total
I	Core Course 1: Transactions: Essential English Language Skills	3	15	60	75
	Core Course 2: Ways with Words: Literatures in English	3	15	60	75
	Core Course 3: Malayalam /Hindi /Arabic	4	20	80	100
	Core Course 4: Mathematics-1	4	20	80	100
	Core Course 5: Basics of Electrical & Electronic Engineering	4	20	80	100
	Core Course 6: Basic Mechanical engineering	4	20	80	100
	Core Course 7: Office Automation Tools Lab	4	20	80	100
	Core Course 8: Electrical Engineering Practice	4	20	80	100
	Audit Course: (Environment Studies)	4	-	-	-
	Total	**30**			**750**
II	Core Course 9: Writing for Academic and Professional Success	4	20	80	100
	Core Course 10: Zeitgeist: Readings on Contemporary Culture	4	20	80	100
	Core Course 11: Malayalam /Hindi /Arabic	4	20	80	100
	Core Course 12: Financial and Management Accounting	4	20	80	100
	Core Course 13: Introduction to Automobile Engineering	3	15	60	75
	Core Course 14: Instrumentation for Automobile Engineers	4	20	80	100
	Core Course 15: Electronic Engineering Practice	4	20	80	100

	Core Course 16: Mini Project	3	15	60	75
	Audit Course: Disaster Management	4	-	-	-
	Total	**30**			**750**
III	Core Course 17: Basic Mathematics and General Awareness	4	20	80	100
	Core Course 18: Professional Business Skills	4	20	80	100
	Core Course 19: Human Resources Management	4	20	80	100
	Core Course 20: Power systems and Power Electronics	3	15	60	75
	Core Course 21: Automotive Electrical and Electronic systems	4	20	80	100
	Core Course 22: Electrical machines and Machine Drives	4	20	80	100
	Core Course 23: Automotive Electrical Laboratory I	3	15	60	75
	Core Course 24: Automotive Electronics Laboratory	4	20	80	100
	Audit Course: Human Rights \ Intellectual Property Rights \ Consumer Protection (Can opt any one)	4			
	Total	**30**			**750**
IV	Core Course 25: Entrepreneurship Development	4	20	80	100
	Core Course 26: Public Health, Sanitation & Safety	4	20	80	100
	Core Course 27: Electronic Engine Management Systems	4	20	80	100
	Core Course 28: Digital Fundamentals	3	15	60	100
	Core Course 29: Microprocessors and Microcontrollers	3	15	60	100
	Core Course 30: Automotive Electrical Laboratory- II	4	20	80	100
	Core Course 31: Industrial Workshop	4	20	80	100

	Core Course 32: Project Work / Internship	4	20	80	100
	Audit Course: Gender Studies \ Gerontology (Can opt any one)	4			
	Total	**30**			**750**
V	Core Course 33: Life Skill Application	3	15	60	80
	Core Course 34: Internet of Things (IoT)	3	15	60	80
	Core Course 35: Automotive Electrical System	4	20	80	100
	Core Course 36: Electric and Hybrid Vehicles	4	20	80	100
	Core Course 37: Automobile HVAC	4	20	80	100
	Core Course 38: Vehicle Body Engineering	4	20	80	100
	Core Course 39: Microprocessor Lab	4	20	80	100
	Core Course 40: IoT Lab	4	20	80	100
	Total	30			750
VI	Core Course 41: Term paper	2	50	-	50
	Core Course 42: Internship & Project (900hrs.) Internship Project	28	80	320	400
	Total	30			450
Core Course:		180			4200
Audit Course		*16*	-	-	-
Total		**196**			**4200**

Credit Distribution

Semester	Core Course	Elective Course	Project	Viva Voce	Audit Course	Total
1	3+3+4+4+4+4+4+4	-	-	-	4	**34**
2	4+4+4+4+3+4+4+3	-	3	-	4	**34**
3	4+4+4+3+4+4+3+4	-	-	-	4	**34**
4	4+4+4+3+3+4+4+4	-	4	-	4	**34**
5	3+3+4+4+4+4+4+4	-	-	-	-	**30**
6	2+28	-	28	-	-	**30**
Total	**180**	**-**	**35**	**-**	**16**	**196**
Extra Credit Activities						**-**
Grand Total= (180 + Audit Courses + 4 Extra Credit Activities)						**196**

CORE COURSE STRUCTURE

Total Credits: 60 (Internal: 20%; External: 80%)

Semester	Code No	Course Title	Hrs/ Week	Credit	Weightages
I	A01	Core Course 1: Transactions: Essential English Language Skills	3	3	75
	A02	Core Course 2: Ways with Words: Literatures in English	3	3	75
	A07(3)	Core Course 3: Malayalam /Hindi /Arabic	4	4	100
	SDC1MT01	Core Course 4: Mathematics-1	4	4	100
	SDC1AU02	Core Course 5: Basics of Electrical & Electronic Engineering	4	4	100
	SDC1AU03	Core Course 6: Basic Mechanical engineering	4	4	100
	SDC1AU04(P)	Core Course 7: Office Automation Tools Lab	4	4	100
	SDC1AU05(P)	Core Course 8: Electrical Engineering Practice	4	4	100
		Audit Course: (Environment Studies)		4	-
		Total		**30**	**750**
II	A03	Core Course 9: Writing for Academic and Professional Success	4	4	100
	A04	Core Course 10: Zeitgeist: Readings on Contemporary Culture	4	4	100
	A08(3)	Core Course 11: Malayalam /Hindi /Arabic	4	4	100
	SDC2CA06	Core Course 12: Financial and Management Accounting	4	4	100
	SDC2AU07	Core Course 13: Introduction to Automobile Engineering	3	3	75
	SDC2AU08	Core Course 14: Instrumentation for Automobile Engineers	4	4	100
	SDC2AU09(P)	Core Course 15: Electronic Engineering Practice	4	4	100
	SDC2AU10(Pr)	Core Course 16: Mini Project	3	3	75

		Audit Course: Disaster Management		4	-
		Total		**30**	**750**
III	A11	Core Course 17: Basic Mathematics and General Awareness	4	4	100
	A12	Core Course 18: Professional Business Skills	4	4	100
	GEC3CM11	Core Course 19: Human Resources Management	4	4	100
	SDC3AU12	Core Course 20: Power systems and Power Electronics	3	3	75
	SDC3AU13	Core Course 21: Automotive Electrical and Electronic systems	4	4	100
	SDC3AU14	Core Course 22: Electrical machines and Machine Drives	4	4	100
	SDC3AU15(P)	Core Course 23: Automotive Electrical Laboratory I	3	3	75
	SDC3AU16(P)	Core Course 24: Automotive Electronics Laboratory	4	4	100
		Audit Course: Human Rights \ Intellectual Property Rights \ Consumer Protection (Can opt any one)	4	4	
		Total		**30**	**750**
IV	A13	Core Course 25: Entrepreneurship Development	4	4	100
	A14	Core Course 26: Public Health, Sanitation & Safety	4	4	100
	SDC4AU17	Core Course 27: Electronic Engine Management Systems	4	4	100
	SDC4AU18	Core Course 28: Digital Fundamentals	3	3	100
	SDC4AU19	Core Course 29: Microprocessors and Microcontrollers	3	3	100
	SDC4AU20(P)	Core Course 30: Automotive Electrical Laboratory- II	4	4	100
	SDC4AU21(P)	Core Course 31: Industrial Workshop	4	4	100
	SDC4AU22(Pr)	Core Course 32: Project Work / Internship	4	4	100

		Audit Course: Gender Studies \ Gerontology (Can opt any one)		4	
		Total		**30**	**750**
V	GEC5PS23	Core Course 33: Life Skill Application	3	3	80
	SDC5AU24	Core Course 34: Internet of Things (IoT)	3	3	80
	SDC5AU25	Core Course 35: Automotive Electrical System	4	4	100
	SDC5AU26	Core Course 36: Electric and Hybrid Vehicles	4	4	100
	SDC5AU27	Core Course 37: Automobile HVAC	4	4	100
	SDC5AU28	Core Course 38: Vehicle Body Engin eering	4	4	100
	SDC5AU29(P)	Core Course 39: Microprocessor Lab	4	4	100
	SDC5AU30(P)	Core Course 40: IoT Lab	4	4	100
		Total		30	750
VI	SDC6AU31	Core Course 41: Term paper	-	2	50
	SDC6AU32(Pr)	Core Course 42: Internship & Project (900hrs.) Internship Project	900	28	400
Total				30	

ELECTIVE COURSE STRUCTURE

CORE COURSE SYLLABUS

SEMESTER 1

A01 English - 1

Course No: 1.1
Course Code: A01
Course Name: English - 1
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
(This course taken from Syllabus for Common Courses in English
Course Code: BEN1A01
Course Name: Transactions: Essential English Language Skills)

A02 English - 2

Course No: 1.2
Course Code: A02
Course Name: English - 2
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
(This course taken from Syllabus for Common Courses in English
Course Code: BEN1A02
Course Name: Ways with Words: Literatures in English)

A07(3) Malayalam /Hindi /Arabic

A07 (M) Malayalam

Course No: 1.3
Course Code: A07 (M)
Course Name: Malayalam
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Malayalam
Course Code: BML1A07(3)

Course Name: Bhashayum Sahithyavum-1)

A07 (H) Hindi

Course No: 1.3
Course Code: A07 (H)
Course Name: Hindi
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Hindi
Course Code: BHN1A07(3)
Course Name: Prose and one act plays)

A07 (A) Arabic

Course No: 1.3
Course Code: A07 (A)
Course Name: Arabic
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Arabic
Course Code: BAR1A03
Course Name: Communicative skill in Arabic)

SDC1MT01 Mathematics

Course No: 1.4
Course Code: SDC1MT01
Course Name: Mathematics
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
(This course taken from Syllabus for Common Courses in Mathematics
Course Code: BMT1C01
Course Name: Mathematics-1)

Objectives of the Course

This course deals with the two branches of calculus, differential calculus and integral calculus, and their applications. Calculus is a tool for analyzing the physical world around us. The concepts necessary to explore the relationship between moving objects are provided in calculus. The idea of the definite integral is defined with the notion of the limit. The first three modules are based on differential calculus and its applications, and the fourth module is

based on integral calculus and its applications. The Fundamental Theorem of Calculus establishes the connection between the two branches of calculus.

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Illustrate*** fundamental ideas of limit, continuity, and differentiability	Understand	PSO 2
CO2	***Analyse*** Increasing and decreasing functions, local maxima, minima, concavity, and inflection points	Analyse	PSO 2
CO3	***Apply*** these ideas in drawing the graphs of functions	Apply	PSO 2
CO4	***Examine*** maximum-minimum problems using the idea of derivatives	Analyse	PSO 2
CO5	***Demonstrate*** Mean Value Theorem and L'Hospital rule and Riemann sums	Understand	PSO 2
CO6	***Develop*** Fundamental Theorem of Calculus and proof	Apply	PSO 2
CO7	***Solve*** the area problem, the problem of finding the arc length of a plane curve, and volume of solids	Apply	PSO 2
CO8	***Relate*** Average values and the Mean Value Theorem for integrals	Understand	PSO 2

Course Outline

UNIT I (14 Hours)

1.1: Introduction to the derivative-instantaneous velocity, slope of tangent line, differentiating simplest functions.

1.2: Limits- Notion of limit, basic properties, derived properties, continuity. continuity of rational functions, one sided limit, limit involving to +/- Infinity

1.3: The derivative as Limit- formal definition, examples, differentiability and continuity, Leibnitz notation.

1.4: Differentiating Polynomials-power rule, sum rule etc.

1.5: Product and quotients- product, quotient, reciprocal & integral power rule.

1.6: Linear Approximation and Tangent Lines- equation of tangent line and linear approximation, illustrations.

UNIT II (13 Hours)

2.1: Rate of change and Second derivative- linear or proportional change, rates. of change, second derivative.

2.2: The Chain Rule- power of a function rule, chain rule

2.3: Fractional Power & Implicit Differentiation-rational power of a function rule, implicit differentiation.

2.4: Related rates and parametric curves- Related rates, parametric curves. word problems involving related rates.

2.5: Anti derivatives- anti differentiation and indefinite integrals, anti differentiation rules.

UNIT III (16 Hours)

3.1: Continuity and Intermediate value theorem-IVT: first and second version.

3.2: Increasing and decreasing function- Increasing and decreasing test, critical point test, first derivative test.

3.3: Second derivative and concavity- second derivative test for local maxima, minima and concavity, inflection points.

3.4: Drawing of Graphs- graphing procedure, asymptotic behaviour.

3.5: Maximum- Minimum Problems- maximum and minimum values on intervals, extreme value theorem, closed interval test, word problems.

3.6: The Mean Value Theorem- The MVT, consequences of MVT-Rolle's Theorem, horserace theorem.

3.7: / 11.2 L'Hospital rule- Preliminary version, strengthened version.

UNIT IV (17 Hours)

4.1: Summation- summation, distance and velocity, properties of summation, telescoping sum (quick introduction-relevant ideas only).

4.2: Sums and Areas-step functions, area under graph and its counterpart in distance-velocity problem.

4.3: The definition of Integral- signed area (The counterpart of signed area for our distance-velocity problem). The integral. Riemann sums.

4.4: The Fundamental Theorem of Calculus-Arriving at FTC intuitively using distance velocity problem, Fundamental integration Method, proof of FTC. Area under graph, displacements and velocity.

4.5: Definite and Indefinite integral-indefinite integral test. properties of definite integral, fundamental theorem of calculus: alternative version (interpretation and explanation in terms of areas).

4.6: Applications of the Integral- Area between graphs, area between intersecting graphs, total changes from rates of change.

4.7: / 9.1: Volume by slice method- the slice method, volume of solid of revolution by Disk method.

4.8: / 9.3: Average Values and the Mean Value Theorem for Integrals- motivation and definition of average value, illustration, geometric and physical interpretation, the Mean Value Theorem for Integrals,

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1:	**16**
Unit 2:	**16**
Unit 3:	**24**
Unit 4:	**24**

Text Books:

1. Calculus I (2/e): Jerrold Marsdien & Alan Weinstein Springer-Verlag New York Incl 1985) ISBN 0-387-90974-5
2. Calculus II (2/ Jerrold Marsden & Alan Weinstein Springer-Verlag New York Inc 1985) ISBN 0.387.90975-3

References:

1. Soo T Tan: Calculus Brooks/Cole, Cengage Learning (2010)ISBN 0-534-46579-X
2. Gilbert Strang: Calculus Wellesley Cambridge Press(1991) ISBN 0-9614088-2-0
3. Ron Larson. Bruce Edwards: Calculus (11/e) Cengage Learning (2018) ISBN: 978-1-337-27534-7
4. Robert A Adams & Christopher Essex Calculus Single Variable (8/e) Pearson Education Canada (2013) ISBN: 0321877403
5. Joel Hass, Christopher Heil & Maurice D. Weir: Thomas' Calculus(14/e) Pearson (2018) ISBN 0134438981
6. Jon Rogawski & Colin Adams: Calculus Early Transcendentals (3/e) W. H. Freeman and Company(2015) ISBN: 1319116450

SDC1AU02 Basics of Electrical & Electronic Engineering

Course No: 1.5
Course Code: SDC1AU02
Course Name: Basics of Electrical & Electronic Engineering
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

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

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Solve*** basic electrical circuit problems using various laws and theorems.	Apply	PSO 1
CO2	***Analyze*** AC power circuits and networks, and safety concerns	Analyse	PSO 1
CO3	***Analyze*** DC, magnetic circuits.	Analyse	PSO 1
CO4	***Classify*** and compare various types Semiconductor devices and circuits	Understand	PSO 1
CO5	***Demonstrate*** and describe the working of amplifiers and oscillators	Understand	PSO 1
CO6	***Illustrate*** The basics of communication systems	Understand	PSO 1

Course Outline

UNIT I (12 Hours)

DC circuits: Basic circuit elements and sources, Ohms law, series and parallel connection of circuit elements, Star – Delta connection, Kirchhoff's laws, Node voltage analysis, Mesh analysis.

Network Theorems and Applications- Superposition, Thevenin's, Norton's, Reciprocity, Millman's, Maximum power transfer, Tellegen's theorem

UNIT II (15 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- Resonance – Series and Parallel resonance - B.W- Q factors. Electrical Safety –Fuses and Earthing, Residential wiring, Types of wiring.

Magnetic Circuits: Introduction to magnetic circuits, Faraday's laws induced emfs and inductances, Definition of mmf, flux and reluctance, leakage flux, magnetic materials and B-H relationship and eddy currents.

UNIT III (15 Hours)

Introduction to semiconductors- PN junction diode- operation- VI characteristics- rectification, types of rectifier, Efficiency, Nature of rectified output, Ripple factor, different types of filter circuits, Zener diode - voltage stabilization.

Bipolar junction transistor- PNP-NPN structures- operation-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 (12 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.

OP-amp-basic operations, Application, inverting, Noninverting, summing amplifiers, Differentiator- integrator.

UNIT V (6 Hours)

Communication Systems: Basic block diagram of communication-Transmission and reception of radio waves, Analog and digital communication-types of modulation, AM, FM their comparison advantages, demodulation, Super heterodyne receiver- pulse code modulation (qualitative idea only).

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **DC circuits**	**15**
Unit 2: **AC circuits & Magnetic Circuits**	**20**
Unit 3: **Introduction to semiconductors & Bipolar junction transistor**	**20**
Unit 4: **Basic principles of feedback & OP-amp-basic operations**	**15**
Unit 5: **Communication Systems**	**10**

Text Books:

1. D.P. Kothari and I.J. Nagrath , "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. M.S. Sukhija and T.K Nagsarkar, 'Basic Electrical and Electronics Engineering ', Oxford University Press, 2012.
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. Mehta V.K, Rohit Mehta, “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. Electronics principles by Malvino.
6. Physics of Semiconductor Devices- Second Edition – Dilip K Roy – Universities Press.

SDC1AU03 Basic Mechanical engineering

Course No: 1.6
Course Code: SDC1AU03
Course Name: Basic Mechanical engineering
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

To familiarize the students with the basics of Mechanical Engineering.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***List*** different disciplines of Mechanical Engineering.	Remember	PSO 1
CO2	***Summarize*** basics of Thermodynamics and IC engine.	Understand	PSO 1
CO3	***Compare*** the basics of Refrigeration and air conditioning.	Understand	PSO 1
CO4	***Outline*** elementary ideas about different manufacturing processes.	Understand	PSO 1
CO5	***List*** various energy conversion systems	Remember	PSO 1
CO6	***Select*** power transmission elements.	Remember	PSO 1

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.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Thermodynamics**	**20**
Unit 2: **IC Engines**	**20**
Unit 3: **Principles and fields of application**	**10**
Unit 4: **Refrigeration & Air Conditioning**	**10**
Unit 5: **Mechanical Power transmission systems & Manufacturing processes**	**20**

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.

SDC1AU04(P) Office Automation Tools Lab

Course No: 1.7
Course Code: SDC1AU04(P)
Course Name: Office Automation Tools Lab
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

To acquire basic knowledge on word editors, spreadsheets and presentation softwares.

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Demonstrate*** file managers, word processors, spreadsheets and presentation softwares.	Understand	PSO 2
CO2	***Model*** the features and functions of the categories of application software.	Apply	PSO 2
CO3	***Present*** effectively using software tools	Apply	PSO 2
CO4	***Demonstrate*** the ability to apply application software in an office environment.	Understand	PSO 2

List of Experiments

Practical using LibreOffice Writer / MS Word / Google doc

1. Write a paragraph about yourself, Features to be covered: - Change the font size and type, Spell check, Aligning and justification of Text.
2. Creating a Newsletter, Features to be covered: Use Numbering Bullets, page numbering, Footer and Headers,Table of Content, Newspaper columns, Images from files and clipart, drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs
3. Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word, Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows).
4. Prepare your personal resume.

Practical using LibreOffice Calc / MS Excel / Google Spreadsheet

5. Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text, Sorting: Sort a set of data in Ascending and Descending (both numbers and alphabets).
6. Calculations - Features to be covered: - Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP
7. Prepare a Mark list for a B. Voc student.
8. Prepare a Bill for electricity consumption.
9. Prepare a sales Invoice Report.
10. Calculate road tax using an IF function.
11. Using a lookup formula to calculate staff bonuses.
12. Complete a vehicle shopping workbook to compare the purchase of several vehicles of the sales showroom.
13. Selecting car sales data to compare sales for men and women, using various different chart types.

Practical using LibreOffice Impress / MS PowerPoint / Google Slide

14. Drawing Graphs and charts.
15. Create a slide show presentation about Automobile innovation.
16. Prepare a presentation with various slide transitions.
17. Prepare an Organization Charts of your college.
18. Prepare a presentation and include audio, videos.
19. Prepare a presentation and include animations.
20. Prepare a presentation and include links to external websites.

Course No: 1.8
Course Code: SDC1AU05(P)
Course Name: Electrical Engineering Practice
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]

Objectives of the Course

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

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able:*	**Learning Domain**	**PSO No**
CO1	To ***model*** residential wiring and various types of wiring.	Apply	PSO 1
CO2	To ***measure*** the various electrical quantities.	Evaluate	PSO 1
CO3	To ***Apply*** the fundamentals of various electrical gadgets and their working and troubleshooting of them	Apply	PSO 1
CO4	To ***design*** and develop a prototype of a transformer	Create	PSO 1
CO5	To ***explain*** the necessity and types of earthing and measurement of earth resistance.	Understand	PSO 1

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 troubleshooting of electrical equipment (fan, iron box, mixer grinder, 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

A03 English – 3

Course No: 2.1
Course Code: A03
Course Name: English – 3
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in English
Course Code: BEN2A03
Course Name: Writing for Academic and Professional Success)

A04 English – 4

Course No: 2.2
Course Code: A04
Course Name: English – 4
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in English
Course Code: BEN2A04
Course Name: Zeitgeist: Readings on Contemporary Culture)

A08(3) Malayalam /Hindi /Arabic

A08 (M) Malayalam

Course No: 2.3
Course Code: A08 (M)
Course Name: Malayalam
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Malayalam
Course Code: BML2A08(3)
Course Name: Bhashayum Sahithyavum-2)

A08 (H) Hindi

Course No: 2.3
Course Code: A08 (H)
Course Name: Hindi
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Hindi
Course Code: BHN2A08(3)
Course Name: Poetry and Short Stories)

A08 (A) Arabic

Course No: 2.3
Course Code: A08 (A)
Course Name: Arabic
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from Syllabus for Common Courses in Arabic
Course Code: BAR2A06
Course Name: Literature in Arabic)

SDC2CA06 Financial and Management Accounting

Course No: 2.4
Course Code: SDC2CA06
Course Name: Financial and Management Accounting
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

(This course taken from BCA programme
Course Code: BCA2C03
Course Name: Financial and Management Accounting)

Objectives of the Course

To familiarize the students with the basics of Financial and Management Accounting

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able:*	Learning Domain	PSO No
CO1	To get a general ***understanding*** on accounting and its general applications	Understand	PSO 2
CO2	To get an ***understanding*** on various tools for financial statement analysis.	Understand	PSO 2
CO3	To get an ***understanding*** on accounting procedures up to the preparation of various financial statements	Understand	PSO 2
CO4	To get a general ***understanding*** of the important tools for managerial decision making.	Understand	PSO 2

Course Outline

UNIT I (12 Hours)

Principles of accounting - Some fundamentals concepts and conventions - Systems of accounting double entry principles - Advantages of Double entry system personal, real, nominal accounts.

UNIT II (12 Hours)

Cash book - forms of cash books - subdivisions of Journal - Ledgers - limitations of financial accounting - Trial balance - Final accounts - Trading P/L A/C - Balance sheet

UNIT III (12 Hours)

Invitation to management accounting: Analysis and interpretation of trading accounts and financial statements - Horizontal Vertical analysis - Common size Balance sheet - common size income statement - comparative income and balance - sheet trend analysis.

UNIT IV (12 Hours)

Marginal costing - Breakeven point - cost volume profit analysis - margin of safety

UNIT V (12 Hours)

Standard costing - analysis of variance - material - labour - O/H sales variables - Budget and Budgetary control - different types of budgets - master budget - sales budget - production budget - flexible budget - cash budget - advantages - preparation

External Assessment (80 Marks) Mark distribution for setting Question paper No of Questions: 27	
Unit	**Marks**
Unit 1: **Principles of accounting**	**15**
Unit 2: **Cash Book**	**15**
Unit 3: **Invitation to management accounting**	**15**
Unit 4: **Costing**	**10**
Unit 5: **Costing and Budget**	**25**

Text Books:

1. Financial Management, Pandey I.M Vikas publishing house

References:

1. Elements of Accounting. Kellock.J,
2. Advanced Accountancy, S.N Maheshwari, Vikas Publishing
3. Cost and Management Accounting, A.Vinod, Calicut University Central Co-Operative Stores

SDC2AU07 Introduction to Automobile Engineering

Course No: 2.5
Course Code: SDC2AU07
Course Name: Introduction to Automobile Engineering
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours

Objectives of the Course

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

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able:*	**Learning Domain**	**PSO No**
CO1	To ***classify*** and compare the basics of automobile drive trains.	Understand	PSO 1
CO2	To ***identify*** Axles, Steering system and tyre	Applyi	PSO 1

	assembly.		
CO3	To ***illustrate*** the construction and working principle of various parts of an automobile.	Understand	PSO 1
CO4	To ***illustrate*** the suspension and brake system	Understand	PSO 1
CO5	To ***label*** engine parts and transmission system.	Remember	PSO 1

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 (12 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 SYSTEMS: 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 (8 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 (5 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.

External Assessment (60 Marks)
Mark distribution for setting Question paper

No of Questions: 21	
Unit	**Marks**
Unit 1: **VEHICLE STRUCTURE AND ENGINES**	**15**
Unit 2: **ENGINE AUXILIARY SYSTEMS**	**15**
Unit 3: **TRANSMISSION SYSTEMS**	**10**
Unit 4: **STEERING,BRAKES AND SUSPENSION SYSTEMS**	**10**
Unit 5: **ALTERNATIVE ENERGY SOURCES**	**10**

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,IIIiffe 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, IIIiffe Books Butterworth & Co., 1971.
6. John Fenton, Vehicle Body layout and analysis, Mechanical Engg Publication Ltd., London, 1982.

SDC2AU08 Instrumentation for Automobile Engineers

Course No: 2.6
Course Code: SDC2AU08
Course Name: Instrumentation for Automobile Engineers
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

To familiarize the students with the basics of Automobile instrumentation.

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**

CO1	***Illustrate*** the different methods for the Electrical measurement.	Remember	PSO 4
CO2	***Outline*** the construction and working of various industrial devices used to measure Physical quantities.	Understand	PSO 4
CO3	***Analyze***, formulate and select suitable sensors for the given Automobile applications.	Analyse	PSO 4
CO4	***Infer*** Automotive Sensory Systems.	Understand	PSO 4
CO5	***Compare*** Primary sensing elements and signal conditioning elements.	Understand	PSO 4

Course Outline

UNIT I (12 Hours)

Basics Of Measurement: Classification of Instrument, Characteristics of Instruments – Static and dynamic - Accuracy, Precision, resolution, reliability, repeatability, validity, Errors.

Basics of Electrical Measurements : Principle of operation, construction and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter.

UNIT II (12 Hours)

Measurement of low, medium & high resistance: Ammeter, voltmeter method – Wheatstone bridge – Kelvin double bridge –Series and shunt type ohmmeter – High resistance measurement – Megger

A.C bridges: Measurement of inductance, capacitance – Maxwell Bridge – Wein's bridge – Schering bridge – Anderson bridge - A.C. galvanometer

UNIT III (12 Hours)

Primary Sensing Elements And Signal Conditioning: Transducers - Classification & selection of transducers, strain gauges, inductive & capacitive transducers, piezoelectric and Hall-effect transducers, thermistor, thermocouple, photo-diodes & photo-transistors, encoder type digital transducers, Operational Amplifier, Characteristics of Operational Amplifier, Attenuator, Amplitude Modulation and Demodulation, Basic Filters, A/D Converters.

UNIT IV (12 Hours)

Modern automotive instrumentation: Computerized instrumentation system, 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 V (12 Hours)

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.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Basics Of Measurement & Basics of Electrical Measurements**	**20**
Unit 2: **Measurement of low, medium & high resistance & A.C bridges**	**18**
Unit 3: **Primary Sensing Elements And Signal Conditioning**	**18**
Unit 4:**Modern automotive instrumentation**	**9**
Unit 5: **Automotive Sensors And Actuators**	**15**

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.

SDC2AU09(P) Electronic Engineering Practice

Course No: 2.7
Course Code: SDC2AU09(P)
Course Name: Electronic Engineering Practice
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

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

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Identify*** the electronic components and basic electronic instruments.	Remember	PSO 1
CO2	***Recognize*** of various types of Diodes, design half and full wave Rectifiers.	Remember	PSO 1
CO3	***Compare*** the different configurations of BJT.	Understand	PSO 1
CO4	***Design*** Amplifier circuits and draw frequency response characteristics.	Create	PSO 1
CO5	***Develop*** the parameters of feedback amplifier circuit, describe different types of oscillator circuits.	Create	PSO 1

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).

SDC2AU10(Pr) Mini Project

Course No: 2.8
Course Code: SDC2AU10(Pr)
Course Name: Mini Project
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours

Objectives of the Course

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

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to:*	Learning Domain	PSO No
CO1	To ***recall*** innovation in design of products, processes or systems.	Remember	PSO 5
CO2	To ***design*** that add value to products and solve technical problems	Create	PSO 5
CO3	***Provide*** a ***solution*** for a real life situation.	Create	PSO 5
CO4	To ***Determine*** budget and time planning for the project.	Evaluate	PSO 5
CO5	To ***develop*** effective communication skills by delivering a Presentation based on a mini project	Create	PSO 5
CO6	To ***construct*** the idea in mini projects for major projects.	Create	PSO 5

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 a substantial multidisciplinary component. The students will carry out a project one of the specializations of the program under study with a 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 the 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

A11 Basic Mathematics and General Awareness

Course No: 3.1
Course Code: A11
Course Name: Basic Mathematics and General Awareness
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

1. Understand and explain the importance of critical thinking.
2. To overcome or solve the problems occurring in our everyday life.
3. To understand basic of computer and relative concepts.
4. To make the students understand the various services offered by various banks and insurance companies

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to:*	Learning Domain	PSO No
CO1	***Apply*** numerical and reasoning skills in competitive examinations.	Apply	PSO 2
CO2	***Summarize*** some basic concepts of research and its methodologies.	Understand	PSO 2
CO3	***Relate*** the fundamental skills of computers with the present level of knowledge of the students.	Understand	PSO 2
CO4	***Develop*** the students with the skills of modern banking and insurance.	Apply	PSO 2

Course Outline

Module - 1: Numerical Ability (10 Hours)

Data Interpretation (Bar Graph, Line Chart, Tabular, Pie Chart), Inequalities/ Quadratic Equations, Number Series, Simplification and Approximation, Percentages, Average, Ratio

and Proportion, Partnership, Profit and Loss, Simple Interest & Compound Interest, Problem on Ages, Data Sufficiency, Speed, Distance and Time, Work, Time and Wages, Probability, Permutation and Combination.

Module -2: Reasoning Ability (12 Hours)

Advance Puzzles, Seating Arrangements, Distance and Direction, Blood Relations, Syllogism, Order and Ranking, Coding-Decoding, Machine Input-Output, Alphabet and Number Series. Analogy, Passage and Conclusions, Statement and Conclusion, Statement and Assumptions, Statement and Arguments, Decision Making

Module - 3: Research Aptitude (12 Hours)

Research: Meaning, Types, and Characteristics, Positivism and Post positivism approach to research, Methods of Research: Experimental, Descriptive, Historical, Qualitative and Quantitative methods, Steps of Research, Thesis and Article writing: Format and styles of referencing, Application of ICT in research, Research ethics.

Module - 4: Computer Aptitude (12 Hours)

History of computers, Basics of computer's hardware and software, Short Cut Keys, operating system, Internet, Networking, Basics of MS-Office: MS-word, MS-Excel, MS-PowerPoint, Database, Hacking, Security Tools and Viruses.

Module - 5: General/ Financial Awareness (14 Hours)

History of Banking in India, Banking and Financial Reforms in India, Financial Institutions in India, Functions of Banks,Types of Bank Accounts, Types of Loans, Types of Mortgages, Types of Cheque & Cards, Foreign Banks in India, Fund Transfer Services, Structure of Banking Industry, Principles of Insurance, Credit & Debit, Mutual Funds, Bombay Stock Exchange (BSE), National Stock Exchange (NSE), Banking Ombudsman, Inflation, Money Laundering & Anti-Money Laundering, Green Banking, RBI Act, 1934.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Numerical Ability**	**14**

Unit 2: **Reasoning Ability**	**16**
Unit 3: **Research Aptitude**	**16**
Unit 4: **Computer Aptitude**	**16**
Unit 5: **General/ Financial Awareness**	**18**

Text Book References:

1. Quantitative Aptitude for Competitive Examinations - Quantitative Aptitude R.S Agrawal, S.Chand,ISBN: 9789352534029, 9789352534029
2. Edition: Revised & Enlarged Edition, 2020
3. Verbal Reasoning (Useful for Various Competitive Exams), Dr. LAL & KUMAR, ISBN: 978-81-7482-581-0
4. Teaching and Research aptitude, Upkar's Publications, Pratiyogitha Darpan,ISBN: 97874822154.
5. Banking Awareness (English, Paperback, unknown), Arihant Publishers, ISBN: 9789311124667, 9789311124667

A12 Professional Business Skills

Course No: 3.2
Course Code: A12
Course Name: Professional Business Skills
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

1. To update and expand basic Informatics skills of the students
2. To equip the students to effectively utilize the digital knowledge resources for their study

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Develop*** professional by acquiring various soft skills needed for business success	Apply	PSO 2

CO2	***Explore*** the world of e-learning and also the various consequences of Cyber space and crimes.	Remember	PSO 2
CO3	***Application*** of data analysis and the role of artificial intelligence in e-busines	Apply	PSO 2
CO4	***Apply*** the skills of digital marketing and e-commerce.	Apply	PSO 2

Course Outline

Module I (10 Hrs)

Professionalism: Meaning -Definition – Characteristics - Traits and Qualities of a good professional - Professionalism in business - Professional Skills: important soft skills for business success- Professionalism in Communication: Verbal Communication: Professional Presentation - Different Presentation Postures- Written Communication: Email – Significance of Email in business – Email etiquette: format - rules – dos and don'ts – Technical Documentation: Standards – Types

Module II (8 Hrs)

E-Learning: Introduction of electronic learning - benefits and drawbacks of e-Learning - Online education - Digital age learners - Knowledge resources on internet - E-books, Audio, Video and other means for e-learning- Introduction to e-content development and tools - Online libraries – MOOCs - The e-Learning as a service Industry - major technologies usedin e-earning- different approaches for e-Learning delivery - E-learning in India

Module III (10 Hrs)

Business Data Analysis: Features of New Generation Computers – Concept of data analysis– Business Data Analysis – Data Analyst – Types of analysts - organization and source of data, importance of data quality, dealing with missing or incomplete data- Social Networking Analysis – Big Data Analysis - Role of Data Scientist in Business & Society - Role of Artificial Intelligence and Intelligent Agents in e-business - Ethical and Legal considerations in Business Analytics

Module IV (14 Hrs)

Socio - Cyber Informatics: IT and society - Digital Divide – Digital Natives-Cyber space - New opportunities and threats - Cyber ethics - Cyber-crimes -Types - Cyber Laws – Organizations related with cyber laws-Cyber addictions - Information overload – Health issues - e-waste and Green Computing –Recent E-governance initiatives in India

Module V (18 Hrs)

Digital Marketing: Introduction to Digital Marketing Environment –meaning & Concept – Need for digital marketing – Advantages and disadvantages of digital marketing -Trends indigital marketing- Types of digital marketing – Business models in digital marketing Business to Business (B2B), Business to Customer (B2C), Customer to Customer (C2C), Business to Employees (B2E), Business to Government (B2G) - Online advertising - types ofonline advertising - Top e-commerce websites around the world and its scenario in India.

PPC (Pay per Click) advertising – Search engine Analytics – search engine ads – social media channels and ads

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Professionalism**	**14**
Unit 2: **E-Learning**	**12**
Unit 3: **Business Data Analysis**	**14**
Unit 4: **Socio - Cyber Informatics**	**18**
Unit 5: **Digital Marketing**	**22**

References Books:

1. Professional Business Skills – Lee Pelitz 2nd Edition
2. Peter Norton, Introduction to Computers, Tata McGraw Hill Private Limited, New Delhi, 2009.
3. Alan Evans, ITL ESL, Leslie Lamport, Dolores Etter, Darren George, Kenneth C Laoudon, Gary Rogers, Rainer Handel, INFORMATICS -Technology in Action, Pearson Education, Delhi, 2009.
4. V.Rajaraman, Introduction to Information Technology, PHI Learning Private Limited,New Delhi, 2009.
5. Godfrey Parkin,DigitalMarketing:Strategies for online success,New Holland publishers Ltd,2009
6. Damian Ryan,Understanding Digital marketing:Marketing strategies for Engaging the Digital generation,Kogan page,3rd Edition,2014
7. Jonah Berger,Contagious Why things catch on,Simon&Schuster,2013
8. Turban E, Armson, JE, Liang, TP &Sharda, Decision support and Business Intelligence Systems, 8thEdition, John Wiley & Sons, 2007
9. Frank J. Ohlhorst, Big Data Analytics, 1st Edition, Wiley, 2012.
10.Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009
11.Microsoft Office 2007 Business Intelligence - Reporting, Analysis, and Measurement from the Desktop, Doug Harts, TATA McGraw-Hill Edition, 2008
12. Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner, GalitShmueli, Nitin R. Patel, Peter C. Bruce, Wiley Publication, 2010

GEC3CM11 Human Resources Management

Course No: 3.3
Course Code: GEC3CM11

Course Name: Human Resources Management
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
(This course taken from B.Com Finance Programme
Course Code: BCM3C03
Course Name: Human Resources Management)

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able:*	**Learning Domain**	**PSO No**
CO1	To ***Relate*** the students with the different aspects of managing human resources in an organization	Remember	PSO 2
CO2	To ***Infer*** the students with basic knowledge and skills required for the acquisition, development and retention of human resources.	Understand	PSO 2

Course Outline

Module I (16 Hours)

Introduction to Human Resource Management—Importance--scope and objectives of HRM. Evolution of the concept of HRM- Approaches to HRM- Personal management Vs Human Resource Management-HRM and competitive advantage- Traditional Vs Strategic Human Resource Management - E-HRM - Operational E-HRM - Relational E-HRM - Transformational E-HRM.

Module II (14 Hours)

Human resource planning, Recruitment and selection—Job analysis---process of job analysis-job discretion- job specification-- methods of job analysis-- Conventional Vs strategic planning—job evaluation—Recruitment--source of recruitment-methods.

Module III (8 Hours)

Placement, Induction and Internal mobility of human resource. Training of employees—need for training-objectives- approaches --methods-training environment- areas of training-Training evaluation.

Module IV (8 Hours)

Performance appraisal and career planning. Need and importance- objectives process-methods and problems of performance appraisal- . Concept of career planning –features-methods –uses career development

Module V (14 Hours)

Compensation management and grievance redressal. Compensation planning objectives-Wage systems- factors influencing wage system-. Grievance redressal procedure- discipline-approaches-punishment-essentials of a good discipline system. Labour participation in management.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Introduction to Human Resource Management**	**20**
Unit 2: **Human resource planning**	**18**
Unit 3: **aaaaa**	**12**
Unit 4: **Performance appraisal and career planning**	**12**
Unit 5: **Compensation management and grievance redressal**	**18**

References:

1. Human Resource Management- Text and Cases-- VSP Rao
2. Human Resource Management – Pravin Durai
3. Human Resource Management—Snell, Bohlander
4. Personal Management and Human Resources—VenkataRatnam .Srivasthava.
5. A Hand Book of Personnel Management Practice—Dale Yolder

SDC3AU12 Power systems and Power Electronics

Course No: 3.4
Course Code: SDC3AU12
Course Name: Power systems and Power Electronics
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]

Examination: 2 Hours

Objectives of the Course

To provide the students with an overview of the most important concepts in Power electronics and Power systems.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Classify*** different types of power electronics switches	Understand	PSO 4
CO2	***Analyse*** different power electronics devices such as rectifier, inverter, chopper, AC voltage regulators and cyclo converter	Understand	PSO 4
CO3	***Discover*** different types of energy sources of power systems.	Analyse	PSO 4
CO4	***Explain*** the general concept of power transmission and distribution.	Understand	PSO 4
CO5	***Compare*** different types of Relays and circuit breakers	Understand	PSO 4

Course Outline

UNIT I (10 Hours)

Introduction to power electronics- Power diode, SCR, GTO, LASCR, RCT, SITH, BJT, MOSFET, IGBT -Switching losses, driver circuits, protection, cooling, application-Controlled rectifiers-half wave and full wave – R,RL,RLE load (general idea only),dual converter

UNIT II (10 Hours)

Single and three phase bridge inverters with R, RL and RLE loads, square wave inverters, PWM inverters, modulation techniques, SPWM, Single phase and three phase cyclo-converters with R, RL and RLE loads, , operation waveforms-Single phase and three phase ac voltage controllers with R, RL and RLE load

UNIT III (5 Hours)

Choppers – types of choppers- principle of operations- DC-DC converters-principle of operation of buck, boost, buck-boost, Cuk, fly back, forward, push-pull, half bridge, full bridge Converters

UNIT IV (10 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, Overhead Line Power Transmission – Types of conductors, Types Insulators, Potential distribution over a string of suspension insulator, methods of potential equalization, Underground Cables – construction, grading of cables, overhead lines versus underground cables, Parameters associated with transmission Lines, Skin effect, Proximity effect, Ferranti Effect, Corona, Factors affecting corona**.**

UNIT V (10 Hours)

Relays – Principle of operation, Types of relays – Electromagnetic attraction type relay- Solenoid type, Attraction armature type, Balanced beam type, Electromagnetic Induction type relay- Shaded pole structure, Wattmeter type, induction cup type, Differential relay, Distance relay, Relays used in Automotives, circuit breaker- Principle of operation, Classification of circuit breaker, Arcing and arc quenching, Types of circuit breaker based on arc quenching medium, Vacuum circuit breaker, Oil circuit breaker, SF6 circuit breaker, Air circuit breaker, Lightning – Lightning arrester, Peterson coil, Power system faults- symmetrical faults, Asymmetrical faults, Symmetrical components.

External Assessment (60 Marks) **Mark distribution for setting Question paper** **No of Questions: 21**	
Unit	**Marks**
Unit 1: **Introduction to power electronics**	**10**
Unit 2: **Single and three phase bridge inverters**	**15**
Unit 3: **Choppers**	**10**
Unit 4: **Power Systems**	**15**
Unit 5: **Relays**	**10**

Text Books:

1. M. H. Rashid, "Power Electronics - Circuits, Devices and Applications", P.H.I Private Ltd. New Delhi, Second Edition, 1994
2. N. Mohan et.al. "Power Electronics- Converters, Applications and Design", John Wiley & Sons (Asia) Private Ltd., Singapore, 1996.
3. V.K. Mehta and Rohit Mehta, "Principles of power system", S Chand 3rd edition 2005

References:

1. Bimal K Bose, " Modern Power Electronics and AC Drives" PHI
2. R W Erickson and D Makgimovic,"Fundamental of Power Electronics" Springer, 2nd Edition.

3. P. T. Krein, “Elements of Power Electronics”, OUP4. Bhattacharya S. K, “Basic Electrical and Electronics Engineering”, First edition, Pearson Education, 2011.

SDC3AU13 Automotive Electrical and Electronic systems

Course No: 3.5
Course Code: SDC3AU13
Course Name: Automotive Electrical and Electronic systems
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

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

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Enumerate*** the construction, characteristics and maintenance of battery, lighting system and different accessories in a typical automobile after careful inspection	Remember	PSO 4
CO2	***Explain*** the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.	Understand	PSO 4
CO3	***List*** out the principles and characteristics of charging system components and demonstrate their working with suitable tools.	Remember	PSO 4
CO4	***Describe*** the principles and architecture of electronics systems and its components present in an automobile related to instrumentation, control, security and warning systems	Understand	PSO 4

CO5	***Illustrate*** the concepts and develop basic skills necessary to diagnose automotive electrical problems.	Understand	PSO 4

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.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **BATTERIES AND ACCESSORIES**	**20**
Unit 2: **STARTING SYSTEM**	**18**
Unit 3: **CHARGING SYSTEM AND LIGHTING**	**18**
Unit 4:**FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS**	**12**
Unit 5:**ELECTRICAL SYSTEM MAINTENANCE – SERVICING AND REPAIRS**	**12**

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.

SDC3AU14 Electrical machines and Machine Drives

Course No: 3.6
Course Code: SDC3AU14
Course Name: Electrical machines and Machine Drives
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

To provide the students with an overview of the most important concepts in Electrical Machines and Machine Drives

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Classify*** different Transformers and Electrical machines	Understand	PSO 4
CO2	***Analyse*** the construction, working and application of transformers and machines.	Analyse	PSO 4
CO3	***Explain*** the purpose of machine drives.	Understand	PSO 4
CO4	***Explain*** the construction and application of machine drives.	Understand	PSO 4

Course Outline

UNIT I (15 Hours)

Transformers: Operating principle, classification, construction, emf equation, losses & efficiency, Tests on transformer, autotransformers, instrument transformers

D.C. Machines: Operating principle, generator & motor action, construction, types, emf & torque equations, power stages & efficiency. Commutation & Armature Reaction, starting & speed control of dc motors, tests on dc machine

UNIT II (10 Hours)

Synchronous Machines: Construction, types & operating principle of synchronous generator, A.C armature windings, parallel operation, Synchronous Motor, principle, starting, hunting, damper windings, tests on synchronous machine

UNIT III (10 Hours)

Induction Machines: Three-phase induction motors. Principle of operation, construction, types. Rotating magnetic field, emf equation of an AC Machine, torque developed in an induction motor, torque-speed characteristics, starting & speed control, tests on induction machine

Single phase induction motors - principle of operation- starting, application.

UNIT IV (12 Hours)

Special Machines - Constructional features and Principle of operation of – stepper motor- switched reluctance motor – brushless dc motor – permanent magnet synchronous motor - Hysteresis motor- Synchronous Reluctance Motor–Linear Induction motor-Repulsion motor-Applications.

UNIT V (13 Hours)

Electrical Drives - Parts of electrical drives - Choice of electric drives - Status of DC and AC drives - Fundamental torque equations – Speed torque conventions and multi-quadrant operation - Components of load torque - Three phase Induction motor drives - Stator voltage control - Frequency control - Voltage and frequency control

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Transformers & D.C. Machines**	**20**
Unit 2: **Synchronous Machines**	**10**
Unit 3: **Induction Machines & Single phase induction motors**	**20**
Unit 4: **Special Machines**	**20**
Unit 5: **Electrical Drives**	**10**

Text Books:

1. “Electric Machines”, Nagrath and Kothari, Tata McGraw-Hill.

2. Electric Machinery, P.S.Bimbhra, Khanna Publishers
3. Gopal K. Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, New Delhi.
4. V.K. Mehta, Rohit Mehta, Principles Of Electrical Machines, S Chand Publication

References:

1. Theraja B.L., Theraja A.K. A Text Book of Electrical Technology, Vol.II "AC & DC Machines", publication division of Nirja construction & development (p) Ltd., New Delhi, 1994.
2. M. H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson Education
3. Bimal K Bose, " Modern Power Electronics and AC Drives" PHI

SDC3AU15(P) Automotive Electrical Laboratory I

Course No: 3.7
Course Code: SDC3AU15(P)
Course Name: Automotive Electrical Laboratory I
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours

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 Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able;*	**Learning Domain**	**PSO No**
CO1	To ***record*** different types of errors and compensations in measuring instruments.	Remember	PSO 4
CO2	***Experiment*** extension of range of transducers.	Apply	PSO 4
CO3	To ***identify*** different types of error compensations in measuring instruments.	Remember	PSO 4
CO4	To ***examine*** the calibration procedure.	Apply	PSO 4
CO5	To ***apply*** battery inspection procedure.	Apply	PSO 4

Course Outcome

At the end of the course students will be able

1. To record different types of errors and compensations in measuring instruments.
2. Experiment extension of range of transducers.
3. To identify different types of error compensations in measuring instruments.
4. To examine the calibration procedure.
5. To utilize battery inspection procedure.

List of Experiments

PART- I

1. Testing of batteries and battery maintenance.
2. Testing of regulators and cut – outs relay.
3. 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.

SDC3AU16(P) Automotive Electronics Laboratory

Course No: 3.8
Course Code: SDC3AU16(P)
Course Name: Automotive Electronics Laboratory
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

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 Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	To ***construct*** the electronic components and basic electronic instruments.	Apply	PSO 4
CO2	To ***design*** PCB and various processes involved.	Apply	PSO 4
CO3	To ***fabricate*** Printed Circuit Boards.	Apply	PSO 4
CO4	To ***assemble*** and test PCB based electronic circuits.	Apply	PSO 4
CO5	To ***utilize*** basic skills necessary to diagnose automotive sensor problems	Apply	PSO 4

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.

SEMESTER 4

A13 Entrepreneurship Development

Course No: 4.1
Course Code: A13
Course Name: Entrepreneurship Development
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

1. To familiarize the students with the concept of entrepreneurship.
2. To identify and develop the entrepreneurial talents of the students.
3. To generate innovative business ideas in the emerging industrial scenario

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Recall*** the nature of entrepreneurship and the financial assistance and guidance from the government.	Remember	PSO 2
CO2	***infer*** an entrepreneurial business idea	Understand	PSO 2
CO3	***Define*** entrepreneurial leadership and management style.	Understand	PSO 2
CO4	***Build*** an Industrial unit.	Create	PSO 2

Course Outline

Module I(11Hrs)

Concepts of entrepreneur: Entrepreneur- Definitions - Characteristics of entrepreneur Classification of Entrepreneur-Entrepreneurial traits -Entrepreneurial functions - role of entrepreneurs in the economic development - Factor effecting entrepreneurial growth – Entrepreneurship – Meaning – definition - Entrepreneur vs Intrapreneur – Women Entrepreneurs - Recent development – Problems - Entrepreneurial Development Programmes- Objectives of EDP - Methods of training - Phases of EDP.

Module II(13 Hrs)

Institutional support and incentives to entrepreneurs- Functions of Department of Industriesand Commerce (DIC) - Activities of Small Industrial Development Corporation (SIDCO)-Functions of National Small Industries Corporation(NSIC)- Functions of Small Industries Development Bank of India (SIDBI) - Khadi Village Industry Commission (KVIC)-Small Industries Service Institute (SISI)- Functions and services of Kerala Industrial Technical Consultancy Organisation (KITCO)-Activities of Science and Technology EntrepreneurshipDevelopment Project (STEDP)-Strategies of National Entrepreneurship Development Board(NEDB) -Objectives of National Institute for entrepreneurship and small business development (NIESBUD) - TechnoPark-Functions of techno park Incentives- Importance Classification of incentives – Subsidy - Types of Subsidy

Module III(11 Hrs)

Micro Small and Medium Enterprises- Features- Objectives- Importance- Role of SME in theeconomic development- MSME Act 2006- Salient features- Credit Guarantee Fund Trust Scheme for MSMEs - Industrial Estates-Classification-Benefits- Green channel- Bridge capital-Seed capital assistance-Margin money schemes –Single Window System- Sickness Causes – Remedies- Registration of SSI.

UNIT IV (14 Hours)

Setting up of Industrial unit-(Only Basic study) Environment for Entrepreneurship – Criteriafor selecting particular project- Generating project ideas-Market and demand analysisFeasibility study- Scope of technical feasibility- Financial feasibility- Social cost-benefitanalysis-Government regulations for project clearance-Import of capital goods- approval offoreign collaboration-Pollution control clearances- Setting up of micro small and mediumenterprises-Location decision- Significance.

UNIT V (11 Hours)

Project Report - Meaning-Definition - Purpose of project reports-Requirements of goodreport - Methods of reporting - General principles of a good reporting system - Performa of aproject report - Sample project report. (The preparation of sample project report shall betreated as an assignment of this course).

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Concepts of entrepreneu**r	**14**
Unit 2:**Institutional support and incentives to entrepreneurs**	**18**
Unit 3: **Micro Small and Medium Enterprises**	**14**
Unit 4: **Setting up of Industrial unit**	**20**
Unit 5: **Project Report**	**14**

Books Recommended:

1. Shukla M.B. Entrepreneurship and small Business Management,Kitab Mahal Allahabad.
2. Sangram Keshari Mohanty, Fundamentals of entrepreneurship,PHI,New Delhi.
3. Nandan H. Fundamentals of Entrepreneurship,PHI, NewDelhi.
4. Small-Scale Industries and Entrepreneurship, Himalaya Publishing ,Delhi
5. C.N.Sontakki,Project Management,Kalyani Publishers, Ludhiana.
6. Sangam Keshari Mohanty. Fundamentals of Entrepreneurship, PHI, NewDelhi
7. Peter F. Drucker- Innovation and Entrepreneurship.
8. Vasanth Desai, Small Business Entrepreneurship, Himalaya Publications.
9. MSME Act 2006.

A14 Public Health, Sanitation & Safety

Course No: 4.2
Course Code: A14
Course Name: Public Health, Sanitation & Safety
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours
Objectives of the Course

1. To familiarize the students with the concept of entrepreneurship.
2. To identify and develop the entrepreneurial talents of the students.
3. To generate innovative business ideas in the emerging industrial scenario

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Identify*** the diseases associated with occupation	Remember	PSO 2
CO2	***Identify*** the hazard in industrial area and propose preventive measures	Remember	PSO 2
CO3	***Explain*** safety in industries and propose safety measures and PPE	Understand	PSO 2
CO4	***Demonstrate*** the hygiene and sanitation procedures	Understand	PSO 2
CO5	***Demonstrate*** the microorganism responsible for the disease and their control	Understand	PSO 2

Course Outline

Module 1 (12 Hrs)

Health-Physical, Mental, Social – Positive health– Quality of life Index.

Health programmes: Health programmes control measures in operation India- Tuberculosis, poliomyelitis, leprosy, filariasis and diphtheria. Health situation in India–HealthProblems-Primary healthcare India –PHCs National Programmes for elimination of diseases. -Waterbornediseasesandairbornediseases.Methods of disease transmission.

Module 2 (11 Hrs)

Sanitation: Definition and meaning. Microbial growth pattern and factors affecting microbial proliferation.

Sewage Disposal: disposal of sewage and night soil–treatment of sewage system

Waste Disposal- Disposal Of Solid Waste; Waste water handling: Pre-treatment,primary treatment, secondary treatment,tertiary treatment and disinfection.

Water -supplysources–impurities and purification of water.

Module 3 (13 Hrs)

Contamination: Sources of contamination and protection against contamination.

Methods of killing microorganism-Use Heat,chemicals and radiation.

Methods Of Inhibiting Microbial Growth-Use Of Refrigeration, chemicals, dehydration and fermentation

Principles Of Hygiene: General Principles Hygiene– its relation to food preparation and food handling habits.

Personnel hygiene- Meaning and importance; Hygienic practices of employees; personal hygiene and contamination of food Products-Sanitation Training and Education for Food Service Workers.

Module 4 (11 Hrs)

Food Borne infection, intoxication: Food Poisoning– causes and types– Definition, Exotoxin, Endotoxin, intoxications control measures food borne intoxication and infection–sources–effects and prevention.

symptoms and control: Botulism,Staphylococcus, E.coli salmonella.Food Infections–sources, symptoms Methods of Prevention and investigation of food borne disease outbreak.

Module 5 (13 Hrs)

Occupational Safety, Health and Environment: Definition-safety at workplace- safe use of machines and tools-hazard-physical hazard (noise, radiation, fire, Electrical, illumination)-chemical hazard-biological hazard-Personal Protective Equipment - Accident preventive techniques-First Aid-Plant Layout for safety-safety of different sectors.

External Assessment (80 Marks) Mark distribution for setting Question paper No of Questions: 27	
Unit	**Marks**
Unit 1: **Health programmes**	**16**
Unit 2: **Sanitation,Sewage Disposal,Waste Disposal & Water**	**14**
Unit 3: **Contamination & Principles Of Hygiene**	**18**
Unit 4: **Food Borne infection, intoxication & symptoms and control**	**14**
Unit 5: **Occupational Safety, Health and Environment**	**18**

References:

1. Parke.K.2007.Textbook of preventive andSocial
2. Medicine19thEdition,M/s. Banaraisdasis Bhanet Publishers,Jabalpur,India.
3. William,C.,Frazier and Dennie.CWestheff.1996.Food Microbiology 4thEdition, Tata McGraw hill Company Limited
3. S.Roday–FoodHygiene andSanitation
4. M.Jacob.(1989)–Safe foodHandling.
5. V.N.Reinhold–PrinciplesofFoodSanitation
6. B.C.Hobbs & R.J.Gilbert–Food Poisoning and Hygiene.

SDC4AU17 Electronic Engine Management Systems

Course No: 4.3
Course Code: SDC4AU17
Course Name: Electronic Engine Management Systems
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]

Examination: 2.5 Hours

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 Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Describe*** the fuel injection systems in a SI engine, diesel engine and the emission control systems.	Remember	PSO 4
CO2	***Explain*** the different types of sensors used in an automobile engine management system.	Understand	PSO 4
CO3	***Describe*** the ignition and injection methods used in an SI engine.	Remember	PSO 4
CO4	***Summarize*** the electronic systems used in the fuel control system and the dash board unit.	Understand	PSO 4

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.

External Assessment (80 Marks) Mark distribution for setting Question paper No of Questions: 27	
Unit	**Marks**
Unit 1:**ELECTRONIC FUEL INJECTION AND IGNITION SYSTEMS**	**20**
Unit 2:**GASOLINE INJECTION SYSTEM**	**20**
Unit 3: **DIESEL INJECTION SYSTEM**	**20**
Unit 4: **IGNITION SYSTEMS**	**20**

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

SDC4AU18 Digital Fundamentals

Course No: 4.4
Course Code: SDC4AU18
Course Name: Digital Fundamentals
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours
Objectives of the Course

To provide the students with an overview of the most important concepts in Digital electronics

	Expected Course Outcome	Learning	PSO

Course Outcomes	*Upon completion of this course, students will be able to;*	Domain	No
CO1	***Apply*** digital electronics in the present contemporary world	Apply	PSO 4
CO2	***Design*** various combinational digital circuits using logic gates	Apply	PSO 4
CO3	Do the ***design*** procedures for synchronous and asynchronous sequential circuits	Apply	PSO 4
CO4	***Apply*** the semiconductor memories and related technology	Apply	PSO 4
CO5	***Solve*** electronic circuits involved in the design of logic gates	Apply	PSO 4

Course Outline

UNIT I (10 Hours)

Number system and codes: Binary, octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421- 2421). gray code, excess–3 code, cyclic code, code conversion, ASCII, EBCDIC codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation.

UNIT II (10 Hours)

Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De-Morgan's theorem, Min term, Max term, POS, SOP, KMap, Simplification by boolean theorems, don't care condition

UNIT III (7 Hours)

Combinational Logic: The Half adder, the full adder, subtractor circuit. Multiplxer de-multiplexer, decoder, BCD to seven segment Decoder, encoders.

Flip flop and Timing circuit : set-reset laches, D-flipflop, R-S flipflop, J-K Flip-flop, Master slave Flip flop, edge triggered flip-flop, T flip-flop.

UNIT IV (8 Hours)

Registers & Counters: Synchronous/Asynchronous counter - operation, Up/down synchronous counter, application of counter - Ripple Counters, Ring Counters- Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, parallel in/Serial out shift register, Bi-directional register

UNIT V (10 Hours)

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL.

Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS

External Assessment (60 Marks) **Mark distribution for setting Question paper** **No of Questions: 21**	
Unit	**Marks**
Unit 1: **Number system and codes**	**10**
Unit 2: **Boolean Algebra**	**15**
Unit 3: **Combinational Logic & Flip flop and Timing circuit**	**15**
Unit 4: **Registers & Counters**	**10**
Unit 5: **Basic memory structure & Digital integrated circuits**	**10**

Text & Reference Books:

1. Digital Fundamentals by Morris and Mano, PHI Publication
2. Fundamental of digital circuits by A.ANANDKUMAR,PHI Publication
3. Digital Fundamentals by FLOYD & JAIN, Pearsons Pub

SDC4AU19 Microprocessors and Microcontrollers

Course No: 4.5
Course Code: SDC4AU19
Course Name: Microprocessors and Microcontrollers
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours
Objectives of the Course

To provide the students with an overview of the most important concepts in Micro-Processors And Micro Controllers

Course	**Expected Course Outcome** *Upon completion of this course, students will*	**Learning Domain**	**PSO No**

Outcomes	*be able to;*		
CO1	***Demonstrate*** the knowledge of microprocessors and microcontrollers in the present contemporary world	Apply	PSO 4
CO2	***Relate*** the architecture of processors	Understand	PSO 4
CO3	***Apply*** the instruction sets and interrupts in the electronic devices.	Apply	PSO 4
CO4	***Experiment*** with the interfacing of external devices with the micro processors and controllers.	Apply	PSO 4

Course Outline

UNIT I (8 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 (9 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 (9 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 MICROCONTROLLER (9 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 INTERFACING MICROCONTROLLER (10 HOURS)

Architecture of 8051 — Special Function Registers(SFRs) — I/O Pins Ports and Circuits — Instruction set — Addressing modes — Assembly language programming.

Programming 8051 Timers — Serial Port Programming — Interrupts Programming — LCD & Keyboard Interfacing — ADC, DAC & Sensor Interfacing — External Memory Interface-

Stepper Motor and Waveform generation — Comparison of Microprocessor, Microcontroller, PIC and ARM processors

External Assessment (60 Marks) **Mark distribution for setting Question paper** **No of Questions: 21**	
Unit	**Marks**
Unit 1: **Evolution of Processors**	**15**
Unit 2: **Instruction set of 8085**	**10**
Unit 3: **Stack and Subroutines**	**10**
Unit 4: **MICROCONTROLLER**	**10**
Unit 5: **INTERFACING MICROCONTROLLER**	**15**

Text Books:

1. D. V. Hall. Micro processors and Interfacing, TMGH. 2'1 edition 2006.
2. Kenneth. J. Ayala. The 8051 microcontroller , 3rd edition, Cengage learning, 2010
3. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with8085, Penram Intl.

References:

1. Advanced Microprocessors and Peripherals - A. K. Ray and K.M. Bhurchandani, TMH, 2nd edition 2006.
2. The 8051 Microcontrollers, Architecture and programming and Applications -K.Uma Rao, Andhe Pallavi,,Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture. Programming and Design - By Liu and GA Gibson, PHI, 2nd Ed.,
4. Microcontrollers and application, Ajay. V. Deshmukh, TMGH. 2005

SDC4AU20(P) Automotive Electrical Laboratory- II

Course No: 4.6
Course Code: SDC4AU20(P)
Course Name: Automotive Electrical Laboratory- II
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

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

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Test*** different types of dc motors and generators.	Apply	PSO 4
CO2	***Validate*** and to do different test in transformer.	Apply	PSO 4
CO3	***Measure*** power in single phase and three phase system.	Apply	PSO 4
CO4	***Test*** different types of three phase induction motors.	Apply	PSO 4
CO5	***Measure*** regulation of a given alternator.	Apply	PSO 4
CO6	***Explain*** constructional features of 3-phase and 1-phase AC machines.	Apply	PSO 4
CO7	***Experiment*** Speed control of 3-phase and 1-phase motors.	Apply	PSO 4
CO8	***Determine*** efficiency, regulations of different machines.	Apply	PSO 4

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.

SDC4AU21(P) Industrial Workshop

Course No: 4.7
Course Code: SDC4AU21(P)
Course Name: Industrial Workshop
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

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 Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Develop*** a right attitude, team working, precision and safety at work place.	Apply	PSO 6
CO2	***Experiment*** various welding and joining processes.	Apply	PSO 4
CO3	***Practice*** on manufacturing of components using workshop trades including wiring and welding.	Apply	PSO 4
CO4	***Apply*** basic electrical engineering knowledge for house wiring practice	Apply	PSO 4
CO5	***Practice*** Soldering and Desoldering of various types of IC Packages.	Apply	PSO 4
CO6	***Prepare*** wires for soldering and select the correct grades of solder.	Apply	PSO 4

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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.

SDC4AU22(Pr) Project Work / Internship

Course No: 4.8
Course Code: SDC4AU22(Pr)
Course Name: Project Work / Internship
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours

Objectives of the Course

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

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able:*	**Learning Domain**	**PSO No**
CO1	To ***foster*** innovation in design of products, processes or systems.	Apply	PSO 4
CO2	To ***develop*** design that add value to products and solve technical problems	Apply	PSO 4
CO3	***Provide*** a solution for a real life situation.	Apply	PSO 4
CO4	To ***develop*** effective communication skill by delivering a Presentation based on mini project.	Apply	PSO 4
CO5	To ***Demonstrate*** the idea in mini project for	Understand	PSO 4

	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

GEC5PS23 Life Skill Application

Course No: 5.1
Course Code: GEC5PS23
Course Name: Life Skill Application
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours
(This course taken from BSc Psychology
Course Code: BPS5D02
Course Name: Life Skill Application)

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able:*	**Learning Domain**	**PSO No**
CO1	To ***define*** life skill education	Understand	PSO 6
CO2	To ***develop*** abilities for adaptive and positive behavior	Apply	PSO 6
CO3	To ***build*** self-confidence and self-esteem	Create	PSO 6

Course Outline

Module I Introduction (6 Hours)
Life Skill: Concept, meaning, definition, need, Importance, Ten core life skills.

Module II Self awareness, Empathy and Problem solving (9 Hours)
Self awareness: concept, importance of self awareness, skills to become self aware and benefits of self awareness in real life.
Empathy: Need for empathy, importance of empathy in building relationships, benefits of empathy in real life. Problem solving: Steps of problem solving, using problem solving skill in solving real life problems

Module III Survival Skills, Effective communication and Negotiating skills (16 Hours)
Survival Skills: Interpersonal relations-building of interpersonal relations, skill to improve interpersonal relations

Effective communication: listening skills, verbal and non verbal communications. Negotiating skills: decision making-importance of effective decision making in real life, career decision making.

Module IV Life skill in different area (14 Hours)

Life skill for preventing addiction-life skill for career planning and development-life skill for women empowerment-life skill training for various groups (Adolescents, youth).

External Assessment (60 Marks) **Mark distribution for setting Question paper** **No of Questions: 21**	
Unit	**Marks**
Unit 1: **Life Skill**	**12**
Unit 2: **Self awareness & Empathy**	**16**
Unit 3: **Survival Skills & skills**	**14**
Unit 4: **Life skill in different area**	**18**

References:

1. Hurlock,B.E. (2007). Co.Ltd Developmental Psychology. New Delhi:Tata MC Grew Hill Publishing
2. Nelson – Jones, R. (2007). Life Counseling Skills.New Delhi :Sage Publishers
3. Rajasenan ,U. (2010). Life skills,Personality and Leadership.Chennai,RGNIYD
4. UNESCO and Indian Natotional Commission for Cooperation .(2001). Life skills in Non formal Education;A Review. Paris.
5. UNESCO-http://www.unesco.org
6. Wadker,A.(2016).Lifeskills for success. Delhi:Sage Publications
7. WHO (1999) Partners In Life Skill Education: Conclusions from a Uninvited Nations Inter Agency Meeting, Geneva
8. WHO-http://www.who.int/en/

SDC5AU24 Internet of Things (IoT)

Course No: 5.2
Course Code: SDC5AU24
Course Name: Internet of Things (IoT)
Credits: 3
Hours: 45
Marks: 75 Marks [Internal: 15, External: 60]
Examination: 2 Hours

Objectives of the Course

1. Learner will be able to design projects based of Arduino.

2. Learner will be able to Implement projects based of Raspberry pi.

3. Learner will be able to Identify and use different types of sensors which are compatible with Arduino and Raspberry pi.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able ;*	Learning Domain	PSO No
CO1	To ***implement*** simple IOT Systems.	Apply	PSO 4
CO2	To ***explain*** Smart Objects and IoT Architectures	Understand	PSO 4
CO3	To ***Define*** about various IOT-related protocols	Understand	PSO 4
CO4	To ***build*** simple IoT Systems using Arduino and Raspberry Pi.	Apply	PSO 4
CO5	To ***explain*** data analytics and cloud in the context of IoT	Understand	PSO 4
CO6	To ***develop*** IoT infrastructure for popular applications	Apply	PSO 4

Course Outline

Module 1(9 hours)

Fundamentals Of IoT :-Evolution of Internet of Things, Enabling Technologies, IoT Architectures: one M2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture - Product designing - Development Boards - Introduction to Arduino - Basic Arduino structure - void setup (), void loop () - Char & int declaration for analog & digital pins - Pin modes, digital/analog pin writing - Delay generation - Increment/decrement & basic arithmetic functions - Different loops [if, for, while, do while] - Arduino blink using LEDs - Loop functions and LED controlling - Delay generation and controlling - LED blinking using Push button.

Module 2(8 hours)

Serial data transmission - Serial data communication - Serial port selection - Serial data pins [Tx & Rx] - Serial data transmission commands - Serial monitor & serial plotter - Basic arithmetic problem and displaying data - Plotting serial values - Interfacing Ultrasonic sensor - Calibration and range setting - Ultrasonic distance measurement - Displaying and plotting real time reading - Interfacing LED circuits with distance monitor.

Module 3(8 hours)

Sensors - Interfacing basic sensors to Arduino and coding - Interfacing IR LED pairs - Obstacle detection and blinking LEDs - Developing an obstacle detection Application - Temperature Sensor - Basic circuit setup - Displaying temperature measured - Over temperature / lower temperature monitoring using LEDs – LDR - Automatic lamp design - LDR projects - Interfacing servo motors - Servo motor - Basic servo theory - Servo motor rotation (0, 90, 180) - Motor rotation with delay - Projects using servo motor and other sensors - Serial data transmission basics.

Module 4(10 hours)

Introduction to Raspberry pi - Why Raspberry pi? - Features of Raspberry pi - Different uses & versions of Raspberry pi – Raspberry Pi Comparisons – Raspberry Pi Pinout – Install and Configure NOOBS – Opening the Terminal - First time boot & configurations - Time setting, keyboard layout, disk expand - Playing around shell – Connecting to a network – Checking IP address - Introduction to programming - Python - Getting started with python programming – Running Python Scripts – Running Script at Start up.

Module 5(10 hours)

Blink an LED – Dim an LED – Ultrasonic Sensor – Ultrasonic and Buzzer – Digital Input – Control LED Brightness using 2 Buttons – Servo Motor – Setting up webserver on a raspberry Pi – Bottle – Installing Bottle – Running a simple Bottle app – Rendering Templates – Control an LED from Web – Dim an LED from web – Display the distance in web – Web page modifications.

External Assessment (60 Marks) **Mark distribution for setting Question paper** **No of Questions: 21**	
Unit	**Marks**
Unit 1: **Fundamentals Of IoT**	**12**
Unit 2: **Data Transmission**	**11**
Unit 3: **Sensors**	**11**
Unit 4: **Introduction to Raspberry pi**	**13**
Unit 5: **Blink an LED**	**13**

Text & Reference Books:

1. Honbo Zhou, The Internet of Things in the Cloud:A Middleware Perspective-CRC Press 2012.

2. Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.), Architecting the Internet of Things –– Springer – 2011
3. David Easley and Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World, Cambridge University Press - 2010.
4. Olivier Hersent, Omar Elloumi and David Boswarthick , The Internet of Things: Applications to the Smart Grid and Building Automation, Wiley -2012
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

SDC5AU25 Automotive Electrical System

Course No: 5.3
Course Code: SDC5AU25
Course Name: Automotive Electrical System
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

The course aims to impart basic skills and understanding of automotive electrical systems, equipments and their working details.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Illustrate*** the basic auto electrical systems	Understand	PSO 4
CO2	***Make use of*** layout of wiring and connections of electrical systems in automobiles.	Apply	PSO 4
CO3	***Relate*** the working of different electrical components and Auxiliaries used in automobiles.	Understand	PSO 4
CO4	***Identify*** various communication protocols and technologies used in vehicle networks	Understand	PSO 4
CO5	***Infer*** central electrical controls	Understand	PSO 4

Course Outline

UNIT I (10 Hours)

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 (10 Hours)

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 (10 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 IV (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, Xenon lighting, LED & IR lighting, Mono colour signal lamps, Neon technology, Bending light, Intelligent front lighting, Advanced lighting technology.

UNIT V (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.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **ELECTRICAL SYSTEM, WIRING, TERMINALS AND SWITCHING**	**15**

Unit 2: **MULTIPLEXING , MEDIA ORIENTED SYSTEM TRANSPORT**	**15**
Unit 3: **CIRCUIT DIAGRAMS AND ELECTROMAGNETIC COMPATIBILITY (EMC), CENTRAL ELECTRICAL CONTROL, CONNECTED CARS**	**20**
Unit 4: **LIGHTING**	**15**
Unit 5: **AUXILIARIES**	**15**

Text Books:

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

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.

SDC5AU26 Electric and Hybrid Vehicles

Course No: 5.4
Course Code: SDC5AU26
Course Name: Electric and Hybrid Vehicles
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

To present a comprehensive overview of Electric and Hybrid Electric Vehicles

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Choose*** a suitable drive scheme for developing an electric hybrid vehicle depending on resources	Remember	PSO 4

CO2	***Design*** and develop basic schemes of electric vehicles and hybrid electric vehicles.	Understand	PSO 4
CO3	***Select*** proper energy storage systems for vehicle applications.	Remember	PSO 4
CO4	***Summarize*** energy management strategies used in hybrid and electric vehicles.	Understand	PSO 4

Course Outline

UNIT I (12 Hours)

History of Electric Vehicles, Development towards 21st Century, Types of Electric Vehicles in use today – Battery Electric Vehicle, Hybrid (ICE & others), Fuel Cell EV, Solar Powered Vehicles, impact of modern drive-trains on energy supplies. Motion and Dynamic Equations of the Electric Vehicles: various forces acting on the Vehicle in static and dynamic conditions

UNIT II (12 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.

UNIT III (15 Hours)

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of -DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, Switch Reluctance Motor drives, drive system efficiency.

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices

UNIT IV (11 Hours)

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology.

Driving Cycles, Types of Driving Cycles, Range modelling for Battery Electric Vehicle, Hybrid (ICE & others), Fuel Cell EV, Solar Powered Vehicles.

UNIT V (10 Hours)

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management

strategies, implementation issues of energy management strategies. Introduction to various charging technique and schematic of charging stations.

External Assessment (80 Marks) Mark distribution for setting Question paper No of Questions: 27	
Unit	**Marks**
Unit 1: **History of Electric Vehicles**	**15**
Unit 2: **Hybrid Electric Drive-trains**	**15**
Unit 3: **Electric Propulsion unit & Energy Storage**	**15**
Unit 4: **Battery electric vehicle**	**20**
Unit 5:**Introduction to energy management strategies used in hybrid and electric vehicles**	**15**

Text Books:

1. 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.

SDC5AU27 Automobile HVAC

Course No: 5.5
Course Code: SDC5AU27
Course Name: Automobile HVAC
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

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 Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Explain*** working of Automotive Air conditioning & Refrigeration system and its components.	Understand	PSO 4
CO2	***Explain*** the working of the Automotive heater system and its components.	Understand	PSO 4
CO3	***Make use of*** various types of refrigerants and their properties	Apply	PSO 4
CO4	***Distinguish*** manually controlled and automatic controlled air conditioners.	Analyze	PSO 4
CO5	***Plan*** the maintenance and service procedure of Air conditioner.	Apply	PSO 4

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**.**

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **Introduction to Air conditioning & Refrigeration**	**20**
Unit 2: **AUTOMOTIVE AIRCONDITIONING FUNDAMENTALS**	**20**
Unit 3: **AUTOMOTIVE COOLING AND HEATING SYSTEM**	**20**
Unit 4: **AIR-CONDITIOING CONTROLS, DELIVERY SYSTEM AND REFRIGERANTS**	**20**

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.

SDC5AU28 Vehicle Body Engineering

Course No: 5.6
Course Code: SDC5AU28
Course Name: Vehicle Body Engineering
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

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 Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Illustrate*** the different types and components of car body	Understand	PSO 4
CO2	***Explain*** the concept, importance and testing of aerodynamics in car body design.	Understand	PSO 4
CO3	***Identify*** the different types and components of bus and commercial body.	Apply	PSO 4
CO4	***Relate*** different vehicle body materials with their merits and demerits	Understand	PSO 4
CO5	***Illustrate*** the importance of vehicle safety	Understand	PSO 4
CO6	***Summarize*** vehicle ergonomics.	Understand	PSO 4

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.

External Assessment (80 Marks) **Mark distribution for setting Question paper** **No of Questions: 27**	
Unit	**Marks**
Unit 1: **CAR BODY DETAILS**	**16**
Unit 2: **BUS BODY DETAILS**	**20**
Unit 3: **COMMERCIAL VEHICLE DETAILS**	**14**
Unit 4: **Statistics of accidents**	**14**
Unit 5: **Pedestrian Safety and Ergonomics**	**16**

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.

SDC5AU29(P) Microprocessor Lab

Course No: 5.7
Course Code: SDC5AU29(P)
Course Name: Microprocessor Lab
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

1. To practice assembly language programming
2. To practice fundamentals of interfacing/programming various peripheral devices with microprocessor/microcontroller.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Develop*** assembly language programs for problem solving using software interrupts and various assembler directives.	Apply	PSO 4
CO2	***Interface*** different I/Os with Microprocessors.	Apply	PSO 4
CO3	***Implement*** interfacing of various I/O devices to the microprocessor/ microcontroller through assembly language programming.	Apply	PSO 4

List of Experiments

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.

SDC5AU30(P) IoT Lab

Course No: 5.8
Course Code: SDC5AU30(P)
Course Name: IoT Lab
Credits: 4
Hours: 60
Marks: 100 [Internal: 20, External: 80]
Examination: 2.5 Hours

Objectives of the Course

The objective of this course includes a practical understanding of Arduino Uno and thorough clarity on the Internet of Things.

Course Outcomes	Expected Course Outcome *Upon completion of this course, students will be able to;*	Learning Domain	PSO No
CO1	***Design*** projects based of Arduino.	Create	PSO 5
CO2	***Identify*** and use different types of sensors which are compatible with Arduino.	Apply	PSO 5

List of Experiments

Model 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

SDC6AU31 Term paper

Course No: 6.1
Course Code: SDC6AU31
Course Name: Term paper
Credits: 2
Marks: 100 [Internal: 50, External: 0]

Objectives of the Course

1. Each student shall present a seminar on any topic of interest related to the branch-specific courses offered in previous semester of the programme

Internship and project

2. To acquire knowledge on Automobiles and its industry.

Course Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Relate*** and select the task based on their core skills.	Understand	PSO 6
CO2	***Analyze*** the problem and collect necessary data.	Understand	PSO 6
CO3	***Design*** and develop the project using appropriate software by applying the programming skills.	Apply	PSO 5
CO4	***Implement***, evaluate and generate reports.	Apply	PSO 5

Course Outline

Term Paper

- He / she shall select the topic based on the references: from reputed International Journals, preferably SAE / IEEE journals.
- They should get the paper approved by the Programme Coordinator / Faculty member in charge of the seminar and shall present it in the class.
- Proper presentation aid can be used. Every student shall participate in the seminar.
- The students should undertake a detailed study on the topic and submit a report prior to the presentation.
- Marks will be awarded based on the topic, presentation, participation in the seminar and the report submitted.

SDC6AU32(Pr) Internship & Project

Course No: 6.2
Course Code: SDC6AU32(Pr)
Course Name: Internship & Project
Credits: 28
Hours: 900hrs
Marks Internship: 200 [Internal: 40, External: 160]
Marks Project: 200 [Internal: 40, External: 160]

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 Outcomes	**Expected Course Outcome** *Upon completion of this course, students will be able to;*	**Learning Domain**	**PSO No**
CO1	***Develop practical experience*** within the business environment.	Apply	PSO 2
CO2	***Recall*** knowledge of the industry in which the internship is done.	Remember	PSO 2
CO3	***Apply*** knowledge and skills learned in the classroom in a work setting.	Apply	PSO 6
CO4	***Develop*** a greater understanding about career options while more clearly defining personal career goals.	Apply	PSO 5
CO5	***Develop*** and refine oral and written communication skills.	Apply	PSO 3
CO6	***Identify*** areas for future knowledge and skill development.	Apply	PSO 6
CO7	***Develop*** components, products, processes or technologies in the engineering field	Apply	PSO 4
CO8	***Apply*** knowledge gained in solving real life engineering problems	Apply	PSO 5

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.