

FAROOK COLLEGE (AUTONOMOUS)

Farook College PO, Kozhikode-673632

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

(With Effect from the Academic Year 2021-2022)

REGULATIONS and SYLLABUS



Prepared by:

BOARD OF STUDIES IN VOCATIONAL STUDIES
Farook College (Autonomous)

File Ref.No.3128/GA - IV - J1/2013/CU



UNIVERSITY OF CALICUT

Abstract

General & Academic IV- B.Voc. Automobile-Auto Electrical & Electronics programme - Scheme and Syllabus under B.Voc Regulation 2021, w.e.f 2021 Admission - Approved- Implemented - Orders issued.

U.O.No. 1956/2023/Admn

G & A - IV - J

Dated, Calicut University.P.O, 03.02.2023

- Read:-*1. U.O. No. 7135/2021/Admn dated 19.07.2021
2. Item No.2 in the minutes of the meeting of Board of Studies in Electronics(Single Board) held on 05.07.2022
3. Item No.1 in the meeting of, Faculty of Science held on 17.11.2022.
4. Item No.II.F in the LXXXIV Academic Council meeting held on 15.12.2022
5. Orders of the Vice Chancellor in thefile no. 120153/GA - IV -J1/2018/Admnevan dated 24.12.2022

ORDER

1. The Regulations for B.Voc Programmes has been implemented, vide paper read (1) above, with effect from 2021 admission.
2. Board of Studies in Electronics(Single Board) held on 05.07.2022 has approved the Scheme and Syllabus of B.Voc. Automobile-Auto Electrical & Electronics w.e.f 2021 Admission, vide paper read (2) above, prepared in accordance with the Regulations for B.Voc Programmes 2021 under University of Calicut w.e.f 2021 admission.
3. The Faculty of Science approved scheme and syllabus of B.Voc. Automobile-Auto Electrical & Electronics Programme in accordance with the Regulations for B.Voc Programmes 2021 under University of Calicut w.e.f 2021 admission, vide paper read (3) above.
4. The LXXXIV meeting of Academic Council approved the scheme and syllabus of B.Voc. Automobile-Auto Electrical & Electronics in accordance with Regulations for B.Voc Programmes 2021 under University of Calicut w.e.f 2021 admission, vide paper read (4) above, and the Vice Chancellor has accorded sanction to implement the resolution of Academic Council, vide paper read (5) above.
5. The scheme and syllabus of B.Voc. Automobile-Auto Electrical & Electronics in accordance with Regulations for B.Voc Programmes 2021 under University of Calicut, is therefore implemented with effect from 2021 Admission.
6. Orders are issued accordingly. (Syllabus appended)

Ajayakumar T.K

Assistant Registrar

To

Affiliated College offering B.Voc. Automobile-Auto Electrical & Electronics programme
Copy to: PS to VC/PA to PVC/ PA to Registrar/PA to CE/JCE I/JCE VIII/JEX and EG Sections/GA I F/CHMK Library/Information Centres/SF/DF/FC

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Section Officer

**FAROOK COLLEGE REGULATIONS
FOR
CHOICE BASED CREDIT AND SEMESTER SYSTEM
FOR VOCATIONAL UNDERGRADUATE
CURRICULUM - 2021**

(FCCBCSSVUG 2021)

(With Effect from the Academic Year 2021-2022)

**Based on General & Academic - Regulations for B.Voc. Programmes under
University of Calicut with effect from 2021 admissions**

INDEX

- 1. Title**
- 2. Scope & Commencement**
- 3. Terms and Definition**
- 4. Programme Structure**
- 5. Credit System**
- 6. Board of Studies**
- 7. Sector/Specializations**
- 8. Admission**
- 9. Registration / Re-registration**
- 10. Examination**
- 11. Evaluation and Grading**
- 12. Indirect Grading System**
- 13. Grade Card**
- 14. Calicut University Social Service Programme**
- 15. Award of Degree**
- 16. Position Certificate**
- 17. Grievance Redressal Committee**
- 18. Anti-Ragging Cell**
- 19. BVoc Degree at Par**
- 20. Annexure I**
- 21. Annexure II**

1. Title

These regulations shall be called “Farook College Regulations for Choice Based Credit Semester System for Vocational UnderGraduate Curriculum 2021” (FCCBCSS VUG 2021)

2. Scope & Commencement

A. The regulations provided herein shall apply to B. Voc Programmes under Vocational Studies with effect from the academic year 2021-2022.

These regulations strictly adhere to B. Voc Programmes and may not apply to any other graduate or undergraduate level programmes conducted by the College

B. Objectives

The B.Voc courses are designed with the following objectives,

- a) To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- b) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- c) To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- d) To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- e) To provide vertical mobility to students coming out of 10+2 with vocational subjects.

OUTCOME BASED EDUCATION

Programme Outcome

Upon completion of the undergraduate program at Farook College (Autonomous), the students will be able to develop:

PO1:	<p>Competency in Disciplinary Knowledge</p> <p>Graduates acquire comprehensive knowledge in the subject and competence to demonstrate the same, identify the foundations of the respective discipline and develop essential interdisciplinary awareness.</p>
PO2:	<p>PO2. Communication Skills and Digital Literacy</p> <p>Graduates acquire sufficient communication skills in speech and writing to disseminate knowledge and critically analyze various discourses with the assistance of advanced communication technology in order to prepare themselves for learning, working and living in a digital society</p>
PO3:	<p>Critical Thinking and Problem Solving</p> <p>Graduates maintain the practical experience of critical thinking both in academia and real life situations, master appropriate skills to analyze various issues and to formulate coherent arguments using scientific approach and develop individual capacity to solve problems in the real and anticipated life.</p>
PO4:	<p>Leadership Skills and Professionalism</p> <p>Graduates are able to live and work in diverse conditions with members hailing from diverse background towards the fulfillment of the institutional and societal goals, keeping up the spirit of team work and maintaining dynamism and professional behavior based on positive leadership qualities, constructive feedback system and productive corrective measures.</p>
PO5:	<p>Moral and Ethical Awareness</p> <p>Graduates are able to embrace moral and ethical values specific to the society and culture and uphold them consistently as responsible members of the society.</p>

PO6:	Social Responsibility and Citizenship Skills Graduates demonstrate a sense of social responsibility and citizenship skills, including an understanding of social issues, and an awareness of cultural diversity.
PO7:	Global Competence and Sustainability Graduates are able to examine local, global and intercultural issues, understand and appreciate different perspectives and world views, interact successfully and respectfully with others, and take responsible action toward environmental and social sustainability.
PO8:	Employability and Entrepreneurship Graduates are able to achieve professional skills required to be employed in their career globally and the potential to formulate innovative ideas and to start up new enterprises.
PO9:	Inclusiveness and Equity Graduates are able to understand the importance of inclusiveness and equity in their professional and personal lives and demonstrate the ability to communicate effectively and respectfully with people from diverse backgrounds.
PO10:	Scientific Temper and Open Mindedness Graduates are able to develop scientific temper and open mindedness as processes of thinking, behaving and connecting with others based on scientific notions are able to apply the scientific method and its application in various scientific fields.

PROGRAMME OUTCOMES(POs)

By the end of the Programmes, B.Voc Students will be able to

PO1:	Demonstrate comprehensive skills relating to chosen B.Voc Programme and knowledge content of General Education and make them industry ready.
PO2:	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.
PO3:	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.
PO4:	Identify opportunities of Industry-Institute interactions by doing internships in industries.
PO5:	Equip the graduates to go for higher studies after the completion of B.Voc.
PO6:	To develop the knowledge, skills and attitude of the students which help them to support & enhance their entrepreneurial ability.
PO7:	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological change
PO8:	Understand the impact of the technological solution in the societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO9:	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.
PO10:	Create new conceptual, theoretical, methodological innovations that integrate and transcend beyond discipline-specific approaches to address a common problem.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Automobile – Auto Electrical & Electronics Graduates will be able to:

PSO1:	Demonstrate understanding of the principles and application of the basic Electrical, Electronics, Mechanical and Automobile systems.
PSO2:	Record the impact of general education in the areas like Financial and Management Accounting, Professional business skills, Human resources management, Entrepreneurship Development, Public Health Sanitation and Safety and Life skill application etc.
PSO3:	Develop competent technical speaking and writing skills in English so as to enable the graduate to effectively communicate in the workplace.
PSO4:	Develop competency in advanced developing areas such as Automobile engineering, Automobile instrumentation, Power Electronics, Automotive electrical and Electronics systems, Electrical machines drives, Electronics engine management system, Digital electronics, Microprocessor and Microcontrollers, Internet of Things, Automotive electrical system, Electrical and Hybrid Vehicle, Vehicle body Engineering etc.
PSO5:	Provide an opportunity to implement the acquired knowledge into practical applications through mini projects and a chance to appreciate the modern automobile developments through Internships.
PSO6:	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

3. Terms and Definition

- a) **B. Voc:** Bachelor of Vocation- a scheme introduced by UGC for skill development based higher education as part of college /university education.
- b) **NSQF:** National Skills Qualifications Framework is a quality assurance framework. Under NSQF, the learner can acquire the competency needed at any level through formal, non- formal or informal learning. B.Voc programme is mapped as NSQF Level 5, 6 and 7.
- c) **National Occupational Standards (NOS) or Occupational Standards (OS):** defines one key function in a job role. NOS specifies the standard of performance an individual must achieve when carrying out a function in the workplace.
- d) **Qualification Pack (QP) :** QP defines the set of NOS / OS which are aligned to Job Roles. Qualification Pack certifies a person for a specific job role.
- e) **Job Role:** Job role defines a unique set of functions that together form unique employment opportunity in an organization.
- f) **Programme:** A Programme refers to the entire course of study and examinations for the award of the B. Voc degree.
- g) **Programme Outcomes(POs):** Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.
- h) **Programme Specific Outcomes(PSOs):** Programme Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a programme.
- i) **Duration of Programme:** The time period required for the conduct of BVoc programme. It shall be six semesters distributed over a period of three academic years. Each semester shall have 90 working days inclusive of all examinations.
- j) **Academic Week:** A unit of five working days in which distribution of work is organized from day one to day five, with six contact hours of one hour duration on each day. A sequence of 18 such academic weeks (90 working days) constitute a semester.
- k) **Semester:** A term consisting of 18 weeks (16 instructional weeks and 2 weeks for examination)
- Total credits in a semester is 30 (equivalent to 450 hours).
 - For final semester internship and project, total credit is 30 with duration of 900 hrs.
- l) **Course:** Refers to the conventional paper, which is portion of the subject matter to be covered in a semester. A semester shall contain many such courses from general and skill development areas.

- m) **Course Outcomes(COs):** Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage
- n) **Improvement Course** is a course registered by a student for improving his/her performance in that particular course.
- o) **Ability Enhancement Course/Audit Course** is a course which is mandatory as per the directions from the Regulatory authorities like UGC, Supreme Court etc.
- p) **Exit Level:** B.Voc has multiple exit points at each year and successfully completing a year (2 semesters) the candidate will be awarded Diploma. Higher Diploma and/or B.Voc Degree will be awarded accordingly mentioned (in Item 5).
- q) **Sector:** Sector refers to a conventional branch.
- r) **Credit:** A unit of academic input measured in terms of weekly contact hours /course contents assigned to a course
- s) **Extra Credit:** The additional credit awarded to a student over and above the minimum credits required in a programme, for achievements in co-curricular activities and social activities conducted outside the regular class hours, as decided by the university. For calculating CGPA, extra credits will not be considered.
- t) **Letter Grade** or simply **Grade** in a course is a letter symbol (O, A+, A, B+, B, C, P,F, I and Ab). Grade shall mean the prescribed alphabetical grade awarded to a student based on his/her performance in various examinations. The Letter grade that corresponds to a range of CGPA is given in Annexure-I.
- u) **Grade point (G)** Each letter grade is assigned a Grade point (G) which is an integer indicating the numerical equivalent of the broad level of performance of a student in a course. Grade Point means point given to a letter grade on 10 point scale.
- v) **Semester Grade Point Average (SGPA)** is the value obtained by dividing the sum of credit points obtained by a student in the various courses taken in a semester by the total number of credits in that semester. SGPA shall be rounded off to three decimal places. SGPA determines the overall performance of a student at the end of a semester.
- w) **Credit Point (P)** of a course is the value obtained by multiplying the grade point (G) by the credit (C) of the course: $P = G \times C$
- x) **Cumulative Grade Point Average (CGPA)** is the value obtained by dividing the sum of credit points in all the semesters taken by the student for the entire programme by the total number of credits in the entire programme and shall be rounded off to three decimal places.

- u) **Grade Card** means the printed record of students' performance, awarded to Him / her.
- w) **Course Teacher:** A teacher nominated by the Head of the Department shall be in charge of a particular course.
- x) **B.Voc Governing Council:** A college level committee constituted by the Principal of the college. Members include Principal, representative from industrial partner, Department Head and other faculty members nominated by the Principal and university representative.
- y) **Strike off the roll:** A student who is continuously absent for 14 days without sufficient reason and proper intimation to the Principal of the college shall be removed from the roll.

4. Programme Structure

The B. Voc Programme is designed to bridge the potential skill gap identified. The curriculum in each of the years of the programme would be a suitable mix of General Education Components, Skill Development Components and Ability Enhancement Courses/Audit Courses.

A. General Education Components (GEC) :

- a) The general education component provides emphasis to Communication skill, Presentation skill, Basic Mathematical Skills, Health and Safety, Industrial Psychology, Entrepreneurship Development and other relevant subjects in the field.
- b) An option for additional language should be provided which enhances the employability outside the state.
- c) General Education Components should not exceed 40% of the total curriculum
- d) All B.Voc Programmes should follow the GEC pattern listed in the Language Reduced Pattern (LRP) Programmes of University of Calicut for languages. Changes made in the syllabus of GEC by the respective boards will be applicable to B.Voc programmes also.
- e) GEC courses A01-A04 shall be taught by English teachers and A07-A08 by teachers of additional languages respectively. GEC courses A11-A14 shall be offered by teachers of departments offering SDC courses concerned.

f) Table below shows the list of general courses.

No	Semester	Course No	Course Code	Course Name
1	1	1.1	A01	BEN1A01: Transactions: Essential English Language Skills
2		1.2	A02	BEN1A02: Ways with Words: Literatures in English
3		1.3	A07(3)	BML1A07(3): Bhashayum Sahithyavum-1 BHN1A07(3): Prose and one act plays BAR1A03: Communicative skill in Arabic
4	2	2.1	A03	BEN2A03: Writing for Academic and Professional Success
5		2.2	A04	BEN2A04: Zeitgeist: Readings on Contemporary Culture
6		2.3	A08(3)	BML2A08(3): Bhashayum Sahithyavum-2 BHN2A08(3): Poetry and Short Stories BAR2A06: Literature in Arabic
7	3	3.1	A11	Basic Mathematics and General Awareness
8		3.2	A12	Professional Business Skills
9	4	4.1	A13	Entrepreneurship Development
10		4.2	A14	Public Health, Sanitation & Safety

g) While drafting the syllabus of BVoc Programmes, the source of the general education components (other than languages) should clearly specify in the schema and syllabi of the programme. ie. to which group of GEC it belongs by specifying the course code, course name, group no or programme name.

B. Skill Development Components (SDC):

- a) This component should match the skill gap identified.
- b) At least 50% of Skill Development Components should be allotted to practical and can grow up to 60% based on the nature of the course. The practical component can be carried out in the college and/or the industry partner premises.

C.Ability Enhancement Courses/Audit Courses (AEC /AC):

These are courses which are mandatory for a programme but not counted for the calculation of SGPA or CGPA. There shall be one Audit course each in the first four semesters. These courses are not meant for classroom study. The Students can attain only pass (Grade P) for these courses. At the end of each semester there shall be an examination conducted by the college from a pool of questions (Question Bank) set by the College. The students can also attain these credits through online courses like SWAYAM, MOOC etc (optional).

The list of courses in each semester with credits is given below.

Course with credit	Semester
Environment Studies – 4	1
Disaster Management - 4	2
*Human Rights/Intellectual Property Rights/ Consumer Protection - 4	3
*Gender Studies/Gerontology- 4	4

* Colleges can opt any one of the courses.

D. Electives: Students are permitted to take elective subjects provided along with the syllabus of the programme.

5. Credit System

- a) A student is required to acquire a total of **180** credits for the completion of the programme which shall be counted for SGPA and CGPA.
- b) Each semester has a credit of **30**. Out of which the general education components shall not exceed 40% of the total credit of each semester.
- c) The maximum credit for a course shall not exceed 5 and the minimum credit for a course is 2.
- d) Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject.
- e) The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.
- f) **Audit courses** shall have 4 credits per course and a total of 16 credits in the entire programme. The credits of audit courses or extra credits are not counted for SGPA or CGPA.
- g) **Extra Credits:** The maximum credit acquired under extra credit shall be 4. If more extra credit activities are done by a student, that may be mentioned in the grade card. Extra credits are mandatory for the programme. Extra credits will be awarded to students who participate in activities like NCC, NSS, and Swatch Bharath. Those students who could not join in any of the above activities have to undergo Calicut University Social Service Programme (CUSSP). Extra credits are not counted for SGPA or CGPA.
- h) **Credit Assessment**
- One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, practicals / workshops / IT and tutorials;
 - For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops; ie. 1 credit = 30 periods of 60 minutes each.
 - For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

6. Board of Studies

MEMBERS OF BOARD OF STUDIES

Chairman: Dr. Abdul Haleem P P

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Experts from Outside the college:

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Meritorious Alumnus:

10. Mr. Shamseer B

UI & UX Designer and Developer

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a) B. Voc Programmes in each sector are attached to the concerned UG Board of Studies of their parent programmes. If necessary, new Board of Studies for BVoc programmes may be formulated as per the directions from University / Govt.

b) The Board of Studies is responsible for reviewing and approving the syllabus and provide suggestions in the curriculum. The boards shall design and introduce new courses, modify or redesign existing courses and replace any existing courses with new/modified/re-designed courses to facilitate better exposure and training for the students.

c) The institutions offering B.Voc programmes should take initiative to prepare the syllabus in consultation with their industrial partners and concerned Sector Skill Councils to design the skill development part of their theory and practical courses which enable the students to work ready at each exit point.

d) The entire curriculum shall be prepared based on Outcome Based Education (OBE) model and shall include Programme Outcomes(POs), Programme Specific Outcomes (PSOs) and Course Outcomes(COs).

e) The Syllabus of a course shall include the title of the course, the number of credits, maximum marks for external and internal evaluation, Course Outcomes(COs), NSQF Levels, National Occupational Standards (NOS) , Qualification Packs (QP), Job Roles, duration of examination hours, distribution of internal marks and reference materials. The Board of Studies concerned has the liberty to decide whether the questions can be answered in Malayalam or not. Maximum efforts shall be made to maintain a uniform pattern while designing the courses, project, viva, practical etc. in the scheme and syllabus of various programmes

f) Course Code: Each Course shall have a unique alphanumeric code number, which includes the abbreviation of subject component (SDC for Skill Development Component), the Semester number (1 to 6) in which the course is offered, abbreviation for subject and serial number of the courses. For example SDC4IT11 represents the Skill Development Component in the Information Technology Sector of serial number 11 offered in semester 4. SDC4AU17 represents the Skill Development Component in the Automotive Sector of serial number 17 offered in semester 4.

(Note: No separate code for BVoc is needed for general education components for languages (A01-A04, A07(3) and A08(3)) and other than languages (A11 –A14). Instead, follow the same code mentioned above in the column of the course code.

g) The syllabus of each course shall be prepared module wise. The course outcomes are to be clearly stated in the syllabus of all subjects including laboratory subjects. Each module / chapter may mention the number of questions to be asked in each section in the Question paper. The number of instructional hours and reference materials are also to be mentioned against each module. Since a semester contains 16 instructional weeks, the same may be considered in the preparation of the syllabi.

h) The scheme of examination and model question papers are to be prepared by the Board of Studies. The number of questions from each module in each section may be given along with the syllabus.

i) Proper guidelines shall be provided in the syllabus for internship and project, term paper, and exercises for practical sessions.

j) The Higher secondary and Vocational higher secondary syllabus, especially the NSQF element of each sector are also to be taken into account while preparing the BVoc syllabus.

k) The Boards of Studies which include BVoc programmes shall invite one member faculty related to concerned BVoc programmes while approving a BVoc Syllabus. Board of Studies have to be constantly in touch with renowned Indian Universities and at least a few foreign universities. Industrial as well as Subject experts have to be identified in all major fields of study and endeavour, and consulted frequently.

7. Sector and Specializations

Sectors and specializations for BVoc programmes shall be considered as per the guidelines of BVoc published by UGC.

8. Admission

A. Eligibility

a) The admission to all B Voc programmes will be as per the rules and regulations of the College for UG admissions.

b) The eligibility criteria for admission shall be as announced by the College from time to time.

c) Candidates who have passed (Eligible for Higher Studies) the HSE of the Kerala State Board of Higher Secondary Examination or any other examination recognized as equivalent with Mathematics/ Computer Science/Computer Application/ Information Technology/Informatics Practice/Informatics/ Additional Mathematics are eligible for admission in B.Voc Software Development.

d) Candidates who have passed (Eligible for Higher Studies) the HSE of the Kerala State Board of Higher Secondary Examination or any other examination recognized as equivalent with Mathematics are eligible for admission in B.Voc Automobile – Auto Electrical & Electronics.

e) Index Mark:

Total Part III + marks secured for Mathematics in the case of Science group with Mathematics as one of the subject AND Total Part III + marks secured for Computer Science/Computer Application/ Information Technology/Informatics Practice/Informatics/ Additional Mathematics in the case of other combinations without Mathematics as one of the subject. If the Candidates has studied both Mathematics and any one of the following subjects Computer Science/Computer Application/ Information Technology/Informatics Practice/Informatics/ Additional Mathematics, then the marks secured for Mathematics or Computer Science/Computer Application/ Information Technology/Informatics Practice/Informatics/ Additional Mathematics whichever is higher will added for admission in B.Voc Software Development.

Total Part III + marks secured for Mathematics will added for admission in B.Voc Automobile – Auto Electrical & Electronics

An additional 25 marks will be awarded for VHSE/HSE with vocational pass out students.

f) Tie Break:

For B.Voc Software Development.:

If there is a tie in the index marks priority must be given to Mathematics/Computer Science as the case may be. If there is a tie again the marks of the second subsidiary subject marks of English and then the marks for second language will be considered before going to general conditions.

For B.Voc Automobile – Auto Electrical & Electronics.:

If there is a tie in the index marks priority must be given to Mathematics. If there is a tie again the marks of the second subsidiary subject marks of English and then the marks for second language will be considered before going to general conditions.

- g) Separate rank lists shall be drawn up for reserved seats as per the existing rules.
- h) **Grace Marks** may be awarded to a student for meritorious achievements in co-curricular activities such as Sports/Arts/ NSS/NCC/ Student Entrepreneurship.

B. Diploma Holders

Diploma holders (after 10+2) in the parent courses, approved by the University, who satisfies eligibility criteria can be admitted to the higher diploma (3 rd semester) based on the availability of the seats and is under the sole discretion of the Principal / BVoc Governing Council of the college.

C. Fees Structure

1. The course fee and examination will be decided by the College as per the directions from University / Govt.
2. The college can collect Caution deposit, PTA fund, special fees, university fees, sports fee etc according to the norms provided by the university / Govt. at the time of admission.
3. If UGC / Govt. is granting financial assistance for the conduct of the programme, it is considered as in aided stream. After the stipulated period of financial aid the college can conduct the same programme in self-financing mode (provided UGC / Govt. not granting further funds)

D. College Transfer

College transfer may be allowed for programmes without the change in nomenclature

E. Readmission

- a) There shall be provision for Readmission of students in FCCBCSS VUG 2021.
- b) The Principal can grant readmission to the student, subject to the conditions detailed below.
- c) The Readmission is not to be treated as college transfer.
- d) There should be a gap of at least one semester for readmission.
- e) The candidate seeking readmission to a particular semester should have registered for the previous semester examination.

f) Readmission shall be taken within two weeks from the date of commencement of the semester concerned.

g) For readmission, the vacancy should be within the approved strength.

h) If change in scheme occurs while readmission, provision for credit transfer is subject to common guidelines prepared by the Board of Studies/ Faculty concerned.

F. Multiple Entry: The students can discontinue after the successful completion of 2nd semester with Diploma (NSQF Level 5) or 4th semester with Advanced Diploma (NSQF Level 6) and can rejoin to the programme and opt for a lateral entry to 3rd semester or to 5th semester respectively, later if wish to do so and can finish their B.Voc Degree with NSQF Level (7). In such cases, the multiple entry shall be completed within 6 years from the date of first registration of the programme.

When Rejoining through multiple entry, the following points to be considered:

1) If rejoining is sought for a student who is the previous student of the same college and in the same programme, the Principal / B. Voc Governing Council in the institution can grant the readmission.

2)) Rejoining the programme will be allowed to only if the candidate has secured a minimum CGPA of 2.5.

3) The candidate should remit the fees prevailing at that time.

9. Registration / Re-registration

a) A student shall be normally permitted to register for the examination if he/she has required minimum attendance. If the student has a shortage of attendance below 65% in a semester, the student shall be permitted to move to the next semester (if the attendance is more than 50% - Provisional registration) and can write the examination for the entire courses of the semester in which shortage of attendance occurs as supplementary examination only after the completion of the entire programme. In such cases, a request from the student may be forwarded through the Controller of Examinations to the Principal of the college within two weeks of the commencement of the semester. If the attendance is less than 50%, the student is ineligible to continue the programme and has to seek readmission. There will not be any Repeat semester in FCCBCSS VUG 2021.

d) A student who registered for the course shall successfully complete the programme within 6 years from the year of first registration. If not, such candidate has to cancel the existing registration and join a fresh as a new candidate.

e) The students who have attendance within the limit prescribed, but could not register for the examination have to apply for Token registration, within two weeks of the commencement of the next semester.

10. Examination

a) There shall be **examinations** at the end of each semester.

b) **Practical examinations** shall be conducted by the College as prescribed by the Board of Studies. **External viva-voce**, if any, shall be conducted along with the practical examination/project evaluation.

c) **The medium of examination** is either in **English** or **Malayalam** as stipulated by the Board of Studies of each programme.

d) **The model of question** papers may be prepared by the concerned Board of Studies. Each question should aim at – (1) assessment of the knowledge acquired (2) standard application of knowledge (3) application of knowledge in new situations. Different **types of questions** shall possess different marks to quantify their range. A general scheme for the question paper is given in Annexure II.

e) **Audit course:** The students can attain only pass (Grade P) for these courses. At the end of each semester there shall be examination conducted by the college from a pool of questions set by the College. The students can also attain the credits through online courses like SWAYAM, MOOC etc.

f) **Improvement course:** Improvement of a particular semester can be done only once. The student shall avail of the improvement chance in the succeeding year after the successful completion of the semester concerned. The students can improve a maximum of two courses in a particular semester. The internal marks already obtained will be carried forward to determine the new grade/mark in the improvement examination. If the candidate fails to appear for the improvement examination after registration, or if there is no change in the results of the improved examination, the mark/grade obtained in the first appearance will be retained. Improvement and supplementary examinations cannot be done simultaneously.

g) **Moderation:** Moderation is eligible as per the existing rules of the Academic Council.

h) **Examination Monitoring Cell:** The college has an Examination Monitoring Cell at the institution for conducting and supervising all examinations including the internal examinations.

11. Evaluation and Grading

A. Mark system is followed instead of direct grading for each question. For each course in the semester letter grade and grade point are introduced in 10-point indirect grading system as per guidelines given in Annexure-I

B. Course Evaluation: The evaluation scheme for each course shall contain two parts, internal assessment and external assessment.

1) Internal Assessment

a) 20% of the total marks in each course are for internal examinations.

b) The internal assessment shall be based on a predetermined transparent system involving written tests, Classroom participation based on attendance in respect of theory courses and lab involvement, records and attendance in respect of Practical Courses.

c) Internal assessment of the project will be based on its content, relevance, method of presentation, final conclusion and orientation to research aptitude.

d) Components with percentage of marks of Internal Evaluation of Theory Courses are-

Theory		Practical	
Test paper	40%	Record	40%
Assignment	20%,	Lab Involvement	60%
Seminar	20%		
CRP based on attendance	20%.		

For the test paper marks, at least one test paper should be conducted. If more test papers are conducted, the mark of the best one shall be taken. To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of end semester examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to CE of the College.

Split up of marks for test papers

Range of Marks in test paper	Out of 8 (Maximum internal marks is 20)	Out of 6 (Maximum internal marks is 15)
Less than 35%	1	1
35%-45%	2	2
45% - 55%	3	3
55% - 65%	4	4
65% -85%	6	5
85% -100%	8	6

Split up of marks for Classroom Participation (CRP)

Range of CRP	Out of 4 (Maximum internal Marks is 20)	Out of 3 (Maximum internal Marks is 15)
50% ≤CRP <75%	1	1
75% ≤CRP <85%	2	2
85 % and above	4	3

2) External Evaluation

- a) External evaluation carries 80% of marks.
- b) All question papers shall be set by the College.
- c) The external question papers may be of uniform pattern with 80/60 marks (The pattern is given in the Annexure II).
- d) The general components taken from other UG Programmes with 2/3 credits will have an external examination of 2 hours duration with 60 marks and courses with 4/5 credits will have an external examination of 2.5 hours duration with 80 marks.
- e) The external examination in theory courses is to be conducted by the College with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined scheme of valuation and answer keys shall be provided by the College.
- f) The external examination in practical courses shall be conducted as per the directions from the Controller of examinations of the college. The instructions for conducting the practical examinations, the mark distribution, question paper distribution and related matters will provide by the Controller of examinations of the college
- g) After the external evaluation only marks are to be entered in the answer scripts. All other calculations including grading are done by the College.

C. Revaluation:

In the new system of grading, revaluation is permissible. The prevailing rules of revaluation are applicable to FCCBCSSVUG 2021. Students can apply for photocopies of answer scripts of external examinations. Applications for photocopies/scrutiny/revaluation should be submitted within 10 days of publication of results. The fee for this shall be as decided by the College.

D. Internship and Project

a) Internship or the mini/main project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience.

b) The Evaluation process follows 20% internal assessment & 80% external assessment.

c) There will be internship/project at the end of 2nd and 4th semesters.

d) The sixth semester includes one internship and project for the whole semester along with a term paper. Every student shall undergo one internship for the whole semester and along with that they should do a project based on their internship. At the end of the semester they should submit an internship report and project.

e) Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the Principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

f) At least three reviews should be conducted to evaluate the progress of work.

g) Since Internship and Project is considered as a single course having a common course code and course name, external examination is also conducted as single. But the evaluation (internal as well as external) should be done separately for internship and project. In the mark sheet and Grade Card, the split up mark is to be shown.

h) An evaluation team is constituted for conducting the evaluation. The team consists of an external examiner, allotted by the Controller of Examination of the college and a faculty from the institution. If necessary, representatives from the industry can also be added to the panel.

i) Students should submit a report of their work. A valid certificate of internship from the organization should be produced as a proof that the work is carried out in the respective organization. Attendance statement also should be produced.

j) Students are required to make the presentations of their work to present before the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.

For Practical's (LAB)

Distribution	Marks (60)	Marks (80)
Output / Result	40	40
Record	10	20
Viva	10	20
Total	60	80

For Project(Mini) Evaluation

Distribution	Marks (60)	Marks (80)
Design and Development	30	40
Presentation	15	20
Record	8	10
Viva	7	10

Term Paper Internal Mark: (Internal Mark)

Distribution	Marks (50)
Content (sets out relevant issues, explains key terms, confident with material, aids understanding)	10
Delivery (speed, eye contact, clarity, audibility, tone)	10
Use of visual aids uses handout or other visual aids, relevant to content	10
Structure: (logical, easy to follow, provides headings, each section relates to overall purpose)	10
Response to questions: willing to answer questions, actively seeks questions	10

For Internship & Project Evaluation

Mark distribution for internship

Distribution	External	Internal
Report	100	30
Viva	60	10
Total	160	40

Mark distribution for Project

Distribution	External	Internal
Report (Design, Presentation)	100	30
Viva	60	10
Total	160	40

***Review based Split up**

Review I =10 ; Review II = 10; Review III= 10 = Total 30

Mark distribution for Project

Marks Distribution	Total marks	Internal Assessment Marks
Theory/ Algorithm/Flow diagram	40	5
Implementation	80	20
Result/Output	20	5
Record	10	5
Viva	10	5
Total	160	40

E. Evaluation of Audit courses: The examination shall be conducted by the college itself from the Question Bank prepared by the College.

F. Evaluation of Term Paper: The term paper shall be in the sixth semester along with internship and project. It should be in the standard format which is eligible for publishing. It has only internal assessment. The concerned Board of Studies shall include necessary guidelines for the evaluation of term paper.

G. Minimum for pass

The successful completion of all the courses prescribed for the diploma/degree programme with P grade shall be the minimum requirement for the award of diploma/degree.

Notes:

1) For Project/internship, the minimum for a pass shall be 50% of the total marks assigned to the respective examination. A student who does not secure this pass marks in the subject will have to repeat the respective Project/internship.

2) If a candidate has passed all examinations of B.Voc. Programme (at the time of publication of results of last semester) except Internship and Project in the last semester, a re-examination for the same should be conducted within one month after the publication of results. Each candidate should apply for this Save-A-Year examination within one week after the publication of last semester results.

12. Indirect Grading System

a) Indirect grading System based on a 10-point scale is used to evaluate the performance of students.

b) Each course is evaluated by assigning marks with a letter grade (O, A+, A, B+, B, C, P, F, I or Ab) to that course by the method of indirect grading. (Annexure I).

c) An aggregate of P grade (after external and internal put together) is required in each course for a pass and also for awarding a degree (A minimum of 20% marks in external evaluation is needed for a pass in a course. But no separate pass minimum is needed for internal evaluation). No separate grade/mark for internal and external will be displayed in the grade card; only an aggregate grade will be displayed. Also the aggregate mark of internal and external are not displayed in the grade card.

d) A student who fails to secure a minimum grade for a pass in a course is permitted to write the examination along with the next batch. After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of a semester, a student should pass all courses. However, a student is permitted to move to the next semester irrespective of SGPA obtained

SGPA of the student in that semester is calculated using the formula

$$\text{SGPA} = \frac{\text{Sum of the credit points of all courses in a semester}}{\text{Total credits in that semester}}$$

The Cumulative Grade Point Average (CGPA) of the student is calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following formula.

$$\text{CGPA} = \frac{\text{Total credit points obtained in six semesters}}{\text{Total credits acquired (180)}}$$

SGPA and CGPA shall be rounded off to three decimal places. CGPA determines the broad academic level of the student in a programme and is the index for ranking students (in terms of grade points). An overall letter grade (cumulative grade) for the entire programme shall be awarded to a student depending on her/his CGPA (Annexure-I)

13. Grade Card

A. The College shall issue to the students grade/marks card (by online) on completion of each semester, which shall contain the following information:

- Name of University
- Name of College
- Title of B.Voc Programme
- Semester concerned
- Name and Register Number of student
- Code number, Title and Credits of each course opted in the semester
- Internal, External & total marks, Grade point (G) Letter grade in each course in the semester
- The total credits, total credit points and SGPA in the semester (corrected to 3 decimal places)
- Percentage of total marks

B. Final Grade card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. The final grade card shall show CGPA (corrected to three decimal places), percentage of marks (corrected to two decimal places) and the overall letter grade of a student for the entire programme. The final grade card shall also include the CGPA and percentage of marks of General Education Components, Skill Development Components, separately. This is to be done in a 10- point indirect scale. The final Grade card also contains the list of Audit courses passed and the details of Extra credits.

14. Calicut University Social Service Programme

In this programme, a student has to complete 12 days of social service. This has to be completed in the first four semesters; 3 days in each semester. For the regular programme the student has to work in a Panchayath or Local body or in a hospital/ poor home or old age home or in a Pain & palliative centre or any social work assigned by the College authorities. Students who engage in College Union activities and participate in sports and cultural activities at Zonal level have to undergo only 6 days of CUSSP during the entire programme. The whole documents regarding the student should be kept in the college and the Principal should give a Certificate for the same. A College level Coordinator and a Department level Coordinator shall be appointed for the smooth conduct of the programme.

****Note:** Since the whole 6th semester is meant for internship and project, the Grace mark of B.Voc students shall be added on the 5th semester.

15. Award of Degree

The successful completion of all the courses (General Education Components, Skill Development Components and Audit courses) prescribed for the degree programme with 'P' grade shall be the minimum requirement for the award of degree.

Levels of Awards

B. Voc is a programme with multiple exits. Following table shows the various certificates and their duration.

Awards	Duration	NSQF Levels
Diploma	2 Semester	Level 5
Advanced Diploma	4 Semester	Level 6
B. Voc Degree	6 Semester	Level 7

The Job Roles, Qualification Packs and NSQF Levels proposed to be covered in each year.

QP Code	Job Roles and Descriptions	NSQF Level
ASC/Q1408	Automotive Electrician	4
ASC/Q6803	Automotive Maintenance Technician- Electrical	
ASC/Q1105	Automotive Telecaller	
ASC/Q3605	Electric Vehicle Assembly Technician	
ASC/Q1001	Sales Consultant Level 4	
ASC/Q1005	Automotive Sales Consultant	5
ASC/Q1109	Automotive Sales Trainer	
ASC/Q1424	Electric Vehicle Service Lead Technician	
ASC/Q8406	Electric Vehicle Test Engineer	
ASC/Q1403	Four wheeler Service Lead Technician	6
ASC/Q3603	Automotive Assembly Master Technician	
ASC/Q6807	Automotive Automation Specialist	
ASC/Q8102	Automotive Product Design Lead Engineer	
ASC/Q1007	Automotive Sales Leader	
ASC/Q1426	Automotive Service Advisor	
ASC/Q1427	Automotive Service Quality Controller	
ASC/Q1412	Automotive Service Supervisor	
ASC/Q1404	Four Wheeler Service Master Technician	
ASC/Q6801	Manager Maintenance Mechanical & Electrical	
ASC/Q1003	Sales Consultant (Pre-owned Vehicles)	
ASC/Q1109	Sales/Service Trainer (Dealer)	
ASC/Q1604	Warranty Incharge	
ASC/Q1104	Automotive Customer Relationship Manager	7
ASC/Q1413	Body Shop In-Charge	
ASC/Q6505	Manager-PLM(Product Lifecycle Management)	
ASC/Q1503	Spare Parts Operations Incharge	

- a) Students are free to exit at any point in the duration of the programme.
- b) Only those students who successfully complete the courses and clear the examination are eligible for the certificate.
- c) Separate certificate will be awarded for each year for successful candidates. A candidate who successfully completes first two semesters shall be awarded a Diploma Certificate, first four semesters shall be awarded an Advanced Diploma Certificate and clearing all the semester shall be awarded B.Voc Degree certificate.
- d) Students who fail in any course may be allowed to move the higher level but won't be eligible for any certificates until he/she clears previous courses.
- e) B. Voc degree will confer to those whose successfully complete the diploma, higher diploma and internship and project at the sixth semester.

16. Position Certificate

Position Certificate shall be given to those students who are eligible as per the criteria of the university

17. Grievance Redressal Committee

A. **College level:** There shall be a college level grievance redressal committee comprising of student adviser, two senior teachers, two staff council members (one shall be elected member) and elected representative of students (College Union Chairperson) as members and Principal as Chairman.

B. **Department level:** The college shall form a Grievance Redressal Committee in each department comprising of course teacher, one senior teacher and elected representative of students (Association Secretary) as members and the Head of the Department as Chairman. This committee shall address all grievances relating to the internal assessment grades of the students.

C. **Class Level:** Head of Institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and three student representatives (one of them should be a girl).

There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

- a) To review periodically the progress and conduct of students in the class.
- b) To discuss any problems concerning any subjects in the semester concerned.
- c) To identify weaker students of the class and suggest remedial measures.
- d) To review teaching effectiveness and coverage of syllabus.
- e) Discuss any other issue related to the students of the class.

18. Anti-Ragging Cell

The Head of Institution shall take necessary steps to constitute an anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

19. BVoc Degree at Par

B.Voc Degree is recognised at par with other U.G Programme approved by University of Calicut.

20. Annexure I

Method of Indirect Grading

Evaluation (both internal and external) is carried out using Mark system .The Grade on the basis of total internal and external marks will be indicated for each course, for each semester and for the entire programme.

Indirect Grading System in 10 -point scale is as below:

Ten Point Indirect Grading System

Percentage of Marks (Both Internal & External put together)	Grade	Interpretation	Grade point Average (G)	Range of grade points	Class
95 and above	O	Outstanding	10	9.5 -10	First Class with Distinction
85 to below 95	A+	Excellent	9	8.5 -9.49	
75 to below 85	A	Very good	8	7.5 -8.49	
65 to below 75	B+	Good	7	6.5 -7.49	First Class
55 to below 65	B	Satisfactory	6	5.5 -6.49	
45 to below 55	C	Average	5	4.5 -5.49	Second Class
35 to below 45	P	Pass	4	3.5 -4.49	Third Class
Below 35	F	Failure	0	0	Fail
Incomplete	I	Incomplete	0	0	Fail
Absent	Ab	Absent	0	0	Fail

Example – 1 SGPA Calculation

Semester I Course Code	Course Name	Grade Obtained	Grade point (G)	Credit (C)	Credit point (CXG)
xxxxxxx	Xxxxxxx	A	8	4	32
xxxxxxx	Xxxxxxxxx	C	5	4	20
xxxxxxx	Xxxxxxxxx	A+	9	4	36
xxxxxxx	Xxxxxxxxx	B+	7	3	21
xxxxxxx	Xxxxxxxxx	P	4	3	20
xxxxxxx	Xxxxxxxxx	C	9	6	54
xxxxxxx	Xxxxxxxxx	C	9	6	54

$$\text{SGPA} = \frac{\text{Sum of the Credit Points of all courses in a semester}}{\text{Total credits in that semester}}$$

$$\text{SGPA} = \frac{32+30+36+21+20+54+54}{30+30} = \frac{237}{60}$$

$$\text{SGPA} = 7.900$$

Note: The SGPA is corrected to three decimal points and the percentage of marks shall be approximated to two decimal points.

Example: 2

Semester II Course Code	Course Name	Grade Obtained	Grade point (G)	Credit (C)	Credit point (CxG)
xxxxxxx	Xxxxxxx	A	8	4	32
xxxxxxx	Xxxxxxxxx	C	5	4	20
xxxxxxx	Xxxxxxxxx	A+	9	4	36
xxxxxxx	Xxxxxxxxx	B+	7	3	21
xxxxxxx*	Xxxxxxxxx	F	0	3	0
xxxxxxx	Xxxxxxxxx	C	5	6	30
xxxxxxx	Xxxxxxxxx	C	5	6	30

*Failed course

Note: In the event a candidate failing to secure 'P' grade in any Course in a semester, consolidation of SGPA and CGPA will be made only after obtaining 'P' grade in the failed Course in the subsequent appearance

CGPA Calculation

$$\text{CGPA} = \frac{\text{Total Credit points obtained in six semesters}}{\text{Total Credits acquired (180)}}$$

Example

$$\text{CGPA} = (136 + 145 + 161 + 248 + 231 + 237) / 180 = 1158/180$$

$$\text{CGPA} = 6.433$$

$$\text{Total percentage of marks} = (\text{CGPA}/10)*100$$

$$\text{Total percentage of marks} = (6.433/10)*100 = 64.33$$

$$\text{CGPA of Core Courses} = \frac{\text{Total Credit points obtained for Core Courses}}{\text{Total Credits acquired for Core Courses}}$$

Similarly CGPA Complementary Courses, Open courses, English Common courses, and Additional Language Common courses may be calculated and respective percentage may be calculated. All these must be recorded in the final credit card.

21. Annexure II

Question Paper Type 1

Scheme of Examinations:

The external QP with 80 marks and internal examination is of 20 marks. Duration of each external examination is 2.5 Hrs. The pattern of External Examination is as given below. The students can answer all the questions in Sections A&B. But there shall be Ceiling in each section.

Section A

Short answer type carries 2 marks each - 15 questions Ceiling - 25

Section B

Paragraph/ Problem type carries 5 marks each - 8 questions Ceiling - 35

Section C

Essay type carries 10 marks (2 out of 4) 2X10=20
Total = 80

Question paper type 2

Scheme of Examinations:

The external QP with 60 marks and Internal examination is of 15 marks. Duration of each external examination is 2 Hrs. The pattern of External Examination is as given below. The students can answer all the questions in Sections A & B. But there shall be Ceiling in each section.

Section A

Short answer type carries 2 marks each - 12 questions Ceiling - 20

Section B

Paragraph/ Problem type carries 5 marks each - 7 questions Ceiling - 30

Section C

Essay type carries 10 marks (1 out of 2) 1X10= 10
Total =60

SYLLABUS

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

B.Voc AUTOMOBILE- AUTO ELECTRICALS & ELECTRONICS									
PROGRAMME STRUCTURE									
SEMESTER I									
C.No	Course Code	Course Name	Credit	Marks			Hrs. / Week		
				Int	Ext	Tot	T	P	Tot
1.1	A01	English - 1	3	15	60	75	3		3
1.2	A02	English - 2	3	15	60	75	3		3
1.3	A07(3)	Malayalam /Hindi /Arabic	4	20	80	100	4		4
1.4	SDC1MT01	Mathematics	4	20	80	100	4		4
1.5	SDC1AU02	Basics of Electrical & Electronic Engineering	4	20	80	100	4		4
1.6	SDC1AU03	Basic Mechanical engineering	4	20	80	100	4		4
1.7	SDC1AU04(P)	Office Automation Tools Lab	4	20	80	100		4	4
1.8	SDC1AU05(P)	Electrical Engineering Practice	4	20	80	100		4	4
	Ability Enhancement Course -I (Environment Studies)		4						
Semester Total			30			750	22	8	30

SEMESTER II									
C.No	Course Code	Course Name	Credit	Marks			Hrs. / Week		
				Int	Ext	Tot	T	P	Tot
2.1	A03	English – 3	4	20	80	100	4		4
2.2	A04	English – 4	4	20	80	100	4		4
2.3	A08(3)	Malayalam /Hindi /Arabic	4	20	80	100	4		4
2.4	SDC2CA06	Financial and Management Accounting	4	20	80	100	4		4
2.5	SDC2AU07	Introduction to Automobile Engineering	3	15	60	75	3		3
2.6	SDC2AU08	Instrumentation for Automobile Engineers	4	20	80	100	4		4
2.7	SDC2AU09(P)	Electronic Engineering Practice	4	20	80	100		4	4
2.8	SDC2AU10(Pr)	Mini Project	3	15	60	75		3	3
	Ability Enhancement Course-II (Disaster Management)		4						
Semester Total			30			750	23	7	30

SEMESTER III									
C.No	Course Code	Course Name	Credit	Marks			Hrs. / Week		
				Int	Ext	Tot	T	P	Tot
3.1	A11	Basic Mathematics and General Awareness	4	20	80	100	4		4
3.2	A12	Professional Business Skills	4	20	80	100	4		4
3.3	GEC3CM11	Human Resources Management	4	20	80	100	4		4
3.4	SDC3AU12	Power systems and Power Electronics	3	15	60	75	3		3
3.5	SDC3AU13	Automotive Electrical and Electronic systems	4	20	80	100	4		4
3.6	SDC3AU14	Electrical machines and Machine Drives	4	20	80	100	4		4
3.7	SDC3AU15(P)	Automotive Electrical Laboratory I	3	15	60	75		3	3
3.8	SDC3AU16(P)	Automotive Electronics Laboratory	4	20	80	100		4	4
	Ability Enhancement Course - III Human Rights \ Intellectual Property Rights \ Consumer Protection (Can opt any one)		4						
Semester Total			30			750	23	7	30

SEMESTER IV									
C.No	Course Code	Course Name	Credit	Marks			Hrs. / Week		
				Int	Ext	Tot	T	P	Tot
4.1	A13	Entrepreneurship Development	4	20	80	100	4		4
4.2	A14	Public Health, Sanitation & Safety	4	20	80	100	4		4
4.3	SDC4AU17	Electronic Engine Management Systems	4	20	80	100	4		4
4.4	SDC4AU18	Digital Fundamentals	3	15	60	75	3		3
4.5	SDC4AU19	Microprocessors and Microcontrollers	3	15	60	75	3		3
4.6	SDC4AU20(P)	Automotive Electrical Laboratory- II	4	20	80	100		4	4
4.7	SDC4AU21(P)	Industrial Workshop	4	20	80	100		4	4
4.8	SDC4AU22(Pr)	Project Work / Internship	4	20	80	100		4	4
	Ability Enhancement Course (Audit Course)- IV Gender Studies \ Gerontology (Can opt any one)		4						
Semester Total			30			750	18	12	30

SEMESTER V									
C.No	Course Code	Course Name	Credit	Marks			Hrs. / Week		
				Int	Ext	Tot	T	P	Tot
5.1	GEC5PS23	Life Skill Application	3	15	60	75	3		3
5.2	SDC5AU24	Internet of Things (IoT)	3	15	60	75	3		3
5.3	SDC5AU25	Automotive Electrical System	4	20	80	100	4		4
5.4	SDC5AU26	Electric and Hybrid Vehicles	4	20	80	100	4		4
5.5	SDC5AU27	Automobile HVAC	4	20	80	100	4		4
5.6	SDC5AU28	Vehicle Body Engineering	4	20	80	100	4		4
5.7	SDC5AU29(P)	Microprocessor Lab	4	20	80	100		4	4
5.8	SDC5AU30(P)	IoT Lab	4	20	80	100		4	4
Semester Total			30			750	22	8	30
SEMESTER VI									
C.No	Course Code	Course Name	Credit	Marks			Total Hrs		
				Int	Ext	Tot	T	P	Tot
6.1	SDC6AU31	Term paper	2	50	--	50			
6.2	SDC6AU32(Pr)	Internship & Project (900hrs.)	28					900	900
		Internship		40	160	200			
		Project		40	160	200			
Semester VI Total			30			450			900
Grand Total			180			4200			

SEMESTER I

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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.

SDC1AU05(P) Electrical Engineering Practice

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	Learning	PSO
	<i>Upon completion of this course, students will be able:</i>	Domain	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. Jeyapooan T, Saravanapandian M & Pranitha S, “Engineering practices Laboratory manual”, Vikas Publishing House Pvt., Ltd., 2006.

SEMESTER II

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able:</i>		
CO1	To get a general <i>understanding</i> on accounting and its general applications	Understand	PSO 2
CO2	To get an <i>understanding</i> on various tools for financial statement analysis.	Understand	PSO 2
CO3	To get an <i>understanding</i> on accounting procedures up to the preparation of various financial statements	Understand	PSO 2
CO4	To get a general <i>understanding</i> 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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able:</i>		
CO1	To classify and compare the basics of automobile drive trains.	Understand	PSO 1
CO2	To identify Axles, Steering system and tyre assembly.	Applyi	PSO 1
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. Kirpal Singh, “ Automobile Engineering Vol 1 & 2 “, Standard Publishers, Seventh Edition , 1997, New Delhi.
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,Illiffe 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, Illiffe 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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to:</i>		
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 III

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to:</i>		
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	Learning Domain	PSO No
		<i>Upon completion of this course, students will be able to;</i>	
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 used in 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 in digital 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 of online 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, Digital Marketing: 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, 8th Edition, 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, Galit Shmueli, 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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able:</i>		
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	Learning Domain	PSO No
		<i>Upon completion of this course, students will be able to;</i>	
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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 IV

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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 Industries and 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 Entrepreneurship Development 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 the economic 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 – Criteria for selecting particular project- Generating project ideas-Market and demand analysis Feasibility study- Scope of technical feasibility- Financial feasibility- Social cost-benefit analysis-Government regulations for project clearance-Import of capital goods- approval of foreign collaboration-Pollution control clearances- Setting up of micro small and medium enterprises-Location decision- Significance.

UNIT V (11 Hours)

Project Report - Meaning-Definition - Purpose of project reports-Requirements of good report - Methods of reporting - General principles of a good reporting system - Performance of a project report - Sample project report. (The preparation of sample project report shall be treated 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 entrepreneur	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, New Delhi.
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, New Delhi
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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 and Social
2. Medicine 19th Edition, M/s. Banaraisdasis Bhanet Publishers, Jabalpur, India.
3. William, C., Frazier and Dennie. C Westheff. 1996. Food Microbiology 4th Edition, Tata McGraw hill Company Limited
3. S.Roday–Food Hygiene and Sanitation
4. M.Jacob.(1989)–Safe food Handling.
5. V.N.Reinhold–Principles of Food Sanitation
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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 Arnold, 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

Course Outcomes	Expected Course Outcome	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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. Multiplexer de-multiplexer, decoder, BCD to seven segment Decoder, encoders.

Flip flop and Timing circuit : set-reset latches, 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 Outcomes	Expected Course Outcome	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able:</i>		
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 major project.	Understand	PSO 4

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 V

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able:</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able ;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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)

MULTIPLEXING , 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 COMPATIBILITY (EMC), CENTRAL ELECTRICAL CONTROL, 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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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-CONDITIONING 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-CONDITIONING 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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
		<i>Upon completion of this course, students will be able to;</i>	
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 VI

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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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	Learning Domain	PSO No
	<i>Upon completion of this course, students will be able to;</i>		
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.

MODEL QUESTION PAPERS

B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS

Model Question Paper

SDC1AU03 Basic Mechanical engineering

Time – 2. 5 hrs

Max. Marks : 80

PART – A

Answer *all* questions.

Each question carries **Two** mark.

Ceiling -25 Marks

- 1 What is extensive property and intensive property, give example.
- 2 What is the zeroth law of thermodynamics?
- 3 Name The Fuel Used By I.C Engines?
- 4 Why do we have multiple cylinders in an engine? Why not have one big cylinder of the same displacement of the eight cylinders instead?
- 5 Define Manifold.
- 6 Explain the term CRDI.
- 7 Define hydraulic turbine.
- 8 What is the application of steam turbines?
- 9 Write the name of any four Popular turbines.
- 10 Which pump is a more efficient centrifugal pump or reciprocating pump? Comment.
- 11 Name some secondary refrigerants.
- 12 Explain air conditioning
- 13 What are the requirements of air conditioned space?
- 14 What are CNC machines?
- 15 Explain the advantages of ECM and ECM over conventional machining.

PART – B

Answer **all** questions.

Each question carries **Five** marks.

Ceiling -35 Marks

- 16 Efficiency of a Carnot engine with $T_1 = 200^\circ\text{C}$, $T_2 = 30^\circ\text{C}$, is
- 17 A reversible engine working between the temperature limits of 600°K and 1200°K receives 50 kJ of heat. The work done by the engine will be?
- 18 What are the advantages of lubrication in IC engine?
- 19 Compare open and closed gas turbines.
- 20 Differentiate between the fan and blowers.
- 21 Explain desirable properties required for refrigerants.
- 22 Compare TIG and MIG.
- 23 Explain brazing and soldering?

PART - C

Answer any **two** questions.

Each question carries **Ten** marks.

- 24 Differentiate between heat engine, refrigerator and heat pump
- 25 Explain thermal power plants in detail.
- 26 What are the Applications of Air Conditioning?
- 27 Explain working of any three manufacturing processes.

**B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper**

SDC1AU02 Basics of Electrical & Electronic Engineering

Time – 2. 5 hrs

Max. Marks : 80

PART – A

Answer *all* questions.

Each question carries **Two** marks.

Ceiling -25 Marks

1. State and explain Ohms law in electric circuits?
- 2 Differentiate between active and passive elements?
- 3 What do you mean by eddy current?
- 4 What are the advantages of a 3 phase system?
- 5 Calculate the resonant frequency for a series LCR circuit having inductance=5H,C=500 μ F,R=10 Ω .
6. Why 3 phase induction motor self starting?
- 7 Draw the circuit diagram for the center tap full wave rectifier.
- 8 Why is CE configuration the most extensively used?
- 9 Define all the important parameters of BJT?
- 10 Classify the sinusoidal oscillators.
- 11 Why are bipolar junctions so called?
- 12 Draw the equivalent circuit of Op-Amp.
- 13 Name the two regions of the AM band.
- 14 Define communication.
- 15 Define modulation Index.

PART – B

Answer *all* questions.

Each question carries **Five** marks.

Ceiling -35 Marks

16. Explain the dissimilarities of electric and magnetic circuits.
17. What is the self - inductance of an air solenoid 50cm long and 2cm radius if it has 500 turns?
18. What is the significance of back emf in a dc motor?
- 19 A resistor of 50Ω and a capacitor of $100\mu\text{F}$ are connected in series across a 100V,50Hz supply. Find the impedance, current, power factor and voltage across the resistor?
- 20 Explain VI –characteristics of a PN junction diode.
- 21 Explain the Q-point condition of a transistor?
- 22 Compare amplifiers and oscillators.
- 23 Explain feedback and classify them.

PART - C

Answer any *two* questions.

Each question carries **Ten** marks.

24. Differentiate Ferromagnetic, paramagnetic and diamagnetic materials?
- 25 Explain Collector to base Bias circuit, Voltage Divider bias circuit with diagram and voltage equations.
- 26 Explain junction transistors, classify and explain in detail.
- 27 Explain the different modulators/demodulators used in communication.

B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper

SDC2AU07 Introduction to Automobile Engineering

Time – 2 hrs

Max. Marks : 60

PART – A

Answer **all** questions.

Each question carries **Two** mark.

Ceiling -20 Marks

- 1 Name the two types of vehicle suspension.
- 2 What is a transfer box?
- 3 What are the disadvantages of fuel injection?
- 4 What you meant by the term turbo lag.
- 5 Where is the turbocharger located on the engine.
- 6 What is the material for clutch facing?
- 7 Name any four transmissions.
- 8 Define camber, SAI and castor.
- 9 What is self-righting torque?
- 10 Name any three types of steering gears.
- 11 What is a plug in hybrid?
- 12 What is the common blend when we use Biodiesel?

PART – B

Answer **all** questions.

Each question carries **Five** marks.

Ceiling -30 Marks

- 13 State the advantages of frameless construction. What are its disadvantages?
- 14 Describe various component-layouts for automobiles.
- 15 How does CRDi work?
- 16 How does a catalytic converter work?
- 17 Explain the CVT transmission system.
- 18 What is a Mid hybrid vehicle and Full Hybrid Vehicle.
- 19 Briefly explain the layout of electric vehicles.

PART - C

Answer any **one** questions.

Each question carries **Ten** marks.

- 20 What are the main components of an automobile? Describe all them briefly.
- 21 Define camber, SAI and castor

**B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper**

SDC2AU08 Instrumentation for Automobile Engineers

Time – 2. 5 hrs

Max. Marks : 80

PART – A

Answer *all* questions.

Each question carries **Two** marks.

Ceiling -25 Marks

- 1 Compare Accuracy and Precision
- 2 Explain the measurement system.
- 3 What is resolution in measurement system
- 4 What is megger?
- 5 List the different methods used for the measurement of resistance.
- 6 Draw the circuit diagram of Maxwell's bridge.
- 7 What is a transducer?
- 8 What is amplitude modulation and demodulation?
- 9 What is a thermistor?
- 10 What are the different types of gas analysers?
- 11 What is gas chromatography?
- 12 What is coolant temperature and explain its measurement?
- 13 What is VFD?
- 14 Name the types of sensors used in automotive systems.
- 15 What is an oxygen sensor?

PART – B

Answer **all** questions.

Each question carries **Five** marks.

Ceiling -35 Marks

- 16 Explain the classification of measuring instrument
- 17 What are the different types of errors present in a measuring system?
- 18 Compare Wheatstone's bridge and Kelvin's double bridge methods
- 19 With diagrams explaining ADC and DAC.
- 20 Compare LED and LCD
- 21 What is the CAN network?
- 22 What are stepper motors?
23. Explain different types of automotive relays.

PART - C

Answer any **two** questions.

Each question carries **Ten** marks.

- 24 Explain construction and working of PMMC and MI type measuring instruments.
- 25 With diagrams explain different methods used for the measurement of Inductance and Capacitance
- 26 Explain the classification and selection of different transducers.
- 27 Explain different types of Automotive sensors.

**B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper**

SDC3AU12 Power Electronics and Power systems

Time – 2 hrs

Max. Marks : 60

PART – A

Answer *all* questions.

Each question carries **Two** marks.

Ceiling -20 Marks

- 1 What is a controlled rectifier?
- 2 What is the difference between SCR and GTO?
- 3 Explain the purpose of driver circuits in power electronics switches.
- 4 What is a square wave inverter?
- 5 What is an AC voltage controller?
- 6 Explain Push-Pull converter?
- 7 Explain the principle of operation of a DC-DC chopper.
- 8 Compare Overhead and underground power transmission systems.
- 9 What is the skin effect?
- 10 Why insulators are used in overhead power transmission systems?
11. What is differential relay?
12. What is a Peterson coil?

PART – B

Answer **all** questions.

Each question carries **Five** marks.

Ceiling -30 Marks

- 13 What is a dual converter
- 14 explain different types of modulation techniques used in Inverters.
- 15 What is a cyclo converter?
- 16 With diagrams, explain the working of a Cuk converter.
- 17 What is Corona in Power transmission system?
- 18 Explain the principle of operation of Relays.
19. What is arcing and arc quenching in a circuit breaker?

PART - C

Answer any **one** question.

Each question carries **Ten** marks.

20. With diagrams explain different types of power electronics switches.
- 21 Draw the layout and explain different components of Hydroelectric power station and Thermal Power station

**B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper**

SDC3AU13 Automotive Electrical and Electronic systems

Time – 2. 5 hrs

Max. Marks : 80

PART – A

Answer *all* questions.

Each question carries **Two** mark.

Ceiling -25 Marks

- 1 Explain the advantage of Pb acid batteries over conventional batteries.
- 2 Explain oven test.
- 3 Name the different advanced vehicle batteries?
- 4 Explain starting circuit voltage drop test.
- 5 Explain how permanent magnet starters achieve a greater torque.
- 6 Explain motor effect.
- 7 Give a few examples of prolonged electrical load of the vehicle
- 8 Explain the advantages of a three phase alternator.
- 9 Explain about the earth return system?
- 10 Explain the benefits of OBD.
- 11 Explain trafficators.
- 12 Explain the parking brake warning system.
- 13 How do we troubleshoot a fuse with a Multimeter?
- 14 What could be the possible causes for Low state of charge fault.
- 15 Explain the term continuity checking

PART – B

Answer **all** questions.

Each question carries **Five** marks.

Ceiling -35 Marks

- 16 How can we conduct AH test on vehicle battery?
- 17 Explain starting circuit voltage drop test.
- 18 Write a short note on brushes used in starting motors.
- 19 Differentiate between alternator and dc generator?
- 20 Explain Automotive alternator.
- 21 Define OBD-2.
- 22 Explain EGR.
- 23 Note down the important ECU used in modern automobiles.

PART - C

Answer any **two** questions.

Each question carries **Ten** marks.

- 24 Explain battery maintenance check points and battery servicing procedures.
- 25 Explain conditions at starting and behavior of the starter during starting. Explain conditions at starting and behavior of the starter during starting.
- 26 Draw and Explain Automotive alternator.
- 27 Write an essay on EMI and EMC

**B.Voc AUTOMOBILE – AUTO ELECTRICAL & ELECTRONICS
Model Question Paper**

SDC3AU14 Electrical machines and Machine Drives

Time – 2. 5 hrs

Max. Marks : 80

PART – A

Answer *all* questions.

Each question carries **Two** marks.

Ceiling -25 Marks

- 1 Why are transformer cores laminated?
- 2 Explain Fleming's left hand rule
- 3 If there is no back emf in a dc motor what will happen
- 4 What are the classifications of dc generators?
- 5 What is Armature Reaction?
- 6 Explain hunting in a synchronous machine?
- 7 What is damper winding ?
- 8 What is synchronous speed?
- 9 Classify induction motors based on their construction.
- 10 What are the applications of BLDC motors?
- 11 What is a linear induction motor?
- 12 Explain the construction of the stepper motor.
- 13 What are AC and DC drives?
- 14 Explain the components of load torque.
- 15 What are the applications of drives?

PART – B

Answer *all* questions.

Each question carries **Five** marks.

Ceiling -35 Marks

- 16 What is the significance of back emf in a dc motor?
- 17 A 25 KVA transformer has 500 turns in the primary and 50 turns in the secondary. Primary is connected to 3000 V,50Hz supply.Find the primary and secondary currents.Also find secondary emf?
- 18 Differentiate between a motor and a generator?
- 19 Explain the construction and working of a synchronous machine.
- 20 Explain starting and speed control of induction motors.
- 21 With diagrams explaining the construction, working and applications of the Switched Reluctance Motor.
- 22 What are the parts of electrical drives?
- 23 Explain stator voltage control of three phase induction machine drives.

PART - C

Answer any *two* questions.

Each question carries **Ten** marks.

- 24 A 220 V dc machine has an armature resistance of 0.5Ω ,If the armature current is 20A,at maximum load, find the induced emf when the machine acts as a
1) generator 2) Motor.
- 25 With diagrams explaining the classification of single phase induction motors.
- 26 Compare the constructional features of permanent magnet synchronous motor - Hysteresis motor- Synchronous Reluctance Motor
- 27 What are the different control methods of three phase induction motor drives?